



Working to restore & enhance our rivers

River Restoration **News**

Issue 41 *December 2012*

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Rottal Burn Restoration



Restoration in a Special Area of Conservation (SAC)

Rottal Burn



LIFE+ Project

Pearls in Peril

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The RRC is able to provide an independent source of advice and information.



The winners of the 2012

WTT/Orvis Awards



A new assessment methodology

Fish Passage at Riverine Structures

Rottal Burn Restoration

Kenneth MacDougall
EnviroCentre Ltd.

Marshall Halliday
Esk Rivers and Fisheries Trust

The lower reaches of the **Rottal Burn in Glen Clova** have been transformed this summer. The burn that flowed through 650m of straightened, embankment-lined channel since the 1830s has been restored to an open, meandering channel 1,100m in length. These works aimed to restore natural river process, providing increased and more varied in-stream and riparian habitat within a designated **Special Area of Conservation** for Atlantic salmon and freshwater pearl mussel. Within just 10 weeks of the burn flowing within the new channel, there is already a significant increase in the variety of habitat present and salmon have started spawning.

Why the scheme was needed

In addition to being straightened, this watercourse had been subject to regular dredging with gravels stockpiled in embankments alongside the channel. Although spawning habitat was present, the lack of variation in habitat resulted in low numbers of juvenile salmonids. The restoration design was process-based rather than focusing on creating individual habitat areas and there were effectively three main zones, each around 350-400m long. The upper zone had the steepest gradient and the river was routed through a new channel in existing agricultural fields. The middle zone had a shallower gradient and the channel was routed through remnants of relict channel which had

remained a relatively wet, marshy area. In the lower zone, a new channel has been constructed through lower-lying agricultural fields to the confluence with the River South Esk.

The intentions of the scheme

The construction works were designed to create the restored channel without any import or export of material, which required careful planning through the design and the construction phase. The existing gravel embankments were used to provide material for the bed of the new channel and excavated material was used in landscaping and infill of the diverted channel. Sections of the restoration included woody material in the form of trees with rootballs which were sourced from wind-blown Scots Pine from the local estate.



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Photos: Kenneth MacDougall

Construction schedule and associated problems

The works commenced in the spring of 2012 with a two phase construction programme. The new channel was constructed during late spring and time was allowed for vegetation to grow before diverting flow from the existing channel into the new channel in late summer. There were a number of challenges faced during the construction phase including the remote location, the presence of overhead services on site, weather conditions and the limited growing season at an altitude of 220m above sea level.

*Restored natural channel.
Inset (top left) shows the river
before restoration*

Monitoring the scheme shows that benefits are already evident

A monitoring network has been installed across the works which will be used to assess the longer term performance of the project. The new channel has been tested by a number of significant flow events, including the largest spate of the year to date just 36 hours after being diverted, followed in mid-October by one of the largest floods in the past 10 years. A number of sediment bar features have formed creating a significantly improved habitat variety compared to what was present only 2 months ago. The presence of salmon spawning in the new channel is encouraging news for the performance to date.

Project Team

Esk Rivers & Fisheries Trust
(project promoter and project manager)

EnviroCentre Ltd (assessment, design, supervision and construction management)

McIntosh Plant Hire Ltd (construction).

This project was part funded through the **SEPA Water Environment Fund** and the support of **Dee Ward from Rottal Estate**.



Panoramic view of the restored Rottal Burn



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Pearls in Peril LIFE+ project

In September this year an important 4 year conservation project got underway, aiming to secure the future of our most important **freshwater pearl mussel** populations. It is ambitious, with actions due to take place in 21 Special Areas of Conservation in Scotland, England and Wales.

Iain Sime
Scottish Natural Heritage

Species background

The freshwater pearl mussel (*Margaritifera margaritifera*) is a large, long-lived, bivalve mollusc of rivers and streams. The mussel inhabits coarse sand and gravel beds of fast-flowing, non-calcareous streams and rivers. There are approximately 69 recruiting or 'viable' populations (i.e. with juveniles present) in Scotland, mostly in the north and west, with scattered records of the species elsewhere. Few viable populations occur elsewhere in Britain or even the rest of Europe.

Current Threats

Despite recent legislation on pearl fishing, a range of pressures continue to have an impact, including:

- Habitat removal and alteration through development, drainage schemes, flow regulation and fisheries management.
- Declines in populations of salmon and trout, which act as the larval hosts.
- Destructive pearl fishing and illegal pearl trade, aided by improved accessibility.
- Poor water quality, including nutrient enrichment (which also affects the numbers of host fish).
- Conifer planting, exacerbating the effects of river acidification.
- Sedimentation from soil erosion, affecting the suitability of gravel and sand beds for juvenile mussels.

What will the LIFE+ project deliver

The project includes a wide variety of actions with many seeking to restore riverine habitat that, while benefiting the pearl mussel, will also have many benefits to the river habitat and other species. In several key rivers work will improve instream habitat by removing obstacles to sediment transport including existing bank protection and weirs.

Key to the planning of this work have been catchment-scale restoration plans that have identified the main strategic points where restoration will provide the greatest benefit to the wider ecosystem. Work will also take place to reduce diffuse pollution by establishing buffer strips, building wetlands, reprofiling riverbanks and blocking ditches. The project will also establish large areas of riparian woodland, introduce woody material to increase instream habitat diversity and restore migratory fish access. At present the project is recruiting staff with work due to get underway shortly.



The project is funded by 15 different organisations including the **LIFE+ Nature fund**, with the project being led by **Scottish Natural Heritage**. Project 'beneficiaries' include the **Environment Agency**, the **Rivers and Fisheries Trusts of Scotland**, **Forest Enterprise Scotland** and the **West Cumbria Rivers Trust**.



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WTT/Orvis Conservation awards

Jenny Mant RRC

Paul Gaskell Wild Trout Trust

This year's awards were announced on the 2nd October at the Savile Club in London. The judges decided to trial a new assessment approach which consisted of phone-based interviews to each of the finalists using a pre-determined set of questions. This decision was not taken lightly but it transpired that the judges were already acquainted with most sites. This provided the rationale to start with telephone interviews with an agreement that, if necessary, visits would be made. In the end, despite the usual wrangling, sucking of teeth and pulling of hair, the judges managed to make a decision on the basis of the interviews and application forms.

Tributary of the Kells Backwater after work completed by the Kells Angling Association

This year's runners and riders

As usual awards were divided into amateur and professional categories. In the **amateur category** the **Kells Angling Association** and the **Chester Le Street and District Angling club** competed fiercely against each other. Enthusiasm for the task in hand was credited to both groups, with the Chester le Street club following on from their previous year's success. They tackled as promised, the significant issue of reducing harmful red ochre entering the river at Pelton Fell by creating reed beds to act as a filtration system. Most impressively this had been achieved at low cost and had also resulted in better access, with wider local interest in the river than before.

In contrast, the Kells Angling Association, one of the oldest in Ireland, carried out extensive habitat enhancement measures along the Kells Blackwater. Boulders, deflectors, christmas tree revetment and riffles to name but a few, have all been installed with the aim of reducing the impacts of past drainage. Measures were all apparently achieved with 'no problems with bureaucracy', and the success of the schemes for salmonids was clearly demonstrated through the association's methodical monitoring programme.



Planting trees along the River Petteril in Cumbria

Photo: Ian MacHolm



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Photo: Alison Reed Eden Rivers Trust

This pattern for conscious provision of monitoring of the effects and the opportunity to disseminate the subsequent lessons was also demonstrated within the professional category. Examples such as the Kentchurch Weir removal (Environment Agency and Atkins Global) and the **Irwell weirs removal** (Environment Agency, Irwell Rivers Trust) provide examples of precedent-setting projects. This showed what can be achieved through by the removal of a huge barrier (Kentchurch weir on the Monnow) and the removal of 15 weirs between 2011 and 2012 from the Irwell system at a cost of only £180k.

Showing just what can be achieved by a combination of volunteer and contractor effort, the Monnow is on course to become the first major catchment to effectively eradicate Himalayan balsam from its network of tributaries and main river corridors – spanning 42km in length. Similarly, the **Monnow Rivers Association** has established a sentinel programme for early detection of any mink reinvasion following their eradication using a network of volunteers.



Weir on the River Irwell that had collapsed (main photo), and after restoration work carried out by the Irwell Rivers Trust and the EA

Photo – Matthew Schofield IRT and Gary Morris EA



Other achievements that are commonly placed in the “impossible” category included the challenge of getting catchment managers to talk productively with the local farming community. The **Eden Rivers Trust** decided to lock both factions on a bus and drive them round their catchment for a day. This was a radical, and apparently peaceful solution that enabled the cost-saving and ecological benefits of waste management, rainwater separation and buffer-strip creation to be demonstrated first hand. Integrating the improved land-use practices with river-corridor habitat improvement and tackling connectivity issues was another example of best practice that will be of benefit to a wider audience.

Finally, the **Deveron, Bogie and Isla Rivers Trust**, were able to convince landowners alongside the Fishrie Burn that the construction of a vegetated two-stage channel, revetted with larch logs, would be just as effective for the purposes of flood and erosion protection as dredging the river-bed and piling up the spoil to construct flood berms.

One of the pools created to provide habitat for juvenile salmonid fish as part of the extensive work on the Kells anglers project. The top photo shows the stretch of river before the work

Photos – Ciaran O’Kelly KAA

The Winners

Within the **amateur category**, the sheer scale of the work was impressive. Past drainage management has meant that a lot of damage may be impossible to “undo”, but the approaches used to achieve the restoration of habitats should be commended. The **Kells Angling Association** became the worthy winner of this year’s award, but the Chester Le Street and District Angling Club was also applauded for in their innovative approaches to making significant improvements in water quality.

The **professional category** was won by the **Eden Rivers Trust** for their work on the River Petteril. This tributary of the Eden was once the jewelled trout fishery in the crown of the Eden catchment – and has since suffered the heaviest impacts and degradations of all the major streams running into the main river. The Irwell weirs project came second, scoring only slightly less points to take second place.



Amateur Category Winner Kells Angling Association

Two views of a tributary of the Kells Backwater showing before and after the work completed by the Kells Angling Association



Photos: Pat Mc Loughlin KAA

More information

Congratulations to this year’s winners. If you wish to know more about any of these projects please contact the judges (authors of this article).

Professional Category Winner Eden Rivers Trust

Views of a stretch of the River Peterill, before (left) and during work (right), carried out by the ERT and it’s partners



Photos: Alison Reed ERT



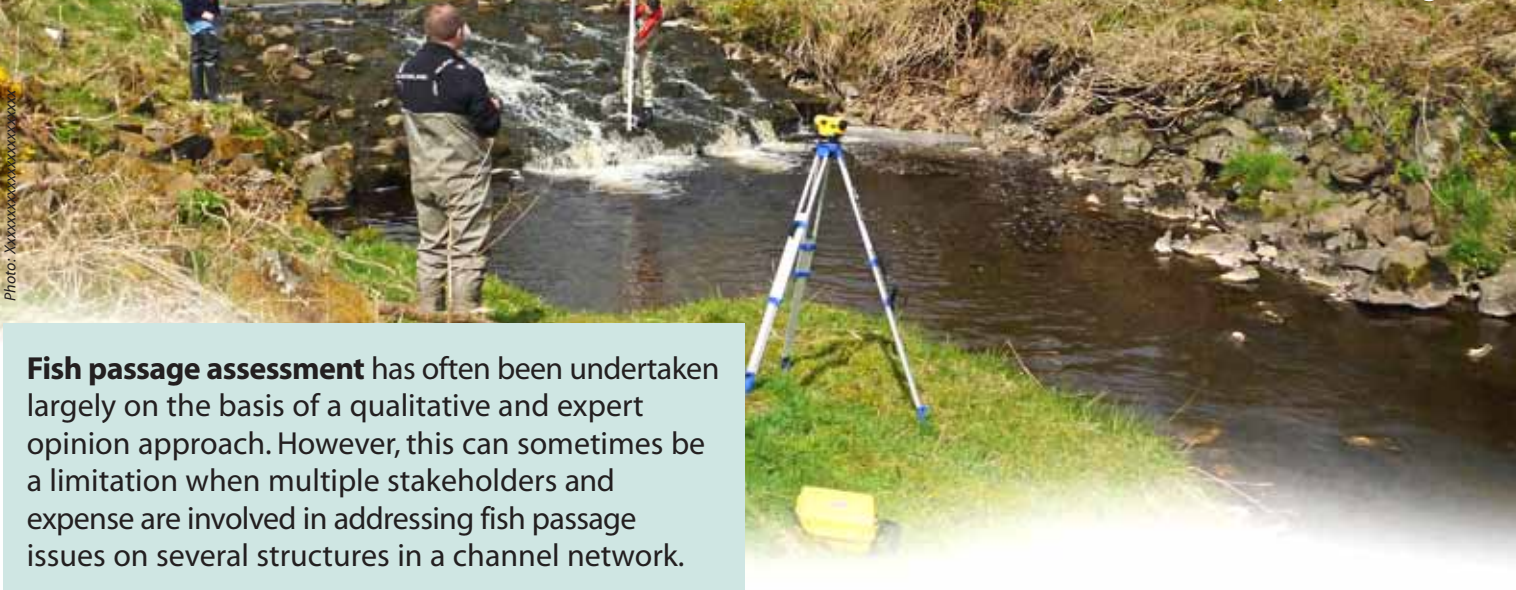
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Fish passage at riverine structures

Colin Bull

Centre for River Ecosystem Science,
University of Stirling



Fish passage assessment has often been undertaken largely on the basis of a qualitative and expert opinion approach. However, this can sometimes be a limitation when multiple stakeholders and expense are involved in addressing fish passage issues on several structures in a channel network.

A new standard assessment methodology

The Sniffer Fish Obstacles Porosity project (WFD111) provides a new common means of assessment to address the potential for fish passes at riverine structures. It has a simplified methodology to facilitate information transfer and enable the quick comparison of potential impact and prioritisation of remedial activities across a range of locations. The methodology was developed to incorporate elements from a number of other assessment methodologies (e.g. the USFS FishXing tool) and be applicable for a wide range of man-made and natural riverine structures where fish passage may be an issue.

The methodology relies upon the initial identification of all potential routes for fish across a structure. There may be several such routes available for fish at each structure, and the methodology requires surveyors to identify and assess all of them when on site. Each potential passage route is then assessed for a variety of fish groups that include both poor- and strong-swimming forms.



Structures such as this box culvert present challenges for fish passage by reducing water depth and increasing velocity along an extended length of channel



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How the assessment works

Assessment uses a combination of standard measurements including the hydraulic height of water between upstream and downstream surfaces, the slope angle and length, and the measurement of the variation in water depth and velocity across the structure. These measurements are used along with more qualitative consideration of additional physical features that may be very site specific (e.g. surface erosion or added features to divert or restrict flow to portions of a structure) to generate one of four passability class for each fish group, based on their physical swimming abilities and knowledge of their behaviour.

the 4 passability classes

- totally impassable;
- partially passable but high impact;
- partially passable with low impact; and
- totally passable.

Identifying bottlenecks in the system

Passability classes are generated for both upstream and downstream fish movement separately, and surveyors complete standard recording sheets with the help of a user manual with easy-to-follow tables of measurements and associated classes. These documents are available to download on the Sniffer website. The final summary assessment of a structure is a consideration of the passability classes generated for each of the identified routes, and for each of the fish groups. This approach allows the bottlenecks relevant to the passage of individual fish types to be identified and recorded in a way that allows future auditing of the process.

Limitations and other considerations

The methodology does have some limitations, and can only really provide a “snap-shot” indication of the fish passage issues at a structure under a limited range of flow conditions. It is recommended that the survey is initially conducted during low

Natural riverine features also present considerable challenges for fish passage, and can be assessed using this standard methodology

flow conditions to allow the “worst case scenario” for fish passage to be assessed. However, information generated during the survey is useful to allow the surveyors to consider the situation under elevated flows, and to provide some comments on whether the structure may become more or less of an obstruction during high flow events. It is important that additional information is collected to compliment the results of the initial assessment and provide a more complete view of the fish passage issues at a site. These include consideration of the time of year and flow conditions under which fish are attempting to pass a structure, (as water temperature and quality variations may impose further restrictions), and the age/ size of fish in the populations of interest.

“Not a standalone tool – use to compliment other assessments”

Training courses have been run by SEPA and NIEA to train surveyors how to use the methodology and it is being used by a number of organisations in the UK. However, a full validation of the technique has not yet been possible to date. For this reason it is recommended that it is viewed as an additional tool to be used in conjunction with other information such as fish distribution surveys, and structural and hydraulic assessments when considering fish passage at a structure. It does however provide an extremely useful and robust coarse-resolution assessment method to allow the initial identification of issues at structures and the comparison of locations when prioritising remedial actions.

A complex weir with at least three possible access routes across the face. Each of these routes are assessed separately using the protocol to provide the basis of an overall passability score for the structure