# River Restoration NEWS

Issue 34
December 2009

*Newsletter of the RIVER RESTORATION CENTRE*



Tel/Fax: 01234 752979 Email: rrc@theRRC.co.uk


# RRC's Houting Outing to Western Denmark

Picture of a Houting

***The RRC team donned thick coats, boots, gloves, and hats, and hopped on a plane to see first-hand the established River Skerne project, and an exciting new EU-LIFE funded programme to improve habitat for a rare salmonid species (The Houting Project). The visit was at the invitation of Hans Ole Hansen of the Danish Forest and Nature Agency. Nick Elbourne (RRC) reports on the progress of the sites visited.***

The houting is an EU Habitat Directive protected species which returns to freshwater rivers from the Wadden Sea in autumn to spawn. While once distributed throughout the entire region, houting are today restricted to only six river systems in Denmark. Industrialisation and floodplain drainage has limited migratory opportunities and areas of reed beds and flooded meadows in which houting fry remain for several months prior to migration are diminishing. The construction of technical fish ladders at weirs has statistically had limited success with only about 50% of the houting population using them.

## *The Skjern Revisited*

The River Skjern restoration project, completed in 2002, was the largest restoration scheme in Denmark and it helped lay the foundation for the current Houting Project by developing restorative techniques and tools. The Skjern project originally aimed to restore watercourses that were straightened for intensive farming in the 1960s, and historical mapping from 1871 was used to inform the restoration of river meanders and 2220 hectares of surrounding wetland habitat (***Figure 1***). During the works a total of 2.7 million cubic metres of soil was removed, enough to fill a series of dumper trucks from the Skjern to Rome, and the length of the Skjern was increased by four kilometres. Straightened sections that were not infilled have been retained as linear ponds.


*Continues on Page 2*


## Inside this issue

*Continues from Page 1*

## *Lessons Learnt from the Skjern*

Land acquisition was a fundamental part of the Skjern restoration process and it was implemented by compensation payments or for those farmers wishing to continue, land replacement elsewhere in the catchment. This took three long and frustrating years but the project is now a fine example of successful river restoration on a large scale. A new delta formation, resulting from sedimentation within shallow waters, provides habitat for a range of migratory waders, and now that the riverbanks have naturalised, it is difficult to envisage how the area was prior to restoration. The area will become a national park, and educational facilities, nature trails, and picnic facilities have already been established.

***Figure 1:***
*The straightened river system alongide drained and agricultural land depicts the old Skjern landscape (top), while the array of developing wetland habitats shows the return of its former mosaic floodplain (bottom).*
*October 2009*

## *Ambitious Aspirations*

The Houting Project co-financed through EU LIFE is extremely ambitious. Launched in 2005, and with a budget of 13.4 million euros, it proposes to restore and maintain favourable conservation status for houting by the end of 2010 in four rivers in Western Denmark (the rivers Varde, Sneum, Ribe and Vida). To achieve the restoration for the houting, thirteen physical obstacles (mainly weirs associated with fish farms and hydro-electric power generation) are to be removed creating access to 130 kilometres of river channel habitat and 500 hectares of new nursery. The removal of weirs at fish farms is being made possible by the farms switching to the use of groundwater rather than abstracting from the river. A budget has been set aside within the Houting Project to implement and monitor the modernisation of fish farms. While fish farming was significant in the mid 20th century, ensuring the sustainability of natural fish populations is today the greater issue in Denmark.

## *Restoring Houting Passage*

The aim of a £1.1 million project in the town of Tonder on the River Vida is to restore houting passage, retain parts of an old millpond as a nursery area, and create spawning grounds. While the mill wheel was no longer present at the start of the project, a two metre high weir created a physical obstruction to houting migration. The pond and the river have now been separated with the creation of a lateral sheet-piled, concrete-faced, broad-crested weir. Gravel bed and banks have been installed (***see Figure 2***) and an otter pass has been built under the bridge just downstream of the reach shown. Two sluice gates and a fish ladder upstream of the mill bridge have been removed and downstream Tonder rowing club also have a new access point to the river to minimise disturbance. Flood banks on the northern side have been set back to ensure flood risk doesn't increase and eighty hectares of shallow-water lakes will form new nursery areas for houting fry. From Tonder, the watercourse meanders 700 metres down to wetlands and this is an increasingly popular walk for local residents.

***Figure 2:***
*Looking upstream from the old Mill in the town of Tonder towards the town centre. The mill pond level is retained, but is separated by a lateral overspill weir from the new 'free-flowing' river with gravel bed and banks. October 2009*

## *Varde, the Crown Jewel of the Houting Project*

The most substantial piece of the Houting Project jigsaw is undoubtedly the restoration of the River Varde, the largest river system flowing from Denmark into the Wadden Sea. (***Figure 3***). The river was extensively straightened after increased demand for power in the interwar years, and a key objective is to widen and re-meander the Varde, increasing its length by 5 kilometres. The Ansager Canal will be infilled with the flow diverted upstream into the Varde, and the hydroelectric power (HEP) station at Karlsgarde will be decommissioned as it is no longer economically viable. This is a critical part of the river restoration as up to 75% of potential houting spawning areas lie upstream of the station. The process of land acquisition however has been arduous, and while 68 of the 70 landowners did sign up, the two that didn't were fundamental to the success of the proposal (the leading landowner and a fish farm owner). Eventually on August 20th 2009, the land ownership issues were finally resolved and restoration work could begin. New meanders have been dug but will not be re-connected until January 2010 when the fish farm will cease operation for 1 year with the owner paid compensation for loss of earnings.

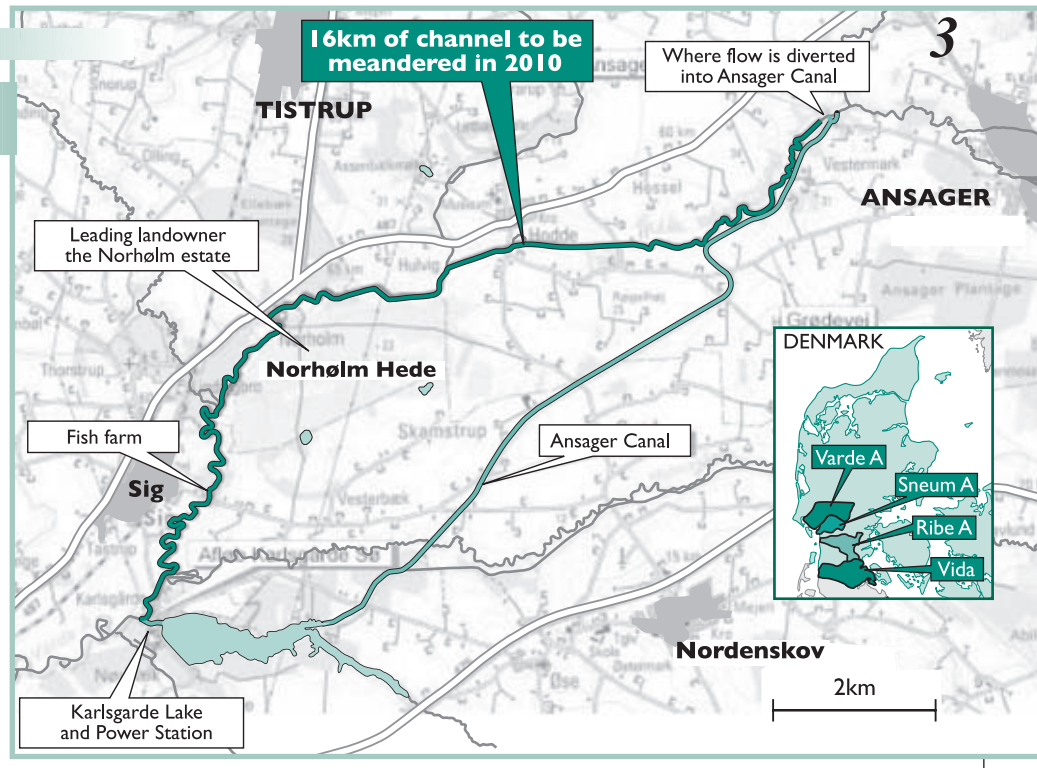



***Figure 3:*** *Map showing the Varde river project and location in Denmark (inset)*

## *What next?*

What amazed the RRC team was the extent of restoration work taking place under the Houting Project. The Varde restoration project is set for implementation in 2010 and there are clearly lessons and mechanisms which can hopefully be applied to streams in the UK. Furthermore, it is hoped that a representative of the Houting Project will be a speaker at the RRC 2010 conference - another reason to put it in your diary now! All representing the RRC in Denmark would like to thank the kind hospitality of Hans Ole Hansen and Helle Kold Jespersen.

**Further information is available at: http://www.snaebel.dk/English/**

**Please also consult Jenny Wheeldon's (2009) STREAM Report from their exchange visit to the Houting Project, which is available through a link on the RRC News and Events page under the heading: STREAM report - Houting Exchange Visit (29th June - 3rd July 2009).**

# Ho ho ho…..Have a go at our Christmas Crossword which has been compiled by RRC staff

Use the letters in the highlighted boxes to solve the final anagram and send in your answer to rrc@therrc.co.uk by Tuesday 5th January 2010.

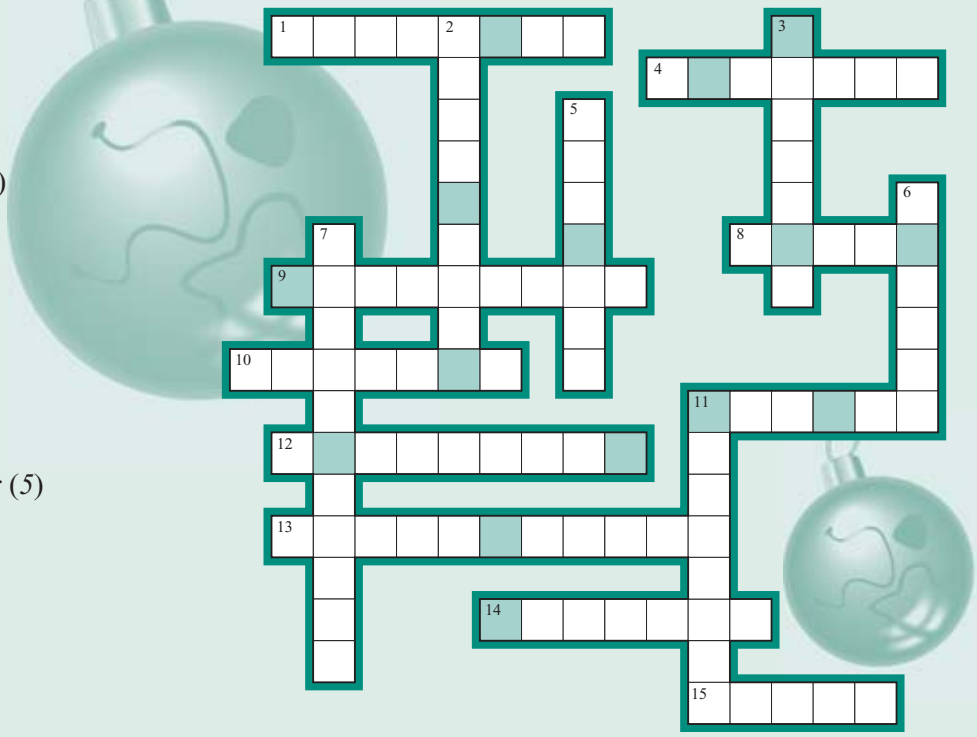
**The first entry drawn from all of the winning emails will win a prize!**

### ACROSS

**1** Fast part of flow.... on a bicycle maybe? (*8*)
**4** Watercourse as seen on tv (*7*)
**8** The Devil turns into this saint (*5*)
**9** Eye Eye Cockney (*5, 4*)
**10** A bundle of meatballs (*4*)
**11** Loud music in a long gun (*6*)
**12** Slope protection (*9*)
**13** Charles returns to the throne and repairs the river (*11*)
**14** Pull it and look for the motto (*7*)
**15** Stretch out for this part of a river (*5*)

### DOWN

**2** Intended to fish? (*8*)
**3** He's built by many when the white stuff appears (*7*)
**5** Here is a gift (*7*)
**6** Hanging on a tree (*6*)
**7** ....All the way!! (*6, 5*)
**11** Expensive shower! (*8*)



**ANSWER**

# Assessing Restoration Proje - River Avon

***The problem for many LIFE projects is the time constraint; once work is completed, there is very little time to appraise the project and evaluate its success with quantitative evidence. Restoring river channel processes and ecological functioning is long term, LIFE projects are not, but reporting is still needed. A visual appraisal method, originally developed by Laura deSmith (previously RRC, now Halcrow), trialled and further adapted by RRC, therefore seemed a useful approach.***

***The River Restoration Assessment (RRA) comprises a site walk over and the completion of a short questionnaire. This method was adapted and used on the STREAM project to provide an independent indication as to whether the works were appropriate for the sites were having the desired effect in the short term and, in the opinion of the RRC, were going to deliver the long-term objectives of the project. This complemented the quantitative work undertaken by Haskoning and allowed the RRA to incorporate this and other data/results into the longer-term predictions provided. In this article we describe the RRC approach and the conclusions reached 4 years after completion.***

## *Assessment Stages*

The STREAM Project (2003) set out to demonstrate restoration within a strategic catchment-based approach. A post-project appraisal of the restoration works was undertaken by Royal Haskoning, with the RRC carrying out a series of River Restoration Assessment surveys. The RRC carried out **pre, during**, just after (**as built**) and **post** restoration works assessments, so this took between 2 and 4 years to complete for each site. The projects were divided into discreet reaches each of which was assessed separately. Repeat photography was also carried out at all of the assessment stages (***see Figures 1 and 2***).

The **pre** project assessment included a précis of the objectives and background information, and a survey of the reach characteristics including width, depth, bank and bed material, vegetation, land use, and quality of ecological habitat. The anticipated short- and long-term potential impacts of the restoration work were also reported.

The **during construction** assessment assembled information about the contractor and a technical site plan. The RRA form was also completed with a summary of predicted short- and long-term impacts (both positive and negative) along with a number of questions relating to the construction programme and costs. Changes to the original design were also noted at this stage.

The **as-built** and **post** assessment provided an inventory of the restoration techniques used and detailed several key aspects of the scheme (visual and social elements; physical characteristics; vegetation; fish and aquatic invertebrates; mammals;

***Figure 1.*** *Wood deflectors installed at Seven Hatches*

# ect Success

**Figure 2.** *Seven hatches Deflectors 10 months after installation*

terrestrial invertebrates; and birds). The potential changes, both short (recovery from the physical works) and long term (beyond the lifetime of the project), are then identified and an appraisal of the techniques used is carried out. The overall project is then assessed and future improvements and management requirements identified along with the potential for adaptive management and future restoration opportunities.

The overall assessment is essentially a qualitative method which uses observation from before the project starts through to up to a year after the project is completed. It describes changes which have been observed and makes a predictive assessment of future changes. The observed and predicted changes are then linked to the project objective and a judgement of the success or otherwise of the restoration techniques made.

## *Findings*

From the assessments it was possible to determine RRC's view of the success or failure of each of the methods and give a long-term prognosis of the works in terms of how they are likely to adapt and develop.

The study showed that overall the range of restoration methods used have worked and the project aims of reinstating the physical form and diversity of the river channel, creating sustainable dynamic habitats and demonstrating novel and appropriate restoration techniques for the chalk river types within the River Avon SAC are being achieved. For example, in the short term, the deflectors have reduced channel width, created flow variability, and allowed the development of emergent vegetation in the newly developed silty berms. In the long term, it is expected that the silty margins will become completely vegetated, further reducing the channel width. Throughout the project an adaptive management process was adopted so that the lessons learnt from one site could be applied to the next. In terms of the deflectors, one lesson taken forward into later works was to increase the size of the trees used. The RRA process highlighted that changes to the hatch operation (for example the hatches being raised permanently), where it occurred, had the biggest immediate impact in the short term by reducing water depth and increasing velocities with the resultant removal of silt from the gravel substrate.

## *Predicted Benefits*

The restoration works should continue to improve the habitat important for several of the SAC species in the river. Greater flow diversity has been created for salmonids. Silty margins, which are developing due to the deflectors, will provide habitat for lamprey ammocoetes, and the shallow margins will provide refuge areas for salmonid fry. Increasing flow velocity over a narrowed width will aid the mobilisation and self cleaning of silt from spawning gravels which are now suitable spawning areas for salmon, lamprey, and bullhead, and habitat for bullhead juveniles. The emergent vegetation cover now developing in the silty margins has also created habitat suitable for Desmoulin's whorl snail. The riffles have created new spawning areas for both salmonids and cyprinids. Whilst bullhead juveniles inhabit shallow stony riffles, the adults prefer sheltered sections which have been created by large woody vegetation, tree roots, leaf litter, macrophyte cover, and large stones.

## *Lessons Learnt*

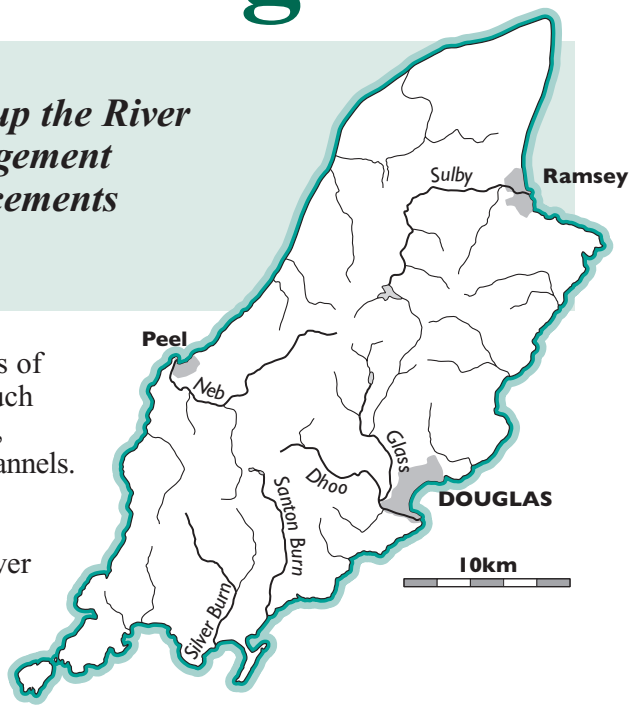
The STREAM project has aimed to work with natural riverine processes, altering the channels in small ways rather than large scale engineering works (which are more costly and increase ecological disturbance) and demonstrates the potential of these in-channel features to improve river habitat. Overall, the assessment identified that the changes to the river are only just beginning to be visible, but also suggests that the changes instigated should lead towards the longer term projects objectives. Something that most projects funders would like to know but is normally not possible given the short timescale of the funding period.

***For more information on the STREAM project see Issue 26 of RRNews and www.streamlife.org.uk for all of the project outputs.***

***The RRC would like to acknowledge the input and collaboration from Jenny Wheeldon from Natural England and Allan Frake and others from the Environment Agency.***

# River Management

***Three years after the Isle of Man Government set up the River Management Project, Karen Galtress (River Management Project Officer) describes some of the river enhancements and mitigation techniques being employed.***




The Isle of Man is a British Crown Dependency of about 500km$^2$ situated in the Irish Sea between south-west Scotland, north-east Ireland and north-west England. The majority of its watercourses are fast-flowing, flashy streams, many of which, despite their relatively small size, support good populations of salmonids, including juvenile salmon densities of >1 fish per m$^2$ in some areas. Eels are also wide-spread and numerous, and minnows, sticklebacks and lampreys are present, though much less common. Coarse fish are not native and, while a few species are present through introduction in some ponds and reservoirs, they are rarely encountered in running waters.

The water quality of Manx rivers and streams compares favourably with the UK, 99% of them being classified as fair or above quality, and the relatively low intensity of agriculture and lack of heavy industry means that diffuse pollution does not pose a major threat. However, ecological potential is constrained by many factors found elsewhere in the British Isles, including obstructions to fish passage, flow regulation, invasive plants, and the typical legacies of previous drainage schemes, such as straightened, and, in places, over-widened and deepened channels.

In May 2006 the Isle of Man Government instigated the River Management Project, joint sponsored by the Department of Agriculture, Fisheries & Forestry's (DAFF) Wildlife Division and Inland Fisheries Section, the Department of Transport's (DoT) Land Drainage Section and the Department of Local Government & the Environment's (DLGE) Environmental Protection Unit with the primary aim of promoting best practice in watercourse management. This varied role includes facilitating liaison between the Departments, promoting awareness of and advising on watercourse issues via information displays, the Government website, and visits to farmers and other landowners.

Not being a member of the European Union, the Isle of Man is not obliged by the Water Framework Directive to restore complete hydromorphological functioning to degraded rivers and the political and financial implications that would be involved prohibit river restoration in the true sense of the phrase. However, various habitat enhancement and mitigation schemes have been instituted and are planned for the future.

## *Weirs*

Weirs remain a major limitation on salmonid populations in many of the streams, and the retention of water rights by landowners and, in places, downstream property development necessitates continued impoundment. On designated 'Main Rivers', the DoT are responsible for maintaining the functionality of weirs, and close liaison with Inland Fisheries has resulted in some improvements to fish passage where minor repairs have been conducted. However, they have a statutory obligation to



***Figure 1:*** *River Neb with (**a**) dilapidated weir (summer 2006), and (**b**) the rock ramp (spring 2007) which has replaced it*

# on the Isle of Man

ensure passability only when weirs need to be replaced. A particularly good example was the installation in 2006 of a rock ramp to replace a dilapidated weir on the River Neb, which had for many years delayed upstream passage of salmon and sea trout, leaving them vulnerable to poachers (***see Figure 1***). The ramp incorporates a low-flow channel, thereby also aiding dispersion of resident brown trout. Although there is not enough monitoring data available to draw robust conclusions, surveys conducted in 2005 and 2007 revealed similar numbers of brown trout but a quadrupling of 0+ salmon at a few kilometres above the site. The ramp also resulted in considerable financial savings for the DoT when compared to a like-for-like replacement.


***Figure 2:*** *Bend on the Silver Burn in (**a**) August 2006, showing cantilever erosion, and (**b**) June 2009, three years after 'green' engineering*

Off 'Main Rivers', current budget constraints severely limit investment by Inland Fisheries in improving passability. However, a survey in 2007 of landowners and tenants, conducted as part of the River Management Project, led to approval of funding to construct a bypass channel beside a weir on the Santon Burn, to enable salmon and sea trout to access several kilometres of prime spawning habitat upstream. This was constructed by the DoT Works Division early this year for circa £10,000 and monitoring will hopefully confirm its benefits in forthcoming years.

## *Riverbank engineering*

Until fairly recently, most bank revetments conducted by the DoT had employed traditional hard engineering solutions such as gabion baskets and 'stob and mesh' (post and wire-mesh barriers back-filled with stone). However, since 2006, greener solutions have been employed wherever possible. The first major example was the revetting of a bend prone to severe cantilever erosion above a large but passable weir on the Silver Burn (***see Figure 2***). 'Stob and mesh' techniques had failed in the past leaving potential for the river to divert from the weir, an undesirable prospect in this instance. The work was used as a training exercise in soft engineering for the DoT's works gangs with Salix River & Wetland Services Ltd contracted to supply the design and supervision. Faggots topped with coir roll were used to construct the desired course and, after regrading and seeding, the bank was reinforced with NAG350 geotextile. In order that only plants of native Manx provenance were used, the coir roll was installed bare and later planted with marginals. A small backwater was also created at the site and a copse of native trees planted to further enhance the area's wildlife potential. The project has led to other green initiatives such as the creation of a lagoon for supplying pre-planted coir roll and the sourcing of faggots from the Manx Wildlife Trust using willow cut during coppice management of nature reserves.

## *Instream Enhancements*

So far, funding has limited instream habitat enhancements to small-scale projects but it is hoped that resources will increase over the next few years. For instance, a series of boulders installed on a straightened stretch of the Silver Burn has diversified the geomorphology, increasing territory for large trout and areas of spawning gravels, while this autumn a set of constrictors have been placed in a several kilometre long straightened stretch of the River Neb to create and maintain a large pool and spawning area. If successful, more such features are planned along this section in the future. Also in the offing is a trial section of deflectors in a heavily dredged channel in the low-lying northern area of the Island. This is one of the few streams where fish surveys have confirmed the presence of lampreys in recent years so by creating a narrow meandering channel within the existing trench we hope to increase areas of exposed gravels suitable for their spawning as well as aiding the brown trout population which records indicate has diminished over recent decades.

**For more information on river management in the Isle of Man visit:**
***www.gov.im/daff/fish/inland/rm***

**or contact Dr Karen Galtress**
**tel: 01624 651544,**
**email: Karen.Galtress@gov.im**

# News and Events

## The RRC on Facebook

**The RRC is now on Facebook!**
To become a fan, please type 'the River Restoration Centre' in the search bar to stay updated on all things RRC.

Find us on Facebook®
Facebook is a registered trademark of Facebook, Inc.

## Conferences and Seminars

### *Water and Risk Workshop*
***12th to 14th January 2010, University of Durham, UK***

The 3-day conference will work through different approaches to water risk and consider how widely applicable approaches may relate to resolve water risk issues. Registration deadline is the 16th November 2009.

For more information go to:
**http://www.dur.ac.uk/water.risk/**

### *RRC Annual Conference*
***14th to 15th April 2010, University of York, UK***

A draft programme is taking shape for the 11th Annual Conference and booking forms will be available before the end of the year. It is likely that there will be an optional site visit on the 16th but the location is TBC.

For more information go to:
**http://www.therrc.co.uk/rrc_news.php**

### *Freshwater Biological Association Annual Summit*
***12th to 15th April 2010, FBA, Lake Windermere, Cumbria, UK***

The conference will aim to tackle the question - why is it so difficult to achieve good ecological outcomes from integrated catchment management programmes? Emphasis will be placed on interaction and discussion, with a mixture of lectures and workshops.

For more information please visit:
**http://www.fba.org.uk/**

### *Water and Environment 2010: CIWEM'S Annual Conference*
***28th to 29th April 2010, Olympia Conference Centre, London***

Will address multidisciplinary issues across all areas of the global water and environment sector, and challenge and inspire the community by sharing knowledge and best practice.

For more information please visit:
**http://www.iwa2010montreal.org/**

## Guided Site Visits for RRC Members

Information regarding these will appear in the New Year for Spring 2010. If you have any suggestions for future visits please contact Ian Brown at the centre:
**http://www.therrc.co.uk/rrc_news.php**

## RRC Courses

### *Understanding River Restoration: Processes, ecology, planning and assessing potential (Module 1)*
***January 2010, UK (venue to be confirmed)***

The next Module 2 is scheduled for September 2010 with Module 1 a pre-requisite.

For more information please contact the RRC:
**rrc@theRRC.co.uk**

## Book Release

### *The Hyporheic Handbook: Recognising the Importance of Groundwater - Surface Water Interactions – David Lerner (Editor)*

This book synthesises the latest research on surface water-groundwater (SW-GW) water interactions and hyporheic zone processes. It aims to encourage the use of sound science in river management decisions and is a suitable teaching aid for postgraduate level students.

The introduction is followed by five chapters which review varying scientific aspects including geomorphology, water flow, geochemistry, hydroecology, microbiology, and fish. Various tools for sampling and modeling are then discussed while the final chapters draw out the relation of river restoration to the hyporheic zone, recommendations for management and future research.

For more information please go to **http://www.hyporheic.net/**

## New Staff

**We would like to welcome Nick Elbourne (*pictured*) as the newest member of the RRC's staff.**

**Nick has taken over the role of Information Officer from Gareth Codd, who left the RRC in August.**

**We would like to thank Gareth for his contribution to the RRC over the last 2 years.**

RRC is most grateful to all those who have contributed text or photos for this Newsletter.

**The following statutory organisations provide core funding for the River Restoration Centre and their representatives form the Advisory Board who together with RRC's Directors make up the RRC Management Board.**

Environment Agency · Natural England · SEPA Scottish Environment Protection Agency · Rivers Agency · Scottish Natural Heritage All of nature for all of Scotland · NIEA Northern Ireland Environment Agency www.ni-environment.gov.uk

***the River Restoration Centre, Building 53, Cranfield University, Cranfield, Bedfordshire MK43 0AL***

Cranfield University **RRC is grateful for the continued support of Cranfield University.**