



Name:

Organisation:

River Restoration Centre 21st Annual Network Conference

River Restoration: scaling up our ambition

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Welcome

...from the RRC Managing Director

Welcome, at last, to the 2020 River Restoration Centre Annual Network Online Conference!

Firstly, a huge thank you for supporting the RRC team over the recent months, by being patient, understanding and, as always, helping us to make this meeting a success.

This is the 21st time you have come together to share your river restoration experiences, learn from each other and make long-lasting contacts. Of course this year is very different, it is the first time we have tried to do all of this through screen, camera and microphone. In fact it is the first time since March that the RRC team have gathered in one place and it is the first time we have met up with two of our growing team – what could possibly go wrong!

So the team has expanded in the last year. Please take a moment to read the ‘Meet the Team’ section on page 34 where you can find a short introduction to James, John, Hannah, Alex, Jackie, Josh, Marc, Nicola and me! We will be metaphorically running about as much as usual, from the comfort of two large rooms at Cranfield University. You can have a chat using our Zoom room throughout the two days.

I must also thank, in advance, all of the presenters, workshop coordinators and sponsoring organisations for rising to the challenge of pre-recording talks and preparing exciting programmes of presentations, films and networking meetings so we can package all of this up to keep you busy and to allow you to get the most out of these two days.

The title and theme for this year is ‘River Restoration: Scaling up our Ambition’. In the early days of the RRC conferences we would report on the success of achieving a few projects, but mostly talk about strategy and our ambition to see more restoration plans being implemented. Now, in comparison, the number of river restoration projects (including NFM, Green Infrastructure, Nature-Based Solutions, habitat enhancement, etc.) being delivered across the UK is staggering.

In terms of ambition now, the question is “In comparison to what remains to be done, is this big enough and bold enough?” How do we scale up our ambition and what are the golden opportunities and the constraining barriers.

As usual we have a great line-up of workshops on topics such as restoring connectivity, the role of beavers in river restoration, NFM implementation guidance, modelling NFM, landowner engagement and urban flood resilience. If your interest spans across a number of subjects, don’t worry, we will be recording the sessions to showcase on our website in the coming weeks. Each of these topics are important in understanding the level of impact our work is achieving and how we might scale up our restoration efforts and be more ambitious.

The UK River Prize Awards and Nigel Holmes Trophy continues into its 6th year. We have three fantastic finalists reaching from Southern England to mid Wales and the Scottish Highlands. We hope you will join us in celebrating their achievements, and also recognising the individual achievements of this year’s

nominated River Champions. This event is open to all, so please feel free to invite your very own 'river champions' to take part.

Finally, I would like to say thank you to everyone who has supported RRC throughout the years. 21 years of the RRC Annual Network Conference is a testament to the support we receive from our members, sponsors and delegates. This year in particular, a gathering of 400 for an online event demonstrates both your faith in us and your collaboration as a river restoration community.

We look forward to seeing you in person at Harrogate next year – April 27th and 28th.

Have a great two days.

Martin Janes, Managing Director

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the River Restoration Centre

Working to restore and enhance our rivers

CONTENTS

Programme of events	9
UK River Prize	25
Meet the Staff	34
About the RRC	35
Abstracts	40
Session 1: Plenary	42
Session 2: Workshops	44
Session 4: Parallel Sessions	50
Session 5: Parallel Sessions	54
Session 6: Parallel Sessions	60
Poster presentations	67
Delegate list	70

A photograph of a river flowing through a lush green landscape with tall reeds and trees in the background under a clear blue sky.

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PROGRAMME OF EVENTS

DAY 1: - - - WEDNESDAY 9TH SEPTEMBER - - -

Session 1

CHAIR: *Martin Janes (River Restoration Centre)*

10:00	River Restoration Centre introduction & welcome <i>Martin Janes (River Restoration Centre)</i>	15 mins
10:15	Water Environment Grant <i>Jenny Wheeldon (Natural England)</i>	15 mins
10:30	<u>Getting delivery done: Funding streams, up-scaling and payment for outcomes</u> <i>David Brown (Environment Agency)</i>	15 mins
10:45	Live Questions & Answers with presenters	15 mins
11:15	Integrating NFM as a measure to reduce flood risk <i>Jon Hollis (Environment Agency)</i>	15 mins
11:30	<u>Breathing life into Scotland's urban rivers</u> <i>Charles Perfect (Scottish Environment Protection Agency)</i>	15 mins
11:45	Biodiversity Net Gain – An Opportunity for River Restoration <i>Sarah Scott (Environment Agency)</i>	15 mins
12:00	Live Questions & Answers with presenters	15 mins
12:15	LUNCH	75 mins

Session 2

13:30

CHOICE OF ONE WORKSHOP

2 h 30 min

Workshop A

Restoring connectivity between the stream
& its floodplain

Facilitator: Fiona Bowles (*RRC*), Stewart Clarke (*National Trust*), John Phillips, Jo Shanahan (*Environment Agency*), & Jenny Wheeldon (*Natural England*)

The workshop will be an opportunity to explore the theory and practice of taking a 'Stage 0' approach to river and floodplain restoration. 'Stage 0' restoration has the potential to deliver multiple environmental and flood risk benefits through reconnecting river and floodplains creating a more resilient channel network and functionally linked floodplain wetlands. This workshop will explore the risks, opportunities and constraints of taking a 'Stage 0' approach in the UK. As part of the workshop the Environment Agency will present for discussion draft findings from a project developing geomorphic mapping tools and guidance for those seeking to identify potential 'Stage 0' sites as well as worked 'case study' examples that explore the technical and practical issues likely to require consideration in developing a 'Stage 0' project.

Workshop B

Understanding the role of beavers in river
restoration

Facilitator: RRC

This workshop will be themed around understanding the role beavers can play for river restoration, how to prepare for the implementation of beavers, and managing river restoration delivery. The session will look to encourage the delegates to discuss challenges related to beavers including how to anticipate benefits of the presence of beavers, how to manage land effectively, and who needs to be included in decision making. Delegates will feedback their thoughts and suggestions to the group, with the aim of looking forward to how we can efficiently encourage establishment of beavers for river restoration.

[Working with natural processes - a
National Trust perspective](#)

Stewart Clarke (*National Trust*)

16:00Close

Session 2

13:30

CHOICE OF ONE WORKSHOP continued...

2 h 30 min

Workshop C

NFM Implementation Guidance

Facilitator: Emma Wren (*Mott MacDonald*)

This workshop will focus on the current CIRIA-led work to produce practical implementation guidance for NFM measures. This workshop will discuss the aim, proposed structure and content and provide an opportunity to influence the approaches taken by the project team.

NFM measures will be implemented by a wide range of organisations and individuals. There needs and requirements in terms of understanding, level and practical experience may vary considerably. The guidance should be as wide ranging as possible, be based on science and best practice and be clear and practical.

We will discuss the priority measures that will form this round of guidance and also what other NFM measures should be looked next.

What examples and key learning experiences related to NFM implementation can you bring to this discussion on national guidance and what would you want to see included?

Workshop D

Application of NFM modelling

Facilitator: RRC, Chris Spray (*University of Dundee*)

This workshop will include talks & demos on modelling Natural Flood Management measures.

[Integrating monitoring and modelling of NFM at the whole catchment scale – emerging results from the Eddleston Water](#)

Chris Spray (*University of Dundee*)

[Modelling benefits of NFM in lowland catchments - River Hull case study](#)

Jessica Fox (*Hull City Council*)

[Shared learning experience in developing appropriate modelling for Natural Flood Management in four catchments in Yorkshire](#)

Steve Rose & Rachelle Ngai (*JBA Consulting*) & Sophie Vanicat (*Environment Agency*)

[Natural Flood Management \(NFM\): Bigger is not always better, prioritisation is key](#)

Charlie Bleasdale (*Atkins, University of Southampton*), Emily Brown (*Atkins, University of Nottingham*) & Emma Lancaster (*Atkins, Durham University*)

[Prioritising natural flood management opportunities for the Thames Regional Flood and Coastal Committee](#)

Gavin Haughton (*Environment Agency*)

[Natural Flood Management in practice: managing environmental risks to improve resilience](#)

Clare Rodgers (*Environment Agency*) & Ian Dennis (*Royal HaskoningDHV*)

16:00

Close

Session 2

13:30

CHOICE OF ONE WORKSHOP continued...

2 h 30 min

Workshop E

Landowner engagement & communication

Workshop F

Achieving Urban Flood Resilience in an uncertain future

Facilitators: Simon Whitton (*APEM*)

Facilitators: RRC & Jenny Mant (*Ricardo*)

In this workshop we will discuss approaches to engaging and communicating with landowners to help us achieve more in our catchments. We will discuss common challenges associated with landowner engagement, and how these can be overcome. Case studies, examples and lessons learned will be used alongside group discussions to draw out key messages and recommendations for river restoration practitioners looking to engage landowners.

[Far from the water's edge: a new focus for near natural rivers?](#)

Jo Old, Louise Weller & Glenn Maas (*Environment Agency*)

[Restoring the Upper Wensum: Kick Starting Natural Processes](#)

Jacob Dew (*Five Rivers Environmental Contracting Ltd*)

[Slowing the flow in Dorset streams; working together for Poole Harbour](#)

Alasdair Maxwell (*Environment Agency*)

Urban Flood Resilience refers to a city's capacity to maintain future flood risk at tolerable levels by preventing deaths and injuries, minimising damages and disruption during floods, and recovering quickly afterwards, while ensuring social equity, and economic and cultural vitality.

Achieving urban flood resilience nationally requires a transformative change in planning, design and implementation of existing and new urban water systems. Flood risk, wastewater and stormwater management should be re-envisioned and transformed to: ensure satisfactory service delivery under flood, normal and drought conditions, and; enhance and extend the useful lives of ageing grey assets by supplementing them with multifunctional Blue-Green infrastructure.

The multidisciplinary Urban Flood Resilience research project, which launched in 2016 and comprises academics from nine UK institutions, has been investigating how such transformative change may be possible through a whole systems approach to urban flood and water management. Research was conducted under five work streams: resilience under change, stormwater as a resource, interoperability, citizens' interactions and resilience in practice.

This workshop will present the outputs from the project and show the potential for integrating Blue-Green and grey systems and implementing new approaches that put flood risk management at the heart of urban planning.

16:00

Close

Session 3

16:00	Keynote Speaker Mark Lloyd, CEO The Rivers Trust	25 mins
16:25	Questions and reflections	20 mins
16:45	Close	

EVENING SESSION

18:30		60 mins
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UK RIVER PRIZE & RIVER CHAMPIONS 2020

19:30	End of Day 1
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Day 2 – Thursday 10th September 2020

Session 4

Restoring resilience

Geomorphology for river restoration

Community Engagement

CHAIR: TBC

CHAIR: TBC

CHAIR: TBC

09:30

Revitalising Chalk Rivers, to Affinity AMP7 and beyond

Jane Everett (*Five Rivers*) & David Watts (*Affinity Water Limited*)

Will the river do the work? A practical guide for assessing River Recovery Potential to assess when passive river restoration measures can be used to allow rivers to self-heal

Helen Reid (*Scottish Environment Protection Agency*)

Engage, Engage, Engage – The key to delivering successful habitat creation

Kevin Skinner, David Gasca & Marc Huband (*Atkins*)

15 mins

09:45

Increasing infrastructure resilience to future change by restoring natural processes

Tamsin Chisnall & Sian Leake (*Arup*)

The benefits to salmonid habitat resulting from process-based river restoration

Hamish Moir (*cbec eco-engineering UK Ltd*)

Unlocking the Severn and reconnecting Worcester with its river

Jason Leach & Alex Ball (*Canal & River Trust*)

15 mins

Session 4 – continued...

10:00	<u>Improving resilience to low flows with integrated, nature-based solutions</u> Nicola Nineham & Joanne Barlow (<i>Mott MacDonald</i>), Thomas Barden & Andy Banham (<i>Severn Trent Water</i>)	<u>Trapping estuarine sediment to restore urban estuary margins: the Estuary Edges project</u> Richard Charman (<i>Environment Agency</i>)	<u>Hurdling NFM barriers in rural catchments: research and practice</u> Jenny Broomby & Steve Rose (<i>JBA Consulting</i>)	15 mins
10:15	Integrating river & wetland habitat restoration into flood and major infrastructure schemes Jo Cullis (<i>Jacobs</i>)	Live discussion with presenters	Live discussion with presenters	15 mins
10:30	Live discussion with presenters	Live discussion with presenters	Live discussion with presenters	10 mins
10:45	Coffee break			15 mins

Session 5

Mitigating effects of dams & reservoirs

Citizen Science programmes

Using data to inform progress

CHAIR: *TBC*

CHAIR: *TBC*

CHAIR: *Judy England (Environment Agency)*

11:00	<u>It's Rock 'n' Roll: Reintroducing a coarse sediment supply to drive ecological improvement downstream of an impounding reservoir</u> Chris Tattersall (<i>Wessex Water</i>)	<u>How to promote citizen involvement in peri-urban river management</u> Pere Vall-Casas (<i>Universitat Internacional de Catalunya</i>)	<u>Making the most of open biodiversity data for river restoration planning</u> Martin Wilkes (<i>Coventry University</i>)	15 mins
11:15	<u>Hafodty Reservoir – Dam removal and channel restoration</u> Kevin Skinner (<i>Atkins</i>)	<u>FreshWater Watch (Citizen Science project)</u> Kesella Scott-Somme (<i>EarthWatch</i>)	<u>The River Condition Assessment: A key component of river assessment within the Biodiversity Net Gain calculations</u> Angela Gurnell (<i>Queen Mary University of London</i>)	15 mins

Session 5 – continued...

11:30	Environmental Benefits of Reservoir Discontinuance – Hurst Reservoir Case Study Helen Beeden (<i>United Utilities</i>)	Measuring the Impact of Citizen Science (MICS) Project Hannah Joyce & John Wheatland (<i>River Restoration Centre</i>)	<u>Floodplain grassland restoration – a 3-year study of floodplain meadow restoration attempts in the UK – restoring resilience in floodplain agriculture</u> Emma Rothero (<i>Open University Floodplain Meadows Partnership</i>)	15 mins
11:45	Live discussion with presenters	Live discussion with presenters	Live discussion with presenters	15 mins
12:00	Live discussion with presenters	Live discussion with presenters	Live discussion with presenters	15 mins
12:15	Lunch			75 mins

Session 6				
Woody dams for NFM		Evaluating urban rivers		Monitoring, evaluation & evidence
CHAIR: TBC		CHAIR: TBC		CHAIR: TBC
13:30	<u>Implementing Leaky Woody Structure Guidance at a Catchment Scale</u> Paul Millard, Emily Hale & Megan Barnes <i>(Mott MacDonald)</i>	<u>Assessing the impacts of urbanisation on the low order streams of Belfast Lough</u> Andrew Moore <i>(Queen's University Belfast)</i>	<u>Evaluation of Aquatic Macroinvertebrate Communities Post-Weir Removal on Rivers in Cumbria, UK</u> Ana Martinez Crucis <i>(AECOM)</i>	15 mins
13:45	<u>Do Leaky Debris Dams Work? Implications for Natural Flood Management Schemes</u> John Phillips <i>(Environment Agency)</i> , Angelique McBride & Sabine McEwan <i>(FWAG (SouthWest))</i>	<u>Living Water Cities: Making a difference in our cities and towns</u> Galen Fulford <i>(Biomatrix Water Solutions)</i>	<u>Developing an evidence base for the implementation of phosphorus and sediment agri-environment measures at the farm-scale in the Evenlode catchment, a headwater tributary of the River Thames</u> Bethany Hancock <i>(Atkins)</i>	15 mins

Session 6 – continued...

14:00	Live discussion with presenters	<u>Rewilding 'lost' urban rivers for health and wellbeing</u> Adam Broadhead (<i>Arup</i>)	<u>Mastering the monitoring: fish community responses to a low-cost passage easement at a bridge culvert</u> Thomas Myerscough (<i>Wyre Rivers Trust</i>) & Jonathan Grey (<i>Wild Trout Trust</i>)	15 mins
14:15	Live discussion with presenters	Live discussion with presenters	Live discussion with presenters	15 mins
14:30	Live discussion with presenters	Live discussion with presenters	Live discussion with presenters	15 mins
14:45		MOVE TO GRAND FINALE!		15 mins

Session 7		
CHAIR: <i>TBC</i>		
15:00	Panel discussion, questions and summary Guest panel	40 mins
15:40	Thanks & parting words	5 mins
15:45	END OF CONFERENCE	



Sustainably Managing Rivers

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2020 Finalists

The UK River Prize celebrates the achievements of those individuals and organisations working to improve our rivers and catchments, and recognises the benefits to society of having a healthy natural environment.

After much deliberation the judges selected the three finalists below. The overall 2020 UK River Prize winner, which will receive the Nigel Holmes Trophy, will be announced at the virtual online Awards Dinner on 9th September 2020.

Finalist	Recognised for	Lead applicant
Afon Merin <i>Ceridigion, Wales</i>	<i>Landscape-scale change to kick start natural river and floodplain processes in a managed forestry plantation</i>	Natural Resources Wales
Allt Lorgy <i>Highlands, Scotland</i>	<i>Removing constraints and working with this upland river to allow it to recover its dynamic shape and ecology</i>	Spey Catchment Initiative
Rivers Test and Itchen <i>Hampshire, England</i>	<i>Long term multi-project plan to restore the condition of these two iconic chalk rivers</i>	Environment Agency

“The high standard of entries for this year’s UK River Prize has once again demonstrated the enthusiasm, passion and commitment of local partnerships, charities, volunteers and agencies, in working to restore the freshwater landscape for people and wildlife. On behalf of the judges, it is always a pleasure to read the detail of all the projects, and a real challenge to choose between them. I would like to thank all of this year’s applicants who submitted their excellent projects from across the UK.

The three finalists this year come from Wales, Scotland and England, and showcase a range of habitats and ecology from upland rivers to lowland chalk streams.”

Martin Janes, Managing Director, River Restoration Centre



2020 Finalists

Afon Merin, Ceridigion, Wales - *Lead applicant: Natural Resources Wales*



In 2017 we were successful in a bid for £30k from Natural Resources Wales' Habitat Creation Fund administered by the Flood & Coastal Risk Management team to undertake a 2 year project within the NRW managed Welsh Government Woodland Estate. The site is situated within the productive Myherin forestry block near Devil's Bridge, Aberystwyth. The afon Merin is one of the principal tributaries of the Rheidol system, flowing, from its upland SSSI watershed, through the Myherin woodland and onwards into the Rheidol Valley. A forestry access road circles the river at an elevated level above the valley floor and we were afforded carte blanche over a 3km section within this area. This provided a landscape scale intervention opportunity, with a vision to remove both planted and self-set conifer, reconnect the afon Merin with its floodplain and create a series of wetlands on the valley floor.

Some areas of planted conifer within the site boundary were scheduled for commercial harvesting at no cost to the project and this was completed over the summer of 2017. A contract was then let in early 2018 to fell the remaining self-set conifer to waste. We were then able to survey the river corridor in the summer of 2018 to look at options to encourage the river to spill to the floodplain on a more regular basis. The valley floor is up to 250m wide within the project area, with a relatively low gradient and should be a depositional zone for sediments.



The 1st Edition OS maps indicated that the river was once more active than it currently is. Land-use and drainage in the immediate area had resulted in the river becoming incised, severing it from its floodplain on all but extreme events. The elevated run-off had scoured most of the fine gravels out of the system, leaving a boulder and cobble substrate sub-optimal for fish spawning and aquatic invertebrates. Groundwater levels were also lowered, with a number of stretches being devoid of water during the prolonged dry-spell of the

2018 summer. However in walking over the valley floor it was obvious that there were still a series of former channels across the floodplain. The plan was to install a number of leaky dams down the system that would hold back water under elevated flows and spill the river to the floodplain. We marked out locations, focussing on bends in the channel with tongues of land to flood out onto.



2020 Finalists

Afon Merin, Ceridigion, Wales - *Lead applicant: Natural Resources Wales*

The intention was to use the existing felled tree trunks and forestry brash to form a relatively open structure that would allow most of the flow to Aberystwyth continue through the dam. The site is upstream of a number of natural barriers to migratory salmonids, but does support native brown trout populations. We were delighted to see that natural processes were already happening – a conifer left felled across the stream had trapped woody debris and damned the flow, creating a ponded area upstream and braiding the river below into relict channels. This formed our template for the installation of 15 leaky dams and a number of scrape features within the catchment. A contract was let in early 2019 to install the dams and create a number of scrapes. A series of trunks were well keyed into the banks and then back filled with forestry brash.



Water immediately started to spill out of bank picking up the network of old channels and low spots within the floodplain. A number of high flow events over the last year have seen the river readjust, with gravel depositing on the stream bed and as point and side bars. This has created more dynamic flow patterns, a complex of side channels, and permanent and temporary pond features.

Having kick-started natural processes the long-term vision is for the site to be self-sustaining



with minimal intervention, We expect some of the features to fail, but others will reform naturally from the woody material on site creating a dynamic system. The complex diversity of river and wetland habitats create niches for a variety of flora and fauna. We anticipate benefits for water quality, groundwater levels, delays in time to peak on flood flows and low flow protection in the summer months. The project has not just enhanced the immediate river corridor, but also the surrounding area of approximately 17 hectares. Monitoring has included pre & post drone survey and fixed point photography at key locations; both of these are due to be repeated this Summer. In addition, Aberystwyth University has carried out flow surveys which they are planning to repeat annually. Fishery and biological surveys are planned to compare the reach with adjacent reference

sites. NRW are developing a River Restoration Programme and will use this project as an illustration of low cost, low technology river restoration both internally and with external partners.

For further info contact: Nick Young (Conservation & Heritage Manager (Forestry)) or Mike Jenkins (Project Manager) Nick.Young@cyfoethnaturiolcymru.gov.uk or Mike.Jenkins@cyfoethnaturiolcymru.gov.uk

2020 Finalists

Allt Lorgy, Scottish Highlands - *Lead applicant: Spey Catchment Initiative*

Restoration of a modified section of the Allt Lorgy, an upland tributary in the River Spey catchment, was undertaken in 2012 by the Spey Catchment Initiative, a catchment management partnership, with technical design input from cbec eco-engineering Ltd.

The project represents a near unique application of the 'process-based' restoration philosophy, reinstating the morphology and associated habitats of a 1 km section of river and its adjoining floodplain. It has had wide acclaim since delivery and, now after eight years of natural fluvial processes re-shaping the river, it represents the earliest and most advanced example of the application of the 'Stage Zero' type of restoration approach in the UK.

Project details

The project aimed to re-establish the fundamental physical processes that drive the evolution of a diverse channel and floodplain environment. Through an 'assisted recovery' approach, artificial constraints to natural processes were removed, thereby encouraging the river to begin a trajectory of change to a condition of increased physical heterogeneity and improved channel-floodplain connection. Groundworks involved the removal of hard bank protection and over 250m length of historical engineered embankments, both of which had constrained the watercourse into a straightened single thread planform. The sediment removed from the embankments was reintroduced to the active channel upstream to 'kick-start' sediment transport processes. Large Wood Structures (LWS) were strategically placed in the channel, their locations determined to provide optimal enhancement of dynamic geomorphic process. 11ha of the adjacent flood plain was deer-fenced and 5,000 native trees planted to supplement natural regeneration. In late 2015, some additional works were undertaken, including further gravel augmentation from stockpiled sediment and large wood input.



2020 Finalists

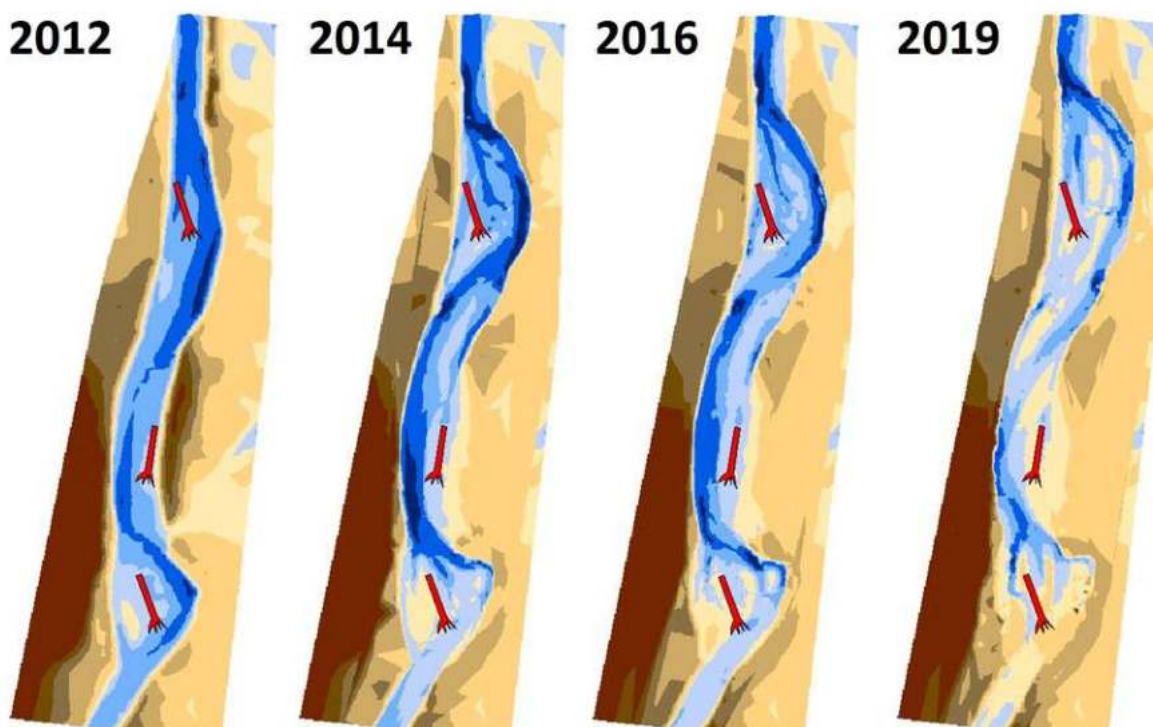
Allt Lorgy, Scottish Highlands - *Lead applicant: Spey Catchment Initiative*

The reference 'wandering' morphology is now re-establishing through the site and floodplain connectivity has substantially improved, including a perennial native wet woodland. Towards the downstream limit of the site, the channel has recently naturally avulsed into its previous floodplain, demonstrating an important mechanism of adjustment in such a 'Stage Zero' type of restoration approach. Importantly, the action of restored processes has now resulted in a self-sustaining system; enhanced lateral channel migration has begun the natural recruitment of riparian trees into the watercourse which further invigorates the dynamic processes responsible for physical heterogeneity/ biodiversity. Riparian woodland is becoming more abundant ensuring a source of dead wood for the future. In effect, the 'circle of restoration' has been completed, providing a sustainably evolving river environment.

Capital funding for the project was provided by CNPA, Scottish Government and SEPA, with trees donated by the Woodland Trust. Occasional practical support and maintenance from the Spey Fishery Board and the landowner, Seafeld Estates, continues to be provided.

Outcomes

Eight years after design implementation (and a number of high flow events), significant changes in river planform, bedform morphology and sedimentology have been quantified through continual topographic resurvey. The channel had been in a near static, flume-like condition for over 30 years but, since restoration, has experienced rapid meander bend migration associated with significantly increased sediment storage forming active alluvial barforms and a divided, wandering planform.



2020 Finalists

Rivers Test & Itchen - *Lead applicant: Environment Agency*

Eight years ago the T&I River Restoration Strategy was launched at Sparsholt College, Hampshire to a slightly wary audience. The event was planned to inform those present that the SSSI status of these two famous rivers had been classified by Natural England as being in 'Unfavourable Condition' and that something needed to be done. That something was the Test and Itchen River Restoration Strategy, a joint project between Natural England and the Environment Agency, the aim of which was to work collaboratively with fisheries and landowners to improve the habitat of both rivers through river restoration so that each could achieve 'Favourable Condition'.

Following the launch a few prestigious fisheries agreed to work with the Strategy in 2013 collaboratively improving sections of river they owned. Their willingness to work with the Strategy in the early stages then gave others the confidence to follow suit. Since then the Strategy has worked collaboratively with 28 owners, who fund 50% of each project, and restored nearly 15km of river.

Vegetation Management

Key to the success of the Strategy so far has been reduced bank side management. Walkover surveys by Atkins in 2012 identified that traditional fisheries management, to provide easy access for anglers, was a key restoration action for the Strategy throughout the length of each river. The majority of river keepers on both rivers are now seeing the benefits of leaving the banks more natural throughout the year. It reduces erosion, provides habitat and cover for fish and invertebrates and makes the rivers more resilient to low flows. It also cost nothing.



Large and small scale restoration projects

The Test and Itchen have many channels associated with historic milling or old water meadow systems and most are designated as SSSI. Consequently restoration projects have varied in size from large scale works on the main channel to smaller projects on the carriers. All however, have the same problems such as numerous impoundments, historic dredging, particularly on the Test, and long lengths of over wide, slow flowing channel.

The Test and Itchen River Restoration Strategy is funded via the Environment Agency's Flood and Coastal Risk Management function and consequently where possible looks to improve flood storage or reduce flood risk off the back of any restoration project.

With each project 50/50 funded between the owner and the Environment Agency the Strategy has used 20,000t of gravel for bed raising, removed 13 impounding structures, built 5 islands and removed one kilometre of piling. 30 hectares of flood storage have also been created and flood risk reduced at 3 locations. Owners can choose their own contractor as this gives them more involvement in each project.

2020 Finalists

Rivers Test & Itchen - *Lead applicant: Environment Agency*

Removing Impoundments

This is one example of many showing the potential for an impounded chalk stream channel to flourish once a structure has been removed. Here a centuries old structure has been removed and the river diverted through pipes. Thousands of tonnes of silt was removed and gravel added. Due to the historic structure an archaeological dig also took place in the dried channel. The image on the right is the same channel one year later.



Working together



Over the last 8 years the Test and Itchen River Restoration Strategy has worked with, completed projects with, or gained invaluable technical advice from the Wild Trout Trust, The Wessex Rivers Trust, The National Trust, The Hampshire and Isle of Wight Wildlife Trust, Southampton University and Environment Agency colleagues. It has also worked with highly skilled contractors on large and small scale projects using a wide variety of restoration techniques. The Test and Itchen River Restoration Strategy would like to thank them all for their expertise, experience, enthusiasm and patience in delivering or helping to deliver these fantastic projects.



Finally, thank you to all the owners and river keepers of the Test and Itchen. Without their trust, awareness, and commitment to these two rivers none of these projects would have happened. It hasn't always been easy, and some may still not agree, but change is in the air. Hopefully this commitment will continue so that these two iconic rivers can continue to reach their full potential into the future.



Nature Driven Design

River Restoration Solutions

Royal HaskoningDHV is a specialist environmental consultancy with a track record of award-winning planning, policy and implementation projects across the UK in the water environment sector. We have a strong team of experts in geomorphology, engineering, hydrology and ecology with experience in working across Europe and the UK.

We use our **Nature Driven Design** approach to improve 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.

Recent experience:

- **Channel restoration and floodplain reconnection:** Feasibility, outline designs, detailed designs and site supervision at sites on the **River Chelt, River Nith, River Colne** and **Battlefield Brook**.
- **Fish passage enhancement:** Design of technical passes, low cost baffles, rock ramps and natural solutions at sites including **Gotter Water Weir, Powick Weir** and **Gateside Weir**.
- **Catchment scale water and sediment management:** Development, appraisal and design of natural flood management solutions and measures to manage sediment supply in the **River Medway** and **River Darent** catchments.
- **Water and sediment quality:** Monitoring and appraising water and sediment quality including data analysis and interpretation against relevant water quality standards in the **Eden, Colne** and **Mease** catchments.



2020 River Champions

'River Champions' seeks to celebrate the outstanding efforts of individuals contributing to river restoration. Below is a brief introduction to the 2020 River Champions, more information about each will be showcased by the RRC over the next year on our website and social media platforms.

Sharon Girardi

Sharon has helped manage projects on the Afon Einion for 10 years. Her voluntary contribution has helped restore the ecosystem.

Angela Gurnell

Now semi-retired, Angela continually seeks to share knowledge in river monitoring and process-based restoration measures.

Martyn Hale

As the Bristol Avon Rivers Trust's Anglers Riverfly Monitoring Initiative Co-ordinator, Martyn volunteers his time for a range of monitoring related work.

Michael Hughes

As a member of Friends of Apley Wood Group, Mike helps manage the reserve and enhance the watercourse.

Dave Jones (posthumously)

Known to some as the "Wandle Ranger", Dave was actively involved with South East Rivers Trust for 10 years.

Angus Menzies

As coordinator of the Dorset Riverfly Monitoring Scheme, Angus runs training days and monitors the health of Dorset's rivers.

Alan Mullinger

Alan has been instrumental in delivering river restoration projects on the River Hull Headwaters SSSI and wider.

Tom Rawson

Tom helped set up the Great Borders River Clean, highlighting issues on rivers across Scottish Borders.

Jason Rennie

With his specialist trucking services, Jason is out and about in rivers multiple times a week.

Olly Southgate

Olly established and runs the Cumbria River Restoration Programme, working closely with various stakeholders.

Jonah Tosney

Jonah has been involved in several important conservation projects, including beaver and burbot release and the roll out of wetlands to clean sewage.

Jon Trill

Jon is the Living Landscape Manager, and volunteers his time to help deliver river restoration projects on the River Hull Headwaters SSSI and wider.





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.

James White – Science & Technical Officer

James provides scientific and technical expertise on different projects. His responsibilities entail delivering training courses, pursuing research funding opportunities and studying application of best-practice restoration techniques. He is currently working on a project funded by the World Bank, aiming to characterise the hydromorphological status of rivers and lakes across Bulgaria.

John Wheatland – Science & Technical Officer

John provides technical and scientific advice on several different projects. He is currently working alongside other members of the RRC team on the Measuring Impact of Citizen Science (MICS) project, which aims to develop tools for evaluating the impact of citizen science on society and the environment.

Hannah Joyce – Science & Technical Officer

Hannah provides technical advice as well as developing research opportunities and training courses. She is working on the Measuring Impact of Citizen Science (MICS) project, funded by the EU Horizon 2020 research and innovation programme.

Josh 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 – Information Officer

Alex manages the National River Restoration Inventory (NRRI), RiverWiki and UK Projects Map, edits the bulletin and social media platforms, updates the RRC website, and supports events planning and project site visits. She also helps out with technical enquiries and training course preparation and delivery.

Nicola Mackley – Centre Administrator

Nicola runs the bookings process for the Annual Network Conference and acts as the RRC's Membership administrator, managing the contacts database and distribution lists. Nicola assists the team with everything that happens in the office and manages incoming calls and emails for the organisation.

Jackie O'Regan – Accounts Technician

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



This practical one-day overview course, featuring field-based demonstration on a nearby river, will introduce participants to hydromorphology.

This course builds on the introductory course and provides more in-depth knowledge of hydromorphological driver/process/form/pressure interaction and how they apply to river restoration.

This course introduces participants to a methodology for developing a catchment-wide restoration plan to help identify and diagnose pressures and impacts, develop catchment-wide objectives and prioritise restoration

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.

This is a 4-day course where surveyors are introduced to the basics of hydromorphology through a combination of fieldwork and presentations.

This course uses teaches you to find, display and interpret existing data to aid river restoration projects and catchment strategy. GIS is used to open data layers, interpret trends and consider pressures on the channel.





the River Restoration Centre

Working to restore and enhance our rivers

RRC Membership Benefits

Technical training, tailored to your needs

Bespoke workshops for your organisation or project

Connecting you to a wide network of environmental professionals

Independent technical advice

Site Visits to best practice restoration projects

Discounted Annual Conference registration

Promote your business or individual expertise



Package Options & Annual Prices

Corporate Membership—covers ALL offices/entire staff of an organisation
£1295 plus VAT

Business Plus Membership—Covers ONE office/7 individuals
£562 plus VAT

Business Membership—Covers ONE office/4 individuals
£280 plus VAT

Sole Trader Membership—Covers a ONE person organisation
£130 plus VAT

Trust Membership—Covers ONE office
£190 plus VAT

Individual Membership—Covers ONE office
£80.50 including VAT

Student Membership—Covers ONE person, not for business use
£40.25 including VAT



the River Restoration Centre

Working to restore and enhance our rivers

Corporate Members

Alaska is an ecological contracting firm committed to ecological restoration.



Water is one of the core themes of the university, delivering robust, innovative solutions for the water sector for over 40 years.



Arup is the inspirational force behind many of the world's most innovative and sustainable planning, building and infrastructure projects.



Client focused solutions for watercourse landscapes and invasive vegetation and management.



Five Rivers Five Rivers provides specialist contracting, consultancy and ecological services to a range of clients across the UK.



Jacobs provide technical, professional and construction services, including all aspects of architecture, engineering and construction operations and maintenance, as well as scientific and speciality



Land & Water is first and foremost an environmental company, full of people who are passionate about caring for our coastline and the nation's network of rivers, streams, wetlands and waterways.



Mott MacDonald is a global engineering, management and development consultancy focused on guiding our clients through many of the planet's most intricate challenges.



R.J. BULL RJ Bull are an established environmental contractor driven by a passion for rivers, wetlands and the natural environment.



Royal HaskoningDHV takes an integrated approach to plans and projects in the areas of coastal, river and spatial development, water management and water treatment.



Stonbury are specialist contractors to the water industry. Works include refurbishment services within clean & waste water.



ATKINS Atkins is a global design, engineering and project management consultancy.



The charity who look after and bring to life 2,000 miles of waterways.



Dublin City Council is the democratically elected body that governs Dublin City, and the largest Local Authority in Ireland.



JBA Consulting is made up of engineers, environmental consultants, scientists and designers, who manage weather and environmental risks and opportunities for their clients.



National Trust look after special places throughout England, Wales and Northern Ireland forever, for everyone.



Roughan & O'Donovan delivers a wide range of water and waste water consulting services to clients across Ireland.



Salix Salix have been involved with river and wetland restoration for over 12 years, working on a full range of river types from chalk streams to intertidal and mobile gravel bed systems.



South East Water abstracts and treats 517 million litres of water a day and supplies around 2.2 million customers.





the River Restoration Centre

Working to restore and enhance our rivers

National River Restoration Inventory (NRRI)

The NRRI holds over 20 years of project information, including costs, locations, site information, techniques and much more. This information is sourced from agencies, trusts and other river restoration practitioners.

Total Projects
5,030


4,067


474


324


120

781
in chalk
rivers

513

Projects involving
partnership

854

Lowland low
energy projects

272

Flow restoration
projects

713

Projects involving
species habitat
creation

Add your project to the NRRI using the Google Form on the RRC website!

The projects on the NRRI are held in a Microsoft Access database, made up of a series of tables containing project information such as background summaries, project techniques, and environmental context.

This is an example of the sort of search we can now do:

Searching for bank protection project examples in chalk stream

Technique Keywords



Site Context



Outputs

Restoration aims	No. of projects
Habitat Enhancement & Biodiversity	1531
Land Use Change	930
Longitudinal Connectivity	666
Bank Protection	520
Hydromorphological Improvement	258
Flood Risk Management	256
Water Quality Improvement	216

River Type (Top 5)	No. of projects
Lowland High Energy	122
Upland High Energy	73
Upland Low Energy	49
Lowland Low Energy	49
Coastal High Energy	20

Land Use (Top 5)	No. of projects
Arable and horticulture	110
Improved grassland	103
Suburban	90
Urban	15
Coniferous woodland	11

Geology (Top 5)	No. of projects
Mudstone, Siltstone and Sandstone	98
Clay, Silt, Sand and Gravel	48
Chalk	48
Sandstone and conglomerate	35
Sandstone, Mudstone, Siltstone and conglomerate	25

Projects
Anton Enhancement Strategy
Aspenden Hall Pond
Bonham Bridge/South Newton - Phase I & II
Broadland Flood Alleviation Project (1990's)
Channel Narrowing and Improvement at Chaulden
Choulston Shallows
Costains / Newbury
Driffeld Trout Stream Bank Improvements

Reference library
Thistly Vale Brook, Aspenden Hall, Buntingford-- Suggestions for Restoration

Images
Digital Images\ - England\Aspenden Hall Pond



Delivering robust and pragmatic solutions



Local understanding, combined with Jacobs global network of industry specialists has made us the consultancy of choice for clients around the world.

With dedicated teams in all aspects of river and wetland management and restoration, we have an enviable breadth of skills and expertise at our fingertips. Our experts provide a comprehensive range of skills and a detailed understanding of hydraulic, geomorphological and ecological processes that combine to provide robust and pragmatic solutions that offer real value to our clients.

To find out how we're solving some of our clients' greatest challenges and how we're helping to make the world a better place, contact Jo Cullis on **+44 1392 269 835** or **jo.cullis@jacobs.com**.

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Reinventing tomorrow.



the River Restoration Centre

Working to restore and enhance our rivers

ABSTRACTS

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Catchment and River Restoration Team

- Natural Processes & Catchment Management
- River Restoration Planning and Design
- Geomorphological Assessments
- Ecological Assessments
- Fisheries Science
- Water Framework Directive Assessments
- Mapping & Modelling
- Engineering Feasibility & Design Studies
- Natural Capital & Ecosystems Services

Get in touch

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Session 1:

BREATHING LIFE INTO SCOTLAND'S URBAN RIVERS

C. PERFECT¹, F. HAYES¹, L. STEWART¹ & D. WALLACE¹

1 Scottish Environment Protection Agency

Scottish Government's Water Environment Fund is managed by the Scottish Environment Protection Agency to deliver projects which enhance the river environment as well as provide wider benefits to local communities. A key focus for the fund is on improving the health of Scotland's degraded urban rivers, helping us thrive within the resources of one planet. The presentation will introduce the key policy influences, including the Scottish Government's Programme for Scotland and the Climate Change (Scotland) Bill, as well as the Water Framework Directive and SEPA's regulatory strategy. Our focus on projects that benefit people and the environment is illustrated with examples from the Glasgow area. The presentation describes how we are building these projects through partnerships with local authorities, to deliver benefits beyond the banks of the river. We conclude with a look to the future, exploring how SEPA can help drive a net zero carbon approach to delivering river restoration.

GETTING DELIVERY DONE: FUNDING STREAMS, UP-SCALING AND PAYMENT FOR OUTCOMES

D. BROWN¹

1 Environment Agency

We are accused of working in silos, but why do we do this? Because there are advantages to this, and its only negative if we don't join it up. If we join up this can lead to integrated, collaborative multi-objective projects with multiple funding streams, and multiple outputs. Up-scaling – what's the most efficient way of delivering NFM? The Stroud model? Local wildlife/River trusts? Larger contractors? I'll discuss some of the findings from the Northwest's £15m NFM catchment scale fund projects about delivery efficiencies and lessons learned. Finally, the future – the Agriculture Bill, promising payment for outcomes and a chance to be selective with intervention locations, not just take available opportunities.

NOTES



frog environmental

environmental protection for river works

Site specific deployment support for:

- Construction sites operating near water
- River restoration projects
- Bankside works



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Session 2: Workshops

Workshop A: Restoring connectivity between the stream & its floodplain

Facilitators: Fiona Bowles (RRC), Stewart Clarke (National Trust), John Phillips, Jo Shanahan & Jenny Wheeldon (Natural England)

RRC Lead: Hannah Joyce

The workshop will be an opportunity to explore the theory and practice of taking a 'Stage 0' approach to river and floodplain restoration. 'Stage 0' restoration has the potential to deliver multiple environmental and flood risk benefits through reconnecting river and floodplains creating a more resilient channel network and functionally linked floodplain wetlands. This workshop will explore the risks, opportunities and constraints of taking a 'Stage 0' approach in the UK. As part of the workshop the Environment Agency will present for discussion draft findings from a project developing geomorphic mapping tools and guidance for those seeking to identify potential 'Stage 0' sites as well as worked 'case study' examples that explore the technical and practical issues likely to require consideration in developing a 'Stage 0' project.

WORKING WITH NATURAL PROCESSES - A NATIONAL TRUST PERSPECTIVE

S. J. CLARKE¹

1 National Trust

The workshop will be an opportunity to explore the theory and practice of taking a 'Stage 0' approach to river and floodplain restoration. 'Stage 0' restoration has the potential to deliver multiple environmental and flood risk benefits through reconnecting river and floodplains creating a more resilient channel network and functionally linked floodplain wetlands. This workshop will explore the risks, opportunities and constraints of taking a 'Stage 0' approach in the UK. As part of the workshop the Environment Agency will present for discussion draft findings from a project developing geomorphic mapping tools and guidance for those seeking to identify potential 'Stage 0' sites as well as worked 'case study' examples that explore the technical and practical issues likely to require consideration in developing a 'Stage 0' project.

Workshop B: Understanding the role of beavers in river restoration

Facilitators: RRC

RRC Lead: Martin Janes & James White

This workshop will be themed around understanding the role beavers can play for river restoration, how to prepare for the implementation of beavers, and managing river restoration delivery. The session will look to encourage the delegates to discuss challenges related to beavers including how to anticipate benefits of the presence of beavers, how to manage land effectively, and who needs to be included in decision making. Delegates will feedback their thoughts and suggestions to the group, with the aim of looking forward to how we can efficiently encourage establishment of beavers for river restoration.

Workshop C: NFM Implementation Guidance

*Facilitators: **Emma Wren (Mott MacDonald)***

*RRC Lead: **John Wheatland***

This workshop will focus on the current CIRIA-led work to produce practical implementation guidance for NFM measures. This workshop will discuss the aim, proposed structure and content and provide an opportunity to influence the approaches taken by the project team.

NFM measures will be implemented by a wide range of organisations and individuals. There needs and requirements in terms of understanding, level and practical experience may vary considerably. The guidance should be as wide ranging as possible, be based on science and best practice and be clear and practical.

We will discuss the priority measures that will form this round of guidance and also what other NFM measures should be looked next.

What examples and key learning experiences related to NFM implementation can you bring to this discussion on national guidance and what would you want to see included?

Workshop D: Application of NFM modelling

*Facilitators: **Chris Spray (University of Dundee)***

*RRC Lead: **Alexandra Bryden***

This workshop will include talks, demonstrations and practical sessions on modelling Natural Flood Management (NFM) measures. There will also be an interactive session.

INTEGRATING MONITORING AND MODELLING OF NFM AT THE WHOLE CATCHMENT SCALE – EMERGING RESULTS FROM THE EDDLESTON WATER

C. J. SPRAY¹, L. COMINS², A. Z. BLACK¹, B. HAWKINS³, D. GARFT⁴ & R. RICHARDSON⁵

1 University of Dundee, 2 Tweed Forum, 3 JBA Consulting, 4 Scottish Government, 5 Scottish Environment Protection Agency

There is increasing evidence that Natural Flood Management (NFM) measures can provide flood risk reduction at small scales, alongside ecological benefits, yet how and whether such NFM measures can be made to work effectively at larger scales is less certain. The Eddleston Water project is Scottish Government's long-running empirical study designed to assess how a range of NFM measures perform within a larger scale catchment (70km²). The study is underpinned by a detailed hydrometric network and extensive ecological surveys, providing robust empirical evidence of the effectiveness of NFM measures on flood risk and habitat improvement. We report on the latest stage of the study, including observed evidence of the impact on flood risk of engineered wood structures and ecological benefits of re-meandering. We also report on the development of a new whole-catchment model of the Eddleston Water to test the effectiveness of the deployment of a range of NFM measures across the catchment.

NATURAL FLOOD MANAGEMENT IN PRACTICE: MANGING ENVIRONMENTAL RISKS TO IMPROVE RESILIENCE

C. L. RODGERS¹ & I. A. DENNIS²

1 Environment Agency, 2 Royal HaskoningDHV

Natural flood management (NFM) is becoming widely recognised as an effective mechanism for restoring resilience to our river catchments and floodplains, allowing them to adopt to changing conditions including climate change.

However, NFM measures are not suitable in all locations and some come with their own risks to the environment (including interrupting geomorphological processes and altering sensitive habitats). Alongside this is the challenge of handling stakeholder (mis)perceptions regarding relevant sources and solutions for flooding.

Our presentation will discuss these issues and how they can be managed, drawing on Royal HaskoningDHV's recent experience of NFM projects for the Environment Agency and local authorities. We will propose a tailored approach to environmental assessment for NFM schemes that is robust and proportionate to the spatial extent and budget of these schemes.

MODELLING BENEFITS OF NFM IN LOWLAND CATCHMENTS - RIVER HULL CASE STUDY

J. L. FOX¹, A. NICHOLSON² & C. SKINNER³

1 Hull City Council, 2 Arup, 3 Energy & Environment Institute, University of Hull

There continues to be an evidence gap of NFM in lowland catchments. This study demonstrates the extent NFM measures could reduce and attenuate peak flows in the River Hull catchment, which is a lowland catchment. The results show that NFM measures in the upper sub-catchments of the River Hull catchment produce localised flood risk and ecosystem services benefits, and concluded that long term sustainable land management practices can be achieved through the application of multiple NFM interventions, including leaky dams, wet woodland, buffer strips and contour ploughing.

A novel evaluation matrix has been developed through partnership working to enable weighting of multiple factors, including ecosystem services, costs and maintenance for assessing bespoke NFM measures in specific locations. The evaluation matrix identified that leaky dams are hydrologically the best measure at reducing peak flows and wet woodland and floodplain reconnection provide the most ecosystem services benefits.

SHARED LEARNING EXPERIENCE IN DEVELOPING APPROPRIATE MODELLING FOR NATURAL FLOOD MANAGEMENT IN FOUR CATCHMENTS IN YORKSHIRE

R. NGAI¹, S. VANICAT², V. COATES¹ & S. ROSE¹

1 JBA Consulting, 2 Environment Agency

Since the publication of the Working with Natural Processes (WwNP) Evidence Base, the Environment Agency (EA) have been advancing their understanding of modelling WwNP or natural flood management (NFM) measures in catchments through shared learning between EA staff and key stakeholders. Four catchments of varying scales in Yorkshire were examined (Backstone Beck, Gargrave, Helmsley, Whiston Brook) through site visits and workshops to demystify the NFM modelling, disseminate modelling results and encourage stakeholder feedback. Important workshop outcomes included the collection of valuable local knowledge and identifying opportunities to deliver multiple benefits. The smaller catchments (Backstone/Whiston) provided impactful results for stakeholders to deliver of NFM on the ground whilst the larger catchments (Gargrave/Helmsley) provided a strategic understanding of the feasibility of NFM. This project reinforces the value of active stakeholder engagement to develop NFM initiatives.

NATURAL FLOOD MANAGEMENT (NFM): BIGGER IS NOT ALWAYS BETTER, PRIORITISATION IS KEY

C. BLEASDALE¹, E. BROWN² & E. LANCASTER³

1 Atkins, University of Southampton, 2 Atkins, University of Nottingham, 3 Atkins, Durham University

NFM is becoming increasingly popular, yet the Environment Agency's Evidence Directory highlights uncertainties around 'scaling up' measures. Does implementation of more measures at the catchment scale always yield a greater reduction in flood risk? By comparing the outputs of three studies (each at a different spatial scale), we hope to evaluate our ambition of scaling up NFM. The results from our modelling studies suggest there is advantage to scaling up, both in terms of the spatial extent of NFM measure implementation and the number of different measures, although these need to be carefully considered. We also highlight the importance of field studies when conducting large catchment-scale NFM projects. Soil compaction is an important process to understand for NFM, yet it is a process that is rarely considered in catchment-wide modelling studies. This

presentation will aim to link the importance of field-scale measurements and scaling these to catchment scale NFM modelling studies.

PRIORITISING NATURAL FLOOD MANAGEMENT OPPORTUNITIES FOR THE THAMES REGIONAL FLOOD AND COSTAL COMMITTEE

G. HAUGHTON¹ & A. DINSDALE-YOUNG¹

1 Environment Agency

The Environment Agency (EA), funded by the Thames Regional Flood and Coastal Committee, has been working on a method for automating the mapping of potential opportunities for Natural Flood Management (NFM) across the Thames Catchment. NFM opportunities are then used to priorities water bodies by their potential for protecting homes at risk of flooding.

This work will help inform Lead Local Flood Authorities of the wide variety of NFM opportunities that could be supported within their catchments, helping to reduce flood risk and provide greater ecosystem services.

Workshop E: Landowner engagement & communication

Facilitators: Simon Whitton (APEM)

RRC Lead: Joshua Robins

In this workshop we will discuss approaches to engaging and communicating with landowners to help us achieve more in our catchments. We will discuss common challenges associated with landowner engagement, and how these can be overcome. Case studies, examples and lessons learned will be used alongside group discussions to draw out key messages and recommendations for river restoration practitioners looking to engage landowners.

FAR FROM THE WATER'S EDGE: A NEW FOCUS FOR NEAR NATURAL RIVERS?

J. OLD¹, L. WELLER¹ & G. MAAS¹

1 Environment Agency

Our rural landscapes will play a crucial role in achieving our ambitions of 'near natural' waters. Every kilometre of river drains on average 50 hectares of adjacent land - 70% of this land is classed as rural. We continue our story from last year – 'letting rivers do the work' - and focus on;

- Our emerging aspiration for river restoration in our rural environments – outlining current and future opportunities for nature-based restoration within our rural communities, farms and woodlands.
- Integrating actions and land management activities in rural environments – thinking big but perhaps....doing less? Actions here can offer additional ecosystem services.
- Rural policy and planning needs – an emerging picture and opportunities for the future.

We'll bring these core themes to life through case studies and first hand experiences of working with our rural land managers, catchment partnerships and communities.

RESTORING THE UPPER WENSUM: KICK STARTING NATURAL PROCESSES

S. KNIGHTS¹ & I. P. MORRISSEY

1 Five Rivers Environmental Contracting Ltd

- Location: Upper River Wensum (SSSI, SAC) Raynham, Norfolk
- Budget: £350,000.00
- Timescale: Works split into 3 phases and delivered over a 4-year period between 2015 to 2018 (due to the length of the river).
- Total length restored: 7km

- Client: Norfolk Rivers Internal Drainage Board (NR IDB)
- Designer: Atkins Ltd
- Principal Contractor: Five Rivers Environmental Contracting Ltd
- Stakeholders: Raynham Estate, Environment Agency, Natural England, Water Management Alliance
- Objective: To naturalise the morphology of the river and enhance, where practical, its connectivity with the floodplain through the implementation of a series of complimentary restoration measures.
- Outcome: The success of the project would not have been possible without the combination of a high-quality design, a flexible approach to delivery in the field and good relationships with the client, landowner and land managers.

SLOWING THE FLOW IN DORSET STREAMS; WORKING TOGETHER FOR POOLE HARBOUR

A. MAXWELL¹, F. J. BOWLES², A. BROOM³ & N. HOPKINS⁴

1 Environment Agency, 2 Poole Harbour Catchment Initiative, 3 Dorset Wildlife Trust, 4 FWAG SW

The Poole Harbour Catchment initiative was one of the first partnerships piloted to help deliver water framework directive goals in 2011. The initial action plan prioritised problems with excess sediment, nitrogen and phosphate but partners identified flood risk issues as well. This paper reviews the evolution of natural flood management within the Poole Harbour and adjacent catchments. Natural flood management was incorporated into these projects to deliver flow improvements but increasingly the multiple benefits on water quality are targeted. A range of measures have been implemented, both within the channel and upstream of the riparian zone. The projects have evolved from single deliverer, through partnered projects to a recent facilitated community project. The presentation reflects on how best to ensure landowner commitment to NFM measures and looks at future delivery opportunities such as reverse auctions.

Workshop F: Achieving Urban Flood Resilience in an uncertain future

Facilitators: Jenny Mant (Ricardo)

RRC Lead: Marc Naura

Urban Flood Resilience refers to a city's capacity to maintain future flood risk at tolerable levels by preventing deaths and injuries, minimising damages and disruption during floods, and recovering quickly afterwards, while ensuring social equity, and economic and cultural vitality.

Achieving urban flood resilience nationally requires a transformative change in planning, design and implementation of existing and new urban water systems. Flood risk, wastewater and stormwater management should be re-envisaged and transformed to: ensure satisfactory service delivery under flood, normal and drought conditions, and; enhance and extend the useful lives of ageing grey assets by supplementing them with multifunctional Blue-Green infrastructure.

The multidisciplinary Urban Flood Resilience research project, which launched in 2016 and comprises academics from nine UK institutions, has been investigating how such transformative change may be possible through a whole systems approach to urban flood and water management. Research was conducted under five work streams: resilience under change, stormwater as a resource, interoperability, citizens' interactions and resilience in practice.

This workshop will present the outputs from the project and show the potential for integrating Blue-Green and grey systems and implementing new approaches that put flood risk management at the heart of urban planning.



UNLOCKING THE SEVERN

Our project has a once-in-a-lifetime opportunity to restore connectivity on the UK's longest river - unlocking 158 miles of habitat for twaite shad and other endangered fish.

The deep vertical slot fish pass we're building at Diglis, Worcester will be the biggest of its kind in England & Wales and contain a unique underwater viewing window.

Find out more at the conference:

- 'Unlocking the Severn and reconnecting Worcester with its river' Thursday 10th, Session 4
- Visit our virtual stand on Thursday 10th from 1.30-3.00pm to find out more and talk to project staff

You can also:

- Join us on 24th October for World Fish Migration Day events
- Take part in our shad-counting citizen science online via our website!
- Help spread the word - #FollowTheShad

unlockingthesevern.co.uk | @SevernUnlocked   



Session 4: Parallel Sessions

Restoring resilience

REVITALISING CHALK RIVERS, TO AFFINITY AMP7 AND BEYOND

J. E. EVERETT¹ & D. WATTS²

1 Five Rivers, 2 Affinity Water Limited

Since 2015, Affinity Water has worked closely with landowners, stakeholder groups and regulators to improve flows, hydromorphology and habitats in revitalising 6 chalk rivers in our supply area to improve WFD status.

We have completed 12 restoration projects, reduced abstraction by 42ML/d leaving more water in the environment, installed 274,363 water meters, provided free water efficiency devices and learnt many lessons along the way.

- Early engagement of key stakeholders for Env Permits/access agreements
- Consequences of landowner apathy/changing minds/refusing works.
- Education linking taps-Rivers-PCC

In AMP7 we are scaling up our Revitalising Chalk Rivers programme greatly, as we aim to deliver a whopping 56 projects across 13 rivers and reduce abstraction by a further 33ML/d! Our vision is to work holistically within each catchment. To realise this ambition requires total stakeholder buy in, a shared vision and willingness to work together for the benefit of the environment.

INCREASING INFRASTRUCTURE RESILIENCE TO FUTURE CHANGE BY RESTORING NATURAL PROCESSES

T. J. STYLES¹, R. THOMAS¹, O. STANDAVID¹ & T. CHISNALL¹

1 Arup

Climate resilience is the ability of the socio-ecological system to absorb stresses and maintain function in the face of external strain imposed upon it by climate change whilst improving sustainability of the socio-ecological system. A growing number of communities are experiencing climate change impacts, including flooding and water scarcity and additional funding is needed to increase the resilience of essential infrastructure so that such impacts can be mitigated. With many traditional environmentally-focused budgets having suffered cuts and over demand from multiple directions, the role of other asset owners (highways authorities, water companies) in mitigating impacts both directly and indirectly, is becoming an increasingly essential part of river and floodplain resilience. We present case studies and lessons learnt from our work across the infrastructure sector where re-introducing natural processes is increasing resilience to the predicted effects of climate change.

IMPROVING RESILIENCE TO LOW FLOWS WITH INTEGRATED, NATURE-BASED SOLUTIONS

N. NINEHAM¹, J. BARLOW¹ & T. BARDEN²

1 Mott MacDonald, 2 Severn Trent Water Ltd

The Cinderford Brook, Gloucestershire, is affected by many complex and interacting factors, both current and historic. Flow in the Brook is impacted by Severn Trent Water's groundwater abstraction, the impact of which is compounded by a legacy of mining in the area and past interventions to prevent stream leakage. The discharge from Crumpmeadow STW provides a significant proportion of flow in the brook, but also results in water quality concerns. This study will establish the feasibility of using nature-based solutions, including river restoration, wetlands, NFM techniques and habitat enhancement, to meet Severn Trent Water's flow obligations under the AMP7 WINEP. The project also aims to bring water quality improvements and additional benefits, such as wider environmental gains through biodiversity enhancement, and social benefits through the creation of recreational space and community engagement, aligned with the wider 'Wild Towns' project led by Gloucestershire Wildlife Trust.

Session 4

Geomorphology for river restoration

WILL THE RIVER DO THE WORK? A PRACTICAL GUIDE FOR ASSESSING RIVER RECOVERY POTENTIAL TO ASSESS WHEN PASSIVE RIVER RESTORATION MEASURES CAN BE USED TO ALLOW RIVERS TO SELF-HEAL

H. E. REID¹

1 Scottish Environment Protection Agency

A framework was created which uses geomorphic principles to identify where more passive approaches to restoration, which encourage the river to adjust and self-heal, can be applied. The tool is designed for non-specialist river managers. This has three steps;

- i) Recovery potential is assessed based on the energy and sediment load characteristics of a reach.
- ii) Recovery tables predict the time it takes for a river to reach good condition based on the recovery potential, pressure type (i.e. straightening) and the restoration approach (Active, Assisted Natural Recovery (ANR) or Passive measures).
- iii) Finally, the document describes Active, ANR and Passive approaches to restoration including case studies of existing restoration schemes assessed based on their recovery potential.

This framework provides a process-based, geomorphic approach to identify where less intensive, river restoration approaches can be applied to maximise the lengths of river restored whilst decreasing the cost.

THE BENEFITS TO SALMONID HABITAT RESULTING FROM PROCESS-BASED RIVER RESTORATION

H. MOIR¹ & E. GILLIES¹

1 cbec eco-engineering UK Ltd

Process-based restoration aims to reinstate the natural physical functioning within river environments impacted as a result of historical human interventions. Reducing constraints to natural processes aims to provide a more diverse physical environment with assumed associated benefits for ecology. To test this approach, we present data from an implemented project where detailed monitoring produced habitat availability models for pre- and post-restoration conditions that were field validated (utilisation by spawning and juvenile salmonids). Results demonstrated significant increases in spawning habitat availability post-restoration, closely associated with enhanced physical diversity related to implemented Large Wood Structures. Observed spawning was closely associated with predicted 'high quality' habitat. The availability of juvenile habitat (fry and parr) was also shown to markedly increase, particularly in wetland areas that were reconnected to river flows.

SALTY LEDGES: TRAPPING ESTUARINE SEDIMENT TO RESTORE URBAN ESTUARY MARGINS: THE ESTUARY EDGES PROJECT

R. CHARMAN¹

1 Environment Agency

Working with an urban estuary's geomorphology is critical to its restoration, as has been looked at in 17 cases studies in the Tidal Thames through London where the creation of fringing mudflat, reedbed or saltmarsh habitats has resulted in a lot of learning. Varying from creeks in small managed realignments where the use of timber brushwood has been used to help accrete sediment to narrow timber ledges bolted onto walls with or without a retaining element, almost all depend on low currents and low wave energy to accrete cohesive sediment. However, additional factors such the slope of the manufactured ledge and the degree of drainage beneath have also been found to have a significant effect on both retaining and accreting sediment and thus if a feature at the right elevation to vegetated actually does so. The angle of a feature to wave energy also make a significant different to how much litter gets washed in. In most scenarios it is possible to aid the conditions to accrete sediment but in scenarios where it is not, a cobble or gravel foreshore still has biodiversity benefits. The findings

of this work are on a new web site www.estuaryedges.co.uk designed to encourage developers to create such features.

Session 4

Community Engagement

ENGAGE, ENGAGE, ENGAGE - THE KEY TO DELIVERING SUCCESSFUL HABITAT CREATION

K. SKINNER¹, D. GASCA¹, M. HUBAND¹, I. MORRISEY¹, S. GREEN¹ & D. LAWRENCE¹

1 Atkins

Successful habitat creation requires many different things coming together at one time. How a scheme develops from original concept through to options appraisal, outline and detailed design will ultimately influence how the project gets delivered on the ground. This presentation illustrates how a variety of different approaches can be used to support the development of habitat creation designs whether these schemes deliver river restoration, wetlands or Natural Flood Management. Approaches illustrated, use examples from a range of case studies at different stages of a project process. Examples included will show the use of masterplans, digital photomontages/virtual reality, storybooks and standard design details. All these approaches can engage people into the design process and help them understand how a project will look once the scheme gets delivered on the ground. They equally enable key constraints and opportunities to be identified and talked through with stakeholders.

UNLOCKING THE SEVERN AND RECONNECTING WORCESTER WITH ITS RIVER

J. LEACH¹, A. BALL¹ & H. PASQUET¹

1 Canal & River Trust

The Programme Director and Community Engagement Manager will present current thinking on how Unlocking the Severn will gain maximum positive impact in the towns and cities within the project area. They will use Worcester as an example; the city where the major part of the capital works is being delivered. They will consider how the fish pass viewing gallery will bring opportunities for city residents and visitors to come close to fish in their river environment. The team is working with an evaluation consultant on ways to assess the impact on communities, plus they are working with university researchers to look at how young people change their perception of global environmental issues through engagement with major restoration projects. The presentation will also give an overview of the engagement activity at a range of hubs in other key towns in the catchment.

HURDLING NFM BARRIERS IN RURAL CATCHMENTS: RESEARCH AND PRACTICE

R. NGAI¹, J. BROOMBY¹, K. CHORLTON¹, S. ROSE¹, S. MASLEN¹ & C. BURMAN²

1 JBA Consulting, 2 Schofield Sweeney

Natural Flood Management (NFM) often involves installing measures on privately owned land and working across a wide variety of stakeholders to generate realistic solutions which offer multiple benefits. This complex process has exposed various barriers to date which have prevented NFM from being adopted more widely. The barriers are not unique to NFM and are typical of many desirable catchment restoration activities. JBA has been working with Defra to investigate the barriers as well as the enablers to the delivery of NFM measures. We will discuss the research findings and research experience working with rural landowners and managers, drawing out where these can provide lessons learnt for implementing a wider range of catchment interventions. The research gathered valuable information from over 60 stakeholder interviews to better understand cultural, institutional and social barriers to NFM.

NOTES



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Session 5

Mitigating effects of dams & reservoirs

IT'S ROCK 'N' ROLL: REINTRODUCING A COARSE SEDIMENT SUPPLY TO DRIVE ECOLOGICAL IMPROVEMENT DOWNSTREAM OF AN IMPOUNDING RESERVOIR

C. TATTERSALL¹, A. HOUSE¹, P. DOWNS², D. GILVEAR², J. PHILLIPS³ & M. HEALEY⁴

1 Wessex Water, 2 University of Plymouth, 3 Environment Agency, 4 Westcountry Rivers Trust

Under the EU Water Framework Directive, Heavily Modified Water Bodies are required to meet 'good ecological potential' through the implementation of mitigation measures relating to their designated 'Use'. The Sutton Bingham stream is impounded by a water supply reservoir which since the 1950s has cut off the supply of coarse sediment to the downstream channel. Macroinvertebrate indices indicated significant impacts of the impoundment on downstream flow, morphology and water quality, linked in part to the rapid settlement of phytoplankton present in the compensation flow and habitat loss through erosion of finer gravels. Wessex Water used an Adaptive Management approach to carry out gravel augmentation as a mitigation measure to replace eroded substrate. Indications of sediment flux, water quality and ecological monitoring using RFID tags, impact plates, channel survey, Surber samples and time lapse photography is provided, and their adaptive implications explored.

HAFODTY RESERVOIR - DAM REMOVAL AND CHANNEL RESTORATION

K. SKINNER¹, I. MORRISSEY¹ & N. LOWDEN¹

1 Atkins

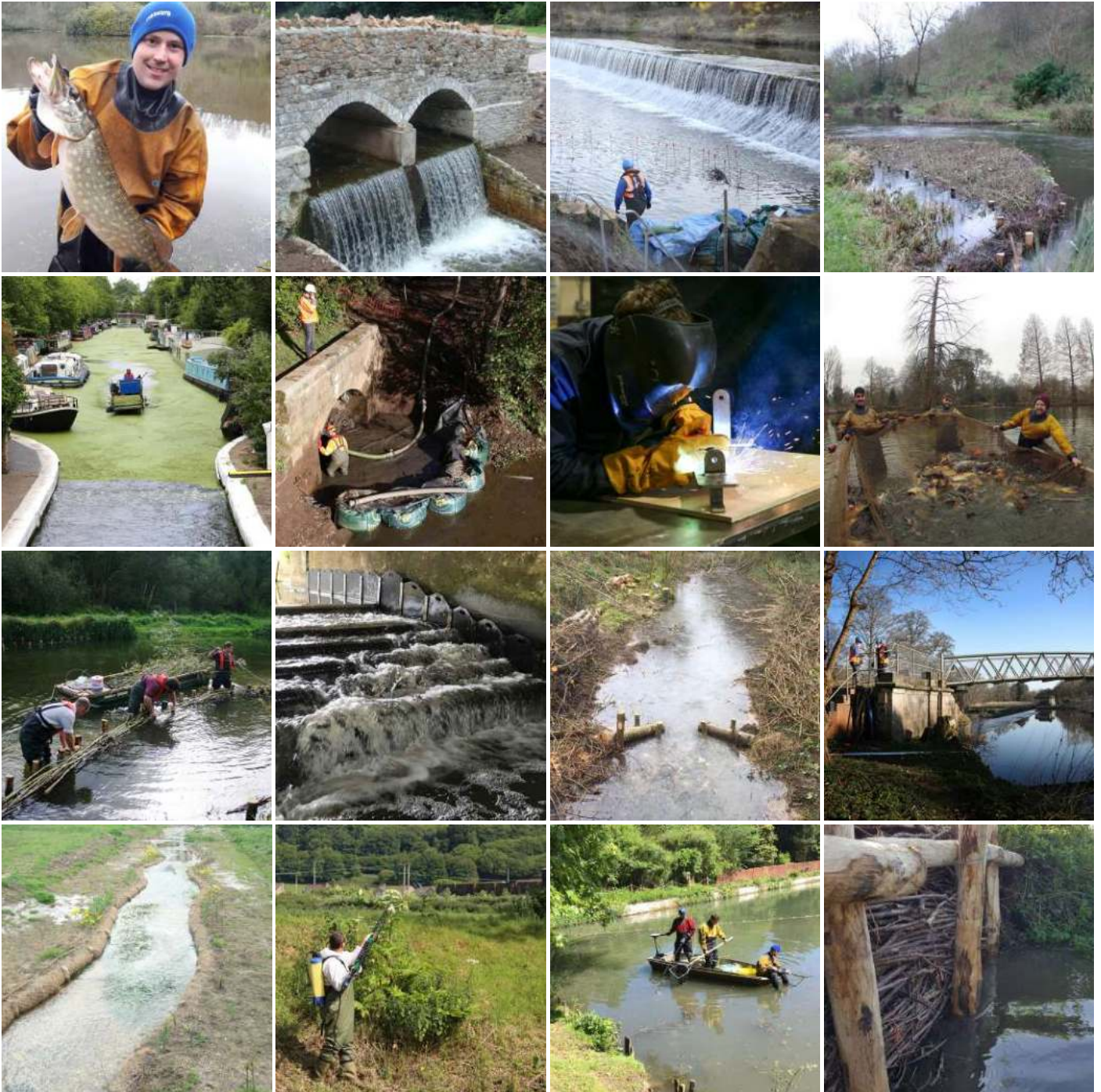
Hafodty Reservoir, near Corris Uchaf, Gwynedd, was a former on-line water storage reservoir managed by Welsh Water. The dam itself was no longer required, or deemed necessary, as a water resource and would have required significant investment to bring up to current safety standards for reservoirs. The best and only option was that of "naturalisation" and so the dam was removed, and the narrow valley restored to its natural state. This included the restoration of the headwaters of the Nant Hafodty, a tributary of the Afon Dulas.

To originally form the reservoir the channel was dammed. This led to the establishment of a 65m long reservoir. The dam face was around 50m wide and 7m high. The decommissioning of Hafodty Reservoir necessitated the design and construction of a new reach of the watercourse which had previously been dammed. The presentation demonstrates how the close working between the designer and contractor on site delivered a high quality, restored, upland channel.

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INVASIVE SPECIES MANAGEMENT - ENVIRONMENTAL SURVEYS - AQUATIC HERBICIDE APPLICATION

Session 5

Citizen Science Programmes

HOW TO PROMOTE CITIZEN INVOLVEMENT IN PERI-URBAN RIVER MANAGEMENT

P. VALL-CASAS¹, M. BENAGES-ALBERT¹, X. GARCIA², A. RIBAS², A. CÚELLAR¹ & D. PAVON²

1 Universitat Internacional de Catalunya, 2 Universitat de Girona

There is a gap between the increasing social use of urban rivers and limited citizen participation in river management under the EU Water Framework Directive (WFD). A pilot participatory process aimed at promoting the active involvement of the general public in the management of an urban stream in the Barcelona Metropolitan Region was designed and tested. The participatory process was supported by web-based Public Participation Geographic Information Systems and face-to-face workshops. The opinions of the general public were collected and citizen decision-making and self-organization were promoted. The assessment of the pilot results provided key learning points for supporting the creation of catchment volunteering groups. These learning points offer a baseline for a bottom-up participation model aimed at empowering riparian communities. This model may complement the current top-down WFD participation model and make river management more multi-level and multi-actor.

FRESHWATER WATCH (CITIZEN SCIENCE PROJECT)

K. SCOTT-SOMME¹, L. CECCARONI¹, S. PARKINSON, I. BISHOP & S. LOISELLE

1 EarthWatch

FreshWater Watch is a methodology for citizen science water quality testing which has been used globally for over 8 years and has collected over 23,000 data points. Freshwater watch uses simple tests for Nitrate (NO₃-N) and Phosphate (PO₄-P) combined with environmental observations to get a snapshot of water quality. The methodology is simple, replicable and scientifically robust, and has been used by small scale community groups, as well as large scale projects, to answer specific questions. This methodology is currently being used by some large-scale EU projects, including Ground Truth 2.0 and MICS.

For Ground Truth 2.0, FreshWater Watch has been used as part of the Swedish case study, to look at water quality management in socio-ecological systems in the Mälarendalen region. The aim of this project was to identify the key challenges in addressing water quality deterioration. From a governance level, the key challenges were found to be that existing data on water quality in Sweden are dispersed, and environmental monitoring by citizens is disconnected from decision-making. We will further discuss lessons learnt and results from GroundTruth 2.0, and how these lessons will then be applied to river restoration projects being run through MICS.

MICS is another large-scale EU funded project, which has created four citizen science projects to monitor the success of nature-based solutions in Hungary (creek Rakos), Romania (Carasuhut wetland), Italy (Marxene river), and the UK (site tbc). This will be developed as a co-design process at the various sites, and FreshWater Watch will be used to monitor water quality where desired.

The aim of FreshWater Watch is to allow citizens more of a role in monitoring water quality, allowing communities to be stewards of their own environments. FreshWater Watch has huge potential to be used by communities to monitor the effectiveness of river restoration, to allow best practice to be scientifically backed up and to provide evidence for communities to defend and implement projects.

Session 5

Using data to inform progress

MAKING THE MOST OF OPEN BIODIVERSITY DATA FOR RIVER RESTORATION PLANNING

M. WILKES¹

1 Coventry University

In recent years, environmental, ecological and genetic data have been increasingly shared in global repositories but the new opportunities arising for applied ecology at large scales have not been fully seized. A novel framework for combining openly available environmental data and species' occurrence, trait and genetic records with computational modelling will be introduced and its potential applications to river restoration planning will be discussed.

THE RIVER CONDITION ASSESSMENT: A KEY COMPONENT OF RIVER ASSESSMENT WITHIN THE BIODIVERSITY NET GAIN CALCULATIONS

A. GURNELL¹, S. SCOTT², L. SHUKER³, J. ENGLAND², R. JEFFRIES² & D. GURNELL⁴

1 Queen Mary University of London, 2 Environment Agency, 3 Cartographer/Thames21, 4 Cartographer

The River Condition assessment is a key element of the Rivers and Streams Component of BioDiversity Net Gain calculations (<http://publications.naturalengland.org.uk/publication/5850908674228224>). This presentation considers three main aspects of the River Condition metric. First, it outlines the assessment's role within the Rivers and Streams component of Net Gain. Second, it explains the multi-spatial scale approach that is employed to evaluate river condition and impacts of changes on condition. Finally, it evaluates the assessment at 40 sites located on 20 rivers, to illustrate how it performs on rivers of different hydromorphological type and degree of human modification.

FLOODPLAIN GRASSLAND RESTORATION - A 3-YEAR STUDY OF FLOODPLAIN MEADOW RESTORATION ATTEMPTS IN THE UK - RESTORING RESILIENCE IN FLOODPLAIN AGRICULTURE

E. ROTHERO¹, A. SKINNER², I. TATARENKO³, D. GOWING³, C. LAWSON³

1 Open University Floodplain Meadows Partnership, 2 River Restoration Centre, 3 Open University

Ecological restoration of floodplain grasslands is a major tool to develop resilient floodplains for climate change. The promotion of multi-functional floodplain habitats should be prioritised in order to achieve better cost/benefit in delivering a range of public goods (e.g. carbon storage). The additional benefit of grasslands is that they are a functional and productive agricultural system.

This talk will present the findings from a 3 year study into floodplain meadow restoration efforts in the UK. It will outline the pre-restoration condition of 163 different restoration sites, methods used, timescales and success. It will also consider the reasons for success or failure.

The talk will also outline the range of ecosystem services this habitat can provide and highlight the extent to which it can contribute towards our resilience in the face of climate change.



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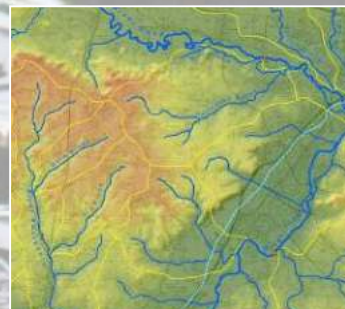
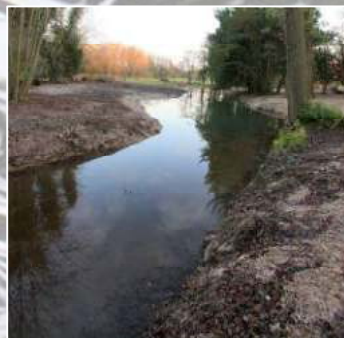


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- Soils, Geology and Geomorphology



Session 6

Woody dams for NFM

IMPLEMENTING LEAKY WOODY STRUCTURE GUIDANCE AT A CATCHMENT SCALE

P. MILLARD¹, E. HALE¹ & M. BARNES¹

1 Mott MacDonald

As part of Leeds Flood Alleviation Scheme Phase II, the Environment Agency and Leeds City Council are undertaking a programme of Natural Flood Management (NFM) works across the 700km² catchment of the River Aire to reduce flood risk in the city. To support the delivery of the scheme, Mott MacDonald is developing a suite of web-based GIS (Geographical Information System) tools to implement NFM measures at a catchment scale. Following the release of the industry guidance 'Assessing the Risk: assessing the potential hazards of using Leaky Woody Structures for NFM' the authors have developed a GIS tool to enable the implementation of this research and to steer the placement and design of leaky barriers on the project so that the risk and consequences of failure is managed appropriately. The guidance has been interpreted into a two-step process; using accessible mapping, followed by simple surveys. The tool is currently undergoing review and is anticipated to be completed in early 2020.

DO LEAKY DEBRIS DAMS WORK? IMPLICATIONS FOR NATURAL FLOOD MANAGEMENT SCHEMES

J. PHILLIPS¹, A. McBRIDE² & S. McEWAN²

1 Environment Agency, 2 FWAG (South West)

Leaky woody dams are seen as effective natural flood management measures that work with natural processes. Currently there is little evidence to assess how effective constructed structures are in 'slowing the flow' or the long-term implications of their impact on channel form and function. This paper represents the results of a detailed monitoring study of the geomorphic and hydrological response of a gravel bed river to a series of 5 constructed dams in a headwater tributary of the River Parrett, Somerset, England. An 18-month continuous record of water levels was made upstream and downstream of each structure together with repeat photographic and topographic survey. The paper makes recommendations regarding site selection of constructed leaky dams and provides clear evidence that these structures will often require future maintenance to ensure that they do not fail to meet their stated flood risk and additional environmental objectives.

NOTES

Session 6

Evaluating urban rivers

ASSESSING THE IMPACTS OF URBANISATION ON THE LOW ORDER STREAMS OF BELFAST LOUGH

A. MOORE¹

1 Queen's University Belfast

In urban areas, rivers have often been seen as a barrier to development and a challenge to be addressed, often with heavy engineering. This has resulted in some river catchments becoming badly degraded, with activities such as channelisation, culverting, storm water discharge and pollution negatively impacting the environment and the ecosystem services these rivers and streams provide. This project brings together hydrological processes, water quality, river ecology and the use of novel eDNA technology on low order streams in the Belfast Lough catchment, to determine the effects of urbanisation. Combining detailed mapping of the drainage infrastructure and hydrological features, with assessments of water quality and the community structure will identify key sources of stream degradation and challenges to improving water and habitat quality.

LIVING WATER CITIES: MAKING A DIFFERENCE IN OUR CITIES AND TOWNS

G. FULFORD¹

1 Biomatrix Water Solutions

Achieving the benefits of River Restoration in heavily Modified Waterways presents a unique set of challenges from vertical hard edges with no riparian zone to elevated nutrient levels and limited space availability. Overcoming these challenges requires innovative and multidisciplinary solutions, often with a technical engineering element. This case study focused presentation will explore some of the latest technical developments in urban river restoration with a particular focus on robust modular Biotechnical engineered designs which can be efficiently implemented by local urban catchment community groups and voluntary organisations without disruption to surrounding infrastructure. The case studies presented address the challenges and opportunities and lessons learned from six specific space constrained urban river restoration projects, ranging from the River Lea in London to the Chicago River and the River Villain in France and more.

REWILDING 'LOST' URBAN RIVERS FOR HEALTH AND WELLBEING

A. T. BROADHEAD¹ & P. SIMKINS¹

1 Arup

This paper considers two emerging concepts – rewilding and health and wellbeing – and considers how these could shape future urban river restoration.

Around the world, lost urban rivers are being restored, uncovered, cleaned, and redesigned as key assets for cities of the future. We argue that concepts of rewilding from the conservation community could be directly relevant to maximising the ecosystem benefits of urban rivers, despite some constraints. This could bring major benefit for both natural environment outcomes in cities, and also have the potential to deliver key outcomes for people – access, amenity, play, safe spaces for urban childhoods, nature prescribing for mental health, as well as economic regeneration, natural flood risk management and future climate adaptation. All of these are important for delivering social resilience, which is an emerging concept that we believe will be increasingly applied to urban planning and environmental projects in future.

NOTES

Session 6

Monitoring, evaluation & evidence

EVALUATION OF AQUATIC MACROINVERTEBRATE COMMUNITIES POST-WEIR REMOVAL ON RIVERS IN CUMBRIA, UK

A. MARTINEZ-CRUCIS¹

1 AECOM

Rivers in United Kingdom have been intensively modified over the years by physical modifications. Weir removals is one of the common restoration measures used to improve the hydro-morphological characteristics and recover their life communities. For the purpose of this study the rivers Lyvennet, Lowther, Eamont and Caldew were selected at the east of Cumbria. River Habitat Surveys (RHS) and macroinvertebrate sampling were carried out to compare the status of the rivers with the location prior to the removals based on historical data. Some improvements were observed in three of the rivers in the RHS and macroinvertebrates scores, except in the River Lyvennet still being used as a crossing point. Although many studies have assessed dam removal outcomes, it is difficult to predict general responses about range or magnitude. A well-designed monitoring programme could be implemented to accurately assess improvements to macroinvertebrate community and hydro-geomorphology.

DEVELOPING AN EVIDENCE BASE FOR THE IMPLEMENTATION OF PHOSPHORUS AND SEDIMENT AGRI-ENVIRONMENT MEASURES AT THE FARM-SCALE IN THE EVENLODE CATCHMENT, A HEADWATER TRIBUTARY OF THE RIVER THAMES

J. STOPPS¹, B. HANCOCK¹, J. NEALE¹, D. GASCA¹, M. BARKER¹ & S. OLNEY²

1 Atkins, 2 Natural England

Understanding the land use factors affecting WFD condition of our watercourses requires an understanding of hydrology and water quality at the farm scale. This paper will describe the design and implementation of a monitoring network developed with landowners that quantifies the flows of water, phosphorus and sediment from fields and farmyards into watercourses.

Over 15 landholdings delivering different agri-environment measures from arable reversion, farmyard management, fencing and buffer strips to wetland creation and Natural Flood Management are being assessed. The monitoring approaches used in each case will be described including their costs and other practical considerations.

Farm scale monitoring is part of the broader Evenlode Catchment Laboratory initiative that hosts and coordinates a large number of data collectors across the Evenlode catchment. The way in which these data are combined to inform integrated catchment strategies will be described.

MASTERING THE MONITORING: FISH COMMUNITY RESPONSES TO A LOW-COST PASSAGE EASEMENT AT A BRIDGE CULVERT

T. J. MYERSCOUGH¹ & J. GREY²

1 Wyre Rivers Trust, 2 Wild Trout Trust

Working in partnership, Wyre Rivers Trust and Wild Trout Trust delivered a low-cost fish easement at a culvert on Woodplumpton Brook in early 2017. The site has been monitored annually (December 2016 pre-works to 2019 and ongoing), supported by MSc student cohorts from Queen Mary University of London as part of a fieldcourse. The students gain training and experience of monitoring and analysis techniques, as well as reporting and science communication (blogs, newsletters), and the co-conspirators gain invaluable data for 'free'. The project was extended in 2019 with sampling in summer by a Lancaster University MSc student, and the aim is to extend sampling at this alternative time period to glean extra information. In a nutshell, the easement has reinstated

connectivity; various metrics indicate that the fish community is more similar upstream and downstream post intervention. Seasonal differences require more data and analysis but hint at some possible issues to address in the future.



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1

Investigation into the Effects of Bank-side Woodland on the Faecal Bacteria Burden in Streams in the Scottish Borders

H. WILKINSON¹

1 Bangor University

2

Shear Stress Data Mining (SSDM) method: national scale prediction of geomorphological processes

B. HANKIN¹, N. TODD-BURLEY¹, M. HEMSWORTH¹, R. ING¹

1 JBA Consulting

3

Mapping socio-environmental interactions and trade-offs in the land-river interface

K. VERCUYSSSE¹, R. C. GRABOWSKI¹

1 Cranfield University

4

Foot Meadow – A Step in the Right Direction

V. TZIKAS¹

1 River Nene Regional Park

5

Natural Course – a collaborative approach to improve our rivers

C. HIGSON¹

1 Natural Course – Environment Agency

6

Monitoring a toolbox of Natural Flood Management structures in Somerset, UK: are they effective for flow attenuation and flood risk reduction?

T. H. LOCKWOOD¹

1 University of Bristol

7

Geomorphological modelling of leaky dams: preliminary results

J. WOLSTENHOLME¹

1 University of Hull

8

Changing river landscapes: An interdisciplinary exploration of trees in Natural Flood Management

J. KNIGHT¹, S. EMERY¹, S. J. DIXON¹

1 University of Birmingham

9

The influence of morphology on temporary stream communities in a changing climate

C. HAYES¹, R. STUBBINGTON¹, J. ENGLAND², R. MORTIMER¹

1 Nottingham Trent University, 2 Environment Agency

10

Improving our urban rivers by means of the Water Environment Fund – an example from the Levern Water in Scotland

S. HOMONCIK¹

1 AECOM

11

Resilience analysis of leaky dam systems

Z. VAN LEEUWEN¹, L. BROWN¹, M. KLAAR¹, M. SMITH¹, R. LAMB², S. ROSE³

1 University of Leeds, 2 JBA Trust, 3 JBA Consulting

12

Courageous Farming: Land managers leading the way in the Upper Aire

S. KNIGHT¹, D. VINE¹

1 Yorkshire Wildlife Trust

13

Improving Fish Passage at Gotter Water Weir

M. DONOGHUE¹, C. AGNEW¹, R. MITCHELL²

1 Royal HaskoningDHV, 2 SEPA

14

Reservoir decommissioning in Britain: A review

D. HUGHES¹

1 Newcastle University

15

Large Wood Structures - applications in the Scottish Highlands for habitat improvement

F. CAITHNESS¹, H. MOIR¹, E. GILLIES¹

1 cbec

16

Yorkshire Environment Programme

The Yorkshire Environment Programme Team (EA)

17

Yorkshire Derwent Catchment Partnership

Yorkshire Derwent Catchment Partnership

18

Ryevitalise, Landscape Project

19

River Esk and Coastal Streams Catchment Partnership

The Esk and Coastal Streams Catchment Partnership

20

Aire Catchment Network

The Aire Catchment Network (Partnership)

21

Hull and East Riding Catchment Partnership

Hull and East Riding Catchment Partnership

22

Burrow Recorder: a smartphone app for capturing impacts of burrowing invasive species on erosion

G. L. HARVEY¹, A. J. HENSHAW¹, J. ENGLAND², D. KILBEY³

1 Queen Mary University of London, 2 Environment Agency, 3 Natural Apptitude

23

Designing Steep Watercourse Cascades and Culvert Crossings in Scotland

S. K. DAVIDSON¹, L. MCGREGOR¹

1 Jacobs

24

What value natural rivers?

V. KEELE¹, D. GILVEAR¹, A. LARGE², A. TREE³, P. BOON⁴

1 University of Plymouth, 2 Newcastle University, 3 Scottish Natural Heritage, 4 Freshwater Biological Association

25

Whole catchment modelling as a digital twin to assess natural flood management options

D. R. KITTS¹, K. KIMBALL¹, J. J. STOBART¹, J. W. PICKERING¹

1 BMT

26

Does re-meandering have a positive impact on flood attenuation?

I. COSTAZ¹

1 University of Dundee



the River Restoration Centre

Working to restore and enhance our rivers

DELEGATE LISTS

AS COMPILED ON 7TH SEPTEMBER 2020

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<u>Name</u>	<u>Organisation</u>	<u>Workshop</u>
Adams, David	River Restoration Centre	Workshop E - Landowner engagement and communication and communication
Ahmet, Melissa	Affinity Water Limited	Workshop E - Landowner engagement and communication and communication
Allum, Natalie	Norwegian Environment Agency	Workshop B - Understanding the role of beavers in river restoration
Andison, Elly	Environment Agency	Workshop B - Understanding the role of beavers in river restoration
Andrews, Karen	Environment Agency	Workshop A - Restoring connectivity between the stream and its floodplain
Arthur, Scott	Heriot-Watt University	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Ashby-Crane, Richard	Jacobs	Workshop B - Understanding the role of beavers in river restoration
Aubrey, Sarah	Natural Resources Wales	
Bailey, Kate	Yorkshire Derwent Catchment Partnership	Workshop C - NFM implementation guidance
Ball, Alex	Canal & River Trust, Unlocking the Severn	Workshop E - Landowner engagement and communication and communication
Banks, Rebecca	Norfolk Rivers Trust	
Barclay, Hannah	Environment Agency	Workshop C - NFM implementation guidance
Barham, Peter	Welland Rivers Trust	Workshop E - Landowner engagement and communication and communication
Barnes, Megan	Mott MacDonald	Workshop E - Landowner engagement and communication and communication
Barrett-Mold, Claire	Environment Agency	Workshop E - Landowner engagement and communication and communication
Beech, Bethan	National Trust	Workshop C - NFM implementation guidance
Beeching, Cathy	Environment Agency	Workshop A - Restoring connectivity between the stream and its floodplain
Beeden, Helen	United Utilities	
Bennett, Sarah	Natural Resources Wales	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Bevan, Dan	Arup	Workshop B - Understanding the role of beavers in river restoration
Bickerton, Melanie	University of Birmingham	Workshop D - Application of NFM modelling
Bingham, Louise	Arup	Workshop A - Restoring connectivity between the stream and its floodplain
Bithell, Claire	Environment Agency	Workshop A - Restoring connectivity between the stream and its floodplain
Blackmore, Mike	Wessex Rivers Trust	Workshop B - Understanding the role of beavers in river restoration
Bleasdale, Charlie	Atkins	Workshop D - Application of NFM modelling
Blincow, Andy	Wessex Rivers Trust	Workshop B - Understanding the role of beavers in river restoration
Bond, Nat	Alaska Ecological Contracting Ltd	Workshop C - NFM implementation guidance
Bond, Will	Alaska Ecological Contracting Ltd	none
Boon, Phil	Freshwater Biological Association	Workshop B - Understanding the role of beavers in river restoration
Boulton, Bonnie	Environment Agency	Workshop A - Restoring connectivity between the stream and its floodplain
Bowles, Fiona	River Restoration Centre	Workshop A - Restoring connectivity between the stream and its floodplain
Bradley, Claire	Natural England	Workshop C - NFM implementation guidance
Brand, James	Environment Agency	Workshop B - Understanding the role of beavers in river restoration
Branson, Gillian	Natural Water (and Arun & Rother Rivers Trust)	Workshop E - Landowner engagement and communication and communication
Brennan, Matthew	Arup	Workshop C - NFM implementation guidance
Broadhead, Adam	Arup	Workshop D - Application of NFM modelling
Brookes, Andrew	AECOM	none
Broomby, Jenny	JBA Consulting	Workshop B - Understanding the role of beavers in river restoration
Brown, David	Environment Agency	Workshop D - Application of NFM modelling
Brown, Emily	Atkins	Workshop D - Application of NFM modelling
Brunner, Peter	Royal HaskoningDHV	Workshop D - Application of NFM modelling
Buckland, Sam	Sussex Flow Initiative	Workshop D - Application of NFM modelling
Buckman, Joe	Environment Agency	Workshop D - Application of NFM modelling
Bull, Ben	R J Bull	
Bull, Harry	R J Bull	Workshop A - Restoring connectivity between the stream and its floodplain
Burgess-Gamble, Lydia	Environment Agency	Workshop B - Understanding the role of beavers in river restoration
Burns, Paul	USDA Forest Service - Siuslaw National Forest	Workshop A - Restoring connectivity between the stream and its floodplain
Burton, Claire	Yorkshire Wildlife Trust	Workshop B - Understanding the role of beavers in river restoration
Caithness, Fiona	cbec eco-engineering UK Ltd	Workshop E - Landowner engagement and communication and communication
Caldwell, James	North York Moors National Park Authority	Workshop C - NFM implementation guidance
Carter, Chloe	University of Hull	Workshop C - NFM implementation guidance
Causser, Katherine	Environment Agency	Workshop A - Restoring connectivity between the stream and its floodplain
Chadd, Richard	Environment Agency	Workshop C - NFM implementation guidance
Chaney Baxter, Mark	University of Birmingham	Workshop E - Landowner engagement and communication and communication
Charman, Richard	Environment Agency	Workshop D - Application of NFM modelling
Chisnall, Tamsin	Arup	Workshop D - Application of NFM modelling
Clapham, Rob	Environment Agency	Workshop E - Landowner engagement and communication and communication
Clark, Alex	Salix	Workshop B - Understanding the role of beavers in river restoration
Clarke, Stewart	National Trust	Workshop A - Restoring connectivity between the stream and its floodplain
Clegg, Matt	Black and Veatch	Workshop D - Application of NFM modelling
Clews, Esther	Individual	Workshop A - Restoring connectivity between the stream and its floodplain
Clyde, Michael	Natural Resources Wales	Workshop C - NFM implementation guidance
Collins, Jennifer	Black and Veatch	
Comins, Kate	cbec eco-engineering UK Ltd	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Coombes, Rachel	AECOM	No option - Thursday delegate only
Cooper, Glen	Natural England	Workshop E - Landowner engagement and communication and communication
Cooper, Ian	Ground Control Ltd	Workshop C - NFM implementation guidance
Costaz, Isabelle	University of Dundee	Workshop D - Application of NFM modelling
Courtneidge, David	South East Rivers Trust	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Cox, Dale	Natural Resources Wales	Workshop C - NFM implementation guidance
Crabb, Maddie	Wessex Rivers Trust	Workshop C - NFM implementation guidance
Craxford, Stuart	Natural Resources Wales	Workshop C - NFM implementation guidance
Crisford, Gen	National Trust	Workshop B - Understanding the role of beavers in river restoration
Croggon, Rosie	Severn Rivers Trust	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Cullis, Jo	Jacobs	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Curran Parry, Sally	Natural Resources Wales	Workshop E - Landowner engagement and communication and communication

<u>Name</u>	<u>Organisation</u>	<u>Workshop</u>
Dahl, Lev	Eden Rivers Trust	Workshop A - Restoring connectivity between the stream and its floodplain
Dale, Kathy	EnviroCentre Limited	Workshop B - Understanding the role of beavers in river restoration
Davenport, Nigel	River Thame Conservation Trust	Workshop D - Application of NFM modelling
Davidson, Stephanie	Jacobs	Workshop A - Restoring connectivity between the stream and its floodplain
Davies, Becky	Natural Resources Wales	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Davies, Dewi	National Trust	
Davies, Ieuan	Natural Resources Wales	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Dawson, David	University of Leeds	none
Deane, Ashley	Cheshire Wildlife Trust	Workshop B - Understanding the role of beavers in river restoration
Denmark-Melvin, Meg	Penny Anderson Associates Ltd	Workshop B - Understanding the role of beavers in river restoration
Dennis, Ian	Royal HaskoningDHV	Workshop D - Application of NFM modelling
Dent, Jonathan	St Nicks	Workshop E - Landowner engagement and communication and communication
Dew, Jacob	Five Rivers Environmental Contracting Ltd	Workshop E - Landowner engagement and communication and communication
Dickinson, Lewis	Wildlife Trust BCN (UBOCP)	Workshop B - Understanding the role of beavers in river restoration
Diver, Naomi	Environment Agency	Workshop B - Understanding the role of beavers in river restoration
Dixon, Simon	University of Birmingham	No option - Thursday delegate only
Dodge, Kimberley	Stonbury Ltd	None
Doe, Shelley	Environment Agency	Workshop E - Landowner engagement and communication and communication
Doherty, Julie	National Trust	Workshop E - Landowner engagement and communication and communication
Downes, Rachel	Environment Agency	
Downing, Anthony	Environment Agency	
Dryden, Rob	Environment Agency	Workshop A - Restoring connectivity between the stream and its floodplain
Edgar, Nicola	Environment Agency	Workshop C - NFM implementation guidance
Edwards, Richard	Salix	none
Egan, Connor	University of Birmingham	Workshop E - Landowner engagement and communication and communication
Ellis, Adam	Five Rivers Environmental Contracting Ltd	Workshop C - NFM implementation guidance
England, Judy	Environment Agency	Workshop B - Understanding the role of beavers in river restoration
Evans, Jennine	Environment Agency	
Everett, Jane	Five Rivers Environmental Contracting Ltd	Workshop E - Landowner engagement and communication and communication
Farmer, Chris	Environment Agency	Workshop A - Restoring connectivity between the stream and its floodplain
Farquharson, Andy	Ground Control Ltd	
Farrell, Emily	Ebsford Environmental Ltd	Workshop D - Application of NFM modelling
Fenton, Ben	Calderdale Council	Workshop E - Landowner engagement and communication and communication
Fisher, Ben	Ebsford Environmental Ltd	
Fisher, Karen	Buckinghamshire County Council	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Foulds, Simon	Royal HaskoningDHV	Workshop A - Restoring connectivity between the stream and its floodplain
French, Chris	Welland Rivers Trust	Workshop A - Restoring connectivity between the stream and its floodplain
Gaertner, Carina	Wildfowl & Wetlands Trust	Workshop C - NFM implementation guidance
Gallop, Jeremy	Environment Agency	Workshop D - Application of NFM modelling
Gamble, Jenny	Environment Agency	Workshop E - Landowner engagement and communication and communication
Gardner, Lizzie	Arup	Workshop B - Understanding the role of beavers in river restoration
Garrett, Heather	Natural Resources Wales	Workshop A - Restoring connectivity between the stream and its floodplain
Gee, Anna	AECOM	No option - Thursday delegate only
German, Sally	Arup	
Gill, Maria	St Nicks	Workshop C - NFM implementation guidance
Gilpin, Jonathan	Natural Resources Wales	Workshop B - Understanding the role of beavers in river restoration
Gilvear, David	University of Plymouth	Workshop B - Understanding the role of beavers in river restoration
Gordon, Sophie	Staffordshire University	none
Grant, Oliver	Environment Agency	Workshop C - NFM implementation guidance
Gray, Leom	Scottish Environment Protection Agency	Workshop B - Understanding the role of beavers in river restoration
Gray, Rob	Friends of the River Crane Environment (FORCE)	
Greaves, Dave	Eden Rivers Trust	Workshop B - Understanding the role of beavers in river restoration
Green, Alex	Yorkshire Wildlife Trust	Workshop E - Landowner engagement and communication and communication
Greest, Vicky	Natural Resources Wales	Workshop C - NFM implementation guidance
Grey, Jonathan	Wild Trout Trust	Workshop A - Restoring connectivity between the stream and its floodplain
Griffin, Ian	Jacobs	
Griffiths, Rosanna	Stantec	Workshop C - NFM implementation guidance
Gurnell, Angela	Queen Mary University of London	Workshop A - Restoring connectivity between the stream and its floodplain
Gurnell, Dave	Cartographer	Workshop B - Understanding the role of beavers in river restoration
Haine, Richard	frog environmental	Workshop C - NFM implementation guidance
Hamilton, Helen	Penny Anderson Associates Ltd	Workshop C - NFM implementation guidance
Hancock, Bethany	Atkins	Workshop A - Restoring connectivity between the stream and its floodplain
Hannaby, Paul	Environment Agency	Workshop D - Application of NFM modelling
Hansen, Silje	Sabima	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Hardcastle, Kathryn	River Nene Regional Park CIC	Workshop E - Landowner engagement and communication and communication
Harland, Grace	Affinity Water Limited	Workshop E - Landowner engagement and communication and communication
Harris, Adam	Natural Resources Wales	
Harrison, Rich	Canal & River Trust, Unlocking the Severn	Workshop E - Landowner engagement and communication and communication
Harvey, Orlanda	River Restoration Centre	
Harvey, Ryan	Yorkshire Esk rivers trust	Workshop B - Understanding the role of beavers in river restoration
Haughton, Gavin	Environment Agency	Workshop D - Application of NFM modelling
Hayes, Chloe	Nottingham Trent University	No option - Thursday delegate only
Hearn, Suzanne	Natural Resources Wales	Workshop C - NFM implementation guidance
Hemsworth, Matt	JBA Consulting	Workshop A - Restoring connectivity between the stream and its floodplain
Herve, Grace	Forestry England	Workshop E - Landowner engagement and communication and communication
Hewitt, Mark	Yorkshire Dales National Park Authority	Workshop A - Restoring connectivity between the stream and its floodplain
Higgins, Bernie	Yorkshire Wildlife Trust	Workshop D - Application of NFM modelling

<u>Name</u>	<u>Organisation</u>	<u>Workshop</u>
Higgs, Richard	National Trust	Workshop D - Application of NFM modelling
Higson, Craig	Environment Agency	Workshop E - Landowner engagement and communication and communication
Hill, Nicholas	Royal HaskoningDHV	Workshop C - NFM implementation guidance
Hobson, Sadie	Natural England	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Holland, David	Salix	
Homonick, Sally	AECOM	Workshop D - Application of NFM modelling
Howell, Phillip	Natural Resources Wales	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Howells, Jill	Natural Resources Wales	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Hughes, Daryl	Newcastle University	Workshop B - Understanding the role of beavers in river restoration
Ing, Rebecca	Mott MacDonald	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Irvine, Matt	Wessex Rivers Trust	Workshop C - NFM implementation guidance
James, Alice	The National Trust	Workshop A - Restoring connectivity between the stream and its floodplain
Jenkins, Kate	Natural Resources Wales	Workshop E - Landowner engagement and communication and communication
Jenkins, Mike	Natural Resources Wales	Workshop B - Understanding the role of beavers in river restoration
Jennings, Ryan	JBA Consulting	Workshop C - NFM implementation guidance
Jones, Adrian	Natural Resources Wales	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Jones, Jason	Natural Resources Wales	Workshop B - Understanding the role of beavers in river restoration
Jones, Kate	Staffordshire Wildlife Trust	Workshop E - Landowner engagement and communication and communication
Jones, Lloyd	Natural Resources Wales	Workshop D - Application of NFM modelling
Jones, Mike	Arup	Workshop E - Landowner engagement and communication and communication
Jones, Peter	Natural Resources Wales	Workshop C - NFM implementation guidance
Juta, Ursula	Norfolk Rivers Trust	Workshop B - Understanding the role of beavers in river restoration
Kelly, Fergal	Office of Public Works (Ireland)	Workshop C - NFM implementation guidance
Kelly, Jackie	Forestry England	Workshop E - Landowner engagement and communication and communication
Kimball, Kathryn	BMT Ltd	
King, Lydia	The Devon Wildlife Trust	Workshop C - NFM implementation guidance
King, Sarah	Atkins	Workshop E - Landowner engagement and communication and communication
Kinghan, Susie	Ribble Rivers Trust	Workshop D - Application of NFM modelling
Kipling, Rachel	Environment Agency	Workshop A - Restoring connectivity between the stream and its floodplain
Knight, Suzie	Yorkshire Wildlife Trust	Workshop C - NFM implementation guidance
Kozak, Luke	Environment Agency	Workshop A - Restoring connectivity between the stream and its floodplain
Lancaster, Emma	Atkins	Workshop D - Application of NFM modelling
Lavelle, Anna	Arup	Workshop C - NFM implementation guidance
Lawrence, Chris	Natural Resources Wales	
Leach, Jason	Canal & River Trust, Unlocking the Severn	Workshop E - Landowner engagement and communication and communication
Leake, Sian	Arup	Workshop D - Application of NFM modelling
Lee, Alison	NatureScot	Workshop C - NFM implementation guidance
Leighton, Emma	Natural England	
Leman, Heb	Environment Agency	Workshop E - Landowner engagement and communication and communication
Letellier, David	Natural Resources Wales	
Lewis-Phillips, Jonathan	Norfolk Rivers Trust	Workshop B - Understanding the role of beavers in river restoration
Li, Ji	University of Birmingham	
Li, Lin	University of Birmingham	Workshop C - NFM implementation guidance
Limbrick, Kelvin	Stantec	Workshop A - Restoring connectivity between the stream and its floodplain
Llewellyn-Smith, Rob	Natural Resources Wales	Workshop E - Landowner engagement and communication and communication
Lloyd, Mark	The Rivers Trust	Workshop D - Application of NFM modelling
Lockwood, Tamsin	University of Bristol	Workshop D - Application of NFM modelling
Long, Emily	National Trust	Workshop A - Restoring connectivity between the stream and its floodplain
Longstaff, Tim	River Thames Conservation Trust	Workshop C - NFM implementation guidance
Lovering, Jason	Five Rivers Environmental Contracting Ltd	
Lowe, Oliver	Natural Resources Wales	Workshop B - Understanding the role of beavers in river restoration
Makin, Joanne	Aylesbury Vale District Council	Workshop D - Application of NFM modelling
Mant, Jenny	Ricardo	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Martin, Josie	Environment Agency	Workshop E - Landowner engagement and communication and communication
Martinez Crucis, Ana	AECOM	none
Maskill, Rachael	Environment Agency	Workshop D - Application of NFM modelling
Maxwell, Alasdair	Environment Agency	Workshop E - Landowner engagement and communication and communication
Maxwell, Louise	Environment Agency	Workshop C - NFM implementation guidance
McBride, Angelique	FWAG SW	Workshop D - Application of NFM modelling
McDonell, Iain	Environment Agency	Workshop C - NFM implementation guidance
McEwan, Sabine	FWAG SW	Workshop C - NFM implementation guidance
McGregor, Chris	Natural England	Workshop D - Application of NFM modelling
McKenzie, Scott	Derbyshire Wildlife Trust	Workshop A - Restoring connectivity between the stream and its floodplain
Meehan, Ceri	Natural Resources Wales	Workshop B - Understanding the role of beavers in river restoration
Mercer, Theresa	University of Lincoln	
Meyer, Kate	USDA Forest Service, Willamette National Forest	Workshop A - Restoring connectivity between the stream and its floodplain
Millard, Paul	Mott MacDonald	Workshop D - Application of NFM modelling
Mitchell, Luke	Mott MacDonald	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Moir, Hamish	cbec eco-engineering UK Ltd	Workshop B - Understanding the role of beavers in river restoration
Moore, Andrew	Queen's University Belfast	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Moore, Annabel	Arup	Workshop C - NFM implementation guidance
Morris, Gary	Environment Agency	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Morrissey, Ian	Atkins	Workshop C - NFM implementation guidance
Morsund, Anne Sofie	Sabima	Workshop B - Understanding the role of beavers in river restoration
Mortimer, Sophie	Affinity Water Limited	Workshop E - Landowner engagement and communication and communication
Morton, Rachel	MTCBC	Workshop E - Landowner engagement and communication and communication
Mullen, Abby	National Trust	Workshop F - Achieving Urban Flood Resilience in an uncertain future

<u>Name</u>	<u>Organisation</u>	<u>Workshop</u>
Mullen, bede	Slow The Flow	Workshop D - Application of NFM modelling
Murphy, Patrick	River Restoration Centre	
Murphy, Siobhan	Natural England	Workshop E - Landowner engagement and communication and communication
Myerscough, Thomas	Wyre Rivers Trust	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Naden, Rachel	Yorkshire Water	Workshop E - Landowner engagement and communication and communication
Nash, Chris	Environment Agency	Workshop A - Restoring connectivity between the stream and its floodplain
Neame, Elisa	Environment Agency	Workshop C - NFM implementation guidance
Needham, Ruth	Trent Rivers Trust	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Ngai, Rachelle	JBA Consulting	Workshop D - Application of NFM modelling
Nicholas, Robert	University of Birmingham	
Nicholson, Jackie	Environment Agency	Workshop A - Restoring connectivity between the stream and its floodplain
Nineham, Nicola	Mott MacDonald	Workshop E - Landowner engagement and communication and communication
Nixon, Kate	Environment Agency	Workshop C - NFM implementation guidance
O'Donnell, Emily	University of Nottingham	Workshop F - Achieving Urban Flood Resilience in an uncertain future
O'Keefe, Owen	Roughan & O'Donovan	Workshop B - Understanding the role of beavers in river restoration
Old, Joanne	Environment Agency (National Geomorphology Team)	Workshop E - Landowner engagement and communication and communication
Osborn, Hamish	Natural Resources Wales	Workshop B - Understanding the role of beavers in river restoration
Page, Annabel	River Thame Conservation Trust	Workshop D - Application of NFM modelling
Parr, Matt	Environment Agency	Workshop D - Application of NFM modelling
Pearson, Eleanor	University of Leeds	Workshop E - Landowner engagement and communication and communication
Pearson, Paula	Groundwork MSSTT	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Pedley, Gareth	Wild Trout Trust	
Penny, David	Natural Resources Wales	
Pepper, Andy	ATPEC River Engineering Consultancy	Workshop B - Understanding the role of beavers in river restoration
Perfect, Charlie	SEPA	Workshop A - Restoring connectivity between the stream and its floodplain
Perry, Sarah	Herts and Middlesex Wildlife Trust	
Phillips, Elisa	APEM Ltd	Workshop A - Restoring connectivity between the stream and its floodplain
Phillips, Hilary	River Thame Conservation Trust	Workshop A - Restoring connectivity between the stream and its floodplain
Phillips, John	Environment Agency	Workshop A - Restoring connectivity between the stream and its floodplain
Pickering, Tim	Environment Agency	Workshop E - Landowner engagement and communication and communication
Pickles, Gail	Trent Rivers Trust	none
Pimblett, Joe	Cheshire wildlife trust	Workshop C - NFM implementation guidance
Pittner, Chris	Stantec	none
Plotnykova, Hanna	UNECE	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Pluckwell, Guy	Environment Agency	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Powell, Helen	Natural England	Workshop A - Restoring connectivity between the stream and its floodplain
Powell, Rebecca	The National Trust	Workshop A - Restoring connectivity between the stream and its floodplain
Powers, Paul	US Forest Service	none
Rajanayagam, Celina	Affinity Water Limited	Workshop A - Restoring connectivity between the stream and its floodplain
Redding, Mike	APEM Ltd	Workshop C - NFM implementation guidance
Rees, Liam	AECOM	No option - Thursday delegate only
Rees, Mair	Natural Resources Wales	Workshop B - Understanding the role of beavers in river restoration
Reid, Hannah	Kent Wildlife Trust	Workshop B - Understanding the role of beavers in river restoration
Reid, Helen	SEPA	Workshop A - Restoring connectivity between the stream and its floodplain
Reid, Tom	Environment Agency	Workshop E - Landowner engagement and communication and communication
Renman, Asa	Sabima	Workshop C - NFM implementation guidance
Reynolds, Liam	Wessex Water	
Rhodes, Felicia	Arup	Workshop D - Application of NFM modelling
Rice, Scott	Stonbury Ltd	None
Riddington, Rob	Stantec	Workshop C - NFM implementation guidance
Roberts, Dewi	National Trust	
Rodgers, Clare	Environment Agency	Workshop D - Application of NFM modelling
Rogers, Jamie	The Environment Agency	Workshop C - NFM implementation guidance
Rose, Chloe	Yorkshire Wildlife Trust	Workshop E - Landowner engagement and communication and communication
Rose, Steve	JBA Consulting	Workshop D - Application of NFM modelling
Rothero, Emma	Open University	Workshop C - NFM implementation guidance
Ruane, Conor	The Local Authority Waters Programme	Workshop E - Landowner engagement
Rushfeldt, Marie	Norwegian Environment Agency	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Sanders, Melanie	Staffordshire Wildlife Trust	Workshop B - Understanding the role of beavers in river restoration
Savage, Peter	Canal & River Trust, Unlocking the Severn	Workshop C - NFM implementation guidance
Scharff, Ella	River Holme Connections	Workshop E - Landowner engagement
Schwendel, Arved	York St John University	none
Scott-Somme, Kes	Earthwatch	Workshop E - Landowner engagement and communication and communication
Shanahan, Jo	Environment Agency	Workshop A - Restoring connectivity between the stream and its floodplain
Sheehan, Kieran	JBA Consulting	Workshop B - Understanding the role of beavers in river restoration
Simons, Charlotte	Yorkshire Dales Rivers Trust	Workshop C - NFM implementation guidance
Simpson, Carolyn	Natural England	Workshop B - Understanding the role of beavers in river restoration
Skinner, Ann	River Restoration Centre	Workshop C - NFM implementation guidance
Skinner, Kevin	Atkins	Workshop B - Understanding the role of beavers in river restoration
Slater, Karen	Natural England	Workshop C - NFM implementation guidance
Smallwood, Lucy	University of Birmingham	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Smith, Brian	Environment Agency	none
Smith, Russell	Stantec	Workshop D - Application of NFM modelling
Sovic Davies, Petra	London Wildlife Trust	Workshop C - NFM implementation guidance
Spray, Chris	University of Dundee	Workshop D - Application of NFM modelling
Standavid, Oana	Arup	Workshop D - Application of NFM modelling
Stewart, Sally	Kaya Consulting Limited	Workshop D - Application of NFM modelling

<u>Name</u>	<u>Organisation</u>	<u>Workshop</u>
Suzuki, Sayaka	TOKEN C.E.E. Consultants Co., Ltd.	Workshop C - NFM implementation guidance
Swain, Nicola	Environment Agency	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Tattersall, Chris	Wessex Water	Workshop C - NFM implementation guidance
Taylor, Marie	Yorkshire Dales Rivers Trust	Workshop C - NFM implementation guidance
Teague, Richard	Environment Agency	Workshop C - NFM implementation guidance
Thomas, Daniel	RSK LTD	Workshop A - Restoring connectivity between the stream and its floodplain
Thomas, Rhodri	Arup	Workshop E - Landowner engagement and communication and communication
Thorne, Colin	University of Nottingham	Workshop A - Restoring connectivity between the stream and its floodplain
Thornley, Angie	Environment Agency	none
Thornton, Leila	Natural Resources Wales	Workshop E - Landowner engagement and communication and communication
Thrower, Rebecca	JBA Consulting	Workshop C - NFM implementation guidance
Tipping, Christianne	River Restoration Centre	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Todd, Rachael	Atkins	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Tomlin, Emma	Forestry England	Workshop B - Understanding the role of beavers in river restoration
Tonkin, Benjamin	University of Surrey	Workshop D - Application of NFM modelling
Tosney, Jonah	Norfolk Rivers Trust	Workshop B - Understanding the role of beavers in river restoration
Tree, Angus	NatureScot	Workshop B - Understanding the role of beavers in river restoration
Trewick, Gareth	Environmental Land Management Solutions Ltd	
Turley, Matt	Devon Wildlife Trust	Workshop B - Understanding the role of beavers in river restoration
Twine, Karen	Environment Agency	Workshop C - NFM implementation guidance
Tzikas, Viktor	River Nene Regional Park CIC	Workshop C - NFM implementation guidance
Vale, Jackie	Environment Agency	Workshop E - Landowner engagement and communication and communication
Vall-Casas, Pere	Universitat Internacional de Catalunya. School of Architecture	Workshop F - Achieving Urban Flood Resilience in an uncertain future
van den Boogaard, Frits	Royal Smals	Workshop B - Understanding the role of beavers in river restoration
van Leeuwen, Zora	University of Leeds	Workshop D - Application of NFM modelling
Vanicat, Sophie	Environment Agency	Workshop D - Application of NFM modelling
Viswan, Sangeetha	Environment Agency	Workshop A - Restoring connectivity between the stream and its floodplain
Vokes, Warren	Roughan & O'Donovan	Workshop D - Application of NFM modelling
Waller, Clare	Stantec	Workshop D - Application of NFM modelling
Walmsley, Adam	Ribble Rivers Trust	
Watts, David	Affinity Water Limited	Workshop E - Landowner engagement and communication and communication
Waugh, Andrew	Buckinghamshire County Council	Workshop D - Application of NFM modelling
Weller, Phoebe	Five Rivers Environmental Contracting Ltd	Workshop A - Restoring connectivity between the stream and its floodplain
Wells, Josh	Trent Rivers Trust	Workshop A - Restoring connectivity between the stream and its floodplain
Wheeldon, Jenny	Natural England/Environment Agency	Workshop A - Restoring connectivity between the stream and its floodplain
Wheeler, Nicola	Vectis Nature	Workshop E - Landowner engagement and communication and communication
Wheeler, Stephanie	Canal & River Trust, Unlocking the Severn	Workshop B - Understanding the role of beavers in river restoration
Whitehead, Joey	Ebsford Environmental Ltd	
Whitton, Simon	APEM Ltd	Workshop E - Landowner engagement and communication and communication
Wilkes, David	Arup	Workshop D - Application of NFM modelling
Wilkes, Martin	Coventry University	No option - Thursday delegate only
Wilkinson, Hannah	Environment Systems	Workshop E - Landowner engagement and communication and communication
Willows, Elizabeth	Arup	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Winslow, Jason	RSK LTD	Workshop A - Restoring connectivity between the stream and its floodplain
Winstanley, Mike	Severn Rivers Trust	Workshop A - Restoring connectivity between the stream and its floodplain
Wolstenholme, Josh	University of Hull	Workshop D - Application of NFM modelling
Wood, Colleen	Environment Agency	
Wozniczka, Julie	Trent Rivers Trust	No option - Thursday delegate only
Wren, Emma	Mott MacDonald	Workshop C - NFM implementation guidance
Wright, Carrie	Environment Agency	Workshop A - Restoring connectivity between the stream and its floodplain
Wyatt, Kayleigh	Environment Agency	Workshop F - Achieving Urban Flood Resilience in an uncertain future
Yapp, Emma	University of Birmingham	Workshop D - Application of NFM modelling
Yexley, Ben	Natural England	Workshop B - Understanding the role of beavers in river restoration