

River Restoration Centre 17th Annual Network Conference





Planning, delivery and evaluation of our rivers: challenges and choices

Delegate Pack Including programme, abstracts, workshop, site visit information, and notepaper

26th & 27th April 2016 Imperial Hotel, Blackpool

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This is a great hangout

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River Restoration Centre 17th Annual Network Conference

Planning, delivery and evaluation of our rivers: challenges and choices



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

Welcome



... from the RRC Managing Director

Welcome to the River Restoration Centre's Annual Network Conference at the Imperial Hotel in Blackpool. This is now the 17th Edition of the Conference which since 1998 has brought together enthusiastic individuals who have a passion for river restoration and catchment management. It's this enthusiasm that makes the event a success year after year. Without the fantastic presentations,

challenging questions and engaging conversations provided by our delegates, we would not have such a successful annual event. We are sure that this year will be no different.

Since last year's conference we have employed three new permanent members of staff. The most recent of those is Jasmine who is our new River Restoration Adviser. Nicola joined last year as the Centre Administrator, as did Will, who is our Community Engagement Officer. Please take the time to read the "Meet the Staff" page (page 25) so that you can get to know them and be able to grab them during the conference if you need assistance.

Following last winter's flooding, we have seen the debate around flood management once again dominate national news and interest. During that time there were many articles discussing how best to address flood risk in the face of future climatic uncertainty. A few months on, this is now a great chance to collectively discuss our approaches to natural flood management and to respond to this interest and acceptance of working with natural processes. It also helps us all with our other work on rivers and catchments by emphasising the other multiple benefits that are now almost implicit in what we do.

In the last year, community groups and partnerships have become increasingly involved in project delivery across the UK. In England, the Catchment Partnership Action Fund (CPAF) tasked 106 Catchment Partnerships to deliver ecological improvements within their sub-basin. Earlier this year, the RRC helped the Environment Agency to build capacity within partnerships through three successful CPAF learning workshops. There is now lots of support and resources available through the Catchment Based Approach (CaBA) in England and RAFTS in Scotland. RRC's commitment is strengthened through Will's appointment, funded by Esmée Fairbairn.

We're proud to say that the UK River Prize will once again feature on the first night of this year's conference. Last year, Tweed Forum was the first to lift the Nigel Holmes Trophy which celebrates best practice in river restoration and catchment management. There are four fantastic finalists that are all hoping to take home the Trophy at the awards dinner. We hope that everyone enjoys the evening, whether you're winning or just enjoying the company, the food and celebrating the great work and great people that make it happen.

Finally, my sincere thanks go out to all of those who support and partner the RRC. I hope, over the next two days, that you fully exploit this opportunity to fill your mind with another year's worth of ideas and contacts to follow up.

Martin Janes, Managing Director

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Loch of Leys Restoration, Banchory

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PROGRAMME OF EVENTS

90 mins

DAY 1:

--- TUESDAY 26th April ---

REGISTRATION at Reception

09:00

NETWORKING & EARLY VIEWING POSTER SESSION in the Washington Suite

Session 1

Lancastrian Suite

	CHAIR: Fiona Bowles (RRC Board)	
10.30	River Restoration Centre introduction & welcome Martin Janes (<i>the River Restoration Centre</i>)	15 mins
10.45	Restoring beavers to Devon: Nature's wetland architects Derek Gow (<i>Derek Gow Consultancy</i>)	15 mins
11.00	Working with natural processes to reduce flood risk and improve the environment Lydia Burgess-Gamble (<i>Environment Agency</i>)	15 mins
11.15	Discussion	10 mins
11:25	In-stream restoration in action Jackie Webley (<i>Scottish Natural Heritage</i>)	15 mins
11:40	River weirs – remove or retain? Matthew Hemsworth (<i>JBA Consulting</i>)	15 mins
11:55	Delivering river restoration in Scotland: the next 12 years Roy Richardson (<i>Scottish Environment Protection Agency</i>)	15 mins
12:10	Restoring morphological functionality to a heavily modified river Sally German (<i>Arup</i>) & David Holland (<i>Salix</i>)	15 mins
12:25	Discussion	15 mins
12:40	LUNCH in the Washington Suite	60 mins

		Session 2		
	<u>Lancastrian Suite</u> Urban River Restoration	<u>Louis Suite</u> Partnering With Nature	<u>Princess Suite</u> Ecological Monitoring	
	CHAIR: Kevin Skinner (Atkins)	CHAIR: <i>Phil Boon (Scottish Natural Heritage)</i>	CHAIR: Judy England (Environment Agency)	
13:40	The restoration and regeneration of Deptford Creek Michael Forrester (<i>London Borough of</i> <i>Lewisham</i>)	Working together to restore The Midlothian Esks Clare Rodgers (<i>Royal HaskoningDHV</i>) & Tommy McDermott (<i>River Forth Fisheries</i> <i>Trust & Trex Ecology</i>)	An ecohydrological approach to river restoration David Harper (Aquatic Ecosystem Services Ltd. & University of Leicester)	15 mins
13:55	Planning river restoration the Dutch way Ian Dennis (<i>Royal HaskoningDHV</i>)	Removing and restoration of rock armour, croys and cars Kenneth Macdougall (<i>EnviroCentre Ltd.</i>)	Biotopes as design for restoration and units for monitoring success Ahmed Al Zankana (<i>University of</i> <i>Leicester</i>)	15 mins
14:10	Discussion.	Discussion.	Discussion.	10 mins

Session 2 – continued...

14:20	Improving habitat linkages in heavily modified urban areas with Floating Riverbanks Galen Fulford (Biomatrix Water Solutions Ltd., Land & Water Services Ltd.)	Working with wood on the Wensum Ian Morrisey (<i>Atkins Ltd.</i>) & Marc Huband (<i>Atkins Ltd.</i>)	Using Beetles to measure riparian habitat quality Jon Webb (<i>Natural England</i>)	15 mins
14:35	Public participation GIS for assessing social values in urban rivers Xavier Garcia (International University of Catalonia)	Partnering with nature for sustainable river restoration Matthew Johnson (<i>University of Nottingham</i>)	The Logie Burn: Results of three years of monitoring Stephen Addy (The James Hutton Institute)	15 mins
14:50	Discussion.	Discussion.	Discussion.	10 mins
15:00		POSTER SESSION in the Washington Suite with tea and coffee		45 mins

		Session 3		
	Lancastrian Suite	Louis Suite Resure Deintroduction	<u>Princess Suite</u>	
	CHAIR: Bill Brierley (Freshwater Biological Association)	CHAIR: Alastair Driver (Environment Agency)	CHAIR: Andrew Brookes (Jacobs)	
15:45	Balancing flow – balancing opinion Jane Moon (Black & Veatch) & Paul Jose (Wessex Chalk Stream & Rivers Trust)	Restoring beavers to Devon – and understanding their impacts Mark Elliott (<i>Devon Wildlife Trust</i>)	Achieving measures for heavily modified water bodies using sediment management Katy Kemble (Jacobs) & Matthew Buckley (United Utilities)	15 mins
16:00	Conflict of interest in river restoration: a county council perspective Jessica Dippie (<i>Buckinghamshire County Council</i>)	Quantifying the multiple benefits of beaver activity across catchment scales Richard Brazier (<i>University of Exeter</i>)	Weir pools and hydropower: methods to assess impacts Simon Palmer (APEM Ltd.)	15 mins
16:15	River restoration pitfalls and successes from concept to monitoring Jenny Mant (<i>Ricardo AEA</i>) & Martin Janes (<i>River</i> <i>Restoration Centre</i>)	Bringing beavers back – how will we manage this species? Roisin Campbell-Parker (<i>Royal Zoological</i> <i>Society of Scotland</i>)	Rapid biodiversity gains through naturalisation: process based success stories Sebastian Bentley (AECOM) & Kieran Sheehan (JBA Consulting)	15 mins
16:30	Discussion.	Discussion.	Discussion.	15 mins
16:45	SHORT B	REAK TO MOVE TO FINAL JOINT SES	SION	10 mins

Session 4

Lancastrian Suite

	CHAIR: Nick Clifford (Kings College London)	
16:55	Keynote Address Positioning River Restoration for 2030: lessons from the past and challenges for the future Geoff Petts (Vice Chancellor and President, University of Westminster; President of the British Hydrological Society and Editor-in-Chief of River Research and Applications)	25 mins
17:20	Discussion (Keynote and General)	20 mins
17:40	Poster competition prizes, final announcements and close Martin Janes (<i>RRC</i>)	15 mins
17:55	END OF DAY 1	

19:30 – PRE-DINNER DRINKS RECEPTION

Washington Suite

&

20:00 – UK RIVER PRIZE AWARDS DINNER

Lancastrian Suite

2016 UK RIVER PRIZE FINALISTS

River Aller and Horner Water	River Dulnain	River Wandle	Rivers Eden, Derwent & Kent
Catchment scale project	Innovative and novel project	Urban Project	Multiple benefit and partnership project
Page 21	Page 22	Page 23	Page 24



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Picture: The Tagliamento River in Italy is one of our research sites and the location for this programme's field trip.

- Flexible study options: Postgraduate Certificate, Diploma and part-time MSc options for those who want to combine work and study.
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Funding: bursaries (up to £4,000) available.

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9:00

DAY 2:

Registration

---WEDNESDAY 27th April ---

Opens at 8:30am

3 hours

30 mins

Session 5

CHOICE OF SITE VISIT OR WORKSHOP

<u>Churchill Suite</u> Workshop B: How to Make the Most of Your Monitoring and Project Appraisal

Planning for natural flood management needs to take account of local social, economic and other stakeholder impacts. Justifying actions that take account of these elements and that also deliver projects that demonstrate multiple benefits inevitably requires transparent planning and mapping decision making support tools. This workshop provides the opportunity to discuss what level of data and interpretation skills are needed to assess impacts and identify how we can work towards developing standardised scoring systems to support decision making. The workshop will include explanations of tools that are currently under development to support this approach and an opportunity to discuss their usefulness and limitations. It will also provide an opportunity to discuss what evidence is needed to demonstrate natural flood management success.

Lancastrian Suite

Workshop A:

Natural Flood Management: Tools to

Help Maximise Benefit and Reduce Risk

The RRC monitoring planner and guidance is now considered as mainstream in terms of supporting best-practice approaches to getting the most from you monitoring. And yet, monitoring outputs still don't always provide all the anticipated answers. This workshop will re-examine why this is still the case and, through the use of case-studies and interactive sessions, provide an opportunity to both refresh your knowledge on how to set good monitoring objectives. We will also discuss how we can take the next steps to supporting more coherent monitoring of river restoration projects across the UK (i.e. linking up citizen science outputs), that can collectively increase the evidence base.

12:30

LUNCH

	Sessie	on 5	
9:00	CHOICE OF SITE VISIT OR	WORKSHOP continued	3 hours 30 mins
	Derby Suite	<u>Louis Suite</u>	
	Workshop C:	Workshop D:	
Demonst	rating the Value of Ecosystem	Building Technical River Res	storation
Serv	ices for Decision Making	Capacity	
Providing	a value for the services that	In recent years there has been an i	ncreased
ecosystems	provide can be a tricky and	expectation that locally-based part	tnerships
controversi	al task. Whilst we understand	will take on the huge task of delive	ering

that not all services are easy to value monetarily, economic valuations are often necessary to support good governance, and provide an opportunity for innovative funding of river schemes. Any valuation however, must include the value of indirect benefits to demonstrate that society will benefit. For example, from reduced costs of flood damage, reduction in health care cost, improved social equity, and increased habitats. The workshop will discuss what tools and techniques are currently available to assess benefits and values, and discuss how best to use information to convince funders and policy makers that river restoration has wider social, economic and environment benefits.

expectation that locally-based partnerships will take on the huge task of delivering catchment-scale river restoration. To do this there is a need for detailed guidance on how to deliver river restoration from large scale concept planning to site implementation (e.g. clear project objectives, project consent procedures, technical design and choice of appropriate techniques, construction and demonstrating success). This workshop will provide an opportunity to discuss what is available and what is

needed.

<u>Princess Suite</u> Workshop E: Dealing with Sediment in Respect to In-Channel Structures **Site Visit:** The Wyre Riparian Restoration Initiative

There are two main areas where sediment issues arise. (1) Disconnection through channel alterations (to bed, banks and in-channel structures) which have significant impacts on longitudinal sediment transport. (2) New channels as part of river restoration projects, especially where inherently unstable. Such sediment dynamics unpredictability can have both unforeseen benefits and risks for habitats and flood risk management which need to be accounted for, in any river alteration. This workshop will discuss what sediment parameters need to be understood in the context of channel modifications (e.g. from weir removal/lowering, impact of small/medium size hydropower schemes, the removal/alteration of bank and bed protection through to full scale naturalprocess driven river restoration projects). It will seek to identify how, when, why and where a better understanding of sediment is necessary, how this can be best achieved and its implications for practical sediment management.

This year's site visit is to the Wyre Riparian Restoration Initiative at Ambrose Farm which is one of the Catchment Partnership Action Fund (CPAF) Projects. The project is looking to improve riparian habitat; this will include bank restoration works, fencing and planting. On the visit we will hear from the individuals and organisations involved and discuss the success of the Wyre Catchment Partnership as well as Catchment Partnerships and the CPAF initiative in general. This topical subject should provide interesting and engaging discussions on site.

		Session 6		
	Lancastrian Suite	<u>Louis Suite</u>	Princess Suite	
	Barrier Removal	Shaping Our Rivers	Modelling: Tools and Techniques	
	CHAIR: Rob Mitchell (RAFTS)	CHAIR: Oliver Lowe (Natural Resources Wales)	CHAIR: David Hetherington (Arup)	
13:35	Provision of fish passage in The Worfe Catchment Iain Stewart-Russon (<i>APEM Ltd.</i>)	The importance of reference state and the assessment of potential for geomorphic work Hamish Moir (<i>cbec eco-engineering Ltd.</i>)	Integrated dynamic analysis of modified channels: dealing with constraints in urban areas Ian Bentley (<i>AECOM</i>)	15 mins
13:50	Innovative fish passage design on an East Lancashire river Adam Walmsley (<i>Ribble Rivers Trust</i>)	A method for defining potential locations for WFD and flood risk restoration in a large catchment Katy Kemble (Jacobs) & Sera Roberts (Jacobs)	Habitat modelling: a useful design, investigation and appraisal tool Dave Mould (JBA Consulting)	15 mins
14:05	Lessons learned at a Norfolk mill Jonathan Whitmore (<i>JBA Consulting</i>)	Balancing risk and reward: a call for a (slightly) more cavalier approach to restoration George Heritage (<i>AECOM</i>)	Hydraulic modelling requirements for river restoration: methods for minimising (not just flood) risk Eric Gillies (<i>cbec eco-engineering Ltd.</i>)	15 mins
14.20	Discussion.	Discussion.	Discussion.	15 mins
14.35	SHC	ORT BREAK TO MOVE TO FINAL JOINT S	SESSION	10 mins

Session 7

	CHAIR: Nick Clifford (Kings College London)	
14:45	Delivering Severn Trent Water's fair share of the WFD Mike Streetly (<i>ESI</i>)	15 mins
15:00	How we achieved good ecological potential Bella Davies (<i>South East Rivers Trust</i>) & Dave Webb (<i>Environment Agency</i>)	15 mins
15:15	River restoration – Priorities for action Nick Clifford (Kings College London)	15 mins
15:30	Discussion and Close.	15 mins
15:45	END OF CONFERENCE	

Lancastrian Suite

Working with natural processes to achieve WFD compliance

Arup's expertise is helping to deliver a range of projects designed to improve the ecological status of water bodies throughout the UK and Europe. Our focus is on designs that work with natural processes.



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UK RIVER PRIZE & NIGEL HOLMES TROPHY

"Rewarding the best in river restoration and catchment management"

On the 26th of April, one of the four shortlisted finalists will be announced as the winner or the UK River Prize and Nigel Holmes Trophy 2016

After much deliberation the judges selected the four category winners for the 2016 UK River Prize. The overall winner will be presented with the Nigel Holmes Trophy, named after the hugely influential and passionate river restoration and conservation advocate. The winner also receives a prize to further the work on their river.



The finalists for the UK River Prize are:

Finalist	Category	Lead applicant
River Aller and Horner Water	Catchment-scale project Demonstrating a whole river approach to restoration	National Trust Holnicote Estate, West Somerset
River Dulnain	Innovative and novel project Demonstrating cost-effective achievements, innovation and novel approaches	Spey Catchment Initiative, Scottish Highlands
River Wandle	Urban project Working on highly constrained and modified urban watercourses to restore a healthy river for people and wildlife	South East Rivers Trust, South London
Rivers Derwent, Eden and Kent	Multiple benefit and partnership project Demonstrating significant contributions to catchment ecology, sustainable water management and local communities	Natural England for the Cumbria River Restoration Strategy

"The 2016 River Prize has attracted an exceptional and diverse group of projects from across the UK and demonstrates how much passion and effort goes into restoring the health and beauty of our rivers and their catchments.

The four category winners highlight the diversity, challenges and rewards of working with our water environment: employing natural flood management across two West Somerset catchments, reversing a history of decline on South London, helping the river to regain its natural shape in the Highlands, and working in partnership on protected rivers across Cumbria.

The judges would like to thank all of the applicants who submitted their projects for the 2016 UK River Prize. "

Martin Janes, Managing Director of the River Restoration Centre







River Aller and Horner Water *Catchment-scale project*

In 2009, in response to the recommendations of the Pitt Review of the summer 2007 floods, DEFRA commissioned three new Multi-Objective Flood Management Demonstration Projects. This included the Holnicote Project on the National Trust Holnicote Estate in West Somerset. The projects were tasked with generating evidence to demonstrate how working with natural processes, implementing a range of natural flood management (NFM) measures, and utilising a partnership approach, can contribute to reducing local flood risk while also producing a wide range of other benefits for the environment and communities.



The Holnicote project ran from 2009 to 2015 and the final project report was delivered in July of 2015. The works included multiple NFM interventions across the Aller and Horner Water catchments.

The intention is to continue and enhance the monitoring project over the next five years, whilst implementing additional NFM measures and interventions at a range of scales and types. In addition, through the Catchments in Trust program, the project will be expanded to achieve greater multiple benefits for water, people and wildlife by improving habitat quality and diversity, promoting water-friendly farming techniques, engaging with local communities and visitors, and enhancing access to rivers and wetlands.



Allt Lorgy, tributary of the River Dulnain Innovative project

Established in 2010, the Spey Catchment Initiative (SCI) is a public/private partnership that aims to deliver environmental enhancement projects throughout the River Spey catchment, an area covering 3,000 km2 of the Scottish Highlands. Through local contacts, the SCI Steering Group became aware that several tributaries of the River Dulnain were functioning poorly and that the landowner was willing to explore options to improve them. Funding was secured for a feasibility study, but it was the solutions offered for the Allt Lorgy that gained most interest and support and proceeded to implementation.

This innovative restoration project restored the morphology and habitats of a 1 km section of river and its adjoining floodplain. This was achieved by removing significant artificial constraints (associated with past engineering works) which had simplified the watercourse from a complex

wandering/braided condition to a straightened single thread channel with low habitat value and diversity.

The restoration measures implemented have reinstated the natural physical and ecological processes that the site would have exhibited under un-impacted conditions. The 'reference condition' of the design site on the Allt Lorgy was an upland 'wandering' gravel-bed river and there is clear evidence that the site is recovering towards this state already.

The long term vision is for the Allt Lorgy and its surrounding site to re-establish its natural wandering morphology though the operation of natural river processes.







River Wandle Urban project

The South East Rivers Trust (SERT), formerly the Wandle Trust (WT), grew from a group of residents concerned for the state of their local river and was established as a charity in 2000-2002.

The Wandle (Carshalton) waterbody was overwide, disconnected and impounded by five weirs. Over-shaded, contaminated with urban runoff, it had little habitat variation, limited fish populations and failed its Water Framework Directive (WFD) target of 'Good Ecological Potential' (GEP).

The overall aims of the Wandle Rehabilitation Project were to rehabilitate the river and increase its resilience to future pressures, move the waterbody towards GEP under the WFD, and establish a recruiting brown trout population for the first time in over 80 years.



This project is an excellent example of what is possible in an urban environment and has resulted in the attainment of GEP. Through a number of mechanisms the project has improved water, sediment and habitat quality, resulting in a diverse and functioning headwater with successful trout recruitment.

The long-term vision is now to maintain and enhance this status, ensuring no deterioration and a selfsustaining population of brown trout. Two further long-term aspirations are to extend the work upstream and to install groundwater augmentation to help avoid any future extreme low flows and restore the more natural temperature regime.





Rivers Derwent, Eden and Kent Partnership and multiple benefit project

The Cumbria River Restoration Strategy (CRRS) is a partnership project between Natural England, the Environment Agency and three Rivers Trusts (Eden, West Cumbria and South Cumbria). The partnership implements river restoration across three river catchments.

This project is an excellent example of what can be achieved through working in partnership. The Rivers Trusts (Eden, West Cumbria and South Cumbria) have led on the ground delivery of the work with strong guidance, technical expertise and support from experienced representatives from both the Environment Agency and Natural England.

Overall the project has restored 14 km of river across the three catchments to a more natural form, illustrating the large scale at which this project was undertaken. The overarching aim was to demonstrate to

landowners, river managers and the wider community, the wide ranging benefits associated with environmentally sustainable river management that works with natural processes.

The ambition is to continue to deliver the restoration measures required by the EU Habitats Directive and Water Framework Directive. The next phase of the CRRS will enable the partnership to deliver more significant pieces of work across all three Cumbrian catchments, using the lessons learnt from the last phase to help increase efficiency and effectiveness.









Meet the RRC Staff

Martin Janes - Managing Director

As Managing Director, Martin's role combines technical, business management and industry liaison elements. He works closely with our core funder to ensure that the RRC provides the expertise they need. Martin enjoys keeping involved with the technical side of the business, using his substantial experience to support the technical team on a variety of river restoration projects. He also routinely represents practitioners and the wider river restoration community on steering groups and larger projects, as well as overseeing management of the RRC.

Emma Turner – Business and Finance Manager

A big part of Emma's role is overseeing the organisation of this annual network conference each year. She also undertakes the management and accounting functions of the business, and works alongside the Managing Director with business planning, staff management, project management and support to the Board. Emma regularly supplies sweet treats in the office to keep the team motivated, which some believe is the most important part of her role.

Jasmine Errey – River Restoration Adviser

Jasmine provides technical river restoration advice in response to enquiries and for on-site projects. This involves scoping new possible projects, providing best practice case studies to illustrate options/techniques, and evaluating and sharing the success and learnings from completed work. Jasmine also manages the RRC's annual program of events, as well as coordinating or delivering the training courses, workshops and member site visits. Jasmine has recently emigrated from Australia and is undertaking intensive training to use full-length words rather than abbreviated ones.

Joshua Robins – Information Officer

Josh's role is to collect, manage and disseminate information on river restoration. He manages the substantial National River Restoration Inventory database through adding new projects and improving existing information. This involves helping to manage the RiverWiki and updating our UK Projects Map. Josh is also the editor of the monthly RRC Bulletin which we use to disseminate information and share good practice. His other roles include managing the RRC's social media platforms, updating our website and coordinating the extremely competitive RRC staff football predictions competition.

Will Barber – Local Engagement and Communications Officer

Will's main responsibility is to coordinate the RRC's support of small UK trusts, partnerships and local groups who deliver restoration projects. This is a new development for the RRC, made possible through funding from the Esmée Fairbairn Foundation. His work includes coordinating desk based and on-site project support, organising training courses, and developing new guidance resources. Will is a tireless cyclist and has left the team wondering just how far away a site visit needs to be before he will concede that it's too far to ride.

Nicola Mackley – Centre Administrator

Nicola runs the bookings process for the Annual Network Conference and Training days. She also acts as the RRC's Membership administrator and manages the contacts database and distribution lists along with helping to maintain the National River Restoration Inventory. Nicola supports Emma's role by undertaking financial tasks such as invoicing and purchasing. Like all the best administrators, Nicola assists the team with everything that happens in the office and manages incoming calls and emails for the whole organisation with the speed of a ninja.

Hazel Wilson - Restoration Assistant

Hazel's role is to support Josh in managing the RiverWiki, National River Restoration Inventory (NRRI) and UK Projects Map. This involves updating existing information and approving new projects. She's also working to improve the RRC Flickr page, adding examples of restoration techniques linked to case studies. When required, Hazel often steps up to undertake coordination of events or support projects, with great success. Hazel will be leaving the RRC soon after this year's conference for her next life adventure. Don't mention this to the rest of the team though, as it's likely to prompt tears.

Chiara Magliozzi - Marie Curie Researcher in River Processes

Chiara is a Marine Scientist and PhD researcher of the European Marie Skłodowska-Curie ITN HypoTRAIN program. Combining a mix of field expertise on ecology and river hydrology, she is currently working on the hyporheic zone, a "hidden area" below and beyond the river bed, to link its functioning to river ecology and river restoration practices. Though Chiara is not technically an RRC staff member, she sits with the team and regularly provides valuable input and support in their work, including the planning for this conference.



Back row, left to right: Chiara Magliozzi, Nicola Mackley, Martin Janes, Emma Turner, Hazel Wilson.

Front row, left to right: Joshua Robins, Jasmine Errey, Will Barber.

art informed by science



Telephone: 01929 463301 Email: info@alaska.ltd.uk Web: www.alaska.ltd Stokeford Farm, East Stoke, Wareham, Dorset BH20 6AL



the River Restoration Centre

Working to restore and enhance our rivers

Update on Support & Advice

Best practice advice

Call us to find out how we can best support you. We can, for example:

- Identify opportunities for restoration, habitat enhancement and natural flood management.
- Provide an independent perspective on existing ideas, plans or design documents.
- Offer technical support and assistance with monitoring and project evaluation.
- Help you to best promote your work to a wider audience.



Advisory visit to the Tichborne Estate

RRC Case Study Series				
Project	Technique	River	Year	
Blenheim Palace Project	Creating side bars, riffles and backwrites	Evenlode	2008	Xim
Boot Lane Enhancement Project	Gravel riffie creation	Shep	2007	View
Priver Cam Habitat and Access Enhancement Project	Bank and in-channel improvements	cam	2005	View
Chintanusii Meadawii	Re-meander channelsed section and floodplate starage	Quitaby	2002	Vie
churdfall tairdens, Saitsbury City Centre	tinlanding clinicities foodwaits	AND	2004	xie
Commill Gardera	Removing concrete channel, bank ra-profiling	Revenshourne	2907	Vier
Oronali Lakes Channel Widening	Bank ra-grading & removal creation of shallows in adjacent takes	Tame, Trent & Meose	29/0	Vie
Day Brosk Water Meadow Project	Small-scale urban river	Day Brook	2005	Vie

New Case Studies page on the RRC Website therrc.co.uk/case-studies



Catchment Partnership Learning Workshop

Available information

Through the Centre's involvement in projects, initiatives and strategy, we:

- Share information and understanding within the UK and across Europe.
- Build the UK evidence base through collating, updating and reporting trends. There are now 4400 projects in the NRRI.
- Provide a forum for the exchange of knowledge and developments (the RRC Annual Network Conference and the RiverWiki).
- Update through a monthly Bulletin, social media (Facebook, Twitter, LinkedIn & YouTube) and our Website.

Guidance and training

Develop your capabilities through our training courses, technical workshops and site visits:

- The RRC can run training courses and site visits tailored to your needs. Previous topics have included natural flood management, monitoring, best practice design and ecosystem services.
- We also publish high quality best practice technical guidance on our website such as the Manual of River Restoration Techniques.

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Why evaluate?

Independent audits and evaluations can help you:

- Demonstrate successful work to investors, stakeholders and the community, providing confidence to encourage future funding and other project support
- Collect valuable lessons learned from those involved at all levels of your project, so you know where and how to improve next time.
- Reinforce your organisation's culture of transparency and continuous improvement
- Understand your project's achievements and challenges within a national perspective
- Identify specific sites or schemes that have lower likelihood of long-term success and may need additional work
- Identify examples of novel approaches, exceptional outcomes or multiple benefits that you can share with stakeholders and the wider community



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Holly Hatch scheme reviewed for New Forest project

Recent and current example projects

- Catchment Partnership Action Fund (CPAF) Review – assessing how well the program contributed to WFD progress and identifying potential improvements for both funder and delivery partners.
- New Forest Wetland Restoration Strategy Review – worked with vegetation expert Jonathan Cox to review whether schemes undertaken by the Forestry Commission had met their objectives and delivered desired benefits.
- Cumbria River Restoration Strategy Evaluation evaluated both technical and project management elements of projects delivered by a five-way partnership.

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The Wild Trout Trust Conservation Awards 2016

An Invitation to Apply

The Wild Trout Trust Conservation Awards, supported by Thames Water and the River Restoration Centre, seek to recognise and encourage excellence in wild trout habitat management and conservation and celebrate the efforts, ingenuity and imagination of all those involved.

Am I Eligible?

The competition is open to entry from individuals or organisations and amateurs or professionals across Britain and Ireland. PLEASE NOTE that we are equally keen to see and spread the word about successful, small-scale efforts to improve a stream at the end of the garden just as much as catchment-wide work funded by government agencies.

Choose Your Award Category

- Large-Scale Habitat Enhancement Scheme: A trophy for projects delivered by government agencies, contractors and larger rivers or wildlife trusts.
- Medium-Scale Habitat Enhancement Scheme: A £1000 prize and trophy for projects delivered by small to medium-sized NGOs e.g. rivers or wildlife trusts.
- Contribution to Wild Trout Conservation: A £1000 prize and trophy aimed at amateur community groups (e.g. fishing clubs or other conservation groups) whose voluntary efforts, either through delivery of a specific habitat enhancement project and/or general ethos of management, have furthered the cause for wild trout conservation.

The Judging

Entrants will be expected to demonstrate to a panel of judges (made up from representatives of WTT and the River Restoration Centre) that a project or management programme has benefited wild trout and their environment in a river, lake, loch or lough. Consideration will also be given to aspects such as conservation value, appropriateness of the scheme for the site, funding and value for money, techniques used, sustainability, local involvement, ease of access and post-project management.

How to Apply

Download the application form on the Wild Trout Trust website: <u>http://www.wildtrout.org/content/conservation-awards</u> Applications must be received by WTT NO LATER than Friday 29 July 2016 via e-mail to: <u>office@wildtrout.org</u>

Wild Trout Hero Trophy Nominations

This trophy will be awarded to a professional whose work has furthered the cause of wild trout conservation and management in Britain and/or Ireland. Our Hero could be a riverkeeper, fishery manager, scientist or administrator. Wild Trout Hero nominations should be submitted to the WTT Director (director@wildtrout.org) no later than Friday 29 July 2016.

Awards Ceremony and announcement of winners:

Savile Club, London, 18 October 2016

Notes



ABSTRACTS

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Session 1:

Lancastrian Suite

RESTORING BEAVERS TO DEVON: NATURE'S WETLAND ARCHITECTS

D. GOW¹

1 Derek Gow Consultancy

Beaver created landscapes across Europe provide habitats for a range of species. Along with habitat creation, beavers and their activities provide a range of ecosystem services which are not only sustainable but free! Many of these functions are being artificially imposed in river systems through significant resource investment. Beavers offer a tangible solution to the creation of such processes if we are prepared to tolerate their presence. Across Europe the use of beavers in river restoration projects is well documented as will be discussed further here. Although negative costs of beavers on agriculture and commercial forestry, especially in relation to common species such as deer and rabbits, has been demonstrated to be insignificant. There is increasing impetus to see the restoration of this extensively studied species. Britain is one of the last states in Europe to fully reintroduce this species.

WORKING WITH NATURAL PROCESSES TO REDUCE FLOOD RISK AND IMPROVE THE ENVIRONMENT L. BURGESS-GAMBLE¹, M. ROSS¹

. 1 Environment Agency

Working with natural processes involves restoring catchments, rivers, floodplain and coasts to their natural functions. Engineering with nature can help to reduce flooding. It can also provide other benefits to people and the environment such as improving water quality, creating new recreation opportunities and helping make space for water. This in turn makes our rivers and coasts more resilient and able to adapt to climate change. One big challenge for us if we are to work more with nature is how we demonstrate the flood risk benefits of these measures. We like to be able to show with confidence how our schemes function to reduce the risk of flooding to people and property. However, these sorts of measures can be hard to model, and how they will perform in a flood can be uncertain and hard to predict. We will describe the current research being led by the Environment Agency in partnership with SEPA and NRW which is starting to bridge this evidence gap.

IN-STREAM RESTORATION IN ACTION

J.WEBLEY¹, I. SIME¹ 1 Scottish Natural Heritage

'Pearls in Peril' (PIP) LIFE is working to safeguard freshwater pearl mussel (*Margaritifera margaritifera*) in Great Britain and has completed over 4km of in-stream restoration. Key challenges include stakeholder engagement, regulation, practical and technical issues associated with physical works. Examples will be demonstrated through two case studies:

1 – River Dee removal of fishing platforms and artificial bank protection. A range of issues were presented associated with stakeholder engagement and regulation.

2 – River South Esk removal of bank protection. Challenging practical and technical issues associated with landscape, land use, access and archaeology located within a Special Area of Conservation.

Managing a variety of stakeholders to deliver restoration works with a value in excess of £500k has been challenging. The delivery has been realised through effective partnership working. PIP is implementing monitoring of the restoration sites and the multiple benefits will be demonstrated in an Ecosystem Services and Socio-economic Assessment.

RIVER WEIRS – REMOVE OR RETAIN?

M. HEMSWORTH¹ 1 JBA Consulting

The Environment Agency, CIRIA and the RRC have recognised the need to update the current version of the Weirs Guide in light of changes to legislation, policy, health and safety considerations, and environmental drivers in the UK, including the European Water Framework Directive. The guide will provide decision makers with information to inform the design of potential weir removal, modification, maintenance or new build projects. This presentation summarises the revised CIRIA Weirs Guide, including detail on decision making processes and the numerous elements to consider. Necessary assessments for weir management projects will be discussed and the geomorphological and ecological context to inform weir removal, modification or new build decisions, planning and designing will be highlighted.

DELIVERING RIVER RESTORATION IN SCOTLAND: THE NEXT 12 YEARS

R. RICHARDSON¹, S. MCCONNELL¹ 1 Scottish Environment Protection Agency

The second river basin management plans for Scotland set out an ambitious programme of river restoration for the next 12 years. They aim to restore over 3,000km of river to good ecological health and remove over 300 barriers to fish migration. This presentation sets out the current condition of Scotland's rivers and how we plan to address the main pressures affecting them. Delivery of river restoration on this scale will require a step-change in effort, innovative solutions and a new approach to partnership working between public bodies, NGOs and land managers. The presentation will set out how we intend to achieve this by building on the success of the Water Environment Fund, pilot catchments and other initiatives to develop new partnerships, secure funding and deliver multiple benefits. Catchment based case studies will be used to illustrate the approach and risks to delivery will be discussed.

RESTORING MORPHOLOGICAL FUNCTIONALITY TO A HEAVILY MODIFIED RIVER

S. GERMAN¹, D. HOLLAND²

1 Arup, 2 Salix

Rivers that have had their flows reduced or their sedimentary regime disrupted by human intervention can struggle to re-establish the processes that support a diverse and functioning morphological and ecological system. Improving the likelihood that restoration interventions will be successful requires a good understanding of the processes acting on the system under the modified regime. If the design of the new channel geomorphology, and its associated features, is based on such an understanding, this will result in both improved functionality and the development of a more natural and diverse ecological system. Appropriate interpretation and implementation of the design intent on the ground requires close collaboration between designer and contractor. Case studies have been used to demonstrate a range of approaches to establishing improved channel morphologies that better suit the modified flow and sedimentary regimes in these rivers. These case studies are primarily focused on addressing WFD objectives. The paper discusses design approaches as well as the practicalities and constraints associated with delivering such schemes on the ground.



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Session 2:

Lancastrian Suite

Urban River Restoration

THE RESTORATION AND REGENERATION OF DEPTFORD CREEK

M. FORRESTER¹, P. CHAPMAN¹ 1 London Borough of Lewisham

Deptford Creek in the London Borough of Lewisham, a tributary of the River Thames, is designated as a London Plan 'opportunity area for regeneration'. It is also a site of nature conservation, a site of metropolitan importance and an industrial conservation area. But the sites are locked off from the river, creek walls need restoration, and there is a lack of developer understanding of what a creek is. Lewisham Council's Planning Service works with developers using our Policy Framework and Borough Vision to place the river at the heart of development schemes, providing ecological benefits and public connectivity along with housing and workspace. This involves partnership working with local stakeholders for the Creek and ensuring developers understand the significance of the place. We aim to replicate previous award winning river focused schemes in the borough, striking the fine balance between ecological restoration and the regeneration of the urban environment.

PLANNING RIVER RESTORATION THE DUTCH WAY

I.A. DENNIS¹, G.J. MEULEPAS¹ 1 Royal HaskoningDHV

The Dutch government's ambitious Room for The River project improved flood resilience and delivered environmental and societal benefits at 30 sites across The Netherlands. One of the key sites was the city of Nijmegen, where the morphology of the river constricted flow conveyance and encouraged flooding. A secondary flood relief channel was created, supporting natural river habitats and recreating the chain of naturally-functioning green floodplains along the river. This presentation will focus on the way in which the project was planned and delivered, with particular attention to the lessons that were learned and how these could be applied to facilitate ambitious river restoration projects in the UK. Altering a river system on the scale of the Room for the River programme was a technical challenge with often large social impacts. These issues were overcome with effective management of stakeholder groups and creating a common sense of ownership for the project.

IMPROVING HABITAT LINKAGES IN HEAVILY MODIFIED URBAN AREAS WITH FLOATING RIVERBANKS

G.Y. FULFORD¹

1 Biomatrix Water Solutions Ltd., Land & Water Services Ltd.

This presentation will address the application of Floating River Banks as a technique to improve ecological potential and provide habitat linkages in urban areas. The presentation will focus on specific project case studies used by catchment hosts on the Lea Navigation at Tottenham as well as other examples. The presentation content will cover the methodology and process of site selection, planning and permitting, community and volunteer engagement, as well as practical considerations including installation methodology, such as planting, assembly, anchoring, maintenance, and monitoring. The presentation will provide upstream to downstream water quality monitoring results showing measurable impacts on specific water quality parameters including, coliforms, BOD, COD, NH₃ and P. The presentation will provide the key information catchment hosts and waterway managers need to evaluate where Floating Riverbanks can offer a solution to improve ecological potential and provide habitat linkages and through the urban environment.

PUBLIC PARTICIPATION GIS FOR ASSESSING SOCIAL VALUES IN URBAN RIVERS

X. GARCIA¹, M. BENAGES¹, P. VALL¹

1 International University of Catalonia

Urban river corridors have the potential to provide cultural ecosystem services that contribute to human well-being. However, the intangible and subjective nature of these services has meant that rehabilitation schemes have often disregarded them against more easily quantifiable ecological or economic considerations. The objective of this study is to evaluate local stakeholders' knowledge of river cultural services, negative values and places that require rehabilitation actions by means of a public participation GIS method (PPGIS). The study area selected is the Caldes Stream in the Besòs River Basin (Catalonia, Spain), which connects an urban system of approximately 60,000 inhabitants. From 35 interviews with local stakeholders, we mapped and analysed cultural services, negative values and places that require rehabilitation actions, and discovered that they presented different distribution patterns. The PPGIS approach meant we could obtain spatially explicit information on cultural ecosystem services and other social values, providing a more informational basis for the development of sustainable river rehabilitation strategies.

NOTES

Session 2:

Louis Suite Partnering With Nature

WORKING TOGETHER TO RESTORE THE MIDLOTHIAN ESKS

C. RODGERS¹, T. MCDERMOTT² 1 Royal HaskoningDHV, 2 River Forth Fisheries Trust & Trex Ecology

River restoration experts from Royal HaskoningDHV and the River Forth Fisheries Trust have been working together to take a "whole catchment" approach to the mitigation of barriers to fish passage along the North and South Esk rivers near Edinburgh. A combination of site surveys, stakeholder meetings and desk-based assessments have been undertaken to date, to identify and prioritise solutions to restore river sediment processes and fish passage across the catchment. This presentation will discuss the benefits of joint working between a consultant and a local catchment partnership to delivering cost-effective river restoration work, from options appraisal through to detailed design and delivery on the ground.

REMOVING AND RESTORATION OF ROCK ARMOUR, CROYS AND CARS

K.A. MACDOUGALL¹ 1 EnviroCentre Ltd.

During the summer of 2015, four river restoration projects were undertaken by the EU LIFE Pearls in Peril project on the River Dee and River South Esk in north east Scotland, both designated Special Areas of Conservation for species including Atlantic Salmon and freshwater pearl mussel. Collectively these involved removal and restoration of 1 km of armoured bank protection and 25 large croys. The croys and armouring were constructed mainly from large stone, although one area of bank restoration involved the removal of 30 cars. Through December 2015 and January 2016 there were numerous large flow events on these rivers with Storm Frank breaking previous flow records. The assessment undertaken prior to the works is compared to the actual conditions now. These projects provide good examples of working in high energy gravel bed rivers, and the challenges of working within sensitive environments, remote locations with restricted communication and difficult access.

WORKING WITH WOOD ON THE WENSUM

I.P. MOSRRISSEY¹, M. HUBAND¹ 1 Atkins Ltd.

Using the Norfolk Rivers Internal Drainage Board's recently completed scheme on the River Wensum as a case study, this presentation describes the approaches taken in the design of a suite of restoration measures implemented to assist reinstatement of appropriate form and function in line with the river's SSSI/SAC designation and WFD objectives. These works, completed in September 2015, along 2km of headwater system, required no material imports. Measures included the addition of large wood yielded from riparian tree management that realised a neutral mass balance of materials and kick-started process to assist natural recovery. The design philosophy was one of a multi-benefit approach, which allowed the project to secure wider value such as flood water management and improvement in riparian habitat complexity.

PARTNERING WITH NATURE FOR SUSTAINABLE RIVER RESTORATION

M.F. JOHNSON¹, C. THORNE¹ 1 University of Nottingham

We aim to draw attention to the power of ecosystems to influence river form and make the case for more effectively harnessing the power of ecosystems in river restoration. Hydropsychid caddisfly larvae bind sediment grains together with silk, which increased the stresses required to mobilise gravel by 33–45% in comparison to uncolonised substrates. Therefore, caddisfly are likely to be important components of many river biomes. Changes to biomes result in a response by the river, which may be distorted when the ecology is substantially altered. For example, invasive Signal Crayfish burrow intensely, increasing gravel mobility, decreasing bank stability, and increasing fine sediment yields. Rivers integrated within a healthy biome can co-evolve with ecological systems, however the future unfolds. Therefore, partnering with nature's ecological river restorers opens up the possibility of designing systems that are more resilient to disturbance and which have a self-repairing capability unique to living organisms.

NOTES

Session 2:

<u>Princess Suite</u>

Ecological Monitoring

AN ECOHYDROLOGICAL APPROACH TO RIVER RESTORATION

D. HARPER¹ 1 Aquatic Ecosystem Services Ltd., University of Leicester

River Restoration has always proceeded at a faster rate than its scientific justification, or generation of evidence for its success. There are many different reasons for this, but almost all of them, in Europe at least, lie in the opportunism of river restoration activities (e.g. end of financial year with money left over..), single sectoral interests (e.g. placing boulders for fish sheltering; removing weirs for fish passage) or political drivers (e.g. WFD). I argue that the full range of different approaches could more easily be justified and monitored if practitioners used a simple ecohydrological approach. My presentation explains exactly what the ecohydrological approach is and presents a methodology derived from this and elements of the (River Habitat Survey which could help future schemes in design, implementation and monitoring. The presentation by Al Zankana *et al.* provides a case study of this approach.

BIOTOPES AS DESIGN FOR RESTORATION AND UNITS FOR MONITORING SUCCESS

A. AL ZANKANA¹, L. SMALLWOOD¹ 1 University of Leicester

The CRF project "Restoration of the Welland at Market Harborough for Wildlife & People", together with a smaller, rural project to restore a Welland headwater stream previously straightened through a long spinney were planned, implemented and are being monitored using an ecohydrological approach. We quantified the effects of restoration using biotope mapping and species recording of plant and invertebrate species at 3 replicates per biotope at BACI sites. The results are presented, evaluated and discussed in the context of both restoration success and suitability of the method for more widespread use.

USING BEETLES TO MEASURE RIPARIAN HABITAT QUALITY

J. WEBB¹, N. MOTT² 1 Natural England, 2 Staffordshire Wildlife Trust

This presentation explores the ways in which invertebrates can be used to monitor riparian habitat quality. The presence of terrestrial beetles with a high fidelity to riparian habitats can be used to score rivers, assigning one or more simple numerical values and thus allowing for an effective method of measuring site quality. Natural England has developed methods for survey assessment and analysis of riparian sites. Natural England also holds a dataset of riparian invertebrates to augment comparative analysis. The hypothesis that these tools can also be used to monitor habitat quality before and after river restoration schemes is discussed. The authors recommend that this monitoring technique is added to the RRC's PRAGMO guidelines.

THE LOGIE BURN: RESULTS OF THREE YEARS OF MONITORING

S. ADDY¹, M. WILKINSON¹ 1 The James Hutton Institute

In 2011, a reach of the Logie Burn, a degraded agricultural stream in Aberdeenshire, was reconnected to relict meanders to improve habitat and provide other benefits. A before-after monitoring program was initiated in 2011 to record hydromorphology, sedimentary, nutrient, high flows and physical habitat responses to help improve understanding of channel recovery in this type of active restoration scheme. Between 2011 and 2014, the reach has aggraded and the sediment has become finer. Sediment sizes and morphological complexity have adjusted to a level similar to the pre-restoration channel. The diversity of physical habitats has improved in part due to wood input but these responses may have been offset by the deposition of nutrient rich fine sediment. The monitoring shows that rapid adjustment of channel morphology and sediments is possible in low energy channels. Ongoing monitoring will help to understand the long term response and the implications for conveyance and habitat.

NOTES



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Session 3:

Lancastrian Suite Addressing Multiple Objectives

BALANCING FLOW – BALANCING OPINION

J.A. MOON¹, P. JOSE², M. PORTER³ 1 Black & Veatch, 2 Wessex Chalk Stream & Rivers Trust, 3 Environment Agency

During the 2014 winter floods the left bank of the River Avon (leat) breached upstream of Lake Hatches at Wilsford cum Lake, near Salisbury in Wiltshire. This resulted in a dramatic change in flow apportionment causing the majority of river to bypass the hatches to an adjacent side stream. This had major consequences for the local residents who live along the leat through loss of amenity and they were adamant that the breach should be repaired. Natural England and the Environment Agency, however, appreciated the environmental benefits of the breach and were keen that it should be retained. In this presentation we will discuss how these conflicting views were resolved to reach consensus, leading to construction in Autumn 2015. Some of the issues we discuss will include the importance of having well defined project objectives/measures of success; designing flow apportionment; and the benefits of the partnership approach to project delivery.

CONFLICT OF INTERESTS IN RIVER RESTORATION: A COUNTY COUNCIL PERSPECTIVE

J. DIPPIE¹

1 Buckinghamshire County Council

During the winter of 2013/14 there was flooding in Aston Clinton Park, partly as a result of a collapsed culvert. The opportunity was taken to create a new stretch of open watercourse which would bypass the collapsed culvert. The project was set to benefit the environment, reduce flood risk and be more cost efficient than replacing the very old culvert. The project involved many different stakeholders: the Environment Agency; the tenant farmer; and the District and Parish Councils. The stakeholders had different interests in the projects and therefore different priorities for the outcomes. These conflicts of interest resulted in many challenges along the way but the priorities of the different groups helped to shape the project and the end result was something all stakeholders were happy with and proud of.

RIVER RESTORATION PITFALLS AND SUCCESSES FROM CONCEPT TO MONITORING

J. MANT¹, M. JANES²

1 Ricardo AEA, 2 River Restoration Centre

River restoration has evolved from a singular organisation's or individual's drive to achieve ecological benefit to one that engages multiple stakeholders (nationally and locally) in both the decision making and delivery process. In terms of raising the profile of river restoration this is a positive move forward. It brings with it inevitable challenges as different sectors and organisations often have varying priorities, alongside local concerns (e.g. land take or flood risk). During 2015 RRC carried out two independent assessments for two very different systems, the New Forest streams and the Cumbria River Restoration Strategy. These looked at partnership working, outcomes for catchment-scale strategies, EU directives and the effectiveness of the river restoration works. The key findings will be presented with the aim of supporting best practice technical, monitoring and delivery for future project partnerships.

Session 3:

Louis Suite Beaver Reintroduction

RESTORING BEAVERS TO DEVON – AND UNDERSTANDING THEIR IMPACTS

M. ELLIOTT¹ 1 Devon Wildlife Trust

In early 2014, beavers were found to be breeding in the wild on the River Otter in east Devon. Following a campaign by local residents and national experts, Devon Wildlife Trust on behalf of the River Otter Beaver Trial was granted a licence by Natural England to re-release beavers back into the river for a 5 year trial, once they had been tested for diseases and proven to be Eurasian beavers. Following trapping and health screening these animals were returned to their territories in late March 2015, and the colonisation of the River Otter by this small population and their impacts are now being studied. Meanwhile, on the other side of Devon in the River Tamar headwaters, an enclosed beaver trial has been established since 2011, and is now generating very important results demonstrating the beneficial impacts that beavers are having on wetland ecology and hydrology.

QUANTIFYING THE MULTIPLE ENVIRONMENTAL BENEFITS OF BEAVER ACTIVITY ACROSS RIVER CATCHMENT SCALES

R.E. BRAZIER¹, A. PUTTOCK¹ 1 University of Exeter

Beavers are often described as ecological engineers with an ability to modify the structure and flow of fluvial systems and create complex wetland environments with dams, ponds and canals. Consequently, beaver activity has potential for river restoration, management and the provision of multiple environmental ecosystem services including biodiversity, flood risk mitigation, water quality and sustainable drinking water provision. With the current debate surrounding the reintroduction of beavers into the United Kingdom, it is critical to be able to monitor the impact of beavers upon river systems and quantify the likely benefits that they may deliver. We have monitored the reintroduction of beavers upon river systems at a range of scales. Herein, we present preliminary results showing how the impacts of beavers can be quantified and how these multiple impacts can be evaluated across river-reach scales. We also present a proposal for catchment-scale monitoring and welcome input on this subject.

BRINGING BEAVERS BACK – HOW WILL WE MANAGE THIS SPECIES?

R. CAMPBELL-PALMER¹ 1 Royal Zoological Society of Scotland

From near extinction in the late 19th century, the Eurasian beaver has now been restored to over 25 European countries. Archaeological and historic evidence indicates that this species was once common and widespread across Britain, and made extinct ~400 years ago through overhunting. The return of this species has been a haphazard affair, through official trial reintroductions in Scotland and now Devon, to a series of unofficial releases in parts of Scotland and England. Experiences across Europe and scientific evidence indicates that beaver restoration results in numerous benefits to freshwater ecology, hydrology and biodiversity. However this requires sensible management, mitigation and human tolerance. A range of mitigation techniques have been commonly employed across Europe and North America, from individual tree guards, flow devices to control dam levels, to more extensive flood bank protection. Such techniques are presented here, some of which are being trialled in Scotland. Whilst effective management techniques exist, beaver presence in certain modern and cultural landscapes may be challenging and even inappropriate.

Session 3:

Princess Suite

Understanding Sediments

ACHIEVING MEASURES FOR HEAVILY MODIFIED WATER BODIES USING SEDIMENT MANAGEMENT

M. BUCKLEY¹, K. KEMBLE²

1 United Utilities, 2 Jacobs

Sediment management is a key developing practice in working towards the improvement of Heavily Modified Water Bodies (HMWB) under the Water Framework Directive (WFD). Intakes and reservoirs act as large 'traps' of sediment that would typically have been transferred to downstream reaches. Below the structures the river is often starved of sediment. The lack of particular sediment sizes within the system is likely to have detrimental impacts on its ecology, habitats and natural geomorphological processes/functions. The implementation of sediment management plans is a relatively new concept and water companies are beginning to drive the process forwards to ensure compliance to the legislation. The case study presented within this presentation provides an overview of seven sites identified as HMWB where sediment management plans are currently being explored. It looks into the key issues, potential solutions and practicalities of using sediment management to improve the status and morphological capacities of the WFD water bodies.

WEIR POOLS AND HYDROPOWER: METHODS TO ASSESS IMPACTS

S. PALMER¹ 1 APEM Ltd.

Weir pools represent hydromorphologically diverse environments, whereby the processes of scour and deposition driven by turbulent flows create conditions favoured by rheophilic fish. Recent growth in run of river, low head hydropower in England and Wales has led to concern over the impacts of such schemes on weir pool ecology and hydromorphology. Relevant guidance requires characterisation of changes to sediment dynamics, flow characteristics, and consequently fish habitat by proposed schemes. This presentation details field studies of weir pools on several UK rivers where hydropower schemes are proposed. The studies employed bespoke equipment enabling field sampling of sediment and hydraulic characteristics in turbulent deep flows, and applied techniques such as 2D modelling, sediment transport calculations and habitat suitability indices to determine likely changes in hydromorphology, and translate these into possible impacts on fish. Consequently, river restoration techniques can be planned during a scheme's design to ensure no adverse impacts occur.

RAPID BIODIVERSITY GAINS THROUGH NATURALISATION: PROCESS BASED SUCCESS STORIES

S. BENTLEY¹, K. SHEEHAN² 1 AECOM, 2 JBA Consulting

River and Floodplain naturalisation offers a number of advantages over conventional restoration approaches. Encouraging morphological development aligned with contemporary process rather than engineering green interventions along a degraded watercourse brings with it sustainability and cost efficiencies whilst promoting an appropriate physical template for the system ecology. This presentation reviews short term (5 year) ecological responses to naturalisation, drawing upon monitoring data from the River Trent where a previously channelised reach was naturalised through anastomosis and the River Ribble where a destabilised wandering channel was naturalised through floodplain re-connection. A review of the aquatic and terrestrial community composition reveals major changes in the species assemblage over that present prior to the works. Vegetation communities across reconnected morphologic units (in-channel and floodplain) have diversified with several new species recorded, this is related in part to increased morphological diversity, functioning in line with flow, and sediment transport processes at each site.

Session 4:

Lancastrian Suite

Keynote Address

POSITIONING RIVER RESTORATION FOR 2030: LESSONS FROM THE PAST AND CHALLENGES FOR THE FUTURE

G. PETTS¹ 1 University of Westminster

This paper looks to 2030 and beyond, seeking to encourage an expanded vision for river management that comprises three elements. First, is that high ecological quality of physical habitats – the primary landforms – requires regular habitat turnover, i.e. erosion, deposition and landform replacement. Stable landforms, such as bars created naturally or engineered, 'age' on predictable pathways and change in ecological quality. The second element calls for recognition that a river network has a history and the morphological future of each river reach is pre-determined by this history, with the morphology of each reach adjusting to sediment surpluses and deficits as sediment is routed downstream through the channel network. Thirdly, network connectivity is shown to be particularly important because of the hierarchy of tributaries (a) with different geological, topographic and land use characteristics that (b) generate different responses to flow extremes and contributions to sediment delivery, which (c) drive sector-scale sediment dynamics and channel adjustments over timescales of decades.

Finally, the paper addresses the reality that all human activities within catchments impact on riverine ecosystems, which consequently need human help to sustain their capacity and resilience. But engineering habitat heterogeneity at the reach scale is not enough. The goal must be to maintain natural geomorphic processes and to accommodate channel dynamics over decadal timescales. There are three key stages:

- 1) address process and function rather than a fixed end point (morphology, species, aesthetics),
- 2) address the entire catchment because physical, chemical and biological processes are interconnected in complex ways,
- 3) recognize that, especially within human-modified systems, at any point in time each reach/segment within a drainage network may have unique features related to transient states induced as responses to disturbances over the past century or longer.

Reach-scale management will continue to play an important role but this should be set within planning decisions that address the condition of the entire drainage network over appropriate timescales.

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- Water quality monitoring
- Pollution incident investigation
- Non-native invasive species assessment and management
- Water Framework Directive assessments
- Preliminary Ecological Assessments
- Terrestrial ecology and protected species surveys
- Thomson Interactive Mapping (TIM)

Lancastrian Suite Workshop A:

Natural Flood Management: Tools to Help Maximise Benefit and Reduce Risk

Planning for the implementation of Natural Flood Management and Working with Natural Processes measures within Flood Alleviation Schemes needs to take account of environmental, social, economic and stakeholder impacts. Schemes that take account of these elements and deliver multiple benefits inevitably require good evidence on effectiveness and performance, together with transparent and well-designed decision making support tools.

<u>Part 1</u>

Exploring the delivery of a Working with Natural Processes approach to flood risk management *Steve Rose, JBA and Lydia Burgess-Gamble, Environment Agency*

The first part of the workshop will explore the current state of knowledge on WWNP for flood risk management in the UK. Steve and Lydia will introduce the new national R&D project on the WWNP evidence base. This will include an interactive discussion on currently available knowledge, what the key knowledge gaps are and how they could be filled.

<u>Part 2</u>

Development of a new decision support tool for catchment-scale natural flood management *Thea Wingfield, the University of Liverpool*

The second part of the workshop allows participants to help shape a decision support tool relating to optimising NFM planning on a catchment scale, for use by catchment partnerships. The session will include explanations and demonstrations of a range of tools that are currently available or under development, and a discussion of their applicability and limitations. It will also provide an opportunity to discuss in groups the barriers that exist to impede implementation of natural flood management projects, and what actions are needed to help work through these.

Workshop chair: Jasmine Errey, RRC

Churchill Suite Workshop B:

How to Make the Most of Your Monitoring and Project Appraisal

The RRC monitoring planner and guidance is now considered as mainstream in terms of supporting best-practice approaches to getting the most from you monitoring. Yet, monitoring outputs still don't always provide all the anticipated answers. This workshop will review the basic principles of monitoring, illustrated by case studies, hearing from the different perspectives of consultant, river trusts, regulatory agencies and academics. We will hear about:

- The importance of monitoring and some basic principles to follow to give meaningful results.
- An example of the application of these principles on the River Wensum.
- New developments in European standard survey methods.
- A perspective of the practical application of monitoring
- The launch of the new Modular River Survey (MoRPh) a physical survey technique aimed at Citizen Scientists.

This workshop will be of interest to anyone working within the catchment partnership, with local groups or with an interest in improving their monitoring skills and learning about new techniques. Discussions will be supported by a number of talks and presentations including:

Judy England, Environment Agency	PRAGMO & monitoring principles
lan Morrissey, Atkins	Case study example of best practice, River Wensum
Phil Boon, Scottish Natural Heritage	CEN standards
Lucy Shuker, Environment Agency Angela Gurnell, Queen Mary University Geraldene Wharton, Queen Mary University David Gurnell, Untyped	MoRPh (Modular River Physical survey)

Workshop chair: Andrew Gill, Cranfield University

Derby Suite Workshop C:

Demonstrating the Value of Ecosystem Services for Decision Making

River Restoration strategies and projects can deliver multiple benefits for society and the environment. Assessing the value of these benefits- and disbenefits is essential to optimise the design and to meet the priorities identified in catchment plans. An Ecosystems service approach provides a framework for assessing these multiple benefits, either qualitatively, or through including valuations allowing a full cost benefit approach for decision making. The Ecosystem approach can also help stockholders and land owners to understand the wider social, economic and environmental benefits. This workshop will consider the tools and techniques which are available to assess these benefits, and how they can be used to influence catchment stakeholders, funders and policy makers to support river restoration.

AN INTRODUCTION TO USING AN ECOSYSTEM SERVICES APPROACH IN RIVER RESTORATION

F. BOWLES RRC Board

The ecosystem services approach is now being used to provide a structure to assess the multiple benefits that river restoration projects provide. This allows river restoration projects to be assessed against other projects proposed within the integrated catchment process, so that all actions can be reviewed and prioritised on a common basis. As well as ensuring that maximum benefit is designed in, the process also provides useful information to engage with particular audiences such as landowners and tenants, regulators and funders. However 'ecosystems services' can seem complex and monetary valuations of natural services require good data and can be hard to agree. So these methods need to be appropriate to the evidence base available, the nature and resources of the project delivery and funding organisations and technically acceptable to those who will grant consents. This talk will introduce the ecosystems services approach as applied to river restoration and Catchment Action Plans and identify some of the issues that need to be considered when choosing a method for your strategy or project or developing the approach further in the Catchment and River Restoration communities.

PROGRESSING THE ECOSYSTEMS APPROACH IN THE ENVIRONMENT AGENCY

A. SKINNER AND M. HARDY Environment Agency

The Environment Agency's vision is a better place for people and wildlife. We are promoting the ecosystems approach with colleagues to increase understanding of the interconnectedness between people and nature, the value of the services nature provides, and how by working with others we can more effectively deliver multiple-benefit projects. We will present some examples of how this approach is being applied, including some flood alleviation projects.

IS URBAN RIVER REHABILITATION ECONOMICALLY VIABLE IN WATER SCARCE BASINS? THE YARQON RIVER EXAMPLE

X. GARCIA

International University of Catalonia

A cost-benefit analysis integrating market and non-market costs and benefits was undertaken in this study to assess the economic feasibility of a river rehabilitation project in a water scarce region, the Yarqon River Rehabilitation project (Israel). In this case, the costs included both the capital and maintenance costs of implementing rehabilitation measures and the opportunity costs of water reallocation. The benefits of rehabilitation included the net marginal benefits of the cultural ecosystem services at both local and regional scale, in addition to the habitat service gene-pool protection. The rehabilitation of the Yarqon River provided positive net present values (approximately \$139 million in 30-year period), demonstrating that river rehabilitation in water scarce regions can be economically viable principally due to the social amenity demand for urban rivers.

DO BEAVERS CAUSE FLOODING? - COMMUNICATING THE MULTIPLE BENEFITS OF THE DEVON BEAVERS

M. ELLIOTT Devon Wildlife Trust

People have very varied opinions about the return of beavers to British river systems. The majority of people interacting with the River Otter Beaver Trial are positive and welcoming, but some have concerns about their impacts. Many of these concerns are based on myths and inaccuracies, but there are some real conflicts that beavers will bring in the longer term. There are two beaver projects in Devon researching in detail some of ecosystem services that beavers provide. The University of Exeter are researching the water resource and water quality benefits in great detail, and some key graphs they have produced have been essential tools for helping to communicate how beaver dams can create wetlands and regulate river flows. If beavers are to be allowed to reduce flooding of properties downstream, they need to be allowed to "cause flooding" upstream.

Workshop chair: Fiona Bowles, RRC Board

NOTES

Louis Suite Workshop D:

Building Technical River Restoration Capacity

River restoration and best practice catchment management is now firmly established to deliver across environmental policy - river ecology, natural flood management, biodiversity and through a range of organisations

Catchment-scale river restoration is a huge task. Delivery depends on forming good working partnerships where each brings their strengths to that group. In this workshop we will explore the varied aspects of river restoration and the relative strengths of different 'partners'. What is the best way to build the capacity to meet the ever growing demand, in a considered and balanced way.

Capacity and technical capability also relies on the right tools and guidance being available, and accessible. Tools and detailed guidance on how to plan and deliver river restoration from large scale concept planning to site implementation (e.g. clear project objectives, consenting procedures, legal and contractual, technical design and choice of appropriate techniques, construction and demonstrating success). This workshop will provide an opportunity to discuss what is available and what is needed.

Discussion supported by introductory short talks from:

Charles Perfect, SEPA - Capability and capacity in Scotland to deliver river restoration. What capacity is needed to deliver national scale targets? How is this working?

Kevin Skinner, Atkins - Delivery from small scale to large schemes – technical competency, assessment of risks, H&S and issues. What skills and experience do you need to deliver?

Paul José, Wessex Chalk Streams & Rivers Trust - A Rivers Trust & Catchment Partnership. From humble beginnings and small scale to a big player in local river management – deciding what and how?

Marta Roca Collell, HR Wallingford - Existing and new guidance and tools – an example of guidance for Implementing Green Infrastructure for River Engineering Measures.

Workshop chair: Martin Janes, RRC

Princess Suite

Workshop E:

Dealing with Sediment in Respect to In-Channel Structures

There are two main areas where sediment issues arise; 1) Disconnection due to channel alterations (bed, banks and in-channel structures) which have significant impacts on longitudinal sediment transport, and 2) New channels constructed as part of river restoration projects, especially where the channel is inherently unstable. Such unpredictability can have both unforeseen benefits and risks for habitats and flood risk management which need to be accounted for in any river alteration. This workshop will discuss what sediment parameters need to be understood in the context of channel modifications (e.g. weir removal/lowering, impact of small hydropower schemes, the removal/alteration of bank and bed protection, or full scale natural-process driven river restoration projects). It will seek to identify when, why and where a better understanding of sediment is necessary, how this can be best achieved and its implications for practical sediment management.

HYDROPOWER IN WALES - A GEOMORPHOLOGICAL PERSPECTIVE

O. LOWE (Natural Resources Wales)

Recent expansion in the Welsh Hydropower industry has raised concerns about the potential geomorphological impacts of high head run-of-river hydropower. Such impacts are relatively underresearched so there is a need to carefully consider sediment and geomorphology. This presentation outlines how hydropower in Wales is designed, constructed and operated and highlights the geomorphological considerations when regulating schemes. This includes sediment management, siting and design, and cumulative impacts at the reach, waterbody and catchment scales.

RESTORING CATCHMENT PROCESSES TO MANAGE SEDIMENT AT SOURCE AND RECEPTOR

D. HETHERINGTON (Arup)

Artificial catchment and channel modifications have led to increased energy in run-off and river flows and increased the availability of sediment at source. This has resulted in artificially high rates of sediment delivery to low energy areas of catchments, increasing the need for maintenance and impacting downstream morphological functioning and habitat quality. This presentation will discuss how Natural Flood Management (NFM) principles can be used to restore sediment delivery levels to more natural levels using a number of example case studies.

GEOMORPHIC INSIGHTS INTO SEDIMENT MANAGEMENT IN THE UPLANDS

H. REID (Scottish Environment Protection Agency)

Managing sediment is a complex endeavour. We do not fully understand sediment transport and delivery, and therefore tend to be risk averse when managing it. This presentation presents; 1) an example of sediment management at a water intake with changing sediments, and 2) an example of sediment dynamics following the remeandering of an active river. This will discuss how we can use geomorphic insights to predict, understand and manage this flux and its associated uncertainty.

PRACTICAL SEDIMENT MANAGEMENT – FINDING THE BALANCE

T. LONGSTAFF (South East Rivers Trust)

Sediment management in lowland, low energy rivers poses its own challenges and risks. This presentation will discuss the problems we have managing sediment on the ground in lowland rivers, particularly during river restoration work. This is both in terms of sediment already in the channel, and that which is sourced from the surrounding areas, especially in urban settings. It will consider the gaps in our understanding and the difficulties this poses for sediment management on the ground.

Workshop chair: Jenny Mant, Ricardo - AEA

Site Visit – Wyre Riparian Restoration Initiative

This year's site visit is to Woodplumpton Brook at Ambrose Farm and Godson House Farm. Part of the Wyre catchment, the brook flows though agricultural land and has issues with diffuse pollution, bank poaching, erosion and channel realignment. Funding from the Catchment Partnership Action Fund (CPAF) has allowed the Wyre Catchment Partnership to address these issues. CPAF has provided funding to 42 catchment partnerships to help them build a foundation for attracting future funding.

Project works

- 1 Crossing point improvement
- 1,200 metres of stock proof fencing
- 5 bank restoration interventions
- 1 Interpretation panel

Sediment input into the river is the largest pressure on Woodplumpton Brook. At this site, land on one side of the river is grazed by cattle and the other side is grazed by sheep. Where the banks were not fenced off, this was having a serious impact (bottom right). Erecting stock proof fencing and creating a buffer strip will help stabilise the banks. To help with this initially, two bank restoration interventions have been made at sites similar to that in the image in the bottom left. The project has also addressed a crossing point which was contributing to sediment problems. Finally an interpretation panel has been installed to engage local farmers and the nearby village of Catforth.



Bank erosion following last winter's storms





An example of previous issues with poaching

The Wyre Catchment Partnership

Hosted by the Wyre Rivers Trust, the Wyre Catchment Partnership is made up of eleven organisations:

- Environment Agency
- United Utilities
- Blackpool and the Fylde College
- Lancaster University
- The Friends of Garstang Walking Festival
- Garstang Millennium Green Trust
- Wyre Borough Council
- Grosvenor Estates Abbeystead
- The Lune and Wyre Fisheries Association
- Catchment Sensitive Farming (NE)
- The Wyresdale Anglers

The Partnership has experience in doing similar works to the Wyre Riparian Restoration Initiative from projects such as the Scorton Habitat Scheme and Wyre Habitat Creation Scheme.



Interpretation panel from a previous project

The connections within the partnership are also helping to monitor and evaluate the Wyre Restoration Initiative project. A student from Lancaster University has been working with the Wyre Rivers Trust to regularly monitor the site before and after the works. This will enable the partnership to demonstrate their success and learn from the project. Being able to demonstrate success is extremely important as it can help secure future funding by giving funding organisations confidence in the work that the partnership is doing.



Service: River Restoration



River Restoration Solutions

The challenge

The Water Framework Directive (WFD) was developed to tackle pressures on the water environment, and provides a planning process to manage, protect and improve rivers, estuaries, coasts and groundwater. As we move into the second cycle of River Basin Management Planning from 2016, the focus is increasingly moving towards addressing complex pressures at a catchment scale, including physical modifications and non-agricultural diffuse pollution. River restoration is an important component of delivering effective and sustainable improvements for the water environment under the WFD by restoring natural processes and improving habitats.

Our approach

Royal HaskoningDHV's river restoration team has an established track record of successfully delivering river restoration schemes from inception and stakeholder engagement through to detailed design and delivery for Rivers Trusts, riparian owners, private companies, local authorities and regulators.

Contact

For further information about our work, come and visit our stand or contact Ian Dennis, Principal River Restoration Specialist, at ian.dennis@rhdhv.com or on 01444 476632. 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 strong team of experts in geomorphology, engineering and ecology who have considerable experience of working across the UK and Europe and an excellent understanding of the relevant drivers and legislation.

We recognise the importance of partnership working and stakeholder engagement in the development and implementation of river restoration plans that deliver benefits for biodiversity, flood risk and public amenity. We therefore make every effort to support the client in their engagement with landowners, fisheries groups, CaBA partnerships and other stakeholders.

As an international company, Royal HaskoningDHV is well-placed to share our experience from river restoration projects in other countries. We have recently been closely involved with the Dutch government's ambitious Room for The River project, which was a significant technical challenge requiring extensive stakeholder management to improve flood resilience and deliver environmental and societal benefits at 30 sites across The Netherlands.





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Session 6:

Lancastrian Suite

Barrier Removal

PROVISION OF FISH PASSAGE IN THE WORFE CATCHMENT

I.J. STEWART-RUSSON¹

1 APEM Ltd.

Over 70 potential barriers to fish migration were identified by APEM on the River Worfe catchment. The installation of fish passage measures to as many of these barriers as possible was sought to improve ecological status. A prioritised strategy was conceived, involving:

- 1. Prioritising 20 potential barriers for detailed fish passability assessments;
- 2. Coarse resolution fish passage options scoping exercise to identify sites for full fish passage options appraisals and feasibility studies;
- 3. Full fish passage options appraisals and feasibility studies at 10 high priority sites;
- 4. Producing detailed designs, obtaining permissions, and arranging delivery of fish passage mitigation at as many of the high priority sites as feasible in the budget.

The final outcome was the provision of fish passage at five structures, including full and partial weir removals, a multi-species pass, and eel ramps. This presentation discusses the theories, challenges, and practicalities involved with undertaking such a project.

INNOVATIVE FISH PASSAGE DESIGN ON AN EAST LANCASHIRE RIVER

A.J. WALMSLEY¹, J.W.A. SPEES¹ 1 Ribble Rivers Trust

A redundant weir on Colne Water in Lancashire provided a challenging site for a fish passage project carried out under the Catchment Restoration Fund. Difficult access, overhead and underground services, a flashy river and a boulder clay substrate were just some of the complications we had to overcome. This necessitated a collaborative design process, involving consultants, the Trust and the contractor, and resulted in a novel and innovative design for the fish easement. We also wanted to find out how well this type of fish easement would work, so worked with Durham University to carry out monitoring of the barrier's porosity using a Radio tagging and tracking method on brown trout. This confirmed that the new fish easement was effective, allowing fish to move up over a previously impassable weir.

LESSONS LEARNED AT A NORFOLK MILL

J. WHITMORE¹ 1 JBA Consulting

This presentation will focus on the planning and delivery of a barrier removal project at Trowse Mill on the River Yare in Norfolk. A balance of meeting stakeholder needs, considering flood risk management, delivering wider biodiversity gains and delivering an efficient fish easement, meant that determination of the final solution was not simple. Phase 1 of the project involved appraising the opportunities for delivering fish passage improvements using the bypass channel. Phase 2 of the project focused on development and implementation of a design that utilised the existing mill leat.

Points of interest which will be covered in the presentation include:

- Management of the balance between stakeholder engagement and a starting point of an unconstrained list of options.
- Are there efficiencies to be realised beyond the immediate scope of the project objectives?
- Successful delivery will pave the way for further restoration and flood risk reduction projects.

Session 6:

Louis Suite Shaping Our Rivers

THE IMPORTANCE OF REFERENCE STATE AND THE ASSESSMENT OF POTENTIAL FOR GEOMORPHIC WORK

H. MOIR¹

1 cbec eco-engineering UK Ltd.

Successful river restoration cannot be applied with a 'one size fits all' type of approach. Not only must the specific configuration of a specific river restoration reflect the imposed physical controls at a site (i.e. reflect the reference condition), but there are different general approaches that are best suited to delivering that configuration. These can be summarised through an increasing degree of intervention associated with gradients of increasing physical constraint and decreasing potential for geomorphic work. However, to date, there have been few attempts to quantitatively define and apply this type of framework. We present an application of such an approach on the River Leven catchment, Scotland. Catchment-wide data on engineering pressures and indicators of the potential for geomorphic work are integrated to provide a metric that, 1) prioritises restoration for greatest WFD benefit, and, 2) identifies what type of general restoration approach is appropriate for those prioritised areas.

A METHOD FOR DEFINING POTENTIAL LOCATIONS FOR WFD AND FLOOD RISK RESTORATION IN A LARGE CATCHMENT

K. KEMBLE¹, S. ROBERTS¹ 1 Jacobs

Some catchments are so large that traditional methods of identifying areas at potential risk or that would potentially benefit from restoration are not viable. High level strategic assessments on a catchment scale using Geographic Information Systems provide an opportunity to potentially gain an insight into the sensitivity of the catchment. By using the findings from this type of assessment tool, key areas at risk or with potential for enhancements can be derived and highlighted for further assessment. This presentation draws on an example from the Republic of Ireland. Jacobs were tasked with developing a tool to identify areas at risk geomorphologically to inform selection and design of potential areas for flood risk management and WFD restoration. The approach used has taken into consideration the uncertainties of working at a strategic level with limited data and information. Two complimentary geomorphological approaches were used independently to increase confidence in the observations made.

BALANCING RISK AND REWARD: A CALL FOR A (SLIGHTLY) MORE CAVALIER APPROACH TO RESTORATION?

G.L. HERITAGE¹, S. BENTLEY² 1 AECOM, 2 JBA Consulting

Many opportunities are presenting themselves to alter the current form and functioning of our river and floodplain networks in the UK to improve ecosystem dynamics, largely driven by the requirements of the European Water Framework Directive. Such opportunities carry a degree of risk linked to system stability and flooding and this presentation argues that the handling of these risks is presently severely hampering ecological gain with a risk averse approach permeating the regulatory process governing river restoration activities. Behind this issue is the preconceived concept of system stability which is both counterintuitive when restoring naturally dynamic river systems and constraining with regard to naturalisation. This presentation reviews restoration projects with which the authors have been involved, illustrating the increased system gains achieved through controlled risk taking. Risk taking can bring rewards and river managers and regulators must take more chances where the consequences of failure are low.

Session 6:

Princess Suite Modelling: Tools and Techniques

INTEGRATED DYNAMIC ANALYSIS OF MODIFIED CHANNELS: DEALING WITH CONSTRAINTS IN URBAN AREAS

I. BENTLEY¹, G.L. HERITAGE¹ 1 AECOM

AECOM have completed a number of integrated analyses of sites across England where modified channels and dynamic river processes are providing challenges to the sustainable maintenance of the system. Our analysis integrated findings from geomorphology audit, detailed hydraulic modelling combining 1D modelling within the catchment and 2D modelling of the modified section and river engineering condition assessment. The river systems investigated transport significant volumes of gravel, which are deposited to form bars at various locations along the channel forming a potential source of flood risk particularly at bridges. The river channel at this location is highly engineered with the modified form of the channel acting as a primary control on gravel deposition. The combined audit, modelling and engineering approach adopted allowed iterative optioneering at the sites providing a robust integrated evaluation of potential options in highly constrained situations helping to ensure sustainability whilst minimising engineering impact on the environment.

HABITAT MODELLING: A USEFUL DESIGN, INVESTIGATION AND APPRAISAL TOOL

D. MOULD¹

1 JBA Consulting

JBA have used hydraulic habitat modelling in a range of applications. The basis of hydraulic habitat modelling will be outlined, and its functionality explored using three recent JBA projects as examples: as part of the design, as an investigation tool to build evidence and finally as an impartial appraisal tool. Through these three case studies, the pros and cons of hydraulic habitat mapping will be drawn out. Advantages include, the ability to evaluate hydraulic habitat across the whole flow regime, the spatial nature of the outputs, the ability to produce results in a data-poor situation and the ability to change model topography to optimise or minimise the impact of designs. Disadvantages include, the associated scale of the modelling, and the limitations associated with knowledge of the behaviour of many aquatic species.

HYDRAULIC MODELLING REQUIREMENTS FOR RIVER RESTORATION: METHODS FOR MINIMISING (NOT JUST FLOOD) RISK

E. GILLIES¹

1 cbec eco-engineering UK Ltd.

Hydraulic modelling for flood risk is well-established, and UK-specific research (EA/DEFRA) lists the minimum requirements on models for flood risk assessment. However, the modelling requirements to determine the efficacy/function of a river restoration are often overlooked. These are often different to the requirements for Flood Risk Assessment (FRA), e.g. existing conditions on straightened reaches are often satisfactorily modelled for flood risk using 1D, or 1D/2D, models; whereas restored reaches often introduce greater lateral forcing and require fully 2D models. For cost effectiveness and due diligence, it is important to use a hydraulic model that can safely assess flood risk and also asses restoration design performance, as there is little point spending money on a restoration scheme without some evidence that the design will improve habitat, natural process, social value, etc. Through our experience of modelling for restoration design, combined with mandatory flood risk assessments, we present a set of minimum modelling requirements for discussion.



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River Restoration Wetland Habitat Creation Natural Flood Management Native Plant Nursery



Building with Nature
Session 7:

Lancastrian Suite

DELIVERING SEVERN TRENT WATER'S FAIR SHARE OF THE WFD

A. BANHAM¹, M. STREETLY², D. BRADLEY³ 1 Severn Trent Water, 2 ESI, 3 APEM Ltd.

The National Environment Programme (NEP) is a list of environmental improvement schemes that ensure that water companies in England and Wales meet European and national targets related to water. In recent years the NEP has been one of the most important mechanisms for delivery of the Water Framework Directive. This talk provides an insight into how Severn Trent Water has delivered its NEP obligations over the last 5 year spending period (2010-15) and its plans for delivery under its current business plan (2015-2020). We will also discuss the contribution that this will make to delivery of the WFD in the Humber and Severn River Basins. Going forward, Customer Challenge Groups will be increasingly important for deciding what customers will pay water companies to deliver and it will be essential that water companies can show real value to the public through the measures they are implementing.

HOW WE ACHIEVED GOOD ECOLOGICAL POTENTIAL

B. DAVIES¹, D. WEBB² 1 South East Rivers Trust, 2 Environment Agency

In 2015, the actions required for the River Wandle Carshalton water body in south west London to reach Good Ecological Potential (GEP) were completed after a series of measures were implemented by the Wandle Trust (now the South East Rivers Trust) in conjunction with a range of partners. Good Ecological Status has been clearly defined but there was no such clear definition of GEP, the alternative target for Heavily Modified Water Bodies. The Environment Agency worked closely with the Trust and the Wandle Catchment Partnership to develop a method to affirm when the river reached GEP. The presentation outlines both the process that was undertaken to define GEP and the series of measures implemented on the Carshalton water body. It is thought to be the first urban river to reach GEP.

Notes





Projects now demand a more soft and sustainable engineered solution, consultants and engineers can now look at flexmse as a creditable & dependable green alternative to traditionally built hard engineered structures. Flexmse is a globally patented system consisting of earth filled geotextile bags and interlocking plates that create stable geomodular solid structures to resist earth movement, with the continued development and innovation of geogrid and geotextile technology flexmse has the enhanced engineered stability, durability and the loading capabilities to be considered for use in most projects, with great success.



'Photos by Environment Agency (Solent & South Downs, West Hants)'. Urban stream erosion repairs: Jenner Way, Romsey.

The environmental and aesthetic advantages of the flexmse system should not be underestimated, unlike concrete or other stone filled structures, vegetated wall systems can create mini "eco-pockets" accumulating moisture, allowing seeds to germinate, root systems to develop and flora to blend in with the local environment.

These systems are also able to accept almost all types of vegetation, depending on the application and desired aesthetic, this can include pre-seeding and hydro-seeding with native grasses and wild flower mixes, live planting with marginal plants and staking of perennial ground covers, shrubs, grasses and flowers to achieve an instant, fully customised vegetation finish.

Ambrose Environment Solutions will provide all the technical assistance required to help in the design of a Flexmse system within your projects. For further information please visit <u>www.flexmse.com</u> or please call Chris Ansell on 07711932323, Mike Bailey 07808063079 or Brian Gordon 07843350479 to discuss your requirements.

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Highlighting the value of process based fluvial assessment.

N. WILLIAMS¹, G.L. HERITAGE¹ 1 AECOM



Cost effective survey and modelling for river restoration.

N.S. ENTWISTLE¹, G.L. HERITAGE² 1 University of Salford, 2 AECOM



Wetland biota and community composition as part of river restoration. O. SHOLI¹, G.L. HERITAGE¹ 1 AECOM



5

Enhancement or just good design? A collaborative approach to river and wetland restoration.

J. CULLIS¹, M. LANE², C. GREEN¹ 1 CH2M, 2 Environment Agency

River Avon Restoration Project - Examples of successful restoration techniques.

S. GALSWORTHY¹, A. MAXWELL¹, S. WELLS¹, M. PORTER¹ 1 Environment Agency



The Spey Catchment Initiative - Delivering river restoration schemes for multiple objectives.

L. HENDERSON¹ 1 Spey Fishery Board



Letting the Dove flow.

J. WOZNICZKA¹ 1 Trent Rivers Trust



River channelization and modification – The subsequent effects of macroinvertebrate assemblages due to in-stream habitat alteration. B. WALLS¹, J. ARNSCHEIDT¹, B. RIPPEY¹ 1 University of Ulster, Coleraine

9	Supply-demand ecosystem in river restoration: an enabling framework for Cost-Benefit Analysis (CBA). B. DENJEAN ¹ 1 Beijing Forestry University
10	The importance of the hyporheic zone to river restoration. C. MAGLIOZZI ¹ , R.C. GRABOWSKI ² 1 Cranfield Water Science Institute and the River Restoration Centre, 2 Cranfield Water Science Institute
11	Simple metrics to inform riparian shade management. M.F. JOHNSON ¹ , R.L. WILBY ² 1 University of Nottingham, 2 Loughborough University
12	Working with Natural Processes (WwNP) for flood resilience across the Stour catchment T. LAVERS ¹ , S. CHARLESWORTH ¹ , C. LASHFORD ¹ , F. WARWICK ¹ 1 Coventry University
13	Pollution from historic landfill sites. J. BRAND ¹ , K. SPENCER ¹ 1 Queen Mary University of London
14	Restoration of the rivers Wylye and Nadder at Salisbury, Wiltshire L.E. DAHL ¹ , J. GRANT ¹ , G. COLLEY ¹ , A.M. ANTHEUNISSE ¹ 1 Wiltshire Wildlife Trust
15	Evaluation of gravel beds as spawning habitat for rheophilic fish species in Flanders. L. VANDAMME ¹ , I. PAUWELS ¹ , D. BUYSSE ¹ , J. COECK ¹ 1 Instituut voor Natuur- en Bosonderzoek – Research Institute for Nature and Forest
16	Geology, landscape and sediment dynamics in catchments: Connecting rocks, rivers and coasts. K. WHITBREAD ¹ , C. THOMAS ¹ 1 British Geological Society
17	If you build it, will they come? Quantifying the efficacy of large woody debris river restoration. J. HUDDART ¹ , S. BROOKS ² , G. WOODWARD ¹ 1 Imperial College London, 2 Natural History Museum
18	Do habitat restoration measures in the River Marke (Flanders, Belgium) to increase habitat quality for rheophilic fish? I. PAUWELS ¹ , D. BUYSSE ¹ , L. VANDAMME ¹ , J. COECK ¹ 1 Instituut voor Natuur- en Bosonderzoek – Research Institute for Nature and Forest

Natural management of landslips for improved water quality. C. CONSTANTINE ¹ , O. IACOB ¹ 1 Arup
River restoration in the Glazert Water catchment. C. WARD ¹ 1 Scottish Environment Protection Agency
The effect of woody debris 'rewilding' on stream ecosystems: a case study for developing a database of ecological restoration. M.S.A. THOMPSON ¹ 1 University College London
Wandling free again: A Lower Wandle fish easement. T. LONGSTAFF ¹ 1 South East Rivers Trust
Targeting a WFD fish failure: Fish passage and habitat. O. VAN BIERVLIET ¹ <i>1 South East Rivers Trust</i>
How'd you solve a problem like a weir? C. GARDNER ¹ , D. JOHNSON ² , L. SMITH ³ 1 South East Rivers Trust, 2 The Rivers Trust, 3 North West Kent Countryside Partnership
Weir removal and riffle creation in Kent. R. PYPER ¹ 1 South East Rivers Trust
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The Allt Lorgy – Kickstarting natural river processes. UK River Prize Finalist – Innovative Project Spey Catchment Initiative
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Over the last 20 years Willowbank have developed expertise in River Restoration, Erosion protection, Habitat enhancement, Fish Passage, Marginal aquatic planting, Sediment management and Waterside construction techniques. This combined with our specialist knowledge of the use of natural materials allows us to offer innovative solutions and cost effective installation methods with regards waterside construction and environmental enhancement.

Willowbank has extensive experience of natural engineering techniques, (using natural materials and plants in construction). We are well versed in delivering projects with Natural England, Water Authorities, Environment Agency, Main Contractors and Councils in Sites of Special Scientific Interest (SSSI), special Areas of Conservation (SAC), Special Protection Areas (SPA) and Ramsar Sites

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DELEGATE LISTS

AS COMPILED ON 15TH APRIL 2016

Kindly sponsored by:



Organisation

Name

RRC Staff

Will Barber Jasmine Errey Martin Janes Nicola Mackley Chiara Magliozzi Marc Naura Josh Robins Emma Turner Hazel Wilson

RRC Board Members

Will Bond Fiona Bowles Nicholas Clifford Andrew Gill Kevin Skinner

Delegates

Stephen Addy Bev Allen Ahmed Al-Zankana Chris Ansell Martijn Antheunisse Denise Ashton Katie Atkinson **Joanne Backshall** Alison Baker Tina Bardill Sylvian Barry Shawn Beatson Jenna Beckett Lawrence Belleni Ian Bentley Sebastian Bentley Mike Blackmore Will Bond Phil Boon **Fiona Bowles** Paul Bradley James Brand

Local Engagement and Communications Officer River Restoration Adviser Managing Director Centre Administrator Marie Curie Researcher Science and Technical Manager Information Officer Business and Finance Manager Restoration Assistant

Alaska Independent King's College London Cranfield University Atkins

The James Hutton Institute **Environment Agency** University of Leicester **Ambrose Environment Solutions** Wiltshire Wildlife Trust Wild Trout Trust Arup Eden Rivers Trust Forth Fisheries Trust National Trust Forth Fisheries Trust Wessex Water Arup Forth Fisheries Trust AECOM AECOM Wild Trout Trust Alaska Scottish Natural Heritage Independent PBA Applied Technology Ltd. Queen Mary University of London Daniel Brazier **Richard Brazier Bill Brierley** Andrew Brookes **Tim Brooks** Chryssa Brown Polly Bryant Alexandra Bryden Matthew Buckley Amelia Bulcock Lydia Burgess-Gamble Matt Bush John Callaghan Roisin Campbell-Palmer Tom Cartmel **Richard Charman** Robert Clapham Stewart Clarke **Elizabeth Clements** Nicholas Clifford Daniel Coenen George Colley Leonardo Camelo Kate Comins Luke Comins Nick Coombs Greg Corcoran Laura Cotton Thea Cox Jennifer Cox Alexandra Cripps **Jo Cullis** Lev Dahl Carden David Keith Davie **Bella Davies** Jenny Davies Iwan de Vries Ian Dennis **Bryony Devoy** Jessica Dippie Shelley Doe **Tracey Doherty** Anthony Downing Alastair Driver

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Rob Drvden Kathryn Edwards **Richard Edwards** Mark Elliot Adam Ellis Judy England Neil Entwistle Erdem Eroglu Jane Everett **Duncan Ferguson** Amy Fergusson Kimberly Ferran-Holt Melanie Fletcher Laura Foden Andrew Folkard Charles Forman Michael Forrester Gez Foster Laura-Beth Foulds Siri Frost Galen Fulford Karl Fuller Xavier Garcia Chris Gardner Anna Gee Paul George Sally German Andrew Gill **Eric Gillies** Joanna Girvan Derek Gow Andy Graham Tom Grayling Michael Green Gareth Greer Jon Grey Angela Gurnell John Gurnell David Gurnell **Richard Haine** Elisabeth Hammett Gene Hammond Stephen Hancke Beth Hancock Maria Hardy

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David Harper Judith Hartly Gerard Hawley Suzanne Hearn **Eleanore Heasley** Matthew Hemsworth Paul Henderson Liz Henderson Ed Henshaw George Heritage Nigel Hester **David Hetherington** Mike Hill Mike Hill Charlotte Hitchmough David Holland Jane Hornsby Claire Horseman Liz Horton Vicki Howden Jill Howells Marc Huband Joe Huddart Toby Hull Sarah Hussey Mike Jenkins **Kimberley Jennings** Matt Johnson Anneka Johnson-Marshall Gahan Jonathan Paul Jose Roz Kehoe Katy Kemble Martin Kernan **Dickon Knight** Caroline Laburn Mary-Rose Lane Emma Lewin **Emily Long** Tim Longstaff Jonathan Louis Jason Lovering Oliver Lowe Suzie Maas Kenny MacDougall

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Notes



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 desynchronisation

Hydrodynamic Modelling

- Flood risk, geomorphic process assessment, habitat availability, water quality and fish passage
- Hydrological and hydrodynamic modelling platform
 - · Hydraulic measurements & monitoring

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eco-engineering

- Fluvial audit/ geomorphic mapping
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 - Sediment characterisation (including sedimentary transport)
 - Habitat surveys

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