Advisory Visit

River Don, South Yorkshire

8th January, 2009

1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the River Don, South Yorkshire on 8th January 2009. Comments in this report are based on observations on the day of the site visit and discussions with Will Brown, Paul Gaskell and Dave Woodhead of Upper Don Fly Fishers (UDFF).

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 Fishery Overview

The River Don rises on the Millstone Grit and Coal Measures of the Pennines and flows east to join the Yorkshire Ouse and then the Humber. It flows through the urban areas of Sheffield, Rotherham and Doncaster, and larger tributaries include the Rother (draining the Chesterfield area) and the Dearne (draining the Barnsley area). The UDFF sections of river are all on the Don upstream of Sheffield.

There is a long history of man's impacts upon the River Don which are described in the fascinating *Domesday to the New Millenium – 900 Years of the Don Fishery* (Firth, 1997). The most important of these on the upper Don are impoundment and abstraction of water, and water quality impacts from industry, sewage and minewater.

Since the formation of the Water Authorities in 1974, significant improvements have been made in the upper Don catchment. These include the modernisation of sewage treatment processes, more sustainable abstraction regimes, and efforts to control ochreous minewater pollution. The efforts of the late Gerald Stocks and the South Yorkshire branch of the Salmon & Trout Association played a large part in these improvements which resulted in great improvements in the trout population, and in 1983 the re-introduction of grayling (at Hazlehead, above Penistone); these have since re-colonised the river as far downstream as Sheffield.

3.0 Habitat Assessment

Three sites were visited: Wharncliffe (upstream of the iron bridge), Thurgoland, and the upper river near Penistone at Hazlehead.

Wharncliffe (National Grid Reference (NGR) SK 298 955)

The river here occupies a steep-sided, wooded valley. The river gradient is steep and this is reflected in the instream habitat: large boulders, cascades, pools and runs (Photo 1). Habitat for trout is generally very good with ample adult and juvenile habitat. This is a popular stretch for UDFF anglers and contains good numbers of trout and grayling.

Despite the heavily wooded banks, there did not appear to be much large woody debris (LWD) in the river. This may be because of the high flows experienced in this reach, which would be likely to wash out all but the largest LWD.

Many of the tributaries of the Don were dammed in the C19th and early C20th to provide water supply reservoirs for industry and increasing populations in urban centres like Sheffield. The Ewden Beck which joins the Don in this locality is a good example; More Hall reservoir is located about 1 km upstream of the Don confluence. Dams limit the access for trout to spawning areas in the tributaries and fragment populations.

Because of a lack of access to spawning tributaries, trout populations are more reliant on main river spawning which may be less successful because of less suitable habitat, or flood events causing washout of eggs and fry. It is important to maximise the habitat quality of the tributaries that are accessible, and to improve access across barriers where possible (e.g. small weirs and culverts, rather than the reservoir dams). Imported spawning gravels could be tried on tributaries below dams; these would be more likely to stay *in situ* here than in the main channel, if flows released from the dams can be controlled.

It is understood that the Environment Agency (EA) have a prioritised list for fish passage improvement on the weirs on the main River Don (Neil Trudgill, EA Fisheries Technical Specialist). UDFF should obtain a copy of the report

and support the EA in its efforts to restore connectivity to fish populations in the Don.

Within this reach, on the valley side above the river on the left bank, there is an extensive area of spoil which, it is understood, originates from foundry furnace linings (Photo 2). These areas have been profiled down the valley sides forming a steep, hard surface. The edges of the spoil are colonised with willow and birch scrub, including a strip along the lower edge of the slope before it gives way to the river bank with its more mature trees.

At one point (SK 29560 96482), there appears to be a breach in the willow/birch scrub where run off from the spoil flows into and across the river bank, and affects the vegetation; a number of mature trees have died, and there is little or no understorey of grass, brambles, etc (Photo 3). This is leaving the river bank exposed to erosion during high flows. This is a matter that should be investigated further with the responsible authority (probably the Waste Regulation function of the EA) to prevent the situation deteriorating.

Photo 1 Typical view of the Don at Wharncliffe

Photo 2 Poor quality picture of the spoil heaps on the valley side

Photo 3 Vegetation possibly affected by run off from the spoil heap

Thurgoland (NGR SE 276 019)

This section of river (upstream of the road bridge) is higher up the catchment and is narrower than at Wharncliffe, and also has a lower gradient to the channel. The banks have a single line of trees between the river and fields used for grazing (Photo 4). The right bank fence was installed by UDFF with a grant from Yorkshire Wildlife Trust and is providing valuable protection to the riparian zone of the river.

Most of the trees are mature alders of a similar size and age, and many are showing signs of the fungal disease *Phytophthora*. This disease will eventually kill the trees, and their loss will probably lead to problems with bank erosion as the root mass deteriorates or is lost with the tree falling. Preventative action should be taken and this should include coppicing alders in the early stages of the disease (this will prolong their life) and planting native tree species to succeed the alders.

Generally this reach of river has little variation in river bed topography: it is shallow, and there is little variation in depth or flow patterns. This is poor habitat for all life stages of trout, and particularly for holding adult fish. A notable exception to this is where a large willow has fallen across the river, creating some valuable habitat (Photos 5 and 6). The scour underneath the tree bole during higher flows has created a deeper pool area downstream of the structure, and thrown up some well-sorted gravels below it; good habitat for adult trout in the deeper water, and good spawning gravels as well – two benefits for the price of one. It is important such LWD is retained.

The key to improving this stretch is to use trees arising from coppicing work to create LWD structures within the channel, to promote scour of the river bed (see section 4.0 Recommendations).

Photo 4 The River Don at Thurgoland

Photo 5 A fallen willow across the channel creates some good habitat...

Photo 6 ...in the form of a deep scour pool, and well-sorted gravel in a riffle and side bar

Upper River, Bullhouse to Hazlehead NGR 211029

UDFF have fished this stretch of river since the 1970s, the longest of any of their waters. It was one of the few reaches of the Don which supported trout at the nadir of poor water quality in the catchment. It was also the target for a large new abstraction in 1975; the club successfully argued for a reduced volume of abstraction and strict conditions which ensured that, after use, most of the water was returned to the river in a condition which would not significantly alter quality.

This section has also suffered minewater input and discoloration from ochre, something which was again tackled by the club leading to works by the Coal Authority to ameliorate the problem. There is still some evidence of the problem in the form of iron ochre in the Cranberry Holes Brook tributary (NGR SK 208 026) and some upwelling in the main river, although UDFF members report the problem is generally much reduced (Photo 7).

The river was inspected from the access next to industrial units, upstream for several fields. There are a number of issues restricting the quality of in-

stream habitat in this reach. The most significant of these is grazing of the banks by livestock. This is evident at several locations including the field downstream of the blockstone weir (left bank) (Photo 8), and the two fields downstream of Hazlehead Hall (Photos 9 and 10). There is a distinct contrast between the quality of habitat in the sections where livestock access is restricted (where it is much better), and the sections where access is unfettered.

The grazing is leading to over-widening of the channel creating a uniform, shallow depth profile (Photo 9), and 'scalloping' of the bank between trees where they are present (Photo 10). This promotes erosion of the bank behind the trees, speeding up their rate of loss. This is of particular concern because, like the Thurgoland reach, many are mature alders suffering from *Phytophthora* disease (Photo 11). Unless some action is taken, it will not be many years before most of the alders on this reach are lost, with the predictable consequences of greatly increased rates of bank erosion.

As a consequence of such runaway erosion, the channel will widen and potential spawning habitat will be smothered by fine particulate material. This not only limits recruitment of current non-migratory trout populations, but also denies spawning opportunities if migratory salmonids were ever to be restored to the river. Coppicing of alders, replanting native tree species, and fencing a riparian zone to allow regeneration are the prescriptions required here.

The river channel has been modified in the past for milling; there is a weir in this reach (Photo 12), the leat from which would have powered Bullhouse Mill, and there are other weirs on the map further downstream. Weirs fragment fish populations and restrict migration for spawning, feeding, and accessing resting or feeding habitat. If these structures are redundant, their removal would be of immediate benefit to stream resident species like trout, grayling, bullhead and brook lamprey, and in the longer term to migratory species such as salmon and sea trout as they return to the Don catchment.

The channel has also been modified in places by the construction of bank retaining walls, usually on the outside of bends to revet the bank against erosion (Photo 13). This tends to fix the channel in position for a long time (decades), restricting the natural dynamic river processes of erosion and deposition which create depth variation (the natural pool-riffle sequence);

hence in some such areas the channel is a uniform shallow glide, with relatively poor trout habitat. Use of LWD in these areas can increase the variability of river bed topography and improve fish habitat (in a similar way to the example at Thurgoland – Photo 6).

In some areas UDFF have constructed some low stone weirs to create pool habitat (Photo 14). These have been designed to impound water behind them to create depth; this tends to be counter-productive because sediment can accumulate behind the weir leading to a loss of depth, and a smothering of valuable coarse substrates (gravel/cobble) with less desirable fine material (sand/silt). A better method would be to use designs that concentrate the flow downstream of the structure, scouring the river bed; this could be achieved with careful positioning of LWD, or with more engineered structures like K-dams or wedge dams (see recommendations).

The areas where the channel is wide and uniform, for example the field below Hazlehead Hall (Photo 15), could be improved by the use of LWD (arising from tree coppicing works) to narrow the channel, and to make groynes for promoting scour of the river bed.

UDFF have transplanted water crowfoot *Ranunculus* spp. to this reach with mixed success (Photo 16). It has taken in some areas, but in others it has been uprooted during flood events. Cutting the weed back in the autumn after its first season's growth will help prevent it being uprooted in winter floods. Indeed it may be worth regularly cutting back each clump throughout the year (by one-third to one-half) as a precaution against floods in this spatey river.

Photo 7 Ochrous minewater in the Cranberry Holes Brook

Photo 8 Intensive grazing leading to eroded banks (left bank); contrast with the fenced RHB.

Photo 9 Over-wide, over-shallow – very poor habitat as a result of livestock access to the river

Photo 10 'Scalloping' of the banks between trees

Photo 11 Tarry spots – a symptom of *Phytophthora* disease in alders

Photo 12 The weir constructed from block stone

Photo 13 A walled bank (far bank)

Photo 14 Weir constructed by UDFF to retain water levels and depth for adult trout (the centre has collapsed). A design to promote downstream scour, rather than retain upstream depths, would be better.

Photo 15 Wide and shallow – poor fish habitat

Photo 16 Water crowfoot *Ranunculus* sp. in the upper Don

4.0 Recommendations

Wharncliffe:

· Check EA fish survey records for this area (if available) to see how successful or otherwise juvenile trout recruitment is. This will confirm whether it is worth improving access and habitat in tributaries.

· Assess the tributary becks for access and habitat quality (spawning), and flow regimes from dams. Identify likely candidates for spawning habitat improvement.

· Contact the EA regarding the run-off from the spoil heaps on the left bank.

Thurgoland and Bullhouse – Hazlehead:

· Fence off the river banks to prevent livestock grazing the banks, and provide an alternative drinking source. This is particularly recommended on the upper river. The type of fencing required will depend upon what livestock are kept in the fields; cattle can be excluded with a 2-strand barbed wire fence, whereas sheep will require sheep-netting topped with barbed wire. The cost of the latter would be approximately £4 per metre, the former somewhat cheaper. Electric fencing would be cheaper, but requires more regular maintenance (battery changing), and is vulnerable to battery theft. Gates within the fenceline should be provided to allow for managed livestock access to control excessive growth and undesirable plant species on the riverside of the fence.

Provision for livestock drinking would ideally be with mains-supplied troughs. The capital costs of installing this would depend on the proximity of a mains supply, and the length of pipe that would need to be laid. There would be a small ongoing cost to supply metered mains water. Alternatively a designated drinking area could be created (Photo 17) with a stone base to the bed and banks to minimise sediment inputs. This would be sited to minimise river-borne debris accumulation.

Pasture pumps are another possible alternative; these lift water from the river or an adjacent sump area using either a cattle operated pump (the cattle push against a plate in their effort to get at water in a small trough, which primes and operates a small lift pump that replenishes the trough -

Photo 18), or a modern ram pump such as the Papa Pump (Papa Pumps, Unit 10, Efford Business Park, Vicarage Road, Bude, Cornwall EX23 8LT Tel: 01208 354454). A note of caution: the logistics of positioning them in a spate river and their suitability for sheep are uncertain.

Photo 17 Livestock watering point, Afon Aled, North Wales

Photo 18 Pasture pump

· Start a programme of coppicing alders to prevent their loss to *Phytophthora* disease. Ideally a seven to ten-year cycle of coppicing should be implemented, but given the extent of the disease observed it may be necessary to shorten the cycle to five years or less. Some key points of best practice when coppicing are listed in Appendix 1. One of the most important is to protect re-growth from grazing livestock (by fencing); if this is not done the new shoots will be eaten and the tree will die. Rather than coppicing blocks of trees, a random pattern to create a mosaic of light and shade is recommended.

· Native tree planting should be carried out to provide a succession of trees to replace the alders which have already been lost. Alternative species include ash, hazel, and willow species (particularly sallows such as *Salix cinerea* and *S. caprea*). Advice on species and sources of trees could be sought from the local Wildlife Trust.

Photo 19 Alders coppiced in 2004 on the River Dane, Cheshire...

Photo 20 ...and the same site in 2008.

Consideration should be given to improving fish passage at barriers like the sloping blockstone weir near Bullhouse (Photo 12). Ideally they should be removed, as this will not only facilitate fish passage but improve the ecology of the stream by restoring the slow-flowing impoundment to more natural flow conditions..

Not all obstructions can be removed, and a secondary option would be to look at improving fish passage with fish passes or easements; this would require site surveys and designs from a suitably qualified person. Such a consultant could prepare a preliminary overview of structures in the upper Don, highlighting priorities, options and costs for removal or improvement. It is recommended that UDFF liaise with the EA to see if any such work has been completed in the past, and if not, the possibility of initiating such a study.

It makes sense to address the issue of barriers on a catchment scale, and it is likely the EA will have considered this and prioritised structures for action; however, the focus is likely to be on larger weirs lower down the catchment. This does not preclude local groups like UDFF promoting local action

In the US, Trout Unlimited promotes the removal of small dams and provides support for local advocates. (http://www.tu.org/site/c.kkLRJ7MSKtH/b.3263791/k.2D58/Small_Dams.htm). It can be an emotive and complicated subject, but unless someone takes the initiative (as STA South Yorkshire Branch has done with issues of abstraction and minewater), then the degraded habitat caused by dams will remain.

· The club should adopt a policy of retaining LWD in the river channel wherever possible. 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 or extract the debris.**

Note: If the debris dam 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.

· Woody debris should be introduced to the river channel to create variation in channel width and river bed topography. This can be achieved in a variety of ways including anchoring whole or parts of trees within the channel (Figure 1); using brushwood to provide cover, protect eroding banks and promote channel narrowing; and more engineered structures (Figure 2) like wedge or K-dams, channel constrictors and cross-channel logs and deflectors (Hunt, 1993).

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.

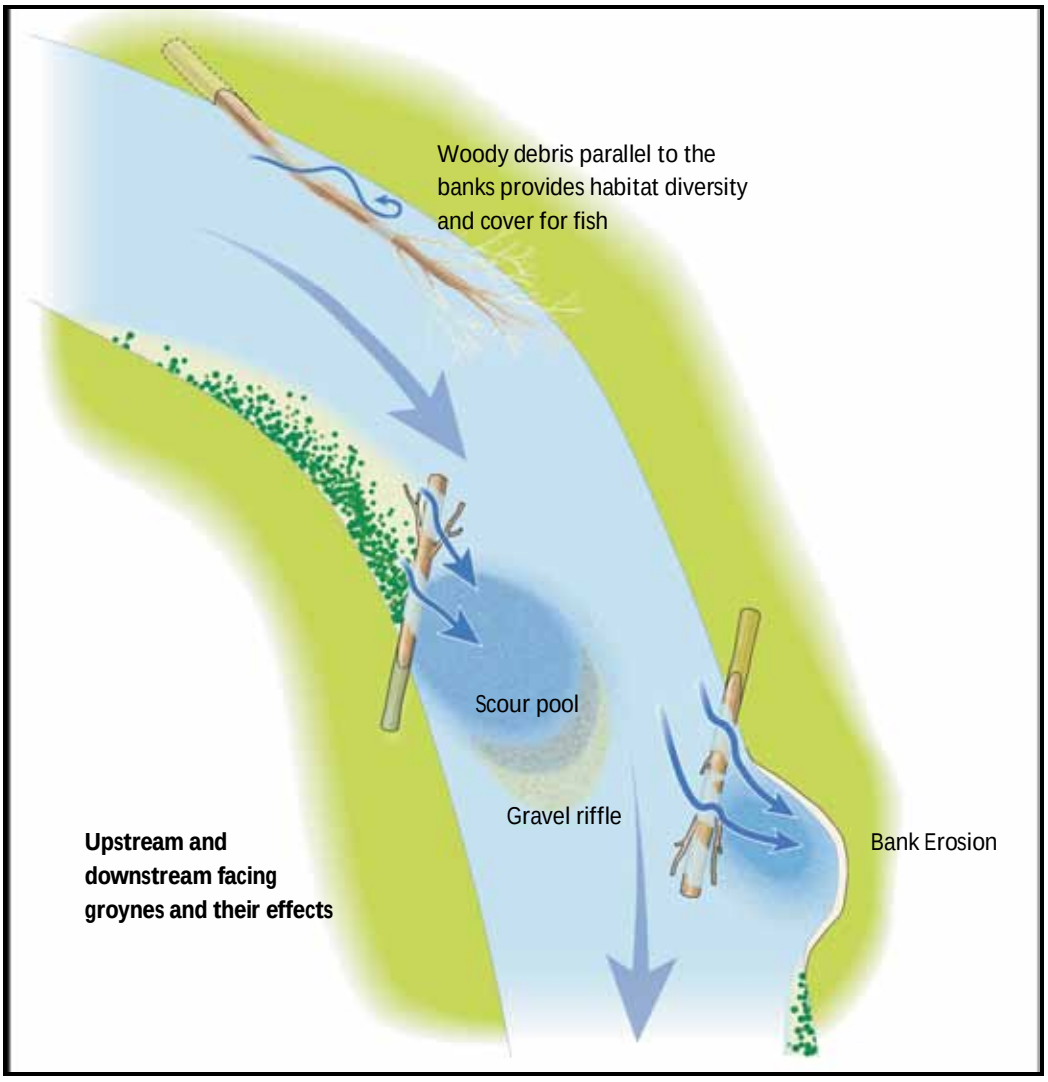

Figure 1 Examples of LWD positioned for channel narrowing, cover and bed scour. Downstream pointing groynes are generally best avoided to prevent bank erosion

Photo 21 Using a wood auger to bore holes in LWD

Photo 22 Fixing LWD in position with steel rebar

Photo 23 Whole tree anchored alongside the bank with steel cable to a standing tree (River Goyt, Cheshire)

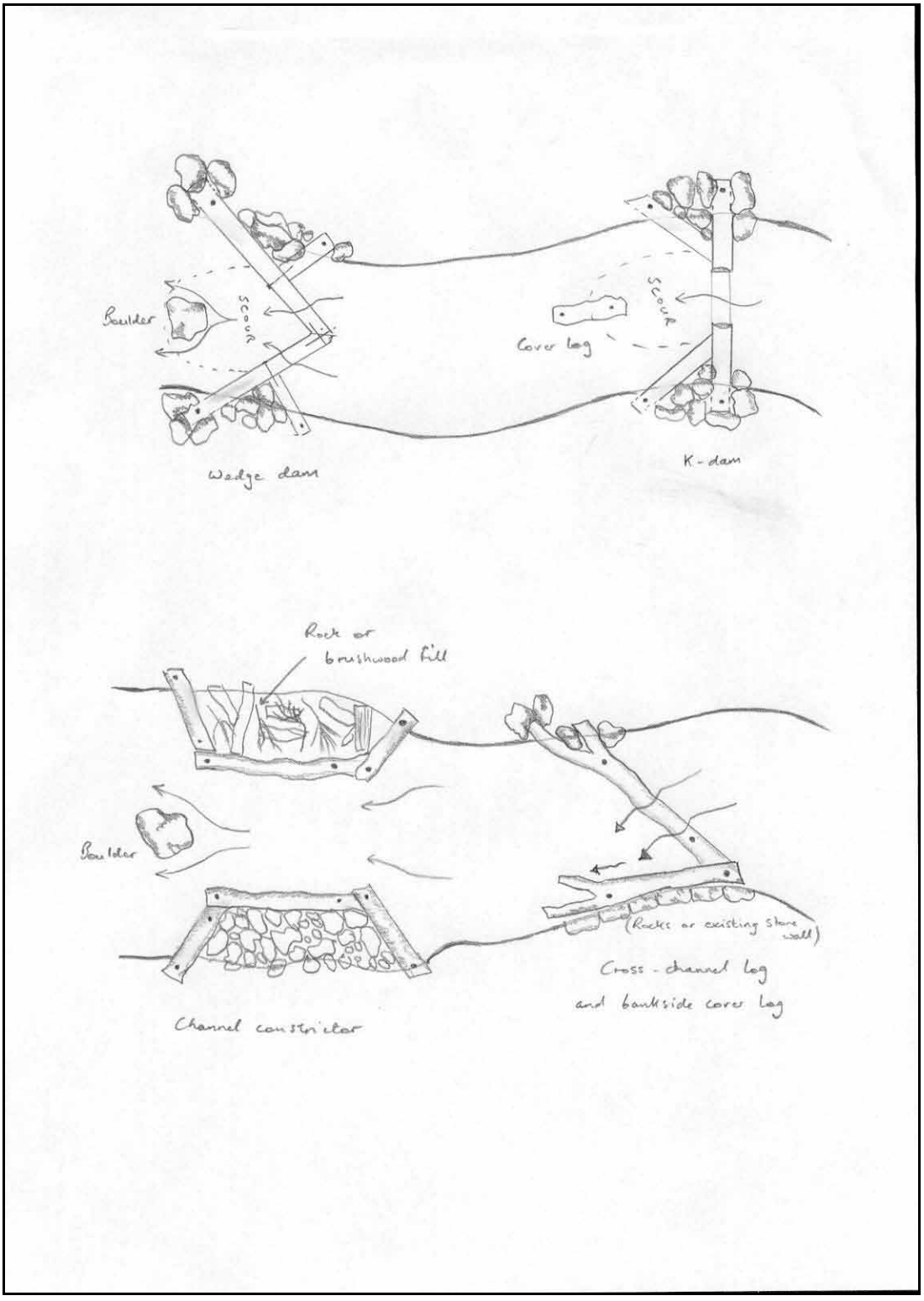

Figure 2 Schematic of more engineered structures – these would be most appropriate where the river is smaller (Hazlehead section).

5.0 Making it Happen

The WTT could help to start a programme to carry out these recommendations. Physical enhancement works could be started with the assistance of a WTT 'Practical Visit' (PV). PV's typically comprise a 1-3 day visit where WTT staff will complete a demonstration plot on the site to be restored. We will give you training regarding the appropriate use of conservation techniques and materials, including Health & Safety equipment and requirements. This will then give you the strongest possible start to carrying out the rest of the project.

The WTT can fund the cost of labour (two/ three man team) and materials (max £1800). Recipients will be expected to cover travel and accommodation expenses.

There is currently a big demand for practical assistance and the WTT has to prioritise exactly where it can deploy its limited resources. The Trust is always available to provide free advice and help to clubs, syndicates and landowners through guidance and linking them up with others that have had experience in improving trout fisheries.

6.0 Acknowledgement

The WTT are grateful to the Environment Agency for the support which made this advisory 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.

8.0 References

Firth, C (1997) *Domesday to the New Millenium – 900 Years of the Don Fishery* .Environment Agency booklet.

Hunt, R.L. (1993) *Trout Stream Therapy*. University of Wisconsin Press.

Appendix 1 – Good Practice Code for Coppicing

Coppicing of riparian trees during the winter is a traditional method of

management. This can benefit the river, the farm and the whole catchment area. One of the aims is to increase the amount of light falling on the banks and bed of the river to promote the growth of bankside grasses and aquatic macrophytes and algae. Coppicing should be planned on a minimum of a five to nine year cycle.

1. Before carrying out any coppicing a plan should be drawn up. For this the presence of protected species (including bats and otters) should be determined (see below), and their habitat requirements taken into account.

2. In heavily shaded sections, coppicing should be concentrated in fast flowing shallow 'riffle' areas with lighter work around the glides and pools.

3. Try to leave most of the remaining shading on the south bank along glides.

4. Coppice trees only from October to March and, in any case, well before they come into leaf in the spring.

5. Avoid cutting right back to old growth. Aim to cut to knee height, retaining at least 200mm of new growth. This helps promote good re-growth of the coppice stool.

6. Preferentially leave ivy covered trunks.

7. Leave old and dead trees unless dangerous. Very old or "veteran" trees provide valuable habitat for a variety of wildlife and can contain a rich lichen flora. Some bat species are known to roost under loose bark and in tree holes.

8. Do not take mature timber. It does not coppice well. Any trees with good holes, cavities, splits, or loose bark should be retained.

9. Do not use machinery in the river. There are risks of pollution from fuel, oils and silt associated with use of machinery, which could result in prosecution.

10. Do not damage riverbanks or tree roots with machinery as this may lead to additional erosion. Avoid the use of machinery within 3m of the bank edge or tree stems.

11. Do not work **in** the river between 1 October and 31 March to prevent disturbance to spawning trout, trout eggs and newly hatched fry.

12. Coppiced timber and brash can form valuable habitat for a wide variety of wildlife. Where possible, it should be used to create LWD in the channel, or stacked and secured in such a way as to avoid it washing away and either endangering fences downstream or accumulating on obstructions (bridges etc) and causing a flood risk. If material cannot be securely stacked then it should be removed from the flood plain completely. Should any material be burnt then this should be done no nearer than 50m to any other tree. In no circumstance should burning take place in the river channel. Ash must not be allowed to enter the watercourse.

13. Leave the stumps in the bank as they help to protect the bank from erosion and provide valuable habitat for fish. Tree roots also provide lying up sites for otters and nest sites for riverine birds such as grey wagtail and dippers.

14. Coppicing should be fenced to prevent damage to new growth from browsing stock.

15. Before working in areas with wildlife designations - Natura 2000 sites, Sites of Special Scientific Interest, National and Local Nature Reserves – you must first consult the relevant authorities, to avoid breaching wildlife legislation.

PROTECTED SPECIES

Many of the animals associated with river corridors (including bats, otters and dormice) are protected under Schedule 5 of the Wildlife and Countryside Act (1981), as amended by the Countryside and Rights of Way Act (2000) (CROW 2000) and The Conservation (Natural Habitats, &c.) Regulations 1994. This now extends the offence in section 9(4) of the 1981 Act to 'subject to the provisions of this Part, if any person intentionally or recklessly kills, injures or takes any wild animal included in Schedule 5, he shall be guilty of an offence.

BATS

All work that may affect bats should be discussed in advance with Natural England as a bat licence is required to survey (licensed consultant/bat worker) or carry out work on roost sites (DEFRA license). Under the Bonn Convention (Agreement on the Conservation of Bats in Europe) the UK is also required to protect their habitats, requiring the identification and protection from damage or disturbance of important feeding areas.

Bank side trees form important habitats for bats, as certain species are dependent on trees. Check trees for signs of bat roosts:

· obvious holes, cavities and splits in trunks and limbs

· dark staining on the tree below a hole

· staining around a hole caused by the natural oils in bats' fur

· tiny scratch marks around the hole from bats' claws

· droppings below a hole - they look similar to those of rodents but crumble to a powder of insect fragments

· noise (squeaking or chittering) coming from a hole

· check holes by inserting a mirror and watching the hole at dawn or dusk

· bats will also roost behind loose bark, which should be checked similarly.

If a roost is identified or suspected a more detailed inspection must be undertaken by someone with the relevant experience and correct license to assess, obtain and implement a DEFRA license where tree roosts will be damaged or lost. Whether bats are found or not, any trees with good holes, cavities, splits, or loose bark should be retained. An assessment should be made of the impact the work will have on bat roosts, feeding habitats and commuting routes before determining the final coppice plan, which may require alteration to accommodate the requirements of the bats.

OTTERS

Otter holts are found in cavities in large tree root systems, so any work on trees should be preceded by a root inspection. If a holt or lying-up place is *identified or suspected* a more detailed inspection must be undertaken by someone with relevant experience to ascertain whether otters are present. Coppicing should be carried out so that the coppice cut is taken some height above the stool, to allow for the protection of the cavity. Otter holts are protected by law and a licence may be required if disturbance is likely. All such works should be discussed and agreed with Natural England before proceeding.