



Advisory Visit

Oxfolds and Costa Beck, North Yorkshire

June 10th 2010



1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the Oxfolds and Costa Beck on 10th June, 2010. Comments in this report are based on observations on the day of the site visit and discussions with Dave Southall and Paul Wood of Pickering Fisheries Association.

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 Oxfolds / Costa Beck is a headwater of the Yorkshire Derwent catchment located within the Vale of Pickering. The Beck is groundwater fed from the calcareous Corallian aquifer and has a naturally high base flow giving it the typical characteristics of a chalkstream.

Keld Head springs in the town of Pickering mark the start of the Beck; these feed a short section before it splits into two, forming the Costa Beck (right hand channel) and the Oxfolds Beck (left hand channel) (Figure 1). The flow is managed at this point with a sluice which controls relative flows down each channel. Two large watercress/fish farm complexes are present (one on each channel) before the channels coalesce at Low Costa Mill to become the Costa Beck. Just downstream of Low Costa Mill the sewage works effluent from Pickering discharges to the river along with the combined sewage/stormwater overflow.

Pickering Fishery Association (PFA) owns or leases the fishing rights to various sections of the Oxfolds and Costa Beck. In the past, PFA have stocked the reach with around 400 farmed brown trout each year. However, no stocking has been carried out by PFA in recent seasons in response to the problems described below. In 2009, the beck was stocked with juvenile grayling by the Environment Agency.

The Oxfolds / Costa Beck is recorded as being a high quality trout and grayling fishery in angling literature of the early C20th and by PFA members who fished the river in the 1960s and 1970s. Since about 1980 PFA catch

records and Environment Agency surveys have recorded a marked decline in the fishery. The decline is the subject of ongoing investigations by PFA, Angling Trust and the Environment Agency. A comprehensive investigation (Everall, 2007) highlights problems with water quality including high levels of suspended solids and siltation, eutrophication, elevated ammonia / nitrite levels and ephemeral peaks in ammonia levels. Water quantity is also raised as a potential problem, with concerns regarding the Yorkshire Water Services abstraction at Keld Head (since the 1970s) and the apportioning of flows between the two channels (and hence fish farms) and the effect on the dilution of their effluents.

All parties involved in the investigations are keen to see a resolution to the problems affecting the Oxfolds / Costa Beck and the Wild Trout Trust were asked to visit the site to advise upon how habitat improvements could contribute. Habitat quality is one of the "three pillars" of a good fishery, the others being water quality and water quantity. It must be stressed that all these factors need to be addressed and it would be a waste of time and effort to improve habitat if water quality or quantity remain as limiting factors.

Downstream of the Gatehouses gauging station the Costa Beck was the subject of a legal case around 2001/02 when the Anglers' Conservation Association won damages on behalf of PFA against the Environment Agency. Weed cutting was necessary on this stretch to prevent the gauging weir from drowning out, but difficulties in operating the weed cutting boat were being caused by previously installed habitat improvements. This resulted in the EA dredging this part of the river.

At the time of the visit, the section of river downstream of the gauging station had extensive growths of weed (water crowfoot, *Ranunculus* sp.) which was holding back water levels, potentially affecting the gauge. PFA reported that apart from the installation of some wooden flow deflectors (see below), there had been no maintenance of this section of river by either EA or PFA since the dredging incident.

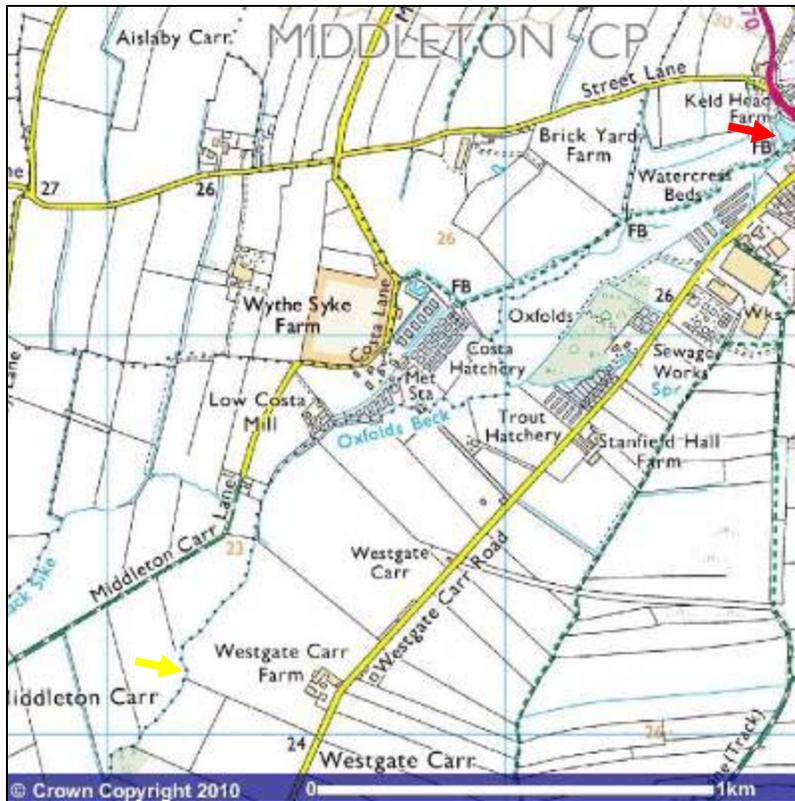


Figure 1 Red arrow is upstream limit of visit, yellow downstream.

3.0 Habitat Assessment

The river was walked in a downstream direction from immediately below the trout farm on the Oxfields Beck. The river bed here is very silty with a heavy growth of green algae. The aquatic flora includes starwort (*Callitriche* sp.), water parsnip (*Berula erecta*) and sparse amounts of water crowfoot (*Ranunculus* sp.).

The channel dimensions are relatively uniform with little variation in depth or width, the exception being where deeper holes have been excavated in the river bed. The holes were created by the Environment Agency as areas to trap silt for subsequent removal; despite these areas being emptied infrequently they appear to have maintained some degree of depth.

The bankside vegetation alongside the beck is very good, consisting of a dense fringe of reeds, rushes and grasses forming excellent low cover over the margins of the river. The left bank is fenced here alongside a wet meadow and the right bank is an Environment Agency depot.

The marginal vegetation is complemented by the presence of a number of low-growing willow and alder trees, mainly on the right bank; these have been sensitively maintained to provide low cover and shade over the watercourse. It is understood that this mix of marginal vegetation may have partly resulted from the lack of angling access to the beck over the last few years (because of the poor fishing); it is important that a balance is struck between access and preserving this excellent habitat should angling activity increase. If trees are pruned, it should be done in a way which preserves low cover over the water (within 30 cm of the water surface) and paths should be trimmed away from the water's edge to maintain the shaggy fringe of vegetation.

With progress downstream the silty nature of the river bed becomes less evident and some patches of gravel appear in narrower sections of the channel. Some in-stream habitat improvement work was carried out along this section in the 1990s by EA Fisheries Officer Sean McGinty; this includes in-stream structures to deflect flows, narrow the channel and provide marginal cover.

The Costa fish farm site sources its water from the Costa Beck then discharges to the Oxfolds Beck from the right bank. There are two rock groyne in the river here extending from the right bank which were introduced in conjunction with gravel along the left bank to create a fish spawning area. This has not worked as intended and a pool has scoured between the groyne and the gravel has dissipated; the pool is however providing a good holding area for adult trout and grayling. In addition to the above, a large submerged log has been positioned across the channel just upstream of this point.

Downstream of the Oxfolds / Costa fish farm confluence the river is faster (increased gradient) with a gravel bed and less silt and more water crowfoot evident. Invertebrate monitoring by PFA (as part of the Riverfly Partnership Anglers' Monitoring Initiative) and Everall (2007) has however indicated organic enrichment at this site.

With downstream progress, past the holiday cottages on the right bank to the bridge where Costa Beck joins Oxfolds Beck, down to the Gatehouses flow gauging station, the river has a similar habitat. The channel is straight and the gradient appears slightly higher than other sections; some gravel is evident on the river bed (although this is generally unsorted and not

particularly good for spawning) and there is a mix of submerged aquatic vegetation; this includes mare's tail (*Hippuris vulgaris*) in addition to previously mentioned species. Marginal vegetation remains good with plenty of low overhanging cover. Downstream of the bridge there is a short section which is heavily shaded by hawthorns, but generally tree cover along this reach maintains a good balance of light and shade.

The Pickering sewage treatment works outfall enters the beck from the left bank a short distance upstream of the gauging station. At the time of the visit it was discharging highly coloured effluent despite the recent prolonged dry weather; this was reported as an incident to the Environment Agency hotline.

As mentioned in the previous section, the river downstream of the gauging station was dredged around 2001/02. The river here is canalised and has a relatively low gradient. At the time of the visit, submerged plant growth was prolific and holding up water levels.

Photographs from Everall (2007) of the same section show the nature of the channel in early spring, without the plant growth. The channel is uniform with little variation in width and depth and has a trapezoidal cross-section. The bed is heavily silted and there is little in the way of cover for fish when submerged weed has died back. Grazing is taking place on both banks and bank poaching and loss of marginal vegetation has occurred in many places.

Trees and bushes present along this section include hawthorn and willow. The latter have grown out across the channel in some areas; this provides some good cover for fish, but these are vigorous species and some degree of management is likely to be required. Sallows (*Salix cinerea* and *S. caprea*), such as those seen further upstream, would be more suitable species in this location.

Wooden flow deflectors are positioned along this section at regular intervals. These have not had any discernable effect upon the river channel. Their effectiveness is hampered by the channel being too wide, the low gradient and the prolific weed growth backing up water levels. A much more radical approach is required to improving in-stream habitat along this section involving channel narrowing and remodelling to create variation in the depth profile.



Photo 1 Oxfolds Beck below the trout farm – heavily silted bed with algae growth



Photo 2 Excavated silt trap. Combined with the overhead cover this makes good holding habitat for adult fish.



Photo 3 Good riparian vegetation



Photo 4 Some in-stream habitat works have been carried out



Photo 5 The beck running alongside Costa fish farm



Photo 6 Just upstream of the confluence of the two channels



Photo 7 Alongside the holiday cottages



Photo 8 Sewage works discharge – highly coloured at the time of the visit



Photo 9 Downstream of the gauging weir the dredged channel is heavily weeded



Photo 10 Livestock have unrestricted access to the banks



Photo 11 Vigorous willow growth may require management to maintain cover but allow angling access



Photo 12 (Everall, 2007) Flow deflectors are ineffective in this overwide channel



Photo 13 (Everall, 2007) Showing the nature of the channel and deflector positions in the absence of prolific weed growth

4.0 Conclusions and Recommendations

The primary consideration for this river is to take action to improve the water quality and prevent continuing polluting inputs. Habitat improvement works will make no difference to the quality of the fishery unless water quality issues are addressed first.

The fishery can be divided into two sections for the purposes of habitat improvement recommendations, namely upstream and downstream of Gatehouses gauging station. The section downstream of the gauging station is the most impoverished habitat because of dredging works in the recent past; this section should be a priority for remedial works.

Upstream of the gauging station

The primary problem in relation to habitat quality on this section of the river is the accumulation of fine sediment of the river bed. The spring-fed nature of the beck means that there are no small tributaries which could provide spawning habitat: all spawning must take place within the main channel. The tendency of trout (and to some extent grayling) to run upstream to spawn means this area is likely to be a key area for spawning and the habitat quality here critical to success.

Accumulation of fine sediment in gravels drastically reduces spawning success for trout and grayling by blocking the spaces (interstices) between individual pieces of gravel and preventing the free flow of water to the buried eggs. Accumulated inorganic sediments (e.g. sand) will cause this effect, but if the sediment is organic in nature there is the additional problem of this breaking down (rotting), polluting the immediate environment around the eggs.

Measures to create scour (channel narrowing, deflectors, etc.) will shift silt from localised areas and help to sort gravel into grades suitable for fish spawning. These techniques are described in the Wild Trout Trust's Chalkstream Habitat Manual. However, these measures will only displace silt downstream and the source of the sediment must be tackled in order to get a long term solution to the problem, i.e. the rate of sediment displacement must exceed its supply to make a difference.

The techniques that would be suitable for use here include (with reference to appropriate section of the Chalkstream Manual)

- Introduction of large woody debris
- Channel narrowing (using cut-and-fill, or brushwood mattresses)
- In-stream structures (groynes and deflectors)

The river was stocked with juvenile grayling in 2009. Many fish were observed in this section including large numbers of grayling around 8 inches in length (consistent with the fish stocked in 2009). Stocking fish is likely to be masking whether the fishery is truly self-sustaining (for example, if habitat or water quality are preventing successful spawning and recruitment). For this reason it is recommended that no further stocking takes place, or fish which are introduced are clearly marked so they can be distinguished from natural recruits.

Downstream of the gauging station

The river here has an over-widened channel and lower gradient which promotes the deposition of fine sediment; this in turn leads to prolific weed growth during the summer which chokes the channel. The uniform channel

here requires totally remodelling in order to improve in-stream habitat. The following steps are recommended:

- Channel narrowing to speed up the flow rates. This can be achieved using the methods described in the Chalkstream Habitat Manual (e.g. cut-and-fill to create a two-stage channel). River widths upstream of the gauging station can be used as a guide. (Figures 2,3; Photo 14)

Another method of rapidly remodelling a river channel is simply using an excavator to create pools and then use the spoil to make 'shoulders' upstream of the pools to maintain scouring flows. This technique was pioneered by Dr. Nigel Holmes and is suitable for rivers with very stable flows such as Costa Beck. It has the advantages of being quick, cheap and having no net import of materials (hence maintaining overall channel capacity). (Photos 15, 16).

- Introduce large woody debris to the river channel to create cover for fish and depth variation through localised scour. This should be done in conjunction with channel remodelling to complement and reinforce those improvements.
- Limit the access of grazing animals to the river banks to encourage the development of a healthy vegetated river margin similar to the ones present on the upstream section of the Beck. Encourage the development of trees along the bank to provide more shade over the channel. Manage the very vigorous types of willow and introduce lower-growing, bushy species (sallows), ash, and alder.

It is a legal requirement that all the works to the river require written Environment Agency (EA) consent prior to undertaking any works, either in-channel or within 8 metres of the bank.

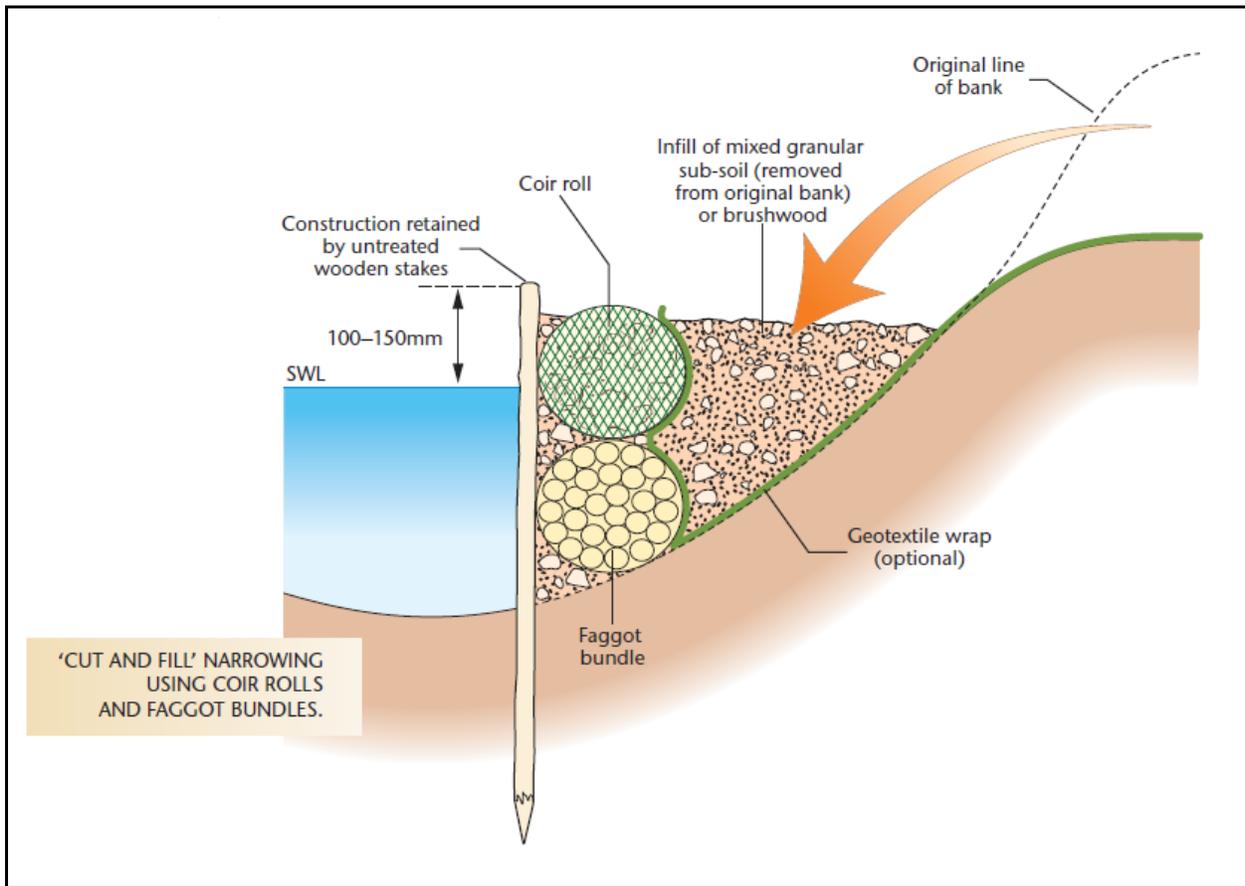


Figure 2

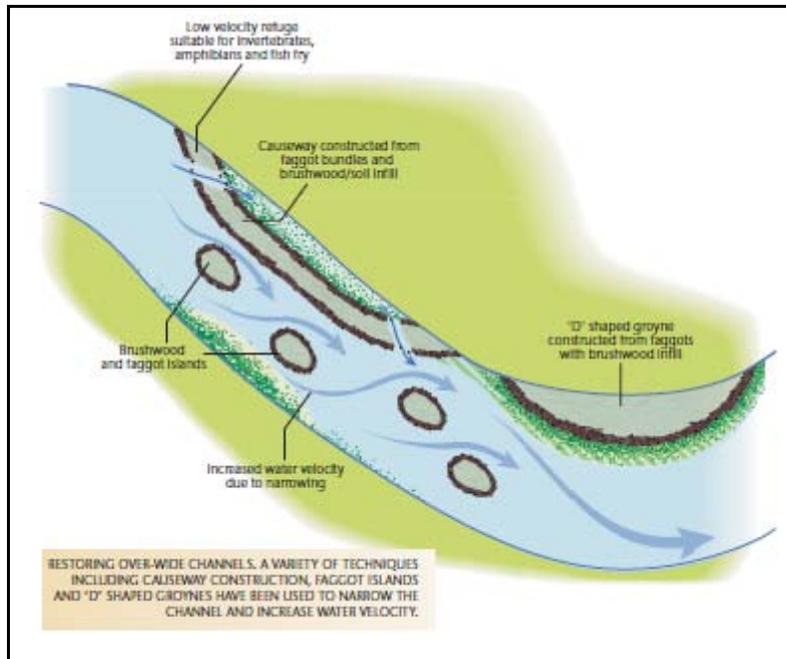


Figure 3 Channel narrowing options – see Chalkstream Manual for full details



Photo 14 Recently narrowed channel and woody debris installation, River Meon, Hants.



Photo 15 (Before) Channel narrowing upstream and deep pool dug to energise river and create diverse habitat for conservation and fishery – Slight gradient and mixed substrates: main channel Itchen – Winnal. (Picture Dr. Nigel Holmes)



Photo 16 (After) Channel narrowing upstream and deep pool dug to energise river and create diverse habitat for conservation and fishery – Slight gradient and mixed substrates: main channel Itchen – Winnal. (Picture Dr. Nigel Holmes)

5.0 Making it Happen

The Wild Trout Trust can provide further assistance to PFA by helping with the preparation of a detailed project proposal and preparation of the necessary consent applications. Assistance with fund-raising to implement the project is also available through the Advisory Visit Bursary scheme (up to £1500 to assist with obtaining matched funding) and the Rods for Conservation Scheme (a Sage or Hardy rod for raffle or auction to raise funds for habitat schemes). This report should also be discussed with the Environment Agency (Dave Bamford, who was present on the visit) to explore the possibility of a partnership project.

6.0 Acknowledgement

The Wild Trout Trust would like to thank the Environment Agency for the support that 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.

References

Everall (2007) *The Probable Causes of The Fishery Decline in the Costa and Oxfolds Beck 1980-2006*. Dr. Nick Everall MIFM C Env; Aquascience : Tel/Fax (01246) 239344.

The Chalkstream Habitat Manual, Wild Trout Trust www.wildtrout.org . Available on CD (tel. 023 9257 0985) or via the website: http://www.wildtrout.org/index.php?option=com_content&task=view&id=324&Itemid=315