



**Advisory Visit**

**Foston (Kelk) Beck, East Yorkshire**

**September 2012**



## 1.0 Introduction

This report is the output of a site visit undertaken by Tim and Laura Jacklin of the Wild Trout Trust to the Foston Beck (also known as the Kelk Beck), near Driffield, East Yorkshire on 11<sup>th</sup> September, 2012. Comments in this report are based on observations on the day of the site visit and discussions with Alan Mullinger of Foston Fishing Club (FFC) and East Yorkshire Chalk Rivers Trust (EYCRT).

Normal convention is applied throughout the report with respect to bank identification, i.e. the banks are designated left hand bank (LHB) or right hand bank (RHB) whilst looking downstream.

## 2.0 Catchment / Fishery Overview

The Foston Beck is a small chalk river located to the east of Driffield in the Wolds of East Yorkshire. It rises near Kilham and flows south to join the Frodingham Beck and ultimately the River Hull. FFC have 26 members and control the fishing rights on 8km of the Beck. Six hundred trout are stocked annually by FFC to augment catch and a reasonable proportion of these are reported to over-winter successfully.

Foston Beck comprises two waterbodies under the Water Framework Directive: Kilham to Lowthorpe Area (ID no. GB104026067120) and Kelk Beck from Harpham to Frodingham Beck (ID no. GB104026067100). The former is a heavily modified waterbody, currently with poor ecological potential (2015 target: moderate potential) and the latter is currently classified as poor ecological status (2015 target: good status). In both cases, the overall designation is because of a poor (very certain) assessment for fish. The quantity and dynamics of flow in both cases are listed as *does not support good* with a justification for not achieving good status by 2015 given as *unknown - uncertain there is a failure / impact and low confidence that abstraction is adversely affecting ecological status*.

The Foston Beck is part of the River Hull Headwaters Site of Special Scientific Interest (SSSI) which is designated for their national importance as the most northerly chalk stream system in Britain.

([www.sssi.naturalengland.org.uk/citation/citation\\_photo/1003424.pdf](http://www.sssi.naturalengland.org.uk/citation/citation_photo/1003424.pdf)). The Beck itself forms unit 37 of the SSSI and its current condition (assessed

December 2010) of *unfavourable recovering* is described on the Natural England website as:

*The unit passes on water flow as well as biological and chemical water quality attributes including ammonia, orthophosphorus and suspended solids. However siltation, channel form, bank and riparian zone vegetation, plant species composition and abundance, and negative indicators (presence of *Z. palustris*\*) fail the condition assessment. These attributes are being addressed through DWPP and River Restoration Plan, both of which are underway.*

\**Zannichellia palustris* (horned pondweed) = indicator of slow flows / sedimentation

Other SSSI units representing lowland fen, marsh and swamp (unit 1, unfavourable declining) and neutral lowland grassland (unit 2, unfavourable recovering) are present adjacent to the Beck to the west of Harpham (see [www.natureonthemap.naturalengland.org.uk](http://www.natureonthemap.naturalengland.org.uk)).

The Beck has a small number of fish species, including brown trout, bullhead, brook lamprey and eel; there are no crayfish present. Water voles (*Arvicola amphibius*) are abundant and were observed during the visit along with numerous signs (latrines).

### **3.0 Habitat Assessment**

#### Downstream Section (Great Kelk – Foston area)

The channel here is artificial, being perched at a higher level than the land on the right (west) bank (Photo 1). There are two drainage systems here, a high level system that drains land on the left (east) bank into the river and a low level system of ditches and drains for land on the west bank; in some cases drainage channels from the east pass underneath the river in culverts and feed into the low level system (e.g. Creyke Dike, TA0894856012, Photo 2).

The channel dimensions are uniform, with a trapezoidal cross-section and steep banks. The margins of river are colonised with emergent plants, largely reed sweet-grass (*Glyceria maxima*), whilst the mid-channel is open water (Photo 3). Submerged aquatic plants are abundant in the open, flowing water and water crowfoot (*Ranunculus* sp.) predominates (Photo 4). The river bed substrate is comprised of fine sediments (silt, sand and fine gravel). A number of trout were observed in the size range approximately 10" to 18", probably a mixture of wild and introduced fish (Photo 5).

Monitoring stations for water voles (floating latrine platforms moored in marginal vegetation) had been deployed here by Yorkshire Wildlife Trust and showed abundant signs of use.

An annual winter weed cut is carried out by the Environment Agency (at the request of landowners) on this section of the Beck; this involves removal of emergent vegetation from the margins of both banks of the channel using an excavator and weed-cutting bucket (Photo 6). The machine works from the right bank, hence the presence of trees and bushes only on the left bank. Foston Mill, a short distance downstream, impounds the river and incorporates a flow gauging station; the flow data indicate river levels are higher for the same flow during the summer months when aquatic weed growth is greater.

Maintenance regimes for aquatic vegetation in artificial or engineered channels are always a 'hot' topic given the often conflicting objectives of water conveyance, biodiversity and fisheries. For example, removal of emergent marginal vegetation in the winter time may be of benefit for flood protection/land drainage and avoid bird nesting season, but is very likely to be damaging to the over-wintering success rate of juvenile trout. Dense, submerged cover in marginal areas is vital habitat for trout in their first winter of life, normally a time when typically 95% die, even with good habitat. The presence of water voles, a highly protected species, is also a key consideration. Some suggestions that might be incorporated into the vegetation maintenance operations are made in the recommendations section.

The trees and bushes on the left bank are valuable features, improving the diversity of habitat along the Beck. The low, overhanging branches provide low cover, creating lies favoured by adult trout (Photo 4); they also moderate marginal reed growth and its requirement for maintenance. Trailing submerged branches and roots also provide dense refuge cover for juvenile trout which is very important for successful over-wintering. The bushes are also valuable for fly life, for example providing perches for newly emerged duns to shed their skin before mating and returning to the river for egg laying. Other groups of aquatic flies in addition to upwings (Ephemeroptera) will also use the bushes, as will terrestrial species of angling interest (e.g. hawthorn flies).



**Photo 1** The Beck is in a perched channel above the level of land to the west (left of picture)



**Photo 2** A culvert under the river channel carrying land drainage



**Photo 3** Reed sweet-grass (*Glyceria* sp.) in the margins, open water in the centre channel. Bushes on the true left bank (right of picture), but absent from the opposite bank for machine access.



**Photo 4** Low cover over the water provided by willow bushes – excellent trout holding habitat.



**Photo 5 Fine sediment composition of the river bed, and a trout.**



**Photo 6 Showing the extent and nature of weed cutting carried out annually (Photo: Alan Mullinger)**

### Middle section (downstream of Lowthorpe Mill)

The Beck was inspected downstream of the railway bridge. Here the gradient of the channel was greater, producing shallow riffle habitat with a coarser gravel and exposed chalk substrate, gradually giving way to deeper glide habitat with progress downstream (Photo 7). The area is known to be used by trout for spawning and to hold reasonable numbers of wild trout. The channel cross-section remains artificial and trapezoidal, but mechanised vegetation maintenance is no longer carried out here. The right bank has a steep profile, but the left bank has developed a low, soft berm with a diversity of aquatic plant species; along with the generally more shaggy nature of the banksides, this provides excellent riparian habitat benefiting a range of species including juvenile trout (Photos 7-9).

There are more trees and bushes along this section and they are present on both banks. Generally these are beneficial in providing shade, low cover over the water and habitat for invertebrates (trout food), but there are some sections on the left bank where hawthorns have been managed as a hedge; here there is a danger of overshading becoming a problem, with associated widening and shallowing of the channel (Photo 11). Thinning the hawthorns in these areas is recommended; the arisings can be used to create superb in-stream structures for channel pinching and juvenile trout cover.

Overall, the in-stream habitat on this section is good, apart from the depth profile which is uniform and shallow. In the context of the wider river, this may be no bad thing given that shallow, fast flowing habitat is at a premium. However, creating a few deeper areas by promoting localised bed scour would improve in-stream diversity; a good example is shown in Photo 12. There are a number of ways of achieving this, including introducing woody debris, narrowing using D-groynes, installation of flow deflectors or re-modelling the cross-sectional profile of the river. The latter is probably the most effective and beneficial method and could be achieved by using an excavator to push the existing bank line out into the river then re-profile on the landward side; this retains intact the existing marginal habitat and is quick and easy. A similar method has been used on the Avon Stream Project and locally on the Costa Beck. The channel in this section of the Beck does not appear to be perched, so altering the channel profile should be possible (Photo 10).





**Photo 7** Faster flow, well-sorted gravel bed and good cover from shaggy margins and overhanging bushes – great trout habitat, especially for spawning and juveniles.



**Photo 8** Soft, low, well-vegetated margin on the left bank.



**Photo 9 Contrast between low soft margin on left and steep right bank**



**Photo 10 Looking downstream along the right bank – scope for re-profiling and pinching the river channel in places (see Photo 12).**



**Photo 11** Dense hawthorn growth on the left bank is over-shading the channel here and should be thinned.



**Photo 12** A pinch point in the channel (arrow) has created some valuable depth variation here. Features like this could be created by bank re-profiling.

## Upper section – above Lowthorpe Mill (TA087604)

Lowthorpe Mill (Photo 13) impounds the river behind a weir and there is also an overspill channel on the left bank. The head of water here is no longer used and it is understood that options for improving fish passage and reducing silt accumulation are being considered by Royal Haskoning on behalf of the Environment Agency and Natural England; EYCRT have also provided comments. It is beyond the scope of this report to consider this issue, but important to bear in mind that any reduction in the height of the impoundment may impact upon recommendations upstream.

Upstream of the mill, the impact of the impoundment can be seen where fine sediment has settled out on the river bed and aquatic vegetation comprises species favouring slower water, such as emergent plants, mares tail (*Hippuris vulgaris*) and water parsnip (*Berula* sp.) (Photo 14). The land on the right bank is low-lying and possibly beneath the level of the channel suggesting the course was moved to the valley side to provide the fall for the mill. With progress upstream the river appears to occupy a more natural position.

There are about six weirs throughout this section which used to be made of stone with a fixed crest height (Photos 16, 17). These were replaced in recent years by the fishing club with RSJs and boards, allowing the crest height and upstream water levels to be managed according to flows. Boards are removed during periods of good flow (as during the current exceptionally wet year) and replaced when flows are low (as during the previous two drought years).

Localised downstream scour pools are present to varying degrees depending upon the height of the weir “wings” and size of the central notch. Individual weir height also determines the extent of impounded water upstream and the associated habitat of finer bed material (silt) and plant community (mares tail, emegents). Upstream of Newroad Bridge (TA084613), the in-stream habitat is largely influenced by weir impoundment, whereas downstream there are longer stretches between weirs and more varied depths, river bed composition and plant species.

The impounding effect of weirs is undesirable and generally outweighs the intended fishery benefit of keeping up water levels. The accumulation of fine sediment and colonisation by slow-water plants smothers gravel (required

for trout spawning) and requires intervention to prevent the channel from becoming choked with emergent plants. Hand cutting of vegetation is carried out on this reach (Photos 18, 19) and occasional, supervised mechanical cutting by the EA upon request of the fishing club. Removing or reducing the height of the weirs and narrowing the river channel is the usual prescription for in-stream habitat improvement in these circumstances and there is certainly scope for this here, but with certain caveats. The land alongside the river upstream of Newroad Bridge is a SSSI for lowland fen, marsh and swamp, currently in *unfavourable declining* condition. The importance of river water levels to the SSSI status should be determined before any changes are made.

Work has been carried out in several areas to narrow the river channel, by creating a new bank line with brushwood bundles or logs and back-filling (Photos 20, 21). These have been successful in locally pinching the channel and increasing flow velocities, allowing water crowfoot (*Ranunculus* sp.) to establish following transplanting. Further measures like this would be beneficial, but are only likely to succeed in areas unaffected by weir impoundment, or where impoundments are reduced/removed. Water crowfoot has been successfully established by planting, for example in the shallow glide area downstream of Newroad Bridge (Photo 15).

The most upstream section visited was alongside Neat Holmes Wood. Shading of the channel by riparian trees is affecting in-stream habitat here, limiting the growth of aquatic and marginal plants and rendering the channel over-wide, shallow and prone to accumulating fine sediment (Photo 22). There is ample scope for thinning trees here and introducing large woody debris (whole trees) into the channel. This would increase light penetration, create localised scour, grade river bed material and provide cover for juvenile trout. Natural England are reported to favour removing sycamores and poplars from the wood, so a mutually beneficial project may be possible. A similar project was carried out successfully on the River Bure in Norfolk.



**Photo 13 View downstream to Lowthorpe Mill**



**Photo 14 Impounded reach above Lowthorpe Mill**



**Photo 15 Transplanted water crowfoot doing well in a shallow glide**



**Photo 16 Weir**



**Photo 17 Weir downstream of Newroad Bridge showing removable boards and deep scour pool downstream**



**Photo 18 Section upstream of a weir similar to the one in Photo 17 (upstream of Newroad Bridge).**





**Photo 19** Similar location to Photo 18. Emergent rushes have been hand-cut here (stems just visible mid-channel).



**Photo 20** Low berm created to narrow the channel, using brushwood bundles and backfill.



**Photo 21** Another narrowed section, with a softer edge to the river.



**Photo 22** The wooded section at the upstream end. Shading has restricted in-channel plant growth leading to a wide, silty channel.

## 4.0 Recommendations

### Downstream section of Beck (Foston area)

- Vegetation management

Presently it appears that the majority of the marginal emergent plant growth is removed annually. This could be changed to leave uncut areas, either as a continuous strip along one bank, or preferably in sections on alternating banks to provide a sinuous clear channel. Blocks of vegetation could also be left uncut on both banks directly opposite each other, to create pinch points and promote localised bed scour. Discussion with the Environment Agency Biodiversity and Operations Teams, Natural England, landowner and wildlife interests is recommended to try and find a balanced approach which would allow more marginal cover to be retained during the winter period.

- Retention and management of trees

The trees and bushes along the left bank should be retained and the low, overhanging cover shown in Photo 4 encouraged. Subject to landowner permission and maintenance considerations, establishment of low-growing tree species (sallows) is also desirable on the right bank and could easily be achieved by planting cuttings.

### Middle section (downstream of Lowthorpe Mill)

- Create depth variation by encouraging localised bed scour.

Various techniques using flow deflectors, woody debris and channel narrowing are detailed in the WTT Chalkstream Habitat Manual ([www.wildtrout.org/content/wtt-publications](http://www.wildtrout.org/content/wtt-publications)), but perhaps the most cost effective and least disruptive technique here would be pinching the channel using an excavator to push in the margins and backfill (Figure 1).

- Thin the dense stands of hawthorn to allow light to the overshadowed sections (Photo 11). Peg the material arising into the river margins to create excellent juvenile trout habitat.

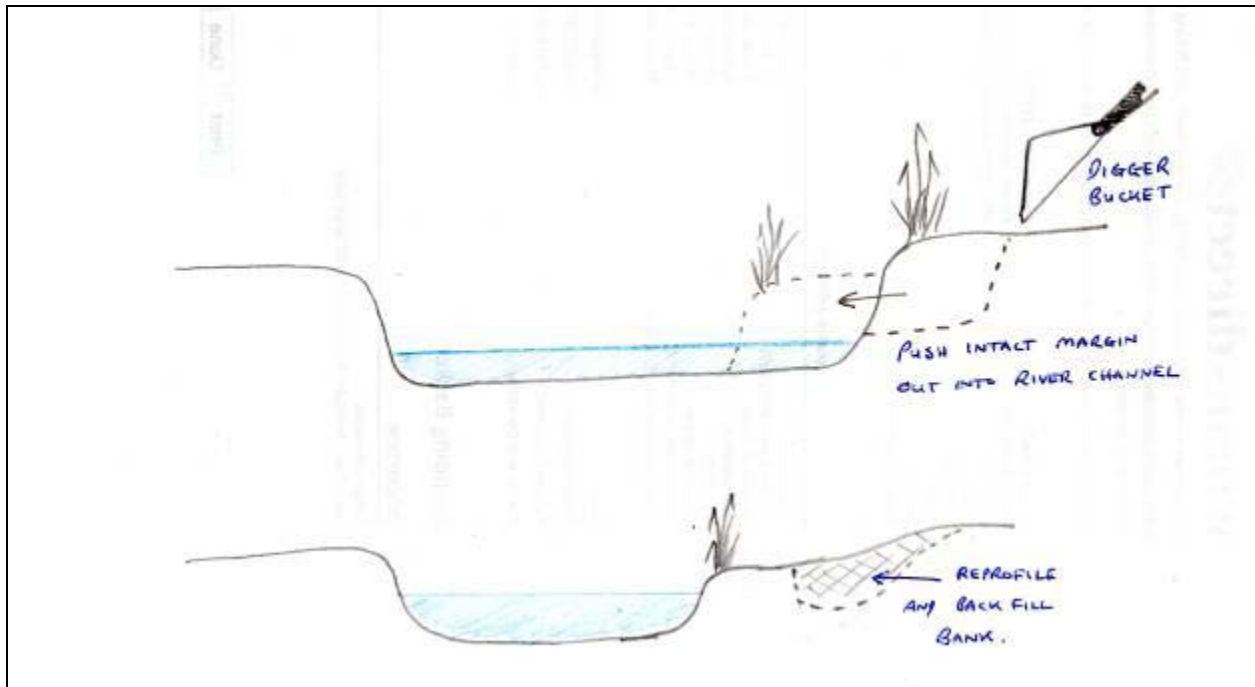


Figure 1

Upper section – above Lowthorpe Mill (TA087604)

- Continue work to narrow the channel by creating low marginal berms, pinching the channel and increasing flow velocities. The success of this approach depends upon choice of site with respect to the location of weirs, areas unaffected by impoundment being the best. Consideration should be given to complete removal of one or two weirs along with channel narrowing works and possibly raising the river bed level (gravel introduction). This approach would not only improve in-stream habitat for flow-loving species, but may benefit riparian habitats in the appropriate location (e.g. the wet fen SSSI currently in unfavourable condition).

Channel narrowing would be best achieved using woody debris sourced from tree work in Neat Holmes Wood. Whole trees, tree tops and brushwood pegged in the margins would create a matrix that would soon colonise with aquatic plants, producing a soft-edged marginal habitat; this is preferable to the more defined edge produced using log or faggot edging.

- On the upstream section in Neat Holmes Wood, thin out trees alongside the river and introduce large woody debris to the channel. A

very similar project on the River Bure was carried out by the National Trust and partners (Photos 23, 24).



**Photo 23 Work in progress installing large woody debris on the River Bure, Norfolk.**



Photo 24 Before (above) and after pictures of woody debris work on the River Bure, Norfolk.

Please note: It is a legal requirement that all the works to the river require written Environment Agency (EA) consent prior to undertaking any works. The SSSI status of the Beck means Natural England (NE) permissions are also required and NE consultation should take place as part of the EA consent process. Early consultation with both NE and EA is recommended.

### Trout Stocking

If not already the case, it is recommended that the club switch to using all-female, triploid brown trout as stock fish. This will remove the risk of interbreeding between stocked fish and native trout which is known to have an adverse effect upon the numbers and survival prospects of trout spawned in the river. Further details on this subject are available on the WTT website ([www.wildtrout.org/content/trout-stocking](http://www.wildtrout.org/content/trout-stocking)).

## **5.0 Making it Happen**

The next stage would be to discuss the recommendations in this report with other interested parties, particularly Natural England and the Environment Agency. The Wild Trout Trust may be able to provide further help in developing a project proposal and practical project assistance using EA funding aimed at improving the status of WFD waterbodies which are failing for fish, in particular trout.

## **6.0 Acknowledgement**

The Wild Trout Trust would like to thank the Environment Agency for the support which made this visit possible.

## **7.0 Disclaimer**

This report is produced for guidance only and should not be used as a substitute for full professional advice. Accordingly, no liability or responsibility for any loss or damage can be accepted by the Wild Trout Trust as a result of any other person, company or organisation acting, or refraining from acting, upon comments made in this report.

