
## River Deerness

The Deerness catchment, located west of Durham City, covers 53 km$^2$ and includes the small colliery towns of Ushaw Moor, Esh Winning and Cornsay. Land use is largely agricultural, with woodland cover and several reclaimed open cast and landfill sites. A significant part of the catchment fails the Water Framework Directive for fish, due to the cumulative effects of barriers to the upstream and downstream movement of all fish species and also because of water quality issues (principally phosphate) reflected in altered phytobenthos.

| Key facts | |
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| **River Basin District** | Northumbria |
| **Catchments** | Deerness and Old Durham Beck |
| **Outcomes** | **Enhanced habitat connectivity throughout both catchments** allowing all fish species, migratory and non-migratory, maximum scope to spawn and feed.<br>**Improved knowledge of fish populations and behaviours** through baseline and post-implementation monitoring and evaluation.<br>**Progress toward/achievement of Good Ecological Status** and focus on any residual water quality issues required to achieve good status.<br>**Establishment of partnership working** and joint delivery to be extended under the auspices of the Wear Catchment Management Plan. |
| **Start Date** | July 2012 |
| **End Date** | March 2015 |
| **Budget** | £922,075 (£546,975 from CRF) |
| **Project Partners** | Durham County Council<br>Durham University |

The Old Durham Beck catchment, to the east of Durham City and covering 55 km$^2$, has been heavily modified by mine workings and railway infrastructure and is one of the most intensively farmed Wear tributaries. It is categorised as having moderate to poor ecological status, failing for fish, ammonia and phosphate. Walkovers identified a series of culverts obstructing fish passage. In November 2011 approximately 50 congregating salmon were observed unable to make their way upstream.

The Wear Rivers Trust operates fish and invertebrate surveys to assess fish populations and water health in both catchments. Under CRF a Durham University PhD student, with WRT and volunteer support, will survey below and above each obstruction both before and after restoration activities to measure impacts on those animal groups. Changes in invertebrate communities are not expected as a direct result of the restoration activities but they can inform on the wider food web for fish feeding opportunities, and provide biotic indices of water quality, giving wider insight into local environmental quality. Waste water management is significant across the Lower Wear system, including these two catchments. Supplementary projects, based on a separate volunteer walkover programme, will be developed under the auspices of the Wear River Catchment Management Plan to identify and address point and diffuse sources of pollution, in order to augment CRF actions for improvement to fish movement within these catchments.

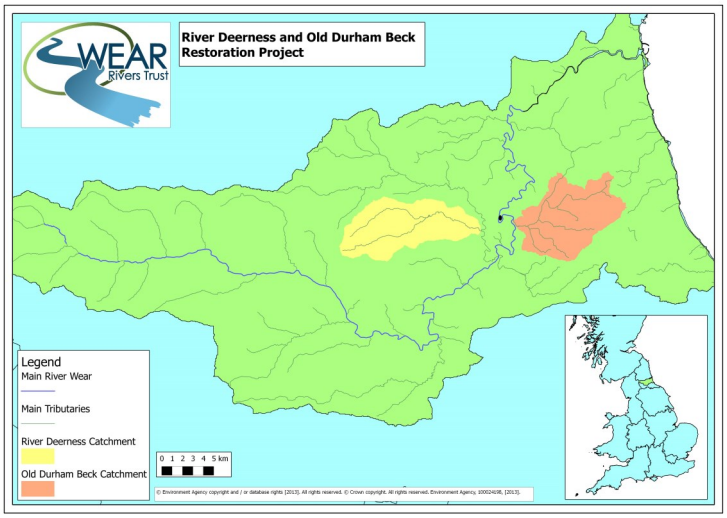
## Description of Works

On the **Deerness** a range of obstruction types are being addressed: culvert, vertical weir, stepped bridge footings and both large and small pipe bridges.

**Cornsay -** a stepped culvert was improved in 2012 by raising the water level back into the culvert to slow and deepen average flows, achieved by the creation of a series of pools constructed to allow fish to move through the levels and into the culvert.

**Broadgate -** the proposed removal of a 1.5 m high vertical weir will not now go forward because of the presence of a 40 in gas main 50 m upstream. A by-pass channel solution has been developed for implementation in 2013.

**Ushaw Moor -** a series of 4 concrete steps installed in 1933, to cover a large erosion pool, will be addressed in 2013 by diverting low to average flows into a bunded fish pass area. A weir on the top step will deepen flows running under the bridge, which will be baffled to create fish resting areas. A rock ramp running down the steps with boulders and smaller river cobbles set into concrete will create a natural-type river bed.




**Various locations** - a series of pipe bridges will be removed and replaced with fish-friendly box culverts or with single span crossings.

Durham University will determine the effectiveness of restored connectivity though the measurement of fish passage for key species. Considering Cornsay as a specific example, a dramatic breakage of population distribution for bullhead *Cottus gobio* (a BAP species) and European minnow *Phoxinus phoxinus* has been identified. During 2013, fish passage, including that of small species, will be evaluated. Microchip ID (PIT) tags will be used for larger trout and Elastomer Visible Implant (EVI) marking will be used for fish as small as 4 cm.

**On the Old Durham Beck** specialist investigations are required to ascertain the condition of substantial Industrial-Revolution-era culverts. During 2013, invertebrate sampling will take place at representative sites to identify local community differences and to infer water quality variations, supported by physio-chemical sampling.

Fish community composition will be determined, and likely impacts on fish migration assessed, by examining community change in relation to barriers. Fish passage though culverts is believed not just to be an issue of access and flow conditions, but may also affect ability and willingness of fish to pass different types of culvert. Following fish surveying, above and below culverts, opportunities for enhancing access will be considered for potential implementation in 2014.

## What will success look like?

The enhanced connectivity, for fish of all species, of both the Deerness and Old Durham Beck catchments, through the modification of existing structures, will have been demonstrated through the publication of Durham University data and analysis, including original research into the behaviour of fish in relation to long dark culverts.

| About the team |
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| **Project Manager:** Steve Hudson |
| **Finance/admin/PR:** Sue Zissler |
| **Director:** Peter Nailon |
| **Other contacts** |
| **Environment Agency:** Eva Diran |

With improved connectivity, “fish” will no longer be a Reason for Failure for the Deerness (where water quality for fish is less of a problem) or for the Old Durham Beck, if water quality and habitat issues can be solved there. Improved knowledge of catchment waterbodies will provide opportunities for supplementary projects (building on the CRF programme) with a clearer focus on residual Reasons for Failure around water quality and associated waste water management issues, continuing the drive for Good Ecological Status.

Success will include sustainable partnership working with Durham County Council to address water management issues around their assets, potentially extending the scope to include, for example, urban run-off and green infrastructure or fly tipping into water courses: a concern for many local communities. Similarly with Durham University, a successful partnership will provide opportunities for further research, enhancing knowledge of the catchment.

Department for Environment Food & Rural Affairs · NATURAL ENGLAND · River Restoration Centre · WEAR Rivers Trust · Durham University · Durham County Council

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