THE WILD TROUT TRUST
www.wildtrout.org

Advisory Visit

Rivers Colne and Holme, Huddersfield (Greenstreams)

22nd June, 2010

1.0 Introduction

This report is the output of a site visit undertaken by Paul Gaskell of the Wild Trout Trust to the urbanised sections of Yorkshire's rivers Colne and Holme, on 22nd June 2010. Comments in this report are based on observations on the day of the site visit and discussions with Beth Allcock, Paul Atkinson Fiona Ellwood and Jeff Keenlyside (representatives of the Greenstreams project).

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 surveyed sections of the Rivers Colne and Holme are located in the largely urbanised upper to middle reaches of the catchment in Huddersfield. The Holme rises on Holme Moss and flows to the north, joining the Colne immediately south of Huddersfield town centre. The Colne itself arises from myriad small tributaries draining the Eastern slopes of the Pennine hills in West Yorkshire close to the village of Marsden. The geology of both rivers is dominated by gritstone and coal measures and both are typical of "post industrial" upland spate rivers of the Yorkshire and East Lancashire areas of England. Historically, water-powered cotton and woollen mills were commonplace alongside the rivers of this region; consequently, large weirs and retaining walls feature frequently along these rivers.

The visit concentrated on typical reaches within Huddersfield's urban environment and spanned from national grid reference SE 15108 16248 on the river Colne (Somerset Bridge) up to a view upstream to the large double weir on the Colne (viewed from SE 14237 15976). The upstream limit of the Holme captured by this visit was the Bridge Street crossing at SE 13675 15117. These sections of Huddersfield's urban rivers are not currently adopted by angling club interests and are being cared for as part of the Greenstreams initiative (http://www.greenstreams.org.uk/). Anglers and conservationists in the region (e.g. Calder and Colne Rivers Trust: http://calderandcolneriverstrust.org/) are aware of the importance of the thriving but threatened wild grayling and trout populations of these rivers. There have been several serious pollution incidents, with significant fish and invertebrate mortalities recorded in the two-years prior to the Advisory Visit of June 2010.

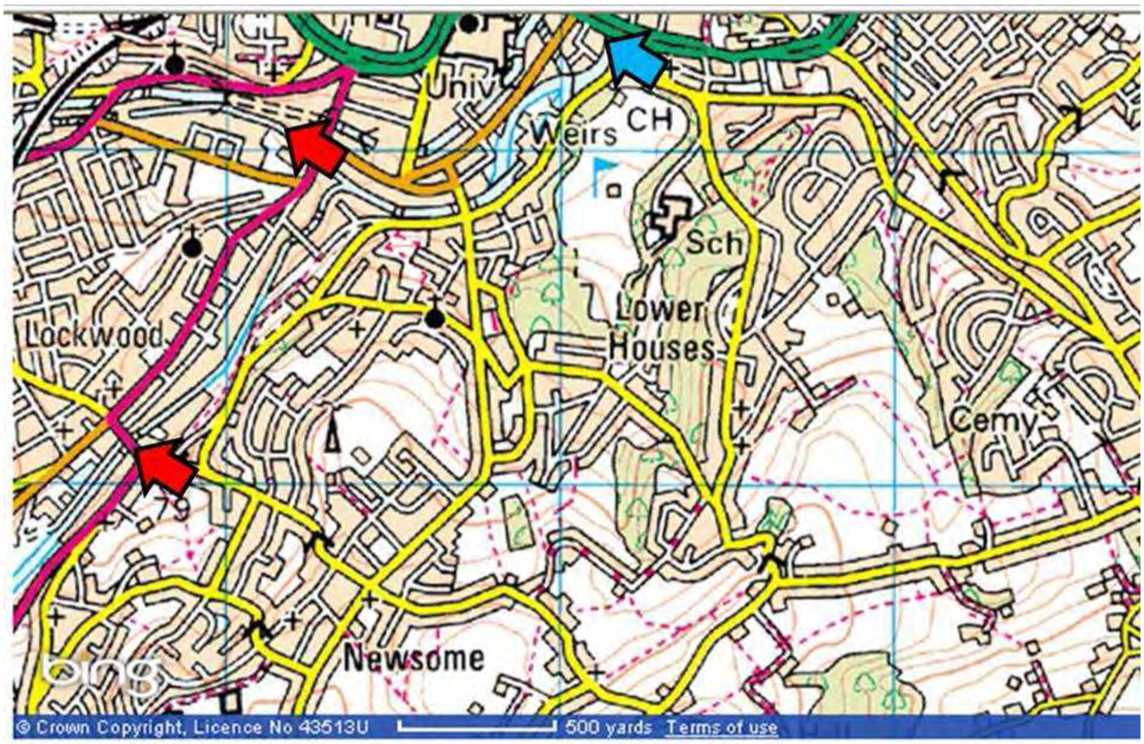

Figure 1: Location showing approximate upstream (red arrows) and downstream (blue arrow) limits of visit

3.0 Habitat Assessment

3.1 Somerset Bridge to Snow Island weir (Colne)

The river between Somerset Bridge and Snow Island weir (SE 15108 16248 to SE 150424 16215) is typical of many urbanised upland rivers. Specifically, the fragmentation of habitat due to one of several large weirs in the area is clearly evident at Snow Island (Fig. 2A). In order to ensure resilient and self sustaining fish populations, it is important to maximise the potential for movement between high quality patches of habitat. This is beneficial, not only because it meets the changing habitat needs during each life stage of fish (spawning, juvenile and adult), but also by providing escape routes from pollution episodes. Furthermore, the reduced flow velocities and increased siltation upstream of large weirs (Fig. 2B) provide poorer habitat for a range of aquatic invertebrates and fish alike. The loss of physical variety in the

A

B

Figure 2: Barrier to fish passage (A) and upstream habitat homogenisation via reduced flow velocity and increased siltation (B)

micro-habitats due to siltation and reduced flows tends to favour fewer species, rather than a broad diversity. In many cases, this impacted habitat due to weir impoundments is compounded by straightening of the channel by vertical retaining walls. However, one of the many redeeming features of these upland rivers is their relatively steep gradient and corresponding fast turbulent flows. Away from the impounding effect of weirs this can, over time, enable the river to re-establish a more varied and meandering river bed. Recovery happens by a process of erosion and deposition of bed material in the channel between the retaining walls. In rivers that are fortunate to have these sufficiently energetic spate flows, vital variation in the habitat is provided by the formation of "point bars" of gravel and cobbles deposited at the sides of the channel (Fig. 3). These bars are a little like shingle beaches and help to provide variation in both depth and current speed. The resultant shallow inner edge and deepened outer edge of the cross section is termed "lateral scour" and is a key mechanism in the production of natural river meanders.

Figure 3: Lateral scour just upstream of Somerset Bridge with point bar (centre and right of frame) and scoured bend (left of frame). Picture taken under summer low flow conditions facing upstream

Despite the spontaneous regeneration of some habitat variation by a little deposition and lateral scour, there is a lack of really high quality scour-pool habitat in this reach, upstream of Somerset Bridge. In other words, the natural processes of recovery can only achieve so much given the constraints imposed by past engineering of the channel. The limited recovery is probably not helped by a general lack of debris any larger than cobbles (20 to 30-cm size-range). In systems that have either large boulders or naturally-occurring fallen trees, significant localised scouring of the stream bed provides really excellent adult trout habitat – as well as producing mounds of prime spawning gravels. Fallen tree material, termed Large Woody Debris (LWD), is a particularly valuable component of high quality trout streams because of the multitude of benefits it provides. As well as the pool scouring/gravel cleaning processes, LWD offers overhead shelter to help fish avoid predators and is also excellent habitat for a range of aquatic invertebrates. Unfortunately from an ecological perspective, LWD is often removed from rivers – usually with uncertain consequences. The West Country Rivers Trust provides a useful guide to the management of natural LWD:

1. Is the debris fixed, if yes then continue to 2, if not continue to 5.
2. Is the debris causing excess erosion by redirecting the current into a vulnerable bank? If yes then go to 5 if not then go to 3.
3. Would fish be able to migrate past it (take into account high river flows). If yes got to 4, if no go to 5.
4. Retain the woody debris in the river.
5. Re-position and securely anchor or extract the debris.

Note: If debris needs to be removed but there is still a significant amount of the root system attached to the bank then it is recommended that the stump be retained for its wildlife habitat value and its stabilising effect on the bank.

Within this reach and many others on the Colne and Holme (according to discussions during the visit) both Himalayan Balsam (*Impatiens glandulifera*) and Japanese Knotweed (*Fallopia japonica*) are well established invasive plant species on the banks. With Greenstreams’ existing environmental credentials, it is unnecessary to devote very much text to explaining the ills of both species. Some key points are worth noting though:

- Himalayan Balsam outcompetes native flora (and hence reduces the diversity of the associated invertebrates) before dying back in winter
- Winter die-back promotes erosion of bare earth banks during winter spates – choking spawning gravels and killing fish eggs and smothering some species of invertebrate
- Plants produce up to 800 seeds that are spread via exploding pods. Each seed may be catapulted 6 to 7 m away from the parent plant, so the plant can spread very effectively and very quickly
- Japanese knotweed spreads vegetatively via underground root systems (rhizomes) but also dies back during winter – having outcompeted native flora
- A fragment of rhizome weighing only 0.8 g and about the size of a thumbnail is capable of producing a whole new stand of knotweed and rhizome systems typically extend 7 m from any individual stem visible above the soil surface


Figure 4: Himalayan balsam (left) and Japanese knotweed (right)

It is positive, though, to note the presence of mature woodland vegetation alongside even these heavily urbanised reaches. As well as providing great riparian habitat, the mature trees may also be a source of raw materials for any in-channel habitat enhancements.

3.2 Breached weir (Colne) at SE 14778 15881

A

B

Figure 5: Energised riffle flows at the breach (A) and upstream (B) of the weir at SE14778 15881. A fantastic boost to habitat quality as well as connectivity that would not be achieved by any bypass measures

Spontaneous breakdown over time of this weir on the Colne is an ideal showcase for the habitat benefits that accrue from reducing the impounding effect upstream of the weir (Fig.5).

The energised current upstream of the weir and the downstream migration of large blocks of stone from the weir structure are forming some excellent habitat for both juvenile and adult trout as well as a range of aquatic invertebrate species. Silt that would previously have been trapped amongst the bed cobbles upstream of the structure has been scoured out, to accumulate in a more "patchy" fashion downstream. A formal "fish pass" solution to weirs simply does not provide these habitat enhancements. Although fish passes can be a vital means of providing connectivity where the head of water must be maintained by a weir, they should not be the default option when seeking to improve ecological status of a watercourse. If it is possible, allowing redundant weirs to degrade naturally over time is one of the best available ecological enhancements – both in terms of connectivity and habitat quality. If the appropriate consents and permissions can be obtained (i.e. from both the owner/operator of the structure and surrounding land, the Environment Agency Development Control and Flood Risk Management teams as well as any other potentially affected parties), then work to gradually lower and remove weirs is another excellent opportunity for habitat improvement. Of course, in many cases, there may be no practical alternative to bypassing or easing passage over an otherwise unchanged structure. See recommendations (Section 4) for some starting points for tackling both connectivity and habitat improvement in relation to weirs.

3.3 Kings Bridge (Colne) at SE 14691 15816

The section upstream of Kings Bridge (Fig. 6) is an example of how artificial straightening and widening of river channels may reduce the potential for lateral scour. As a consequence, the habitat is relatively uniform and generally lacks the necessary cover to help fish avoid predation. This is, however, a relatively short section and a nice riffle is present below the bridge structure itself. The depth and flow characteristics would potentially be suitable for juvenile life stages of fish (including trout and grayling). The introduction of stable additional marginal cover (for example in the form of tree “kickers”; Fig. 7) may increase the value of this section as a nursery/overwintering site for fish.

Figure 6: Channel upstream of Kings Bridge SE 14691 15816; straightened and uniformly wide with little depth variation

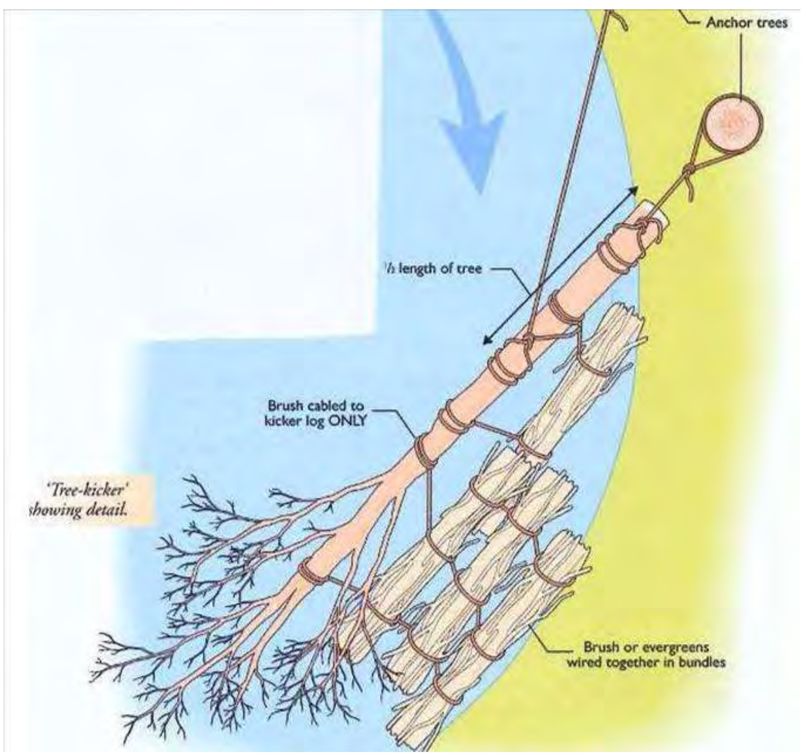

Figure 7: Schematic example of tree "kicker"

Figure 8: Tree kicker installed on Derbyshire's river Goyt. Trunk is anchored to its stump via 12-mm braided steel cable

Tree kickers may also promote a small but potentially significant amount of "gravel sorting" during high flow events. Bed sediments are said to be "unsorted" when the gaps between larger sediment particles, e.g. gravel or cobbles, are filled with sand and other fine sediments. Conversely, sediments that occur in mounds of similar particle sizes are said to be sorted. Trailing branches and tree trunks focus the flow of water onto the stream bed and can remobilise fine silt, gravels or even larger particles. Because large particles fall out of suspension in faster flowing areas than the slow flows that allow silt to settle, localised scour and re-deposition tends to "sort" the accumulated mounds of sediment into groups of similarly-sized particles. Well-sorted and well-irrigated gravels are essential for survival of trout eggs in the gravel beds following spawning.

3.4 Queens Mill Road (Holme) at SE 14195 15739

This section is impounded by at least one weir and it would be beneficial to prioritise either relatively cheap "easements" to fish passage, full formal fish pass installation or weir lowering/removal as appropriate. Given the risks of erosive damage to supporting walls – it may be that facilitating fish passage with only minimal lowering (if any) of the weir is most appropriate here. The impounding effect of the weirs can be seen below (Fig.9) – as can the very beneficial low-hanging vegetation on the LHB and the good wetted margin and emergent vegetation on the RHB. For adult trout, the most useful overhanging vegetation to use as shelter should be less that approximately 30cm from the water surface, so the vegetated wall is providing a vital resource. Conversely, emergent vegetation and associated roots can be vital habitat for juvenile fish and aquatic invertebrates alike.

Figure 9: Facing downstream - a weir is just visible in the background of the frame. Valuable marginal vegetation fulfilling both adult and juvenile fish requirements is in evidence on both LHB and RHB and large(!) adult trout and grayling were observed during the site visit in this reach.

3.5 Riverside path section on Holme between SE 14045 15495 and SE 13960 15352

Some good quality habitat and several fish were observed during the visit in this reach. Much of the section is bordered on its RHB by a steep woodland valley side. A large number of trees in this section were of a similar age and would, perhaps, benefit from some light rotational coppicing to improve variety in the age/size structure. A fringe-benefit of such works would be the convenient provision of raw LWD material for any habitat works that may be desirable. By contrast, the LHB was largely delimited by the walls of industrial units (the footings of which often standing vertically down into the water; e.g Fig. 10). However, some useful shading by gantries that overhang the river may provide a small cooling effect for fish during full sunshine, low-water conditions in midsummer.

Figure 10: Good marginal vegetation (RHB) and vertically walled opposite margin (LHB). Note shaded margins produced by gantry (photo facing upstream)

Although straightened in parts, this reach of the Holme possesses a linear pool and riffle structure and is perhaps less severely affected than some straightened sections of the Colne below the confluence with the Holme. It also benefits from several changes in direction (i.e. is not especially extensively straightened). The good quality instream habitat could also potentially be a result of the steep aspect of the LHB maintaining a channel that is sufficiently narrow to generate stream bed erosion and deposition. Another positive feature in this section is the presence of some larger stoney substrate (of various natural and man-made sources!) that has generated useful local bed scour (Fig. 11).

Figure 11: Large brick "boulder" on a riffle. Note the effect on the surface foam and especially the scour hole downstream (i.e. to the right) of the "boulder". Excellent and vital variation in both flow and depth is generated

As well as generating localised scour and producing respite for fish from the full force of the current, boulders can act as vital interruptions to the line of sight of territorial fish like trout. Clusters of boulders are especially valuable both in terms of producing scour and enabling a higher number of adult trout territories to exist in a given area of stream (Fig. 12). Again, the variety in substrate particle size from patches of silt and sand through to large boulders is also vital in supporting a diverse range of aquatic invertebrates.

Figure 12: Boulder clusters (centre of channel to the right of the frame) can increase the capacity of a riffle to hold adult trout as well as offering great habitat for a range of invertebrates - for example as stable substrate for caddis larvae to anchor cases during pupation. Many of these boulders were originally dressed pieces of gritstone used in weir or wall construction

3.6 Woodhead Road/Bridge Street on Holme SE 13675 15117

Special mention is made of the spawning habitat in this section (Fig. 13). Several factors combine to make this an absolutely vital "engine room" for healthy trout and grayling stocks in the Holme/Colne system. Firstly, and most importantly, are the clean mounds of sorted gravels that have formed at the tails of pools below the bridge. It is likely that water is flowing right through these gravels, providing the constant supply of oxygen required by trout eggs if they are to survive and hatch. Secondly, there is an abundance of overhanging vegetation that fish getting ready to spawn can hide beneath between breeding attempts. Thirdly, the lack of easy access for the public to

Figure 13: Brighter orangey areas of gravels are visible towards the right of the frame close to and amongst the dappled shade from vegetation on the RHB. These mounds appear to be deposited material derived from the scour pool just upstream in the bottom right of the frame (in the area surrounding the pale square block of submerged debris)

this section of the channel may be important in avoiding damage to eggs developing in the gravels. A lack of undue disruption to the fish themselves during spawning may also help this area to achieve its full contribution to sustaining wild trout and grayling stocks. Potential disruptions or damage could be the result of, for example, families paddling or dogs being exercised within the channel. Also, in future years, with the vital work planned by the Calder and Colne Rivers Trust to bring migratory fish back to the system, these areas will become vital for any salmon spawning efforts. Therefore, great care must be taken when considering how to arrange and sustain appropriate public access to the green spaces of Huddersfield. The existing restriction to physical access into the channel, whilst elevated views are afforded from the bridge is a good (if accidental) strategy. Appropriate interpretive signage may also be useful. Consider relatively cheap, easily replaced materials and treat as a consumable in urban areas. Don't use materials with scrap value.

4.0 Recommendations

- Offer full support to the efforts to establish and maintain an early-warning monitoring system of aquatic invertebrate populations (http://www.riverflies.org/index/riverfly_monit.html) by the Calder and Colne Rivers Trust partners of Greenstreams. This will be a tremendously valuable contribution to tackling the problem of episodic pollution incidents

- Identify priority barriers to fish movement on the system based on:

    - Length of river that would be connected by removing or bypassing each individual barrier (higher priority placed on barriers that segregate the longest sections of river)

    - Barriers that segregate high quality adult habitat from high quality spawning and/or juvenile habitat. Consider the potential for simple enhancement works to produce high quality habitat patches that could be linked together

- Obtain specialist advice (e.g. Adrian Fewings or Greg Armstrong of the E.A.'s national fish pass team - contact numbers available via the E.A. enquiries line: 08708 506 506) on easement options for weirs at Snow Island and Queens Mill Road (see section 5.1 of the Upland Rivers Habitat Manual for further guidance on fish passage easements: http://www.wildtrout.org/images/PDFs/Upland_Manual/uplands_section5.pdf)

- Use the excellent Greenstreams infrastructure to pursue funding to tackle barriers in a prioritised sequence

- Consider light rotational coppicing of the woodland bordering the riverside path reaches (Section 3.5)
- Consider installing secure LWD to promote localised scour upstream of Somerset Bridge (Section 3.1) and also along the riverside path reaches (Section 3.5). This could be undertaken in a design and delivery partnership with Environment Agency Fisheries and Operations Delivery staff along with the WTT. Examples of useful features are given below:
    - Pinching down the channel below riffle at SE13977 15381 (Fig. 14)

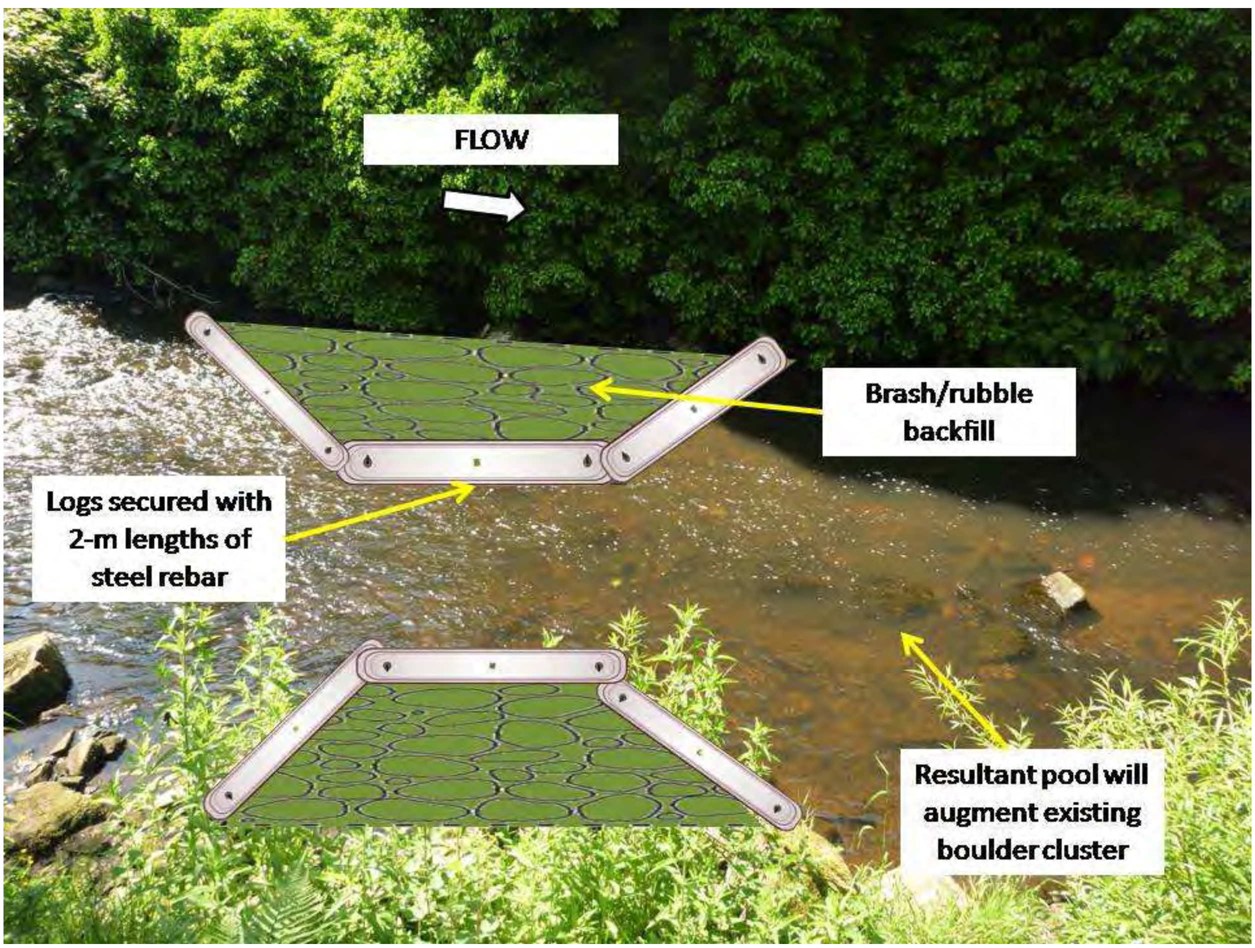

Figure 14: Suggested paired log and brash berm structures for amplifying bed scour. N.B. brashings can be nailed to logs used in construction in order to provide additional cover for juvenile trout

- Single log and brash side “berms” (in contrast to the pair of berms shown in Fig. 14) with additional brash nailed to tops and outer edges of logs could also be used on the LHB beneath the gantry at the base of the vertical walls shown in Fig. 10
- Tree kickers (Figs. 7 and 8) can also produce a similar effect to side berms, therefore combinations of side berms and/or kickers may be staggered along both RHB and LHB to produce some instream meandering flow within an artificially straightened channel
- Promoting localised scour, gravel sorting and marginal cover at Somerset Bridge(Fig. 15)

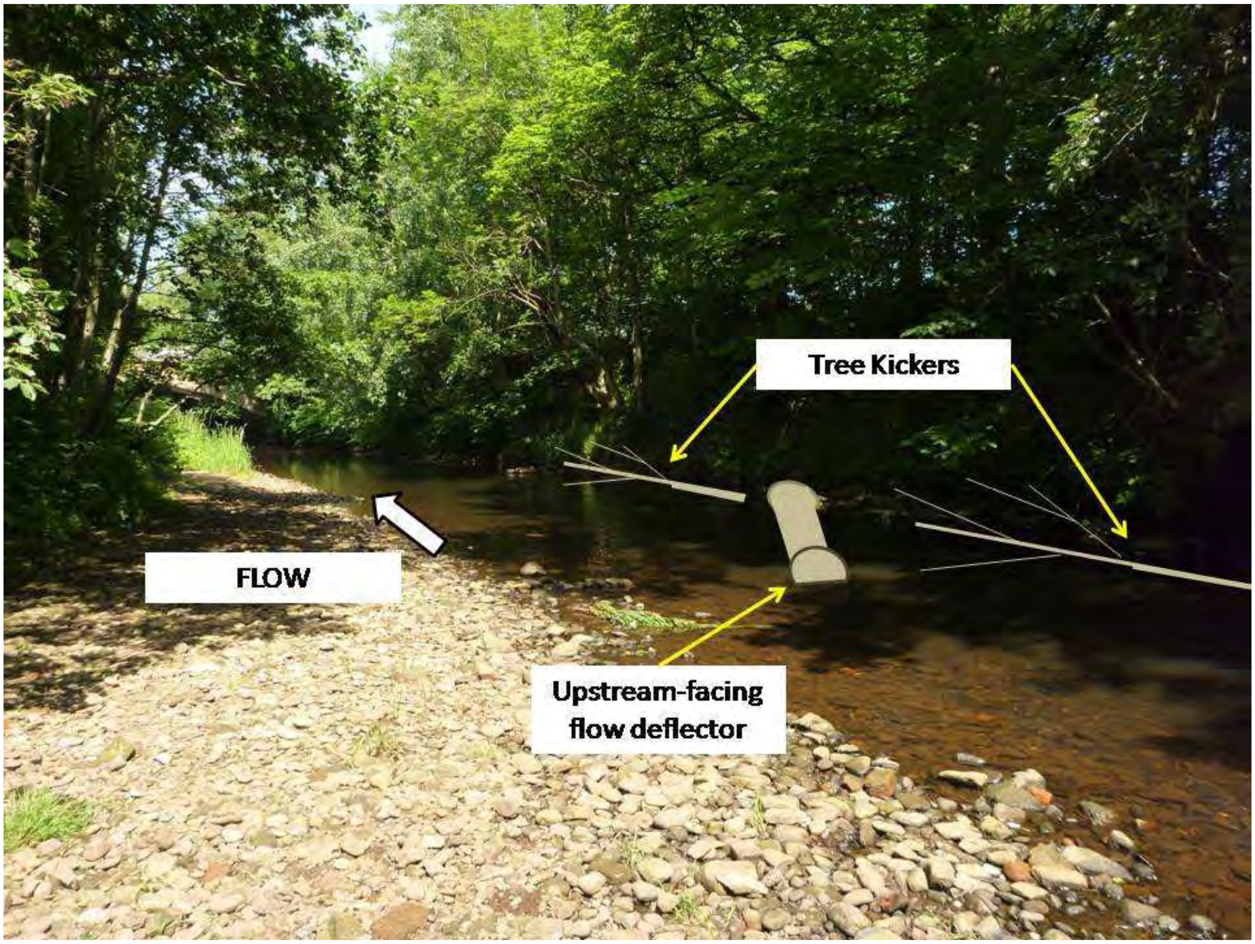

Figure 15: Log flow deflectors (anchored using 2-m lengths of steel rebar) used to promote localised scour could be used at 10 to 15-m intervals along the RHB. Interspersing log flow deflectors with tree kickers would provide additional cover for adult and juvenile fish

N.B. All such in-channel works would be subject to the approval and official consent of parties including (but not limited to):

Landowners, Environment Agency Development Control, Environment Agency Flood Risk Management, Local Council etc.

The WTT may be able to offer help and guidance in securing necessary permissions.

Although demand is very high, it may also be possible to incorporate part of these works as a WTT "Practical Visit" (PV) in order to train Greenstreams volunteers in the relevant techniques. More information about the PV programme is available here: http://www.wildtrout.org/index.php?option=com_content&task=view&id=109&Itemid=155.

5.0 Acknowledgement

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

6.0 Disclaimer