

River Wensum

Restoration Strategy

Issue 13, February 2014

Welcome to our thirteenth newsletter

Sculthorpe Moor Restoration Scheme

In November we completed the second phase of our major river restoration project at Sculthorpe Moor. This means that, together with the River Tat scheme implemented earlier in the year, we restored over 4 kilometres of river during 2013.

At Sculthorpe we have learnt from past experiences by moving away from a prescriptive design solution. Instead we have relied on the skills and experience of Graham Breeze, Mick Hicks and Neil Sturman, from our North Norfolk Operations Field Team, to determine the finer detail based on how the river reacts to restoration features as they are being constructed. The team have been able to incorporate locally available materials such as timber from selective tree management, and re-use spoil banks from historical dredging of the channel. This flexible approach uses fewer resources and saves money by reducing the amount of material that needs to be imported. It is also a big advantage in locations, such as Sculthorpe, where ground conditions for machine access are challenging.

A sustainable solution to improve a silted gravel bed is to squeeze the flow using berms, woody debris or pinned willow. This constricts the over-wide channel, increasing water velocity and keeping silt and sand on the move so that the gravel bed remains exposed. This should provide ideal spawning habitat for trout and home to an assortment of invertebrates and aquatic plants that depend on a clean gravel substrate.



Image: Redistribution of existing gravel bed and re-profiling of spoil banks creates a narrower, more sinuous river course



Image: Newly installed gravel glide, resulting in varying river bed height and flow diversity

Large spoil embankments, a remnant of past dredging activities, occur along much of the reach. These have been selectively removed on the southern bank, to improve floodplain connectivity. The result, floodplain wetting during periods of high flow, provides multiple benefits. Floodplain biodiversity is improved, sediment is removed from the channel and flood risk to people and property in Fakenham and further downstream is reduced.

The works have created a healthier river, helping to restore the River Wensum Special Area of Conservation and contributing to the Water Framework Directive target of “Good Ecological Potential”.



Image: Locally available woody debris has been installed to increase habitat and flow diversity



Image: Removal of spoil embankments at selected locations has restored the connection between river and floodplain during high flows

Costessey Fish Refuge

When a landowner asked us to take a look at a local area of eroding bank on the River Wensum at Costessey, the easiest solution would have been to fill it in. However, during a site visit we realised the erosion had created a valuable fry bay, a feature which is uncommon along this otherwise uniform stretch of river. This type of habitat is essential for the recruitment of fish, providing food, warmth and refuge during times of high flows.

This opportunity was too good to miss. Working with the landowner, we developed a simple low cost solution which enlarged the refuge feature and addressed the landowner’s concern of repeated inundation of the marshes during prolonged periods of wet weather.

The scheme has been successfully implemented by Stephen Lown and Andy Woods from the North Norfolk Operations Field Team. As a finishing touch, alder trees will be planted to provide some shade and restrict vegetation encroachment. This is a reason why this type of habitat is rare, because without continued maintenance the functionality of fry bays gradually reduces. We will assess the need for any light touch vegetation clearance when planning any future maintenance or restoration work within the reach.



Image: Enhanced fish refuge at Costessey

Monitoring Results

We are undertaking a comprehensive suite of surveys to monitor the ecological responses to changes in river form brought about by river restoration. The results so far have been encouraging. Here is a flavour of some of the monitoring results so far.

Ryburgh End

This scheme, completed in December 2011, involved re-connecting over 1 kilometre of meandering river channel, and monitoring has already shown some improvements in fish populations. Last summer's post-restoration electro-fishing survey recorded 705 fish representing 12 species, an increase from the 107 fish of 7 species caught in 2012 when the habitat was still quite bare following restoration. These figures compare with 158 fish of 9 species caught in a pre-restoration survey in an immediately adjacent reach. Fish density in the restoration site in 2013 was 11.7 individuals per 100m² compared with 5.7 per 100m² in the pre-restoration survey site. Standing crop was 568 grams per 100m² in the restoration site, a small increase on the 508 grams per 100m² recorded during the pre-restoration survey. Numbers of stone loach, bullhead, brook lamprey, brown trout, dace and gudgeon have increased compared with the pre-restoration condition. Further monitoring will be undertaken in future years so that we can understand more about how fish populations change in response to habitat improvements.

The low level shelves that we created at summer water level at the channel margins have been colonised by a diverse flora including water mint, water forget-me-not, brooklime and gipsywort. The river channel itself supports a number of typical chalk stream plant species including watercress, water starwort, lesser water-parsnip and whorl-grass.



Image: Ryburgh End scheme (August 2013) - diverse range of flora establishing on berms



The restored section of channel provides valuable habitat for a wide range of bird species, including this kingfisher (see photo above) which was seen utilising one of the installed pieces of woody debris as a convenient perch for fishing.

Post restoration surveys for water vole in 2012 found abundant vole signs in the backwater, formed when the main channel was plugged to divert water into the former meandering channel. This was positive news, confirming that the scheme has had minimal short term impacts on the local vole population. There were also some early signs that water voles were beginning to colonise the newly restored meandering channel. We expect this trend to continue over the next few years.

Swanton Morley

The pre-works baseline fish survey completed in 2012 recorded a total of 45 fish of 7 species. The repeat survey in 2013, one year after restoration, recorded 143 fish of 11 species. The improved habitat has seen 3-spined stickleback, brown trout, dace and stone loach moving into the reach. Fish density increased from 1.4 fish per 100m² in 2012 to 3.2 fish per 100m² in 2013. Fish standing crop saw a moderate drop from 2057 grams per 100m² to 1606 grams per 100m² over the same period. The change in standing crop is largely accounted for by the reduction in numbers of pike caught in the 2013 sample.



Images above: Species such as the caddis fly *Polycentropus flavomaculatus* (top) and stonefly *Leuctra* sp have benefited from the provision of new gravel glides at Swanton Morley, ©FBA.

Kick sampling for invertebrates has shown a post-restoration increase in the diversity of taxa in all but one of the sample locations within the restored reach. It was particularly exciting to find two species of stoneflies, which require a pebbly substrate with plenty of small spaces and high dissolved oxygen levels. Caseless caddis flies were absent from the pre-works survey, but were recorded across the whole reach in the post-works survey. These species require larger stable substrates and will have benefited from the installation of the gravel glides. Mayfly species diversity has increased in the post-restoration survey samples. Despite these encouraging signs the numbers of invertebrates found was quite low. This might indicate high predation pressure from the invasive non-native signal crayfish which are abundant in this section of the Wensum.

Aquatic plant populations remain poor on the restoration reach. Again, this may relate to the large population of signal crayfish.

Angling Success

You may recall hearing a few months ago about John Bailey's ultimately unsuccessful Wensum barbel challenge. Well, others have been slightly luckier and we thought we would share this picture showing the spoils of a recent fishing trip by one of our project team.



Image: Ian Morrissey with 7lb 8oz Wensum barbel caught in September 2013

Maintenance work completed on the Wensum in 2013

We regularly inspect the Wensum to ensure flows are conveyed effectively, especially through sluice gates (such as at Fakenham and Lenwade mills). During 2013 we undertook the following maintenance works on the Wensum:

- Weed cutting between A1065 Fakenham bypass and Fakenham Mill (0.65 kilometres).
- Weed cutting upstream of Great Ryburgh Mill (0.6 kilometres).
- Weed cutting between Broom Green Drive and Bintree Mill (2 kilometres).
- Weed cutting between Ringland Hills and Taverham Mill (2.1 kilometres).
- Weed cutting between Place Farm and Costessey Mill (2.5 kilometres).
- Weed cutting between Marriots way footbridge and Hellesdon Mill (3.9 kilometres).

This type of activity is an integral part of our maintenance strategy. We do not always anticipate major clearance works being required on an annual basis. The Wensum is included within our incident response patrolling network and this includes checking and reacting to potential flood risk issues.

Looking ahead

We are currently in discussion with landowners and others about further restoration schemes for implementation later this year on the River Tat and the upper Wensum above Fakenham. If you are interested in partnership working or would like further information, please contact us at the following email address:

river.restoration@environment-agency.gov.uk or by post to: Adam Thurtle, Environment Agency, Dragonfly House, 2 Gilders Way, Norwich, NR3 1UB.

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