



Working to restore & enhance our rivers

River Restoration Centre 20th Annual Network Conference

River Restoration in Practice

Including programme, abstracts, workshop &
site visit information, 2019 UK River Prize finalists and notes pages

30th April & 1st May 2019

Britannia Adelphi Hotel, Liverpool

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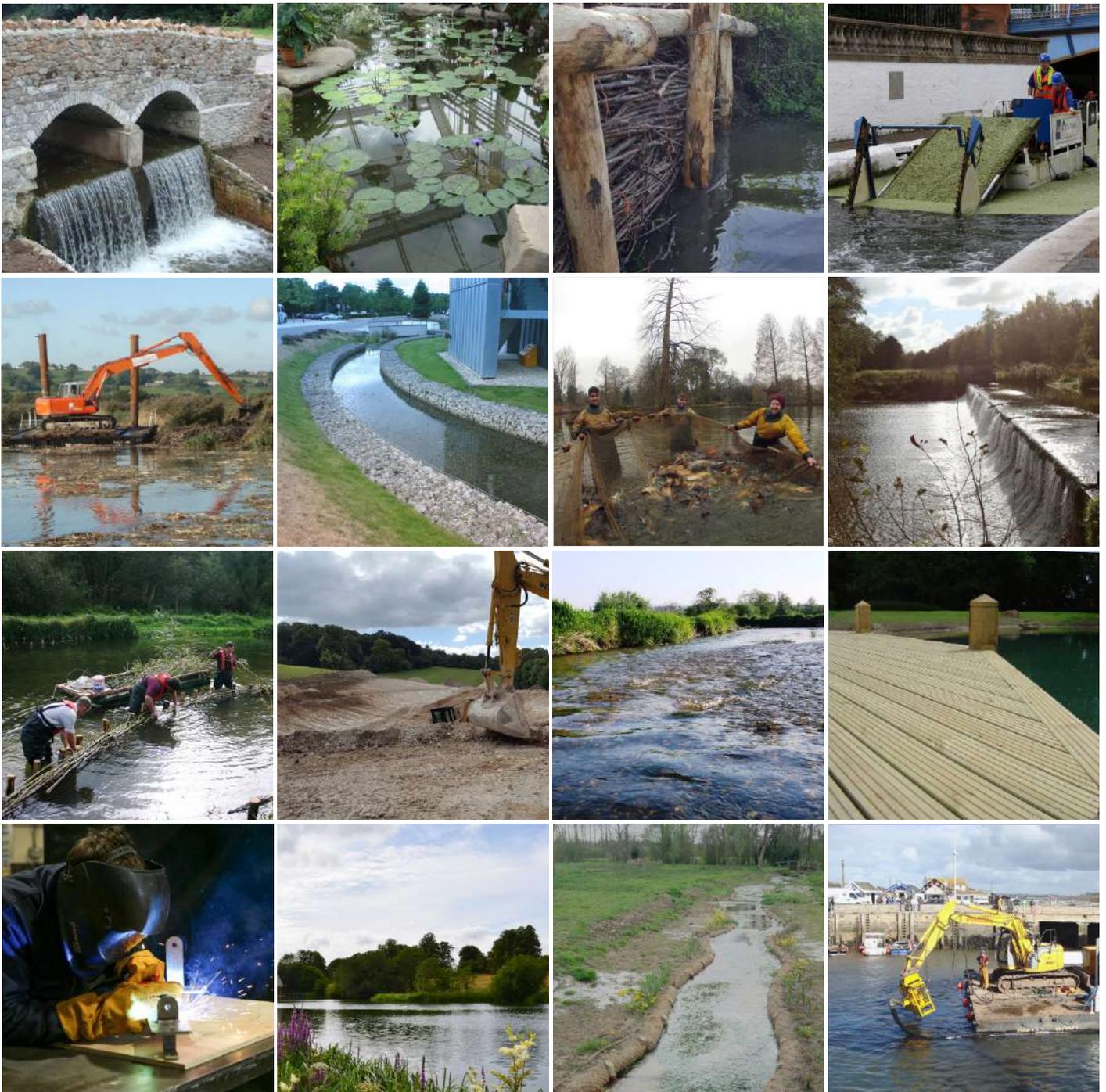
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River Restoration Centre 20th Annual Network Conference

River Restoration in Practice

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Welcome

...from the RRC Managing Director

Welcome to the 20th River Restoration Centre Annual Network Conference! Yes, this is the 20th time river restoration enthusiasts have come together to share experiences, learn from each other and make long-lasting contacts. Starting in Manchester with 159 delegates, we have been to Bristol, Durham, York, Brighton, Edinburgh and Blackpool, just to name a few. We are now here in Liverpool with over 350 delegates for a packed 2 days of 'River Restoration in Practice'. I could not have imagined the Conference growing to be this size 20 years ago. I would like to thank you all for your support; whether it's your first time or your 20th, each of you makes the conference what it is today.

Those of you who have been to our recent Conferences will probably recognise most of the team. The only change from last year is that Chiara has moved on following the completion of her PhD at Cranfield University. Please take a moment to read the Meet the Team section on page 29 where you can find out more about Alex, Jackie, Josh, Marc, Nicola and me!

The title and theme for this year is 'River Restoration in Practice'. A lot of the focus for discussion over the last few years has been on the wider social, economic and strategic challenges that we face as river restoration practitioners. However, it is important that we don't lose sight of the practical, design and construction of river restoration works. We need to continue sharing and furthering best practice, and that is what we are hoping this year's title will encourage.

We have sessions on NFM, analysing data, large-scale engineering, hydromorphology, involving stakeholders and much more. Make sure you read through the abstracts in this handbook - they might help you make the tough decision on which session to attend! One session everyone will be attending is the keynote from Colin Thorne. Colin will be looking over the last 20 years of river restoration and providing a view on what to expect in the next 20 years. It promises to be a fascinating end to day one.

On day two we have a great line-up of workshops and site visits on topics such as climate change, small water bodies and citizen science. If your interest spans across to the other sessions, don't worry, we will be uploading all of the outputs to our website in the coming weeks. One of the workshops is titled 'Learning lessons from what goes wrong'. I think this is an important message for the whole two days - to learn from both our successes and 'failures' - most often due to expectation and understanding. So whether you're presenting, listening or networking, have a think about how your experiences can help others and how we can all learn from your work.

The UK River Prize and Nigel Holmes Trophy continues into its 5th year. We have four fantastic finalists stretching from South West England to the Scottish Highlands. We hope you will join us in celebrating their achievements.

Finally, I would like to say thank you to everyone who has supported RRC throughout the years. 20 years of the RRC Annual Network Conference is a testament to the support we receive from our members, sponsors and delegates. We hope to see you at many more!

Martin Janes, Managing Director



Penny Anderson Associates Ltd

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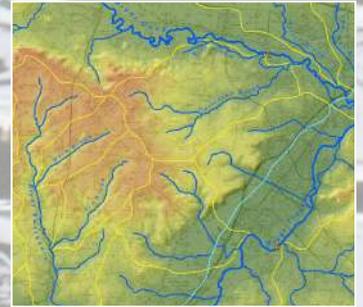


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- Ecological Survey and Evaluation
- Habitat Creation and Restoration
- Soils, Geology and Geomorphology





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2009-2019 River Restoration in Practice
SSSI Wetland Restoration in the New Forest

old channel

Re-Meandering @ Fletcher's Thorns - Image courtesy of New Forest HLS Scheme

PROGRAMME OF EVENTS

DAY 1: - - - TUESDAY 30TH APRIL - - -

REGISTRATION at Reception
Opens at 08:30

09:00 NETWORKING & EARLY VIEWING POSTER SESSION
in the Main Lounge, Pearce & Sefton 60 mins

Session 1
Main Banqueting Room

CHAIR: *Martin Janes (River Restoration Centre)*

10:00 **River Restoration Centre introduction & welcome**
Martin Janes (River Restoration Centre) 15 mins

10:15 **A process-based approach to restoring depositional river valleys, an anastomosing channel network**
Johan Hogervorst & Paul Powers (US Forest Service) 15 mins

10:30 **River restoration in concrete channels**
Jean-Noël Pansera (Rhin-Meuse Water Agency) 15 mins

10:45 **Discussion** 15 mins

11:00 SHORT BREAK *with coffee and tea* 35 mins

11:35 **Innovation, technology and knowledge transfer to support the enhancement of water quality, instream habitat and riparian management**
Ruairí Ó Conchúir (Waters and Communities Office (Ireland) – LAWCO) 15 mins

11:50 **Westcountry Rivers Trust: 25 Years of managing at a catchment scale**
Laurence Couldrick (Westcountry Rivers Trust) 15 mins

12:05 **After the Mersey Basin Campaign, what happened next?**
Peter Batey (Mersey Rivers Trust & Nature Connected) 15 mins

12:20 **Discussion** 15 mins

12:35 LUNCH in **the Main Lounge** 60 mins

Session 2

Main Banqueting Room

Delivering Natural Flood Management

Kensington

Large-scale river engineering

Derby

Analysing the data

CHAIR: *Ann Skinner (River Restoration Centre Board)*

CHAIR: *Jenny Wheeldon (Natural England)*

CHAIR: *Phil Boon (River Restoration Centre Board/Freshwater Biological Association)*

Small scale Natural Flood Management interventions in Norfolk, Suffolk and Essex
Helen George (*Environment Agency*)

A14 – Delivering habitat improvements at a grand scale!
Kevin Skinner (*Atkins, member of SNC-Lavalin Group/A14/River Restoration Centre Board*)

A multiple catchment-scale analysis of historic upland river channel planform adjustments over the last 150 years: A case study in the Lake District, UK
Hannah Joyce (*Durham University*)

13:35

15 mins

Natural Flood Management in practice: overcoming challenges faced by practitioners in two Nottinghamshire catchments
Josh Wells and Alan Graham (*Trent Rivers Trust*)

Delivering major infrastructure, flood risk and biodiversity benefits through collaboration: the A120 Little Hadham bypass and Flood Alleviation Scheme
Nick Elbourne (*Environment Agency*)

Looking forward, looking back: a catchment-based approach to the changing Dorset Stour
Antony Firth (*Fiordr Ltd.*)

13:50

15 mins

14:05 **Discussion**

Discussion

Discussion

10 mins

Session 2 – continued...

<p>Missenden Stream Natural Flood Management and Restoration Alex Back (<i>Buckinghamshire County Council</i>)</p>	<p>“River Restoration in Practice” – Enhancement or just good design? A collaborative approach to river and wetland restoration James Maddison (<i>Jacobs</i>)</p>	<p>Dataset overload - processing methods to support effective catchment planning and assessment Rosanna Griffiths (<i>Stantec</i>)</p>	<p>15 mins</p>
<p>How restoring natural physical processes can mitigate the impacts of an increasingly extreme hydrological regime Hamish Moir (<i>cbec eco-engineering</i>)</p>	<p>Glenridding flood alleviation scheme: combining natural flood management with traditional engineering to deliver flood resilience in complex upstream environments Lyndon Baker (<i>Atkins, member of SNC-Lavalin Group</i>)</p>	<p>Investigating channel sensitivity to morphological changes and impact on future flooding Natasha Todd-Burley & Rebecca Ing (<i>JBA Consulting</i>)</p>	<p>15 mins</p>
<p>14:45 Discussion</p>	<p>Discussion</p>	<p>Discussion</p>	<p>10 mins</p>
<p>14:55</p>	<p>POSTER SESSION in Pearce & Sefton <i>with tea and coffee</i> <i>Vote for your favourite poster</i></p>		<p>45 mins</p>

Session 3

Main Banqueting Room

Morphology & physical processes

CHAIR: *Oliver Lowe (Natural Resources Wales)*

15:40
The Stream Evolution Triangle: integrating the influences of geology, hydrology and biology
Janine Castro (US Fish and Wildlife Service)

Modelling the effects of large woody dams on sedimentary processes
Matthew McParland (University of Liverpool)

CHAIR: *Lydia Burgess-Gamble (Environment Agency)*

15:55
Dynamic waters full of life: letting rivers do the work
Glenn Maas and Mark Diamond (Environment Agency)

Natural Flood Management in Upper Wharfedale: a collaborative and coordinated approach to creating a resilient landscape
Daniel Turner (Yorkshire Dales Rivers Trust)

Kensington

Exploring the potential benefits of Natural Flood Management

CHAIR: *Jo Cullis (Jacobs/River Restoration Centre Board)*

15 mins
River Irwell: small streams, big WFD gains
Kimberley Jennings (JBA Consulting) and Katherine Causer (Environment Agency)

15 mins
Taclo'r Tywi/Tackling the Tywi-working in partnership to restore an iconic river
Ioan Williams, Megan Herbert-Evans & Huw Williams (Natural Resources Wales)

Derby

Involving stakeholders in catchment management

16:10 **Discussion**

Discussion

Discussion

10 mins

Session 3 – continued...

16:20	The science and 'Art' of geomorphology – how fluvial geomorphology contributions are developing and maturing over time Katy Kemble (<i>Jacobs</i>)	Evaluating NFM benefits : Keeping it simple David Brown (<i>Environment Agency</i>) and Mike Norbury (<i>Mersey Forest</i>)	Rivers and Wetlands Community Days - inspiring communities Stuart Maloure and Dominic Martyn (<i>Environment Agency</i>)	15 mins
16:35	Designing for instability: process-form restoration across our rivers and floodplains George Heritage (<i>AquaUoS – University of Salford</i>)	Estimating effectiveness of Natural Flood Management: Keeping it simple Marc Huband (<i>Atkins, member of SNC-Lavalin Group</i>)	Becoming impatiens with Balsam on our river banks Nicola Craven (<i>Lincolnshire Rivers Trust</i>)	15 mins
16:50	Discussion	Discussion	Discussion	10 mins

17:00 SHORT BREAK TO MOVE TO KEYNOTE SESSION 10 mins

Session 4
Main Banqueting Room

CHAIR: *Fiona Bowles (River Restoration Centre Board)*

17:10	Restoration in Practice: Rivers for the Future, Rivers for Everyone <i>Colin Thorne (University of Nottingham)</i>	25 mins
17:35	Questions and reflections	20 mins
17:55	Poster competition prizes, final announcements and close <i>Martin Janes (River Restoration Centre)</i>	5 mins
18:00	END OF DAY 1	



19:00 FOR 19:30 – UK RIVER PRIZE AWARDS DINNER
Main Banqueting Room

2019 UK RIVER PRIZE FINALISTS

RIVER BULBOURNE <i>PAGE 25</i>	RIVER NAIRN <i>PAGE 25</i>	NEW FOREST WETLANDS <i>PAGE 26</i>	RIVER OTTER <i>PAGE 26</i>
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AND
‘RIVER CHAMPIONS’
PAGE 28

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* Fisheries Science and Management

* Ecological Impact Assessments (EclA, WFD, HRA)



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Session 5

9:00

PRE-BOOKED SITE VISIT OR WORKSHOP continued...

3 h 30 min

Derby Workshop C:

Protecting, managing and restoring small waterbodies: ponds and small lakes, headwaters, ditches, springs and flushes

Facilitators: Jeremy Biggs (*Freshwater Habitats Trust*) & Stewart Clarke (*National Trust*)

In this workshop we will review and discuss the importance of small waters for freshwater biodiversity and ecosystem services. The session will consider monitoring and assessment methods, practical measures for creating, protecting and restoring small waters, methods for enhancing ecosystem service delivery and opportunities for partnership. We will discuss the role of small waters in natural flood Management projects.

Assessing natural flood management opportunities and associated potential benefits in headwater catchment areas

Ryan Jennings & Steve Rose (*JBA Consulting*)

Empire Workshop D:

Citizen science for impact

Facilitators: Stéfani Novoa (*Earthwatch Institue*), Laura Dal Pozzo (*Eastern Alps District (AAWA)*) & Luigi Ceccaroni (*Earthwatch Institute*)

This workshop will focus on the benefits and evidence of the inclusion of citizen science activities to enhance river restoration practices and its wider societal and economical aspects – how they provide a knowledge-base for the design, implementation and evaluation phase of river restoration practices and improve sustainability of restoration efforts through increased participation and accessibility of larger audiences.

We will highlight the potential of citizen science to contribute to the evidence base for well-grounded decision-making in policy through two short case-study presentations from the river monitoring realm. We will then discuss the experience of the audience on definitions, requirements and opportunities for participatory research approaches to complement or replace traditional research and evaluation procedures within river restoration.

The River Starts Here! Collaboration between a Rivers Trust and the Environment Agency to monitor, analyse and improve water quality in an urban headwater

Julie Wozniczka (*Trent Rivers Trust*) & Shelley Doe (*Environment Agency*)

Unlocking the Severn - for People and Wildlife

Jason Leach (*Canal & River Trust*) & Tim Thorpe (*Severn Rivers Trust*)

Extending beyond the reach: Engaging with evidence through citizen science

Lucy Shuker (*Thames 21*)

12:30

LUNCH

65 mins

Session 5

9:00

PRE-BOOKED SITE VISIT OR WORKSHOP continued...

3 h 30 min

Crosby

Workshop E:

Reinstating channel-wetland-floodplain systems to pre-disturbance condition

Facilitators: Colin Thorne (*University of Nottingham*), Johan Hogervorst (*US Forest Service*), Paul Powers (*US Forest Service*) & Janine Castro (*US Fish and Wildlife Service*)

Stream restoration is often based on creation or re-creation of a single thread, meandering channel with a bankfull discharge return period of 1.5 or 2 years. The channel is designed to achieve 'sediment-balance', in which all the sediment supplied from upstream and locally is transported downstream. This is appropriate in 'sediment transport or transfer' reaches, but not in reaches with active floodplains, which are net sediment sinks. There is now overwhelming geologic, historical, empirical and theoretical evidence that natural, sediment sink reaches are characterised by multi-threaded channels that are fully connected to wetland-floodplain complexes.

This workshop introduces a new approach to restoring degraded streams – generally referred to as 'Stage Zero' - into connected channel-wetland/ meadow-floodplain systems that replicate pre-disturbance conditions. Presentations will cover the theory, case study demonstrations, strengths and limitations, and strategies for managing risk. The presenters aim to inform restoration professionals and practitioners about the opportunities associated with restoring full channel-floodplain connectivity.

Site Visit 1:

Daylighting the River Alt

Facilitators: Helen Rawlinson (*Cass Foundation*), Janet Hooke (*University of Liverpool*) & Phil Putwain

This case study centres on the reclamation of 8.2ha of brownfield land, 'daylighting' the River Alt into a newly engineered 900m section of river, mosaic of habitats and publically accessible greenspace known as 'Alt Meadows'. The project led to the creation of an enhanced environment providing a catalyst for positive change and regeneration. The visit will look into the project's economic and environmental drivers, the importance of genuine collaboration between project partners, contractors, University of Liverpool and the local community. In addition, facilitators will provide information on the ecological and physical design and monitoring as background to discussion about the channel morphology, processes and ecological development.

Site Visit 2:

Working with Natural Processes (WwNP): Blackbrook Slow the Flow, St Helens

Facilitators: Mike Norbury (*Mersey Forest*) & David Brown (*Environment Agency*)

Blackbrook in St Helens, Merseyside, experiences repeat flooding from a combination of main river and surface water sources. Blackbrook has a 5% chance of flooding in any given year and sits in a low-lying bowl at the confluence of 5 rapid response catchments whose upstream area is 21km². Capital solutions to reduce the flood risk are prohibitively expensive, as culvert enlarging would be required to reduce the flow constriction. This site visit will cover the NFM works that were undertaken upstream and will cover topics including the practical implementation, benefits, and the sediment and water quality implications.

12:30

LUNCH

65 mins

Session 6

Main Banqueting Room

Best practice design

Kensington

Catchment planning & delivery

Derby

Fish passage & habitat restoration

CHAIR: *Will Bond (Alaska E.C. Limited/River Restoration Centre Board)*

CHAIR: *Pam Nolan (Environment Agency)*

CHAIR: *Judy England (Environment Agency)*

Investigating step-pool channels in the

Highlands

Carolyn Cload (University of the Highlands and Islands)

Riverlands. Partnership working - does the practice match the theory?

Antonia Scarr (Environment Agency) and Richard Higgs (National Trust)

Highlights and low points from the five year saga to improve fish passage on the River Ehen

Jodie Mills (West Cumbria Rivers Trust)

15 mins

Engineered Wood Structures - practical experience of design, implementation and monitoring from process restoration to sustainable bank protection applications

Eric Gillies (cbec eco-engineering)

Developing a strategy for delivery of catchment wide Natural Flood Management

Thea Wingfield (University of Liverpool)

Greater Thames estuary fish migration roadmap: A platform for identifying habitat restoration and creation opportunities

Wanda Bodnar (Thames Estuary Partnership)

15 mins

14:05 **Discussion**

Discussion

Discussion

10 mins

Session 6 – continued...

14:15	<p>Getting Down and Dirty with a Digger Di Hammond (<i>Affinity Water</i>) and David Holland (<i>Salix River and Wetland Services</i>)</p>	<p>Delivering Integrated Catchment Management - the Littlestock Brook pilot study in the Thames Basin Joanne Old and David McKnight (<i>Environment Agency</i>)</p>	<p>Habitat restoration at Powick Weir - A case study in saving King Henry III's favourite fish Peter Brunner (<i>Royal HaskoningDHV</i>)</p>	15 mins
14:30	<p>Construction Design for River and Floodplain Naturalisation Seb Bentley (<i>AquaUoS – University of Salford</i>)</p>	<p>Strategic approach to river restoration planning Marc Naura (<i>River Restoration Centre</i>)</p>	<p>Video monitoring of fish in rivers: research and management perspectives Mickael Dubois (<i>Cranfield University</i>)</p>	15 mins
14:45	<p>Discussion</p>	<p>Discussion</p>	<p>Discussion</p>	10 mins
14:55	<p>MOVE TO GRAND FINALE!</p>			15 mins



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Session 7

Long-term lessons for river management

Main Banqueting Room

CHAIR: *Kevin Skinner (Atkins, member of SNC-Lavalin Group/A14/River Restoration Centre Board)*

15:10	National assessment of the spatial distribution of river restoration projects in the UK: Monitoring, assessment and maintenance <i>Harriet Moore (University of Lincoln)</i>	15 mins
15:25	International guidance and case studies on using Natural and Nature-Based Features to reduce flood risk and improve the environment <i>Lydia Burgess-Gamble (Environment Agency)</i>	15 mins
15:40	Global challenges tackled through river basin restoration: A reappraisal of the importance of our work <i>David Hetherington (Arup)</i>	15 mins
15:55	Final words <i>(River Restoration Centre)</i> Questions, thoughts and parting insights	20 mins
16:30	END OF CONFERENCE <i>with tea and coffee</i>	

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2019 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 four finalists below. The overall 2019 UK River Prize winner will be presented with the Nigel Holmes Trophy at the Awards Dinner in Liverpool on the 30th April 2019.

Finalist	Recognised for	Lead applicant
River Bulbourne <i>Hertfordshire</i>	Urban Communities Project	Environment Agency
River Nairn <i>Scottish Highlands</i>	Restoring Natural Processes	Aberarder Estate
New Forest Wetlands <i>Hampshire</i>	Catchment-Scale Project	Forestry England
River Otter <i>Devon</i>	Innovative Approach	Devon Wildlife Trust

“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 their river 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.

Martin Janes, Managing Director, RRC



2019 Finalists

River Bulbourne - *Lead applicant: Environment Agency*

Bringing Back the Bulbourne is a collaboration between the Box Moor Trust and the Environment Agency with input from the Chilterns Chalk Streams Project, the Wild Trout Trust and local volunteers. The project has opened up 1.6km of habitat by removing a weir and has improved channel and riparian habitat. The river has regained many of its chalk stream characteristics. Clean gravel beds have been restored and diverse morphology and flow types are now apparent. Water crowfoot has been observed appearing in large swathes and visitors have reported seeing increased numbers of fish throughout the site. Riverfly monitoring results have shown a positive change in the invertebrate community. A public perception survey of 110 people spanning different age groups were interviewed on site, with the majority of people supportive of the scheme.



River Nairn - *Lead applicant: Aberarder Estate*

Aberarder Estate dates back to 1549 and covers nearly 5,000ha of Upper Strathnairn in the Highlands of Scotland. Over the years, 4km of the River Nairn had been very heavily modified to protect properties and agricultural ground. Following a process-based and assisted recovery approach, the implemented restoration works have reinstated natural physical and ecological processes. Channel realignment, improved floodplain connectivity, wetland reinstatement and large wood implementation have kick-started recovery towards the reference state of a wandering upland gravel-bed river. Extensive riparian tree planting will provide direct habitat benefit and also ensure the natural supply of large wood to the channel in the future. Within two weeks, sea trout were utilising typical spawning locations, with Atlantic salmon following a few weeks later.



2019 Finalists

New Forest Wetlands - *Lead applicant: Forestry England*

The New Forest Higher Level Stewardship Scheme (NF HLS) was set up in 2010 as a first-of-its-kind partnership between the Verderers of the New Forest, Forestry England and the New Forest National Park Authority to cover the Open Forest Crown lands. The HLS agreement is worth £19 million over ten years from 2010-2020 with a minimum of £750,000 available for wetland restoration per year. So far the New Forest HLS has delivered 59 projects, totalling 29km of restoration to the New Forest watercourses that had previously been deepened or realigned. The restoration of the mires and streams has delivered reduced knickpoint erosion, reduced incision and lateral erosion,



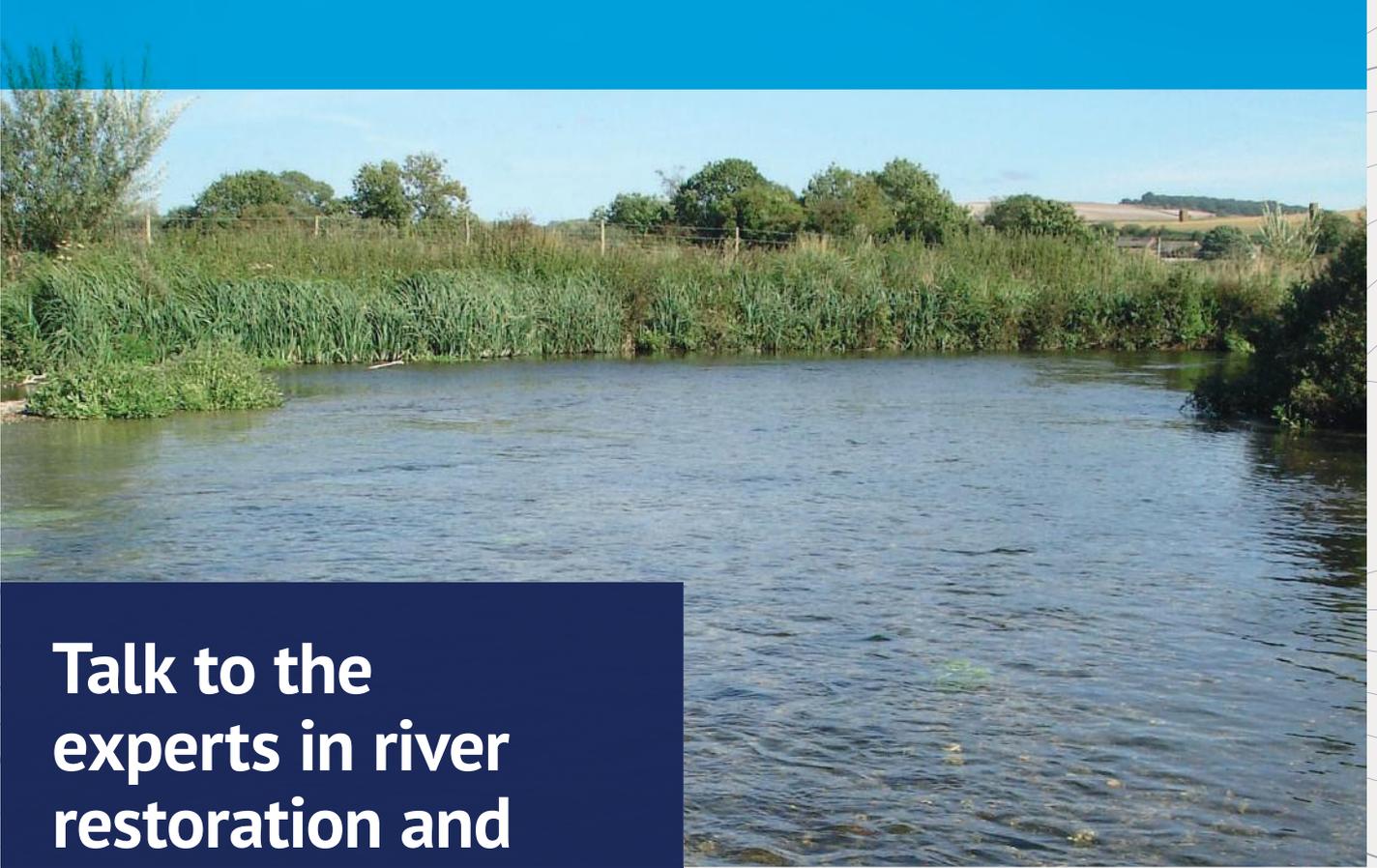
increased floodplain connection, increased resilience during times of drought, and reduced flood peaks.

River Otter - *Lead applicant: Devon Wildlife Trust*

The River Otter Beaver Trial aims to establish a healthy population of Eurasian beavers in a lowland English river catchment and to demonstrate that beavers have a positive impact on ecology and local communities. The trial is running from 2015 - 2020. It covers the entire 250km² of the River Otter catchment, which contains over 600km of watercourse. Beavers have been moving along the entire 50km main stem of the River Otter, and extensively colonising the River Tale (its largest tributary). The greatest effects of their engineering activity on watercourse morphology have occurred where territories are focused in headwater streams, and to date there are five beaver families building dam complexes in the smaller tributaries. This is increasing heterogeneity, creating meanders and spectacular in-channel habitats, taking water out of channel, and restoring natural processes.



where territories are focused in headwater streams, and to date there are five beaver families building dam complexes in the smaller tributaries. This is increasing heterogeneity, creating meanders and spectacular in-channel habitats, taking water out of channel, and restoring natural processes.



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2019 River Champions

'River Champions' seeks to celebrate the outstanding efforts of individuals contributing to river restoration. Below is a brief introduction to the 2019 River Champions, more information about each will be showcased by the RRC over the next year on our website and social media platforms.

Jon Bass

Jon has been volunteering with Wessex Chalk Stream and Rivers Trust as Voluntary Scientific Officer for ten years. He helps manage monitoring programmes and maintains water temperature loggers. Jon carries out surveys and sampling, and helps out at educational events.

Rachel Graham

Volunteering for the Lincolnshire Chalk Streams Project, Rachel carries out surveys and helps deliver community events. She regularly volunteers at shows around Lincolnshire to help promote the project. Rachel created an informative guide and film to aid volunteer identification of aquatic invertebrates.

Simon Mckelvey (posthumously)

Throughout his life, Simon volunteered over 30 years to improving rivers in Scotland. He considered that time was always available to improve rivers. For the last 18 years he chaired the Scottish Institute of Fisheries Management, the Scottish Fisheries Co-ordination Centre, and established a junior angling club. Simon was a passionate environmentalist and will be greatly missed by his river colleagues.

Howard Stevens

For over 30 years Howard has been volunteering to help improve riparian habitats. As well as practical involvement, he contributes to Local Fisheries Advisory Groups (LFAG). Howard helps Natural Resources Wales with habitat restoration schemes, fish passage solutions and improving community involvement.

Gordon Swindells

Gordon is very active in the community as Flood Warden Coordinator for Martock. He works with FWAG SW on the Hills to Levels project, identifying, promoting and delivering NFM. He helps out with catchment walkovers, meets landowners and residents, and finds opportunities to address issues.

Gisele Verniers

Since retiring from academia, Gisele has continued to supervise and mentor students studying river ecology and biodiversity. She often lectures students from under-developed countries on biomonitoring of rivers and hydromorphological monitoring, encouraging students to study river restoration.

Lauren Vickers

Lauren co-founded the Lincolnshire Rivers Trust (LRT) and has volunteered with the trust for 7 years. As the trust was becoming established, Lauren designed the first website, kept social media up to date, and initiated projects. She continues to dedicate time every week to LRT including organising events.

Jeff Woodhouse

As Secretary of the Thames Valley Angling Association for more than 10 years, Jeff has been involved in many projects on the River Thames. He expanded the membership from 10 to 20 clubs and from a few hundred to several thousand anglers. He helped raise money, lobby, and organise river rehabilitation.





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 and 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.

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 (NRI), adding new projects and improving existing information. She manages the RiverWiki and UK Projects Map, edits the bulletin and social media platforms, updates the RRC website, and supports events planning and project site visits.

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 Manger with business planning, project management and support to the Board. Jackie carries out invoicing and purchasing tasks, as well as day to day accounts.



Left to right:

Martin Janes, Alex Bryden, Jackie O’Regan, Marc Naura, Nicola Mackley, Josh Robins



the River Restoration Centre

Working to restore and enhance our rivers

RRC Training Course Series

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

Introduction to Hydromorphology (Level 1)

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

Hydromorphology for river restoration (Level 2)

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

Developing a Catchment-wide Restoration Plan

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 projects.

Mapping for Natural Flood Management

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.

River Habitat Survey Certification Course

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



Date	Location	Course title and information
29th May 2019	Birmingham	Developing a Catchment-wide River
3rd & 4th July 2019	Cranfield University, Bedfordshire	Mapping for Natural Flood Management
19th June TBC	South East TBC	Introduction to Hydromorphology

Member Site Visit

We also offer site visits to exciting, current projects, free of charge to RRC members. These visits usually look at particular techniques used, or cover a range of methods implemented across a catchment. Please get in touch if you have a site you would like to showcase.

Date	Location	Site Visit
22nd May 2019	Shropshire	Love Your River Telford





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RRC Membership Benefits

Technical training, tailored to your needs



Discounted Annual
Conference registration



Promote your business or individual expertise to our networks

Site Visits to best practice or innovative
river restoration projects



Connecting you to a wider network of river restoration and
environmental professionals



Independent technical advice

Facilitated workshops for your
organisation or project



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£190 plus VAT

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





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ARUP



ATKINS

Member of the SNC-Lavalin Group

Atkins is a global design, engineering and project management consultancy. We are fortunate to have our own group (Sustainable River Management (SRM) team) who are focused on ensuring our projects deliver sustainable river management where at all possible. We have a range of specialists within our widely experienced team.

As the UK's only exclusively postgraduate university, Cranfield University works closely with industry and government to provide tailored research, technical development and professional education and training. Water is one of the core themes of the university, and our Cranfield Water Science Institute has been delivering robust, innovative solutions for the water sector for over 40 years.

Cranfield UNIVERSITY

Five Rivers

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Five Rivers provides specialist contracting, consultancy and ecological services to a range of clients across the UK. They pride themselves on providing a professional, pragmatic and innovative service as well as ensuring they get the best possible environmental gains on each project.

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

JACOBS

JBA

consulting

JBA Consulting is made up of engineers, environmental consultants, scientists and designers, who manage weather and environmental risks and opportunities for their clients. They have been an independent, employee-owned firm for two decades, allowing them the freedom to focus on innovation and their commitment to exceptional client service.

National Trust look after special places throughout England, Wales and Northern Ireland forever, for everyone. They take care of coastlines, forests, woods, fens, beaches, farmland, moorland, islands, archaeological remains, nature reserves, villages, historic houses, gardens, mills and pubs and one of the world's largest art collections. They restore them, protect them and open them up to everyone. For the Trust, conservation has always gone hand-in-hand with public access.



National Trust

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. River restoration is the core part of their business and knowledge gained on working on over 50 restoration projects has built a strong knowledge reputation within the industry.

South East Water abstracts and treats 517 million litres of water a day and supplies around 2.2 million customers. Over 70% comes from groundwater resources, the remainder comes from surface water sources and bulk supplies from neighbouring water companies. The company has developed an innovative Catchment Management programme aimed at tackling complex water quality issues associated with pesticide and nutrient losses to watercourses.

south east water





the River Restoration Centre

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RRC Advisory Projects

RRC can provide targeted technical support at any stage of projects, at any scale from a single site to a whole catchment. Here is some of the work that we have been involved in over the last 12 months:

Catchment scale planning and prioritisation

Wince Brook, Manchester

Wince Brook has been significantly modified as a result of urban expansion since the 19th Century, leaving a straightened, resectioned, polluted channel with poor riverine habitat. We implemented a methodology to identify issues and suggest options for ecological benefits at a catchment scale. Pressures, impacts and improvement options included weir removal, invasive species control, riparian buffer strips and bed raising. These measures provide a basis for consultation, further investigation and development of planned action.



Deddington Brook

In North Oxfordshire, the 17km Deddington Brook flows through rural landscape, realigned around residential areas and agricultural fields. RRC were asked to assess the channel hydromorphology, identify catchment impacts and pressures and suggest restoration options. Reach delineation divided the catchment into reaches based on land use, channel substrate, flow types and geomorphological activity. Restoration suggestions included water quality testing, livestock fencing, improving volunteer engagement, removing instream structures for increased channel connectivity, tree planting for biodiversity, and gravel addition to enhance fish habitat. Furthermore, catchment impacts were considered including sediment accumulation.

Site based advice and options

River Cole - Mill Operation



Previous restoration of the River Cole at Coleshill aimed to return natural processes and forms associated with a self-regulating river. It was also recognised that the historic mill should be preserved and returned to working order – an artificial structure with precise requirements to manage water levels and flows. Thus the restoration had to meet these two aims. Whilst the free flowing river should need little maintenance, the mill leat structures will need careful inspection and maintenance over time. Some obsolete structures can be removed or buried to reduce the risk of failure and repair.

Gilwern Brook, North Wales

This project visited a site where unconsented works had led to 500m of steep, straightened channel, removing habitat and riparian trees by infilling meanders. We provided restoration options including total restoration back to previous channel; restoring major meanders to improve channel stability; in-stream enhancement works to improve biodiversity; or leaving the channel how it is currently and accepting that it will change and adapt naturally.





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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
4,930



3,976



473



319

N. Ireland

120

741
in chalk rivers

512

Projects involving partnership

686

Lowland low energy projects

262

Flow restoration projects

701

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
Driffield Trout Stream Bank Improvements

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

Images
Digital Images\ - England\Aspenden Hall Pond



River restoration
Flood bunds
Urban streams and
ditches
Headwalls
Slope stabilisation
Erosion control
Soil reinforced
structures
Gravity walls
SUDs



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ABSTRACTS

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Session 1:

Main Banqueting Room

A PROCESS-BASED APPROACH TO RESTORING DEPOSITIONAL RIVER VALLEYS, AN ANASTOMOSING CHANNEL NETWORK

J. B. HOGERVORST¹ & P. D. POWERS¹

1 USDA Forest Service

Within the Pacific Northwest region of the United States, we have been implementing restoration projects designed to function at Stage 0 (Cluer and Thorne, 2013) within depositional valley types. Stage 0 valleys provide the greatest degree of resiliency and maximize ecological uplift. We have developed a restoration design and implementation technique based upon the Geomorphic Grade Line (GGL) of the valley (Powers et al. in prep). The GGL is used within a GIS based toolkit we have developed to generate Relative Elevation Maps (REM). REM maps allow us to interpret valley features and evaluate the level of agreement with (relic or reference condition) and departure from (degradation) the GGL with a high level of accuracy. REM maps are used for the design of Stage 0 surfaces and allow for easy and accurate calculations of cut and fill quantities. The design REM maps also effectively predict the restored elevation of the shallow groundwater as well as base flow wetted area.

RIVER RESTORATION IN CONCRETE CHANNELS

J. N. PANSERA¹

1 Rhin-Meuse Water Agency

The ideal restoration process would be to remove the concrete walls and bottom in order to set up natural riverbanks, reduce the riverbed and plant trees and shrubs. Unfortunately, when roads or habitations are built close to the concrete channel, it isn't possible.

Solutions improved in different villages in North East of France consist in restoring river banks within the concrete channel, by setting up different facilities:

1. Groin systems to stock sands and gravels, so that a natural riverbank can be created and colonized by local plants
2. Natural riverbanks filled with earth, girdled by stones to prevent erosion and planted with helophytes and local plants
3. Stones and gravels riverbanks

INNOVATION, TECHNOLOGY AND KNOWLEDGE TRANSFER TO SUPPORT THE ENHANCEMENT OF WATER QUALITY, INSTREAM HABITAT AND RIPARIAN MANAGEMENT

R. Ó CONCHÚIR¹

1 Waters and Communities Office (Ireland) – LAWCO

From November 2009 to May 2015 in work on the Lower Shannon SAC (Ireland) considerable river restoration, instream and riparian management work was carried out. The new focus is on agriculture in a catchment which is "At Risk". Key objectives are to: (i) build capacity within the farming community to identify and mitigate agricultural impacts through practical on-farm measures and shared learning; (ii) deliver a collaborative partnership model to enable partners, using the source-pathway-receptor model, to collectively identify key water quality concerns (iii) collate data generated from local catchment assessments to mitigate the risk from sources and pathways identified while simultaneously developing baseline data for monitoring purposes (iv) deliver a highly innovative collaborative approach with local farmers, anglers and conservationists inputting into the co-design of appropriate mitigation measures; (v) celebrate the Lower Shannon via a community based outreach programme.

WESTCOUNTRY RIVERS TRUST: 25 YEARS OF MANAGING AT A CATCHMENT SCALE

L. COULDRICK¹

1 Westcountry Rivers Trust

The Westcountry Rivers Trust is one of the oldest Rivers Trust and was set up in 1994. It was set up due to significant diffuse pollution pressures damaging the aquatic habitats and species and from the early days knew it had to manage at a catchment scale to deal with water quality and quantity. Now 25 years old it has had some considerable successes but continued lack of enforcement, economic pressure and climate change means that there is still a huge problem in that over a third of farmed land and soils is seriously degraded.

Whilst this pressure on our soils is not new and we know the individual solutions it is still considered a 'wicked' problem as the collective solution is incredibly complex, requiring action on a large scale not just spatially but also socially pulling across multiple sectors. The presentation highlights the approaches and evidence needed to deliver change at both the small scale and the larger catchment scale.

AFTER THE MERSEY BASIN CAMPAIGN, WHAT HAPPENED NEXT?

P. BATEY¹

1 Mersey Rivers Trust & Nature Connected

As a government-sponsored 25-year initiative to clean up the rivers, canals and estuary of the Mersey River Basin in North West England, the Mersey Basin Campaign was a pioneer in partnership working and, in the period it was active (1985-2010), made great progress in improving water quality, promoting waterside regeneration, and engaging stakeholders.

After 25 years the Campaign made an honest assessment of what it had achieved and decided that it had to a large degree fulfilled its original aims and made a well-planned, tidy exit in March 2010. The only exception was the Healthy Waterways Trust, the charitable arm of the Campaign.

With no full-time staff, and a very small budget inherited from the Campaign, the prospects for the Trust were not good. This paper describes how, contrary to expectations, a strategic partnership has been recreated, playing a new role as the Rivers Trust for the Mersey Basin and hosting three Catchment Partnerships, with a full portfolio of projects.

NOTES

Session 2:

Main Banqueting Room

Delivering Natural Flood Management

SMALL SCALE NATURAL FLOOD MANAGEMENT INTERVENTIONS IN NORFOLK, SUFFOLK AND ESSEX

H. GEORGE¹

1 Environment Agency

I am project managing 7 NFM projects in East Anglia. These projects are Defra funded and working above communities at risk of flooding. They are being delivered in partnership with a variety of organisations including Norfolk Rivers Internal Drainage Board, Norfolk Rivers Trust, National Trust, Natural England, Suffolk County Council and Essex Wildlife Trust. The interventions involve a range of NFM techniques. An extensive ecological, hydrometric and physical habitat monitoring programme has been implemented to gain understanding into the impacts of NFM. Baseline monitoring took place in Spring 2018 prior to construction, followed by 2 years of post-intervention monitoring. Findings will be reported back to Defra in 2021, with the aim of closing the evidence gap that currently surrounds NFM. I intend to run through each of the projects, with one or two of the partners involved, explaining what the NFM interventions are, how works are being delivered and who's doing what monitoring.

NATURAL FLOOD MANAGEMENT IN PRACTICE: OVERCOMING CHALLENGES FACED BY PRACTITIONERS IN TWO NOTTINGHAMSHIRE CATCHMENTS

J. WELLS¹, A. GRAHAM¹, L. SHARPE¹ & R. NEEDHAM¹

1 Trent Rivers Trust

This presentation focuses on two case studies within Nottinghamshire to discuss the NFM intervention process from the viewpoint of practitioners. Both projects aim to install a mixture of NFM interventions, including earth bunds, leaky barriers and storage areas within productive private land.

Methods applied within opportunity mapping are presented, including flow accumulation generation and estimates of potential intervention storage volume. These methods demonstrate to landowners that intervention within their land would be successful in storing water.

The challenges faced by practitioners during the landowner liaison process, and how these have been overcome are explained, with issues highlighted by landowners during liaison discussed in detail. Positive steps within these projects have been taken to ensure that landowners do not suffer losses, with agreements offered to provide an income for a service.

MISSENDEN STREAM NATURAL FLOOD MANAGEMENT AND RESTORATION

A. BACK¹ & A. BEECHEY²

1 Buckinghamshire County Council, 2 Chilterns Conservation Board

Buckinghamshire County Council are working on options for managing surface and groundwater flooding in the Pednormead End area of Chesham. As part of these works we identified an opportunity to restore a section of the Missenden Stream. This was completed in February 2018.

Historically, the river channel in this location has been widened, deepened and impounded by two concrete weirs. As a consequence, flow, when present, is sluggish and the reach acts as a sink for sediment, which overlies much of the gravel bed especially on the upstream side of the weirs and adjacent to the tennis courts, where the channel is at its widest.

By carrying out this restoration work, this section of the river Chess catchment will be returned to a more "natural" state. It will allow the natural chalk stream processes to re-create habitat, carry natural

amounts of sediment and reconnect the channel and floodplain. Once the habitat is created the wildlife will come back to this reach of the river Chess.

HOW RESTORING NATURAL PHYSICAL PROCESSES CAN MITIGATE THE IMPACTS OF AN INCREASINGLY EXTREME HYDROLOGICAL REGIME

C. BOWLES¹ & H. MOIR¹

1 cbec eco-engineering

Anthropogenic disturbance through impacts such as floodbanks, canalisation, dam construction, land management and urbanization have result in a dramatically altered hydrologic regime. In combination with climate change, this has resulted in a greater severity and frequency of extreme flow events (i.e. both low and high). Such 'hydromodification' usually results in extensive disconnection of the floodplain from its channel, which not only affects ecology but also, potentially, downstream flood risk (traditionally mitigated using floodwalls and other hard-engineered control techniques). However, restoring natural hydrological and geomorphic processes at the catchment scale can provide greater resilience to extreme hydrological conditions, in terms of both physical and ecological considerations. We present data from UK case studies that demonstrate the effectiveness of applying process-based NFM and restoration approaches in managing the impacts of high and low flows.

NOTES

Session 2:

Kensington

Large-scale river engineering

A14 – DELIVERING HABITAT IMPROVEMENTS AT A GRAND SCALE!

K. S. SKINNER¹, F. KEATES², O. BEECH³ & S. SKALECKI²

1 Atkins, member of SNC-Lavalin Group/A14/River Restoration Centre Board, 2 A14/Costain, 3 A14/Skanska UK

The £1.5 billion A14 Cambridge to Huntingdon Improvement Scheme is being delivered by the A14 Integrated Delivery Team (IDT), a joint venture between Costain, Skanska, Balfour Beatty and designers Atkins/CH2M, working on behalf of Highways England. The scheme supports both national and regional economic growth, reducing congestion and delays. Wide scale environmental improvements have been delivered that include the creation of 217ha of new wildlife habitat, through tree planting, river realignments, lakes, ponds, water vole creation areas, wildlife bridges and various bat and bird boxes. Within the scheme, eleven river realignments are being delivered using natural channel design, creating improvements in the riverine habitat over 2.6km. The presentation demonstrates how large infrastructure schemes can not only meet their infrastructure requirements, but also deliver wide scale environmental improvements. River restoration through the realignments is integral in this achievement.

DELIVERING MAJOR INFRASTRUCTURE, FLOOD RISK AND BIODIVERSITY BENEFITS THROUGH COLLABORATION: THE A120 LITTLE HADHAM BYPASS AND FLOOD ALLEVIATION SCHEME

N. ELBOURNE¹

1 Environment Agency

This project is a once in a lifetime opportunity for Hertfordshire County Council and the Environment Agency to deliver multiple benefits to Little Hadham by jointly promoting a dual-purpose major capital scheme. Without this collaboration the flood alleviation aspects of the scheme would be unaffordable. We will achieve significant efficiencies by working together. The scheme comprises a 3.9km single carriageway bypass around the historic village. The bypass crosses three main river watercourses and at two of these road embankments will be used to store floodwater. A fourth watercourse is being deculverted and diverted downstream of the village centre. Significant planning has been required to ensure that the Scheme will comply with the Water Framework Directive.

Best practice is being followed around new structures and along the new diversion channel. Works are due to commence in 2019 subject to the outcome of the statutory processes to secure the land required for the scheme.

“RIVER RESTORATION IN PRACTICE” - ENHANCEMENT OR JUST GOOD DESIGN? A COLLABORATIVE APPROACH TO RIVER AND WETLAND RESTORATION

J. MADDISON¹, J. CULLIS¹, M. LANE² & C. GREEN¹

1 Jacobs, 2 Environment Agency

The Exeter Flood Defence Scheme, provides major upgrades to flood protection while a prime example of integrated environmental design within urban environment constraints. Much of this habitat was necessary to mitigate wider scheme impacts. The design philosophy incorporated multi-functional design, meeting FRM, habitat restoration & environmental objectives. Phase 1 of the scheme transformed 7 ha flood relief channel into a diverse wetland habitat, whilst improving existing conveyance capacity. A Low-flow channel, scrapes and backwaters form a mosaic of wetland habitats. Integration of ecological & engineering design teams was crucial in successful delivery of habitat and flood defence integration. Development of these partnerships is critical to successful delivery and its future maintenance. To reach future restoration and creation targets, we must ensure that these are

fully integrated into flood risk management projects – simply put, it’s not enhancement, it’s just good design.

GLENRIDDING FLOOD ALLEVIATION SCHEME: COMBINING NATURAL FLOOD MANAGEMENT WITH TRADITIONAL ENGINEERING TO DELIVER FLOOD RESILIENCE IN COMPLEX UPSTREAM ENVIRONMENTS

L. BAKER¹ & G. FOSTER²

1 Atkins, member of SNC-Lavalin Group, 2 Environment Agency

This paper examines the December 2015 flooding in Glenridding, in the Lake District, and presents wide-ranging remediation works aiming to improve the village’s resilience to future events.

High runoff, coupled with a high sediment supply upstream, transported large amounts of coarse material and deposited in the village resulting in significant flooding to adjacent residences and businesses. An estimated 20,000 tonnes of gravel was removed in the aftermath. However, in the following two years bed incision threatened the integrity of the surrounding walls, contrary to the previously depositional processes.

Raised flood walls were constructed, along with bed stabilisation aiming to raise bed levels and prevent further incision. In parallel, the EA identified large stores of coarse sediment upstream. Working with the local community, natural flood management options are being considered, including floodplain reconnection, bed roughening, tree planting and vegetation to slow the flow.

NOTES

Session 2:

Derby

Analysing the data

A MULTIPLE CATCHMENT-SCALE ANALYSIS OF HISTORIC UPLAND RIVER CHANNEL PLANFORM ADJUSTMENTS OVER THE LAST 150 YEARS: A CASE STUDY IN THE LAKE DISTRICT, UK

H. JOYCE¹, J. WARBURTON¹ & R. HARDY¹

1 Durham University

Upland rivers are active geomorphic systems that undergo frequent channel planform adjustments in response to steep channel gradients, flashy discharge regimes and high sediment supply. Traditionally upland rivers have been studied, and managed, on a piecemeal, local scale. However, this approach fails to address the spatial and temporal factors driving planform adjustments. The study of historic river planform adjustments is important for understanding the current and future trajectory of a river. This research takes a multiple-catchment assessment of historic upland river channel planform adjustments to identify the patterns and factors controlling planform adjustments. The approach is applied on 250 rivers in 20 catchments in the Lake District, UK (1000km²) over 150 years. The results highlight that both reach and catchment variables control the type, extent and location of planform adjustments, which needs to be considered in tandem for effective river restoration and management.

LOOKING FORWARD, LOOKING BACK: A CATCHMENT-BASED APPROACH TO THE CHANGING DORSET STOUR

A. FIRTH¹

1 Fjordj Ltd.

Fjordr Ltd. has been commissioned by Historic England to pilot a methodology that makes information about river history more readily accessible to watercourse managers. Historic mapping, LIDAR, archaeological and documentary sources have been integrated within a single GIS layer that indicates historic use of the river, changes to the watercourse, and the presence of heritage features. The character of rivers is often the result of the action and interaction of both natural and human factors. On the Dorset Stour, major interventions stretch back several centuries, perhaps even millennia; whilst the historic evidence also points to broader changes in river management and community approaches to living with water. The time-depth indicated by the GIS layer will help in planning remedial interventions in the riverine environment as well as flagging the potential presence of sensitive heritage features and identifying opportunities for heritage-based engagement with the public.

DATASET OVERLOAD – PROCESSING METHODS TO SUPPORT EFFECTIVE CATCHMENT PLANNING AND ASSESSMENT

R. GRIFFITHS¹

1 Stantec

With an increasing number of freely available datasets being collated and released, it raises the question of how do we use this information effectively? Stantec have been assisting clients to answer this question, with the aim to support effective planning and assessment at catchment scale. We will present some of these methods that use different types of data. This will include methods to encourage stakeholder engagement, planning of holistic catchment schemes and spatial data screening and review to support natural and social capital assessment. Methods used to monitor and review the effectiveness of implemented catchment schemes will also be presented.

INVESTIGATING CHANNEL SENSITIVITY TO MORPHOLOGICAL CHANGES AND IMPACT ON FUTURE FLOODING

N. TODD-BURLEY¹, R. ING¹, M. HEMSWORTH¹, P. SOAR², C. PARKER³ & C. THORNE⁴

1 JBA Consulting, 2 University of Portsmouth, 3 University of the West of England, 4 University of Nottingham

JBA is currently undertaking a research project for the EA. The primary objective is to test and evaluate methods for producing information on the scale of erosion, transport and deposition in rivers now and in future climates to indicate a suitable method that could later be applied across England and Wales. It is anticipated that the method will be used in national decision support, particularly for identifying hotspots where channel changes are more likely and need local consideration. Factors that could influence the scale and rate of morphological change during flood flows will also be examined and used. This information will be used to indicate locations which may be particularly sensitive to changes in channel morphology. The literature and evidence gathered will be used to indicate the significance of morphological changes on future flood hazard. The project will provide strategic guidance for using sensitivity of channel changes in Flood and Coastal Risk Management activities.

NOTES

Session 3:

Main Banqueting Room

Morphology & physical processes

THE STREAM EVOLUTION TRIANGLE: INTEGRATING THE INFLUENCES OF GEOLOGY, HYDROLOGY AND BIOLOGY

C. THORNE¹

1 University of Nottingham

This talk will provide an overview of, and underpinning science for, the Stream Evolution Triangle (SET) -- a new approach to understanding stream evolution. The SET broadly integrates concepts geology, hydrology, and biology, and includes improved understanding of potential morphological “stream states” at the reach scale following both natural and anthropogenic disturbances. The SET includes the relative influence of geology, hydrology, and biology on an equal basis in determining stream morphology, which recognizes that streams may be dominated by any of these three drivers depending upon the landscape setting and geographic location. The SET assumes dynamic morphological evolution through time and recognizes variable rates of change for both spatial and temporal scales, along with numerous potential trajectories. Having introduced the SET, we will use evidence from completed projects as case studies for its application in innovative stream restoration.

DYNAMIC WATERS FULL OF LIFE: LETTING RIVERS DO THE WORK

G. MAAS¹ & M. DIAMOND¹

1 Environment Agency

We will share our current thinking and open discussion on restoration, morphology and natural processes, and how rivers and their catchments can help achieve long-term goals for the environment.

- Reflect on recent progresses in river restoration;
- Highlight restoration within the context of local and much broader socio-economic priorities;
- Demonstrate the importance of using the natural energy within geomorphological systems; and
- Share emerging thoughts and goals for river restoration, highlighting potential opportunities and some of the challenges that lie ahead.

THE SCIENCE AND ‘ART’ OF GEOMORPHOLOGY – HOW FLUVIAL GEOMORPHOLOGY CONTRIBUTIONS ARE DEVELOPING AND MATURING OVER TIME

K. KEMBLE¹, J. MOORE¹ & S. ROBERTS¹

1 Jacobs

The application of geomorphology to help solve water-related problems in industry has developed considerably over the past decade. Geomorphology requires available scientific knowledge but also needs the application of that knowledge through the ‘art’ of informed professional judgement. Significantly it is pivotal in compliance with environmental assessments such as the Water Framework Directive. Geomorphology sits between conventional engineering approaches and traditional ecology disciplines and, therefore, has a key role in sustainable development. This paper focuses on two key project examples: a reservoir discontinuance near Glossop in north-west England, and, a collapsing road bridge near Ullapool in the north-west of Scotland. It then draws upon generic learning lessons from the authors experience in working on many projects and comes up with some good practice guiding principles for integrating geomorphology into industry.

DESIGNING FOR INSTABILITY: PROCESS-FORM RESTORATION ACROSS OUR RIVERS AND FLOODPLAINS

G. L. HERITAGE¹, S. BENTLEY¹ & N. ENTWISTLE¹

1 AquaUoS – University of Salford

Primary historic drivers for river restoration are linked to restoring stability, returning to the status quo except for minor and potentially temporary ecological gains. More recently it has been recognised that sustainable restoration requires integration of current process influences into any design and the impetus has moved towards larger scale managed naturalisation. With this approach comes a change of direction as regards restoration, moving from static design to approaches that introduce a dynamic aspect to the system.

This paper reviews several diverse projects that have followed this process illustrating the approaches used to develop a naturalisation template and early system response. Dynamic sediment transport related changes are occurring but the overall integrity of the river/floodplain systems remains. System dynamism has enhanced hydromorphic value and seen positive ecological response, feature creation and evolution is occurring restoring lost change dynamics.

NOTES

Session 3:

Kensington

Exploring the potential benefits of Natural Flood Management

MODELLING THE EFFECTS OF LARGE WOODY DAMS ON SEDIMENTARY PROCESSES

M. MCPARLAND¹ & J. HOOKE¹

1 University of Liverpool

Research on Large Woody Dams (LWDs) has typically focused on quantifying the contribution LWDs make to attenuating flooding by modelling changes to a stream's hydrograph and hydraulics. However, the impacts that LWDs can have on sediment dynamics has been overlooked. Based on analogous literature examining naturally occurring woody debris, it was hypothesised that changes to sediment deposition and erosion caused by the construction of LWDs, would reduce their effectiveness as a flood defence measure. This was investigated by monitoring and modelling LWDs that were installed on a stream that flows through a urban catchment in Northwest England. Significant sediment deposition occurred, reducing the flood water storage capacity of the LWD. Erosion of the stream bed also caused the stream flow to undercut the dam. This demonstrates that the effectiveness of this NFM measure can lessen over time which has important implications for the planning and design of LWD flood management projects.

NATURAL FLOOD MANAGEMENT IN UPPER WHARFEDALE: A COLLABORATION AND COORDINATED APPROACH TO CREATING A RESILIENT LANDSCAPE

D. TURNER¹, C. FORMAN¹ & E. BROWN²

1 Yorkshire Dales Rivers Trust, 2 University of Nottingham

The Yorkshire Dales Rivers Trust is working with farmers to create a landscape that is resilient to flood risk, while providing social, environmental and economic benefits – the Naturally Resilient initiative. At a catchment level, we have commissioned modelling of the catchment by JBA to identify and demonstrate the benefits which could be afforded by NFM interventions. Working with farmers as part of the Wharfedale farmer facilitation group we worked out which interventions would be practicable for farmers. Through funding from Prince's Countryside Trust we are carrying out individual farm walkovers, devising specific farm plans. NFM measures have been delivered by farmers, contractors and volunteers. A key focus has been on improving soil health. We were keen to share best practice more widely. This has taken several forms including the creation of an NFM demonstration site and practical guides available on our website.

EVALUATING NFM BENEFITS: KEEPING IT SIMPLE

D. BROWN¹ & M. NORBURY²

1 Environment Agency, 2 Mersey Forest

Understanding the benefits of NFM interventions is a current science gap. Much is underway to address this, but currently, in practice, it presents a considerable challenge. Combination of NFM interventions even within a relatively small catchment rapidly build up to form a complex set of interdependent intervention variables that present a problem to quantify.

An alternative, simpler approach is to consider the flood risk at the location itself, and the volume of water that can be contained in bank, and an exceedence point, above which are flood flows. Using simple techniques to understand this volume of floodwater, we can realistically assess the impacts of our proposed NFM interventions.

ESTIMATING EFFECTIVENESS OF NATURAL FLOOD MANAGEMENT: KEEPING IT SIMPLE

M. HUBAND¹, E. PALAO¹, E. HEASLEY², D. GASCA¹ & A. RUGGLES-BRISE³

1 Atkins, member of SNC-Lavalin Group, 2 Kings College, 3 Spains Hall Estate

Comprehensive hydrological and hydraulic modelling of NFM schemes is often not possible – either because of prohibitive expensive or access to skills.

This paper explores whether simple hydrological calculations are a useful alternative when assessing the effectiveness of NFM measures in reducing flood risk. Using a small catchment in Essex upstream of a village vulnerable to frequent flooding as a case study, it compares the outputs of a) a full hydrological-hydraulic model setup with b) simple hydrological analysis that could be carried out by anyone with an Environmental Science background.

Simple hydrological assessment may be an appropriate technology for informing the design and benefits assessment of NFM schemes. Although there are short-comings, it can be a cost-effective alternative to full modelling, enabling delivery organisations operating on limited budgets to make a) more informed decisions about design and b) a clearer case to support applications for funding.

NOTES

Session 3:

Derby

Involving stakeholders in catchment management

RIVER IRWELL: SMALL STREAMS, BIG WFD GAINS

K. JENNINGS¹, K. CAUSER², R. DALZIEL¹ & N. MERCER²

1 JBA Consulting, 2 Environment Agency

The River Irwell is currently classed as moderate under WFD. It was identified that smaller tributaries of the main river were contributing to the decline in status. JBA and the EA undertook Catchment Walkover studies (CWS) of three 'Small Streams' in the catchment to identify locations within each where water quality is impacted by diffuse and point pollution sources. The CWS was undertaken in conjunction with a geomorphological walkover. This integrated approach took into account historic system functioning, legacy issues, wider catchment factors and local influences on river system structure and behaviour. Stream morphology was mapped alongside the land use, habitat types, rare and notable species and INNS. Present day form and process were compared with historic records of past channel behaviour. The results were mapped in GIS and used as a discussion tool at a stakeholder meeting to finalise a portfolio of projects which can be undertaken at the local level to ensure WFD gains.

TACLO'R TYWI/TACKLING THE TYWI – WORKING IN PARTNERSHIP TO RESTORE AN ICONIC RIVER

I. WILLIAMS¹, M. HERBERT-EVANS¹ & H. WILLIAMS¹

1 Natural Resources Wales

Rising in the Cambrian mountains, the Tywi River catchment is regarded as one of the most diverse and important river catchments in Wales. The status of the river, the livelihoods it supports and the need to make real improvements to water quality and biodiversity was the driving force behind the establishment of the Taclo'r Tywi Partnership. Land use is dependent on geography, with forestry and sheep farming the dominant land use in the upper catchment, dairy and livestock farming dominant in the lower reaches of the catchment. It is a European designated Special Area of Conservation and is home to a spectacular range of wildlife and plant species such as Otter, Little Ringed Plover and Shad. The main aim is to engage with stakeholders in the Tywi Valley and develop practical sustainable future management for the river, which supports agriculture, forestry, conservation, tourism and recreation and to make sure that the Afon Tywi can continue to thrive for future generations.

RIVERS AND WETLANDS COMMUNITY DAYS – INSPIRING COMMUNITIES

S. MALAURE¹ & D. MARTYN¹

1 Environment Agency

Rivers and Wetlands Community Days (RWCDs) is a nationally unique and exciting programme of events benefitting 20 Thames catchments by inspiring communities in restoring, improving and enhancing rivers, lakes and wetlands in their local environment. Volunteers and trainers were practically involved in these events.

This was devised by Thames River Basin Liaison Panel (TRBLP), Thames Regional Flood and Coastal Committee and catchment partnerships. A Delivery Partnership of the Wild Trout Trust, Angling Trust, Environment Agency, River Restoration Centre and TRBLP oversaw applications and awarded bursaries to the best projects. In 2014, Thames Water funded £192k over 3 years delivering 62 RWCDs projects. £655k match funding was contributed from successful organisations with a return of 1:3.4 on investment. 118 events involved 1800 volunteers. Future plans for funding are to take this collaborative approach with communities to wider businesses including Thames Water.

BECOMING IMPATIENS WITH BALSAM ON OUR RIVER BANKS

N. CRAVEN¹ & L. VICKERS¹

1 Lincolnshire Rivers Trust

Himalyan balsam is widespread and the impacts on rivers are well documented. With balsam bashing now a regular activity for many Rivers Trusts and community groups, Lincolnshire Rivers Trust (LRT) are going one step further and taking on the mammoth task of eradicating this plant from the River Witham.

Evidence has shown that this plant is out competing around 30 native species along the river. However, the LRT, in partnership with the Environment Agency are within the second year of a strategy for controlling this invasive species. Working logically from upstream, we can now demonstrate what a difference this approach has achieved, and how this project underpins our ambitions for the Lower Witham in the future.

NOTES



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1.00 pm	Natural capital	Natural Flood Management
3.15 pm	River restoration	

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Session 4:
Main Banqueting Room

Keynote Address

RESTORATION IN PRACTICE: RIVERS FOR THE FUTURE, RIVERS FOR EVERYONE

C. THORNE¹

¹ *University of Nottingham*

Are these the *best of times*, or *the worst of times*? Is this the *age of wisdom* or the *age of foolishness*? Twenty years have elapsed since the first RRC Conference and it is now time to take stock of where we are, how we got here and, most importantly, where we are going in UK river restoration. Restoration practice and its underpinning science have never been stronger. Policy drivers, process understanding, design principles and project implementation have developed over the last two decades to attain high levels of performance and reliability. However, while the hydrologic, geomorphic, and ecological foundations that have got us to where we are today are well-founded, their translation into practice requires radical reframing as we enter a period of unparalleled change. Going forward, our prime objective must be to restore the capacity of rivers to evolve and adjust to a future that is not just uncertain, but knowable: rivers capable of maintaining their Blue-Green multi-functionality and ecological integrity, however the future unfolds. This requires '*thinking outside the channel*', to restore dynamic channel-wetland-floodplain systems able to accommodate complex morphological responses, while supporting biodiversity and providing the wide ranging ecosystem services values by society. It follows that in restoring rivers for the future, we are restoring rivers for everyone.

NOTES



River Restoration

Wetland Habitat Creation

Natural Flood Management

Native Plant Nursery



Building with Nature

Session 5:

Main Banqueting Room

Workshop A: Future planning for a changing climate: cities & catchments

Facilitators: David Hetherington & Sally German (Arup)

RRC Lead: Alexandra Bryden

Aiming to look at how we can better connect cities and catchments, this workshop will include a few presentations followed by 'world café' style discussions. David Hetherington will lead this workshop with an introduction putting the session into context, outlining the importance of future planning, and defining the key challenges we hope to discuss in this session. These include

- Challenges to better connect rural and urban planning and how to overcome these
- How climate change challenges differ throughout catchments
- Should towns and cities be paying catchments for the services they provide
- Do we need to focus restoration effort in rural catchments to offset for the constraints and reduced restoration opportunities in urban areas; and what are the problems associated with this?

There will then be three presentations covering a few topics:

- Land use change in response to climate change, looking at the differences in rural and urban catchments
- NFM for catchments and cities, focusing on the themes of connectivity, scale and adaptive management
- River process restoration through urban and rural areas, aiming to look at process compensation and interaction, catchment connectivity and process continuity

Following a short break there will be a breakout session where the group splits into 4 smaller groups, to cover the 4 topics of discussion outlined by David at the start of the workshop. There will be time for some closing comments, thoughts and suggestions, before finishing for lunch.

LAND USE CHANGE IN RESPONSE TO CLIMATE CHANGE: OUTCOMES FOR CATCHMENTS FROM RESEARCH FOR THE ADAPTATION SUB COMMITTEE

R. NGAI¹, S. MASLEN¹, B. FREEMAN², A. PETTIT¹ & K. BROWN²

1 JBA Consulting, 2 Committee on Climate Change

This research examined how taking a long-term approach to considering risks from climate change, and anticipating land use changes to manage these risks, could deliver benefits in terms of resilience to climate change. As part of the project commissioned by the CCC, a framework was developed to assess long-term adaptation options for land use, which was then applied to consider how alternative land use and choices in 4 different case study sites in rural England (Petteril catchment in Cumbria; Somerset; Norfolk Broads; and Moor House & Upper Teasdale) could deliver benefits in terms of resilience to climate change, out to 2100. This research seeks to help policy makers, regulators, practitioners, and others to understand the long-term viability of current land use and the benefits of early adaptation to improve the resilience of landscapes and catchments before climate impacts occur.



Rather than simply repair this breach adjacent to a spillway on the River Wey in Hampshire it was upcycled into a rock ramp fish pass!

Session 5:

Kensington

Workshop B: Learning lessons from what goes wrong

Facilitators: Martijn Antheunisse (Wessex Chalk Stream and Rivers Trust), Brian Smith, (Environment Agency), Tim Martin (Greenfix)

RRC Lead: Martin Janes

One of the most valuable ways to improve is to learn from what does not work out as we expected. Understanding what went wrong, the reasons why and how you could do it differently is critical, especially with the high levels of uncertainty when working with natural systems. Lessons from adapting to, or overcoming, a developing problem also provide valuable insight.

To stimulate discussion, this workshop will use examples from the facilitators to highlight projects that did not go to plan, illustrating where in the process problems occurred and how they were dealt with. In addition, we will look at the lessons that can be learnt through experience, reflection and iteration. How can we reduce the likelihood and risk of unexpected problems arising?

In small group sessions you will use the experiences from within your groups to explore common and underlying issues that occur across a range of projects and personal observations. You will have sufficient discussion time to:

- Discuss examples of projects that did not go to plan;
- Utilise the thoughts and insights from project managers and practitioners;
- Explore what we might mean by 'failure' and why and how problems happened;
- Discuss how we can reduce the risk of unexpected consequences;
- Understand how each participant in a restoration scheme could better plan, reflect on and evaluate what they do;

By the end of the morning we will aim to summarise the above discussions and be able to state A) what are the common pitfalls and B) what are the simple actions we can all take to lead to more effective and successful restoration projects.

Participants

If you have good examples of projects with issues/problems/adaptation that you can share within your group to highlight and inform the discussion, please feel free to bring a few visual aids (A3 print outs).

NOTES

Delivering robust and pragmatic solutions



Geomorphological survey on the Allt Coire Mhic-Sith



Trews flood relief channel (Exeter) incorporating wetland habitat

The restored River Wylve at Norton Bavant, Wiltshire

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Session 5:

Derby

Workshop C: Protecting, managing and restoring small waterbodies: ponds and small lakes, headwaters, ditches, springs and flushes

Facilitators: Jeremy Biggs (Freshwater Habitats Trust) & Stewart Clarke (National Trust)

RRC Lead: Joshua Robins

The recent growth in catchment based working has been largely driven by the needs of the EU Water Framework Directive (WFD). Whilst this has increased the number and range of groups and individuals working to improve freshwaters, the way that WFD has been interpreted means that the emphasis of this work is often upon larger waterbodies and is particularly focused on the main river network. This is in contrast to what we know about the importance of smaller freshwaters and wetlands in the landscape; these are often important reservoirs for freshwater biodiversity. In addition, given their smaller catchments and overall smaller scale we might expect it to be easier to improve their ecological health and thereby more quickly and easily make a positive contribution to net freshwater biodiversity.

In this workshop we will review and discuss the importance of small waterbodies for freshwater biodiversity and the provision of ecosystem services. The session will consider monitoring and assessment methods, practical measures for creating, protecting and restoring small waterbodies, methods for enhancing ecosystem service delivery and opportunities for partnership. In the second part of the workshop we will explore how the relatively new driver for catchment management activity, natural flood management, might be applied to these small waterbodies.

The workshop will be interactive and we hope to generate a shared list of potential next steps for work on small waterbodies from guidance to policy advocacy.

There will be short presentations to stimulate discussion, including:

ASSESSING NATURAL FLOOD MANAGEMENT OPPORTUNITIES AND ASSOCIATED POTENTIAL BENEFITS IN HEADWATER CATCHMENT AREAS

R. JENNINGS¹, S. ROSE¹, A. JONES¹ & A. WHALLEY²

1 JBA Consulting, 2 Environment Agency

A Natural Flood Management scoping study in the headwaters of the Wyre Catchment, Forest of Bowland, incorporated a desk based and *in situ* assessment of the characteristics and condition of moorland drainage features and vegetation across the study area. Following this a surface water flood model of the catchment was developed that demonstrated the hydrological effectiveness and connectivity of the extensive system of moorland grips and gullies. The modelling work also helped identify multiple locations within the drainage network and surrounding landscape where it would be possible to intercept, slow and temporarily store run-off as it travels towards the main river network. NFM features such as Peat Gully/Grip Restoration, Runoff Attenuation Features, Leaky Barriers, and scrub/woodland establishment were explored, which also provide other environmental and societal benefits. Outcomes of the work are helping to inform stakeholder engagement activities and the development of long-term restoration and land management plans across these headwater areas. Other headwater NFM project examples will also be incorporated into the workshop discussions.

Aquatic Ecology - Supporting our natural environment

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AECOM's Aquatic Ecology team comprises freshwater & marine ecologists and taxonomists who provide a comprehensive suite of aquatic ecological services for client's projects across UK & Ireland, Europe and Africa.

We have built a market leading reputation based on high quality, consistent & cost effective data collection and analysis underpinned by our internal and external Quality Assessment programme. This approach has led to AECOM being a preferred supplier to the Environment Agency and other regulators and major utilities for biological sample analysis and assessment.

The team provides a flexible, proactive and integrated service covering all aspects of aquatic ecology often in tandem with AECOM's terrestrial ecologists and AECOM's other environmental services across power, utilities, oil and gas, industrials, infrastructure and commercial sectors.



River Habitat Survey, Exeter 2017

Core ecological services

- Aquatic macroinvertebrate surveys
- Aquatic plants (macrophyte) surveys
- Phytobenthos surveys
- Fish surveys (seine netting and electric-fishing)
- Zooplankton, phytoplankton and chlorophyll analyses
- Invasive and protected species surveys
- Water quality surveys and monitoring
- White-clawed and invasive crayfish surveys
- Riparian mammal surveys
- Amphibians, including great crested newt, eDNA and natterjack toad surveys
- Fish passage design and barrier assessments
- River Habitat Survey (accredited) and River Corridor Survey
- Advice on avoidance, mitigation and compensation
- Translocation of protected species
- Invasive species advice and control
- Hydromorphological and Geomorphological studies
- Environmental Impact Assessment
- Habitats Regulations Assessment
- Aquatic ecosystems management
- Pollution/incident response
- Environmental surveillance during construction works
- Ecological Clerk of Works services
- Water Framework Directive (WFD) compliance



Oil & gas



Industrial



Power



Transportation



Rail



Mining



Water



Defence



Aviation



Health



Education



Sustainability

Session 5:

Empire

Workshop D: Citizen science for impact

Facilitators: Stéfani Novoa (Earthwatch Institute), Laura Dal Pozzo (Eastern Alps District (AAWA)) & Luigi Ceccaroni (Earthwatch Institute)

RRC Lead: Marc Naura

This workshop will focus on the benefits of including citizen science activities in river restoration practice and its wider societal and economic impacts. We will discuss how citizen science activities may help the design, implementation and evaluation of river restoration practices and improve sustainability of restoration efforts through increased participation and accessibility of larger audiences. We will highlight the potential of citizen science to contribute to the evidence base for well-grounded decision-making in policy through two short case-study presentations on river monitoring. We will then discuss the experience of the audience on definitions, requirements and opportunities for participatory research approaches to complement or replace traditional research and evaluation procedures within river restoration. We will also present the 10 principles of citizen science developed by the ECSA Working Group "Sharing Best Practice and Building Capacity" as a common framework across disciplines and projects. The framework will be used to test the usefulness and relevance of future river restoration activities. We will reflect on how citizen science activities may align with existing standards and impact indicators for responsible research. Together with the audience, we will define how to best monitor and measure the added value (benefits and costs) of citizen science approach to river restoration, society, the economy, democracy as well as individual citizen scientists. Participants will be able to learn and share experiences on how citizen science can help the research and development process, how the sustainability of river restoration can be improved, and how citizen science can be included as an important policy pathway for decision makers.

THE RIVER STARTS HERE! COLLABORATION BETWEEN A RIVERS TRUST AND THE ENVIRONMENT AGENCY TO MONITOR, ANALYSE AND IMPROVE WATER QUALITY IN AN URBAN HEADWATER

J. WOZNICZKA¹, S. DOE² & N. EDGAR²

1 Trent Rivers Trust, 2 Environment Agency

Urban headwaters can be important sources of diffuse pollution throughout a catchment, and being small can be a good target for collaborative action to improve water quality. 'The River Starts Here!' brings businesses, organisations and communities together to improve a key WFD failing tributary in the East Midlands. From the outset, we have monitored in partnership to determine the nature and causes of pollution, engage stakeholders and demonstrate change. Methods include:

- Two sonde deployments which gave continuous data at 30 minute intervals for 2 months each
- RiverLife, developed by the EA in collaboration with the Riverfly partnership for volunteers to record aquatic invertebrates, including the more pollution tolerant, on a website
- Outfall Safari
- Spot sampling

Our results are shared and used to guide action, and volunteers receive feedback from the EA.

We will share how we have worked together and the benefits for us and the river.

UNLOCKING THE SEVERN – FOR PEOPLE AND WILDLIFE

J. LEACH¹ & T. THORPE²

1 Canal & River Trust, 2 Severn Rivers Trust

A major project to reopen the River Severn, was developed as part of a three year long collaborative partnership between the Severn Rivers Trust, the Canal & River Trust, the Environment Agency (EA) and Natural England. Over the next three years it will remove barriers to fish migration on the River Severn to secure the long-term future of many of the UK's declining and protected fish species, focusing on the once abundant twaite shad (*Alosa fallax*).

But this exciting project is about more than fish migration and will work with communities and schools to reconnect millions of people with the natural, cultural and industrial heritage of the river.

Through our citizen science programme, non-specialists contribute towards cutting edge fisheries research. By considering how to reduce the barriers that often prevent people from becoming involved, we enable volunteers to collect valuable data while learning, enjoying and taking ownership over their river.

NOTES

Session 5:

Crosby

Workshop E: Reinstating channel-wetland-floodplain systems to pre-disturbance condition

Facilitators: Colin Thorne (University of Nottingham), Johan Hogervorst (US Forest Service), Paul Powers (US Forest Service) & Janine Castro (US Fish and Wildlife Service)

RRC Lead: Marc Naura

Stream restoration is often based on creation or re-creation of a single-thread, meandering channel with a bankfull discharge return period of 1.5 or 2-years. The channel is designed to achieve 'sediment-balance', that is a condition in which all the sediment supplied from upstream and local sources is transported downstream. This is appropriate in 'sediment transport or transfer' reaches, but not in reaches with active floodplains, which are net sediment sinks. There is now overwhelming geologic, historical, empirical and theoretical evidence that natural, sediment sink reaches are characterised by multi-threaded channels that are fully connected to wetland-floodplain complexes.

This workshop introduces a new approach to restoring degraded streams – generally referred to as 'Stage Zero' – into connected channel-wetland/meadow-floodplain systems that replicate pre-disturbance conditions. The theory underpinning this approach will be presented and case studies used to demonstrate how GIS-based, terrain analysis can be used to differentiate pre- and post-disturbance surfaces and support restoration design. The strengths and limitations of the new approach will be set out and strategies for managing the risks associated with this type of restoration will be defined. The presenters aim to inform restoration professionals and practitioners about the opportunities associated with restoring full channel-floodplain connectivity, which include dynamic meta-stable equilibrium in the fluvial system, resilience to climate change, and maximum values of habitat diversity and complexity. They will close by conveying to workshop participants how to identify when and where restoration to 'Stage Zero' is, and is not, appropriate.

NOTES

Session 5:

Site Visit 1 – Daylighting on the River Alt

Site visit lead: Helen Rawlinson (Cass Foundation), Janet Hooke (University of Liverpool) & Phil Putwain

This project took place on 8.2ha of reclaimed brownfield, where a 600m culverted stream was opened up on the River Alt, creating an engineered 900m section of river, with a mosaic of habitats, and a footpath running alongside. The newly constructed 'Alt Meadows' utilised 'daylighting' and uncovering the river, providing multiple benefits including improved landscape, habitats for wildlife, and social wellbeing.

Project construction took place in 2013, and the channel has seen a few high water events, typical of a flashy urban catchment. Channel design considered landscape, gradient, available space, and urban setting. Upstream, the channel is approx. 3m wide. If the channel had been designed too wide, this would encourage deposition of fine black silt typical of an urban stream, and discourage hydromorphological feature creation. Furthermore the low gradient (1m over 1km) meant no pools or riffles were incorporated into channel design, but the channel was left to adapt naturally. With a stiff clay bed, geomorphological processes were limited, with the exception of some sand-bed areas in more sinuous sections. Slow flow and stable gravels have ensured the condition of the site has remained stable, with only one area which has experienced erosion.

Techniques used include deculverting of a 600m stretch, erosion control through coir rolls, a planting scheme utilising 300 volunteers and local schools, green infrastructure and a community engagement program with 9 community groups. Local community 'Friends' groups involvement included installing a shallow wire fence around part of the site to alleviate the significant issue of windblown litter; and designing colourful creative murals to represent the work of the community, which were implemented along the footpath. The improved area is a good site for birds and wildlife, as little egret, kingfisher, kestrel, buzzard, duck and moorhen sightings have been recorded here.

The channel remains culverted at the downstream point, as a stormdrain continues to output here. No waste material was taken off site, as all was to be repurposed or recycled on site. Material was used to create mounds and areas of elevated land, providing shelter to the footpath, and views across the site.

The visit will look at ecological and environmental drivers, benefits of collaboration and community engagement, and geomorphological outcome. Facilitators will discuss channel design and monitoring, to put the site in context and encourage discussion.



Session 5:

Site Visit 2 – Working with Natural Processes (WwNP): Blackbrook Slow the Flow, St Helens

Site visit lead: Mike Norbury (Mersey Forest), David Brown (Environment Agency), Matthew McParland (University of Liverpool) & Matthew Catherall (St Helens Council)

Blackbrook in St Helens, Merseyside, experiences repeat flooding from a combination of main river and surface water sources. Blackbrook has a 5% chance of flooding in any given year and sits in a low-lying bowl at the confluence of 5 rapid response catchments whose upstream area is 21km². This project focuses on flood risk and protecting properties downstream in Haydock, where the culvert runs underneath the A58 Blackbrook Road near Sankey Valley Visitor Centre. Previously considered flood risk solutions proved too expensive, as culvert enlarging would be required to reduce the flow constriction. Therefore Natural Flood Management (NFM) techniques are considered a more viable option.

There are 4 structures along this SSSI wet woodland stretch of the Blackbrook, made up of timber trunks, with some willow spilling hedges behind to reinforce the structures. The works were led by St Helens Metropolitan Borough Council, in partnership with University of Liverpool and the Engineered Log Jam's (ELJ) were installed in 2015 by Groundwork, funded by Natural England. Subsequent maintenance work (pleaching) has taken place where the planted willow weaving was partially cut down but remains live. This ensures that although the structures are not totally self-sufficient or maintenance free, they are living and will not totally rot into disrepair.

The plan was to slow the flow wherever possible, and allow water and sediment to pond behind these structures and reduce inundation downstream. These features have also proved beneficial for social wellbeing and mental health, as the local community is engaged in the project and is happy to see implementation of these techniques to reduce flood risk. Furthermore, these structures have influenced reduction in phosphate downstream, improving water chemistry.

This site visit will cover the NFM works that were undertaken upstream and will cover topics including the practical implementation, benefits, and the sediment and water quality implications.



Restoration Specialists for Freshwater & Coastal Environments

River and Floodplain Restoration

- Process-based restoration approach
- Catchment-scale restoration & NFM prioritisation
- Detailed restoration design
- Construction supervision

Natural Flood Management (NFM)

- Floodplain reconnection
- Upland landuse management
- Flood hydrographic attenuation and Desynchronization

Fisheries and Barriers Management

- Habitat surveys
- Barrier assessment & fish pass screening evaluation
- Mitigative habitat design and construction
- Management of fisheries monitoring programmes

Hydropower Support

- Assessment of geomorphic and hydrological characteristics
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- Planning and review of license applications
- Assessment of the status of local fisheries



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Session 6:

Main Banqueting Room

Best Practice Design

INVESTIGATING STEP-POOL CHANNELS IN THE HIGHLANDS

C. M. CLOAD¹ & H. MOIR²

1 University of the Highlands and Islands, 2 cbec eco-engineering

Installing or reproducing step-pool systems is often the most appropriate river restoration technique in steep channels. Engineered step-pools are considered to increase the stability of the channel and encourage biodiversity through providing variation of flow regimes. However the hydraulics of step-pool channels are not well understood and there is an element of trial and error or ‘adaptive design’ when constructing such systems. This research project aimed to identify how the variables describing step geometry interact to achieve a stable channel and how this can evolve over time. Key step geometry relationships were selected from the published literature and compared to measurements taken in natural and restored/ engineered step-pool channels in the north of Scotland. This research adds to the understanding of appropriate design and construction methodologies for stable step-pool channels in river restoration.

ENGINEERED WOOD STRUCTURES – PRACTICAL EXPERIENCE OF DESIGN, IMPLEMENTATION AND MONITORING FROM PROCESS RESTORATION TO SUSTAINABLE BANK PROTECTION APPLICATIONS

H. MOIR¹, E.GILLIES¹ & D. HOLLAND²

1 cbec eco-engineering, 2 Salix River and Wetland Services

Engineered or Large Wood Structures (EWS or LWS) are increasingly utilised in river restoration projects and for the purposes of channel/bank stabilisation. Their use in the latter application is often regarded by environmental regulators as a more sustainable ‘green’ or ‘soft’ engineering alternative to more traditional rock armour/rip-rap/revetment bank protection and implementation of such structures is becoming more common. EWS/LWS provide multiple benefits to a river environment that has a generally limited natural supply of large wood material. Compared to more traditional bank protection measures, their more complex form helps dissipate rather than reflect potentially erosive hydraulic forces. Also, they are to some degree deformable, allowing adjustment in response to dynamic geomorphic processes. They also have significant ecological advantage, both in directly providing habitat (e.g. cover for fish within their structure) and through their role as catalysts for increased morphological heterogeneity (and, therefore, biodiversity) of the channel corridor. We present case studies where EWS/ LWS were utilised for both bank/channel stabilisation and river restoration. We present the stages of implementation, from initial site assessment to modelling/design to construction to monitoring.

GETTING DOWN AND DIRTY WITH A DIGGER

D. HAMMOND¹ & D. HOLLAND²

1 Affinity Water, 2 Salix River and Wetland Services

River restoration projects can take many years to come to fruition and even when the “on the ground” works starts there are inevitably issues/opportunities which occur, requiring adaptive management and a degree of flexibility. A wide range of issues can arise including ; those related to the weather (drought, flooding, snow, extreme temperatures); site access; availability of materials; protected and invasive species; inaccurate services information; unknown or hidden ground conditions; design issues; stakeholder and landowner engagement and decision making. Any, or all of these variations can mean changes on the ground for which adaptive management needs to be applied. Can they be achieved practically? Do they need design changes or can we use “expert judgment” and does early contractor involvement help mitigate these issues?

CONSTRUCTION DESIGN FOR RIVER AND FLOODPLAIN NATURALISATION

S. BENTLEY¹ & G. L. HERITAGE¹

1 AquaUoS – University of Salford

The process of river restoration and naturalisation presents interesting challenges when projects reach the detailed design and construction phase. Nowhere is this more true than with the construction drawings. In the majority of cases, typical engineering oriented CAD type drawings, produced with exact dimensions and levels, are inappropriate to convey the concepts and processes behind the creation of natural river channels and floodplains whilst also adding very considerably to delivery costs.

NOTES

Session 6:

Kensington

Catchment planning & delivery

RIVERLANDS. PARTNERSHIP WORKING – DOES THE PRACTICE MATCH THE THEORY?

A. SCARR¹ & R. HIGGS²

1 Environment Agency, 2 National Trust

The National Trust has launched Riverlands, a major partnership programme with the Environment Agency. This is a multi-million pound, long term programme of work that aims to explore how partnership working can deliver long term sustainable change. Rivers are the lifeblood of our landscapes, defining places and binding communities, and we believe that sustainable change will only be achieved through strong partnerships and a culture of participation. It is about being open, transparent, sharing decisions and acting together, about listening and valuing diversity where there will be a diverse range of perspectives and starting points. The presentation will describe the aims of the partnership, the challenges of two major organisations working together both nationally and locally and use examples to show how things are working so far, including the many other partnerships that are developing at a local level.

DEVELOPING A STRATEGY FOR DELIVERY OF CATCHMENT WIDE NATURAL FLOOD MANAGEMENT

T. WINGFIELD¹

1 University of Liverpool

On the 27th April 2016, under the shadow of the Blackpool Tower, around 50 delegates of the River Restoration Centre conference met to debate and unpick the environmental, social, economic and stakeholder knowledge contributing to or limiting the planning and implementation of Natural Flood Management. This presentation tells the story of that data. From the development of mutual understanding across different disciplines to the integration of knowledge to create new concepts and interconnections. With the assistance of, Ribble life together partnership, Merseyside strategic flood and coastal risk management partnership, Mersey Rivers Trust and the Wyre NFM partnership, the theories generated in the animated and enthusiastic RRC workshop have been tested in practice. The results of both pieces of work have now been brought together in an NFM delivery framework guide, written to support practitioners to make decisions to optimise NFM planning and delivery on a catchment scale.

DELIVERING INTEGRATED CATCHMENT MANAGEMENT – THE LITTLESTOCK BROOK PILOT STUDY IN THE THAMES BASIN

J. OLD¹, D. McKNIGHT¹, R. BENNETT², A. BERKELEY² & V. LEWIS³

1 Environment Agency, 2 Wild Oxfordshire, 3 Evenlode Catchment Partnership

The 16km² Littlestock tributary catchment of the Evenlode is a pilot lowland scheme in Thames Basin to explore the delivery mechanisms and assess the effectiveness of Natural Flood Management (NFM) measures to reduce the risk of flooding in the village of Milton-under-Wychwood, and improve water quality by intercepting soil and phosphate in run-off. The £640K scheme (2016-21) is funded by multiple partners, is community led and being delivered by the Evenlode Catchment Partnership (ECP). The ECP are working closely with Thames Water's 'Smarter Catchment Initiative', Natural England and Forestry Commission to integrate landowner grants for NFM and diffuse pollution measures. The integration of EA resources, consultancy and academic links has established an intensive water-level and water-quality monitoring network, and is supporting hydraulic modelling of the tributary trial area. So far, 10 field corner flood storage areas have been created with a combined capacity of 26,000m³, and linked to

woody dams which divert high river flows. 230m of new open watercourse, flowing through a series of ponds, and 13ha of new riparian woodland have also been created.

This ECP NFM project is integrating multiple objectives stated in the 25 Year Environment Plan; including the management of flood risk, improved water quality, wildlife habitats, recreation opportunities and partnership working with communities.

STRATEGIC APPROACH TO RIVER RESTORATION PLANNING

M. NAURA¹

1 River Restoration Centre

To be effective and sustainable and enable the achievement of Water Framework Directive and other targets, river restoration should ideally be carried out at the scale of river/water body or catchments using broad-scale assessment and planning techniques. Existing methods such as fluvial audits are often demanding in terms of resources, skills, technical and analytical abilities and are often not adapted to the objectives and requirements of decision-makers. The River Restoration Centre has worked towards the development of a framework for planning river restoration at catchment scale that can be used by a wide community of users with differing abilities and skills. We will present an application of a framework and methods on a case study catchment along with simple and innovative techniques for surveying, analysing data and reporting outputs.

NOTES

Session 6:

Derby

Fish passage & habitat restoration

HIGHLIGHTS AND LOW POINTS FROM THE FIVE YEAR SAGA TO IMPROVE FISH PASSAGE ON THE RIVER EHEN

J. MILLS¹, G. L. HERITAGE², L. BRYANT¹ & O. SOUTHGATE³

1 West Cumbria Rivers Trust, 2 AquaUoS – University of Salford, 3 Environment Agency

Barriers to biotic movement remain one of the most significant impacts on river hydromorphology and hydroecology in the UK. Actions to restore biotic access are vital. However, these successes are rarely achieved easily and even modifying the simplest of structures can require numerous permissions. Competing interests from hydropower, angling and historical preservation groups further complicate matters. Permissions and buy-in need to be achieved at a local scale but the difficulties in obtaining these requirements should not be under-estimated.

This paper reports on the five year process leading up to the removal of Ennerdale Mill Dam on the River Ehen, Cumbria. Barrier removal would open up some 15.5 km of habitat reconnecting fresh water mussel and salmon populations. Local, particularly angling related, opposition was strong and protracted and regulatory issues proved difficult but the weir was removed in summer 2018 with the restored river functioning well.

GREATER THAMES ESTUARY FISH MIGRATION ROADMAP: A PLATFORM FOR IDENTIFYING HABITAT RESTORATION AND CREATION OPPORTUNITIES

A. PRYOR¹ & W. BODNAR¹

1 Thames Estuary Partnership

Rivers in countries of the North Sea region are some of the most fragmented by human development in the world. River restoration and intertidal habitat enhancement is completed in an opportunistic way when either a development needs to mitigate for other damage or flood asset management needs addressing. Similarly, migration barriers such as weirs are only addressed in an ad hoc manner and usually only single barriers at a time. This project is designed to bring barrier, freshwater and marine intertidal habitat opportunity data and flood mitigation areas together in one place, and progress by looking at migratory routes as roads to identify the 'highways', 'a-roads' and 'b-roads' that migrating fish will use. This approach has already helped water authorities in the Dutch Rhine West Delta to prioritise their measures for lifting barriers to entire routes. The completed roadmap will provide a platform for identifying habitat restoration and creation opportunities.

HABITAT RESTORATION AT POWICK WEIR – A CASE STUDY IN SAVING KING HENRY III's FAVOURITE FISH

P. BRUNNER¹, I. DENNIS¹, E. VAN MAREN¹ & P. HERICKX²

1 Royal HaskoningDHV, 2 Environment Agency

The River Teme is a major tributary of the River Severn, which is designated as a SSSI. Man-made structures such as Powick Weir have a considerable influence on the River Teme, changing flow patterns, encouraging sedimentation, degrading in-channel habitats and preventing the upstream migration of the twaite shad (many of which vanished after weirs were installed in the 1800s). This presentation will provide an insight on how a partnership of consultants, Rivers Trusts and Regulators have worked together within the community to design and implement effective habitat restoration solutions for Powick Weir.

It will inform delegates on how effective fish and wildlife restoration solutions can be achieved through the careful consideration at the feasibility and detailed design phase, combined with stakeholder consultation to provide a WIN-WIN solution for the environment, anglers and community. In addition, the presentation will also inform the delegates on innovative fish passage solutions for protected fish species, such as twaite shad and provide initial geomorphological and ecological results following the removal of Powick Weir.

VIDEO MONITORING OF FISH IN RIVERS: RESEARCH AND MANAGEMENT PERSPECTIVES

M. DUBOIS¹, R. C. GRABOWSKI¹ & A. GILL²

1 Cranfield University, 2 PANGALIA Environmental

Fish are a critical component of the ecological community of rivers and are often the focus of restoration efforts. Whilst there is excellent scientific and local knowledge of fish populations, an improved understanding of how the whole fish community use river habitat is essential for effective management and restoration. This study aimed to test a novel approach to (i) conduct a fish census, (ii) quantify habitat utility and preferences, and (iii) assess the fish behaviour exhibited in those habitats. A year-long study was conducted in the River Mimram involving the monthly deployment of underwater cameras in different habitats (e.g. pools and rifles). Results will be presented on the seasonal changes in fish abundance, habitat use and behaviour. The findings of this study on the relationships between fish community and habitats will support further river management decision in this river and others. The technique holds promise for use in other, aquatic systems and applications.

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Session 7:

Main Banqueting Room

NATIONAL ASSESSMENT OF THE SPATIAL DISTRIBUTION OF RIVER RESTORATION PROJECTS IN THE UK: MONITORING, ASSESSMENT AND MAINTENANCE

H. MOORE¹, I. RUTHERFURD², D. de ALWIS PITTS¹ & M. NAURA³

1 University of Lincoln, 2 University of Melbourne, 3 River Restoration Centre

Few studies have explored the changing spatial distribution of river restoration projects in the United Kingdom. Our research describes and maps the proportion of projects of different type and theme, the amount of money invested, and the location in terms of stream order, channel size, and catchment area. We also examine the proportion, purpose, and location of projects that have undergone monitoring, assessment, and maintenance, and differences between projects in rural and urban areas. This will improve on earlier reviews of this type of data base conducted in the United States (Bernhardt et al., 2007), and Australia (Brooks & Lakes, 2007). Our analysis adds to the growing body of knowledge about the progress of river restoration in the United Kingdom, and globally. The outcomes of the research provide direction for future projects, and recommendations for the management and funding of projects to ensure they are successful over the long-term.

INTERNATIONAL GUIDANCE AND CASE STUDIES ON USING NATURAL AND NATURE-BASED FEATURES TO REDUCE FLOOD RISK AND IMPROVE THE ENVIRONMENT

L. BURGESS-GAMBLE¹, O. BURNS¹ & J. GUY¹

1 Environment Agency

Natural and Nature Based Features (NNBF) are being promoted internationally to help reduce flood risk whilst delivering a wide range of ecosystem services.

The US Army Corps of Engineers (USACE) has been leading two pieces of work to develop international NNBF guidance and share case studies examples of their application globally.

The Environment Agency has been working with USACE and Rijkswaterstaat to help write this guidance document and to provide case study examples.

We propose to discuss and share the content of this guidance document. We will also look at the NNBF Atlas and show-case exceptional case studies from across the globe.

GLOBAL CHALLENGES TACKLED THROUGH RIVER BASIN RESTORATION: A REAPPRAISAL OF THE IMPORTANCE OF OUR WORK

D. HETHERINGTON¹

1 Arup

Historically, river restoration has been predominantly driven by a desire to improve physical habitat to the benefit of biota and aesthetics. However, only relatively recently (approximately the last 10-15 years) has the true holistic value of river restoration been appreciated through the development and application of ecosystem services frameworks. Additionally, the increasing appreciation of restoration in the context of natural processes and the river basin unit has allowed projects to be designed at a scale that is more sustainable, meaningful and scientifically robust than earlier attempts at habitat improvement. This is demonstrated by the principles of river, and river basin, process restoration being increasingly applied to tackle regional scale problems in rural areas and cities through techniques such as Natural Flood Management (NFM), Blue Green Infrastructure and the strengthening rewilding movement. As the appreciation of the value and impact of the work of river basin specialists has grown, as has the size river restoration community.

The world is changing and it is likely that our roles will become ever more important in the context of emerging and critical global challenges. Climate Change is the only truly global challenge that covers every geography on Earth, and the associated impacts are becoming increasingly apparent. River basin process restoration in rural and urban areas is one of the key actions that society can undertake to tackle the impacts of climate change by reducing flood and drought risk, improving food security, regulating temperature and improving air quality, protecting vulnerable habitats and holding carbon in sustainable ecosystems. Additionally, the planet's population is growing and communities are becoming increasingly vulnerable to droughts, exacerbated by historical and new damage to river basin processes. This paper explains how our community of river restoration specialists has never been more essential, due to the role that we can play in tackling the challenges caused by climate change and population growth. It also explains how our work can be crucial in achieving progress towards Sustainable Development Goals (SDGs), and humanitarian process improvements.

NOTES

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L. BRYANT¹, J. MILLS¹, I. CREIGHTON¹

1 West Cumbria Rivers Trust

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Letting the Dove Flow

T. BROOKS¹

1 Environment Agency

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Delivering Natural Flood Management in Wessex

A. MAXWELL¹, N. McCARTNEY¹

1 Environment Agency

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Modelling floodplain sediment storage times under variable vegetation and streamflows

C. J. FEENEY¹, R. C. CHIVERRELL¹, H. G. SMITH²

1 University of Liverpool, 2 Landcare Research

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The ripple effect of Manor Road Park, the project that just keeps giving

J. EVERETT¹

1 Affinity Water Ltd

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H. JOYCE¹, J. WARBURTON¹, R. HARDY¹

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1 Wood Environment and Infrastructure Solutions UK Ltd, 2 Anglian Water

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1 University of Worcester, 2 Environment Agency

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1 University of Liverpool, 2 Landcare Research, NZ

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1 University of Liverpool, 2 Centre for Ecology and Hydrology

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S. BURKE¹

1 AmbioTEK Community Interest Company

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1 Environment Agency, 2 University of Zurich

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J. ENGLAND¹, A. TREE², S. HEARN³, M. JANES⁴

1 Environment Agency, 2 Scottish Natural Heritage, 3 Natural Resources Wales, 4 River Restoration Centre

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River Prize Finalist – New Forest Wetlands, Hampshire

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River Prize Finalist – River Bulbourne, Hertfordshire

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River Prize Finalist – River Nairn, Scottish Highlands



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Nature Driven Design: River Restoration Solutions



Our approach

Royal HaskoningDHV is a specialist water environment consultancy that has a solid track record of successful, award-winning, planning, policy, design and implementation projects across the UK. Under our motto “Enhancing Society Together”, our team work hard to improve the water environment through the restoration of natural processes, delivering value for money and outcomes that meet the needs of riparian landowners, rivers trusts, regulators and other key stakeholders such as local authorities. Although the main driver of these projects is often to restore and enhance the environment we have identified and delivered wider benefits for natural flood risk management, biodiversity and amenity/educational greenspace as part of our integrated schemes.

Our wealth of experience means we are well placed to create environmentally driven and sustainable designs for the restoration of river and lake systems that provide significant benefit to people, biodiversity and the historic environment alike. Our ‘Nature Driven Design’ philosophy means that we recognise the importance of working with natural river processes to deliver sustainable river improvements as part of a multi-use landscape. We have a strong team of experts in geomorphology, engineering, hydrology and ecology who have considerable experience of working across the UK and Europe, and an excellent understanding of relevant drivers such as the Water Framework Directive.

Our recent experience

Channel restoration and floodplain reconnection

Our team has an established track record of successfully delivering river restoration schemes from inception and stakeholder engagement through to detailed design. We have recently completed a number of channel modification projects to identify options to restore natural river processes and design sustainable solutions. Recent project examples include: **River Twyver and Sud Brook Feasibility Study** and **Ugbrooke Restoration Project**.

Fish passage enhancement

Our project experience in relation to fish passage encompasses a range of technical passes, low cost baffles, rock ramps and natural solutions, such as bypass channels. We have also completed several weir removal projects and were lead fish pass designers for **Powick Weir Removal** which was part of the internationally important **Unlocking the Severn** fish passage project (pictured below). Our engineers, fisheries specialists and geomorphologists work together to deliver robust and innovative designs. Other recent project examples include: **Knightsford Bridge Weir Detailed Design; Creamery Weir Removal; and Enfield Weir Options Appraisal and Design**.



Water and sediment quality

Our team are experienced in monitoring and appraising water and sediment quality, including data analysis and interpretation against relevant water quality standards to provide evidence-based recommendations to improve river habitat quality, for example on the **River Mease SAC/SSSI**. We are also writing **CIRIA guidance for the assessment and management of contaminated sediments**, for those working in rivers, lakes, estuaries and the marine environment.

Contact

For further information about our work, come and visit our stand or contact
Dr Ian Dennis, Water Environment Sector Lead, on ian.dennis@rhdhv.com or 01444 476632.



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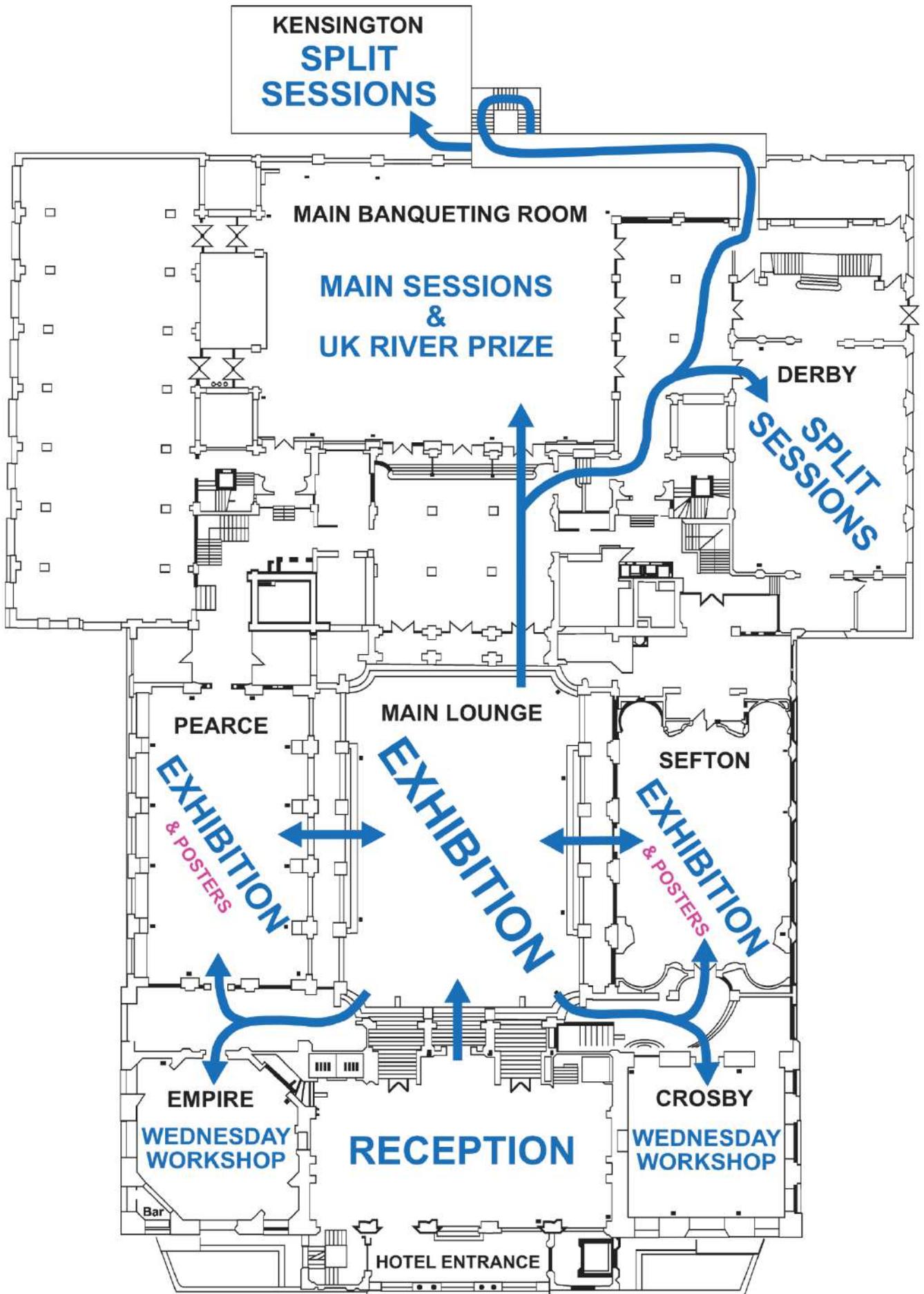
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