Water Framework Directive Investigation

Barlow Brook

Waterbody - GB104027057700

May 2012

1.0 Introduction

This report is the output of a site visit undertaken by Gareth Pedley of the Wild Trout Trust to the Barlow Brook, near Chesterfield, Derbyshire on 4th May, 2012. Comments in this report are based on observations on the day of the site visit and discussions with Richard Ward (Joint Fishery Owner of the Middle section of the waterbody – Barlow Brook Flyfishers). Data was also gathered from Jerome Masters (Environment Agency Fisheries) and Dan Smallwood (Environment Agency Analysis and Reporting) in the form of fisheries, and invertebrate and diatom investigation reports, the Cause of Fish Failure in Barlow Brook report and the Barlow Project Capture Report.

Normal convention is applied throughout the report with respect to bank identification, i.e. the banks are designated left hand bank (LB) or right hand bank (RB) whilst looking downstream. Location coordinates are given using the Ordnance Survey National Grid Reference system.

2.0 Catchment / Fishery Overview

The Barlow Brook is a tributary of the River Drone, which forms part of the River Don and Rother catchment. The section of Brook subject to this advisory visit is from Highlightley Lane (SK3263576043) downstream to the River Drone (SK3726974962). This section was chosen to incorporate the upper three survey sites, where fish densities were not considered to be a significant issue, in addition to the four lower sites where issues are suspected. Water Framework Directive (WFD) details regarding the waterbody and its status are shown in the table below.

Water body classification (2009)	
Bad	
Poor	Invertebrates, Phytobenthos
Moderate	Fish
Good	Hydrology, Morphology, phosphate
High	Ammonia,DO,temperature, copper zinc
Comments	
The Failure is based on data attained in 2006	

Barlow Brook from Source to River Drone	
Waterbody ID	GB104027057700
Waterbody Name	Barlow Brook from Source to River Drone
Management Catchment	Don and Rother
River Basin District	Humber
Typology Description	Low, Small, Calcareous
Hydromorphological Status	Not Designated A/HMWB
Current Ecological Quality	Moderate Status
Current Chemical Quality	Does Not Require Assessment
2015 Predicted Ecological Quality	Moderate Status
2015 Predicted Chemical Quality	Does Not Require Assessment
Overall Risk	At Risk
Protected Area	Yes

The Environment Agency (EA) have assessed the elements contributing to an overall moderate status for this waterbody are fish (Moderate status), and invertebrates and phytobenthos (Poor status).

The brook falls within the Derbyshire Peak Fringe and Lower Derwent Natural Area. The predominant geology of the area is shales, gritstone and sandstones of the Millstone Grit Series. (www.naturalareas.naturalengland.org.uk/Science/natural/NA_search.asp). The sediments resulting from erosion of this geology tend to have a high proportion of sand, which has an influence on the composition of the river bed and hence in-stream habitat. Boulder clays also have a significant influence on the overlying soils and contribute to fine sediment loading of the watercourse.

Water quality impacts are reported to be sedimentation and the consented discharge from waste water treatment works (WWTW), which is believed to be the source of elevated phosphate levels in the Brook below the discharge. The whole brook catchment lies within a Nitrate Vulnerable Zone Deferred Slurry Storage Area.

3.0 Habitat Assessment

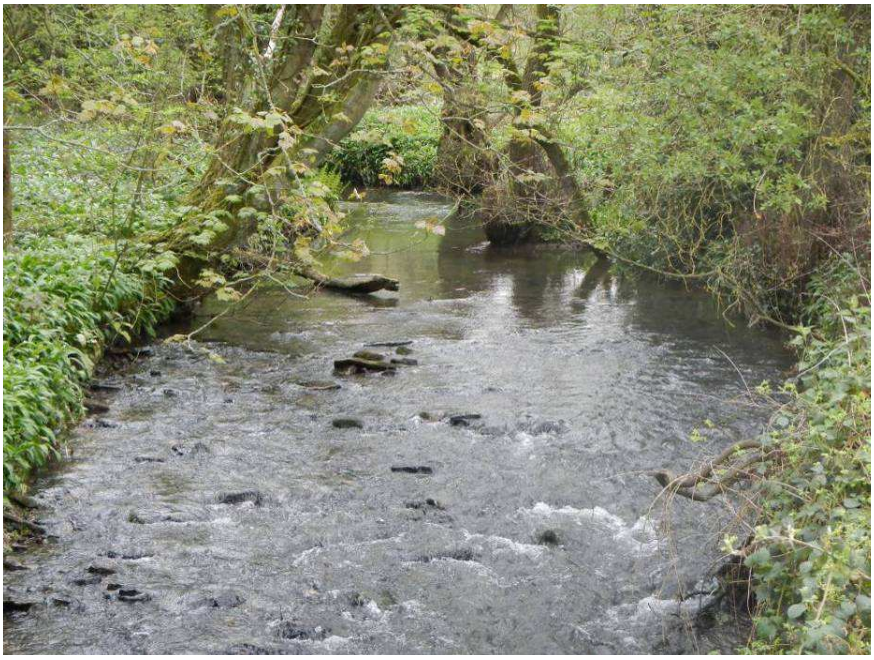
3.1 Upper Section - Highlightley Lane (SK3262376057) to Crow Hole (SK3362675800)

Before commencing the walkover, spot checks were undertaken along Highlightley Lane to provide a brief assessment of the watercourses contributing to the Barlow Brook. This assessment revealed an unnamed tributary, too small to provide significant habitat for trout populations and that the Black Carr Brook although small, had potential as a spawning and nursery area for salmonids, with suitable sized, relatively clean substrate (Picture 1).

Picture 1. Salmonid spawning and juvenile habitat available on the Black Carr Burn.

Investigation of the Barlow Brook downstream of Highlightley Lane revealed a watercourse with high quality physical salmonid habitat. The Brook exhibited a naturally meandering planform with an abundance of morphological and structural features with even short sections providing most of the habitat features required for the full trout lifecycle (Pictures 2 & 3).

Picture 2. Excellent trout habitat provided by low-level cover from roots and branches.



Picture 3. Healthy river channel with natural pool and riffle sequence and an abundance of marginal and aerial cover.

The water was relatively clear (indicating no major sedimentation locally) and displayed a healthy diversity of flow characteristics. The substrate was of a very high quality for trout spawning, being loose and free of fine sediment, with plenty of material in the 10-40mm range (again suggesting no major sediment issues at this point). The natural, un-impacted morphology of the Brook in this section facilitates an appropriate ratio of scour and deposition, which coupled with a healthy abundance of woody debris (WD) are undoubtedly contributing to the natural gravel sorting (Picture 4) and glean gravels.

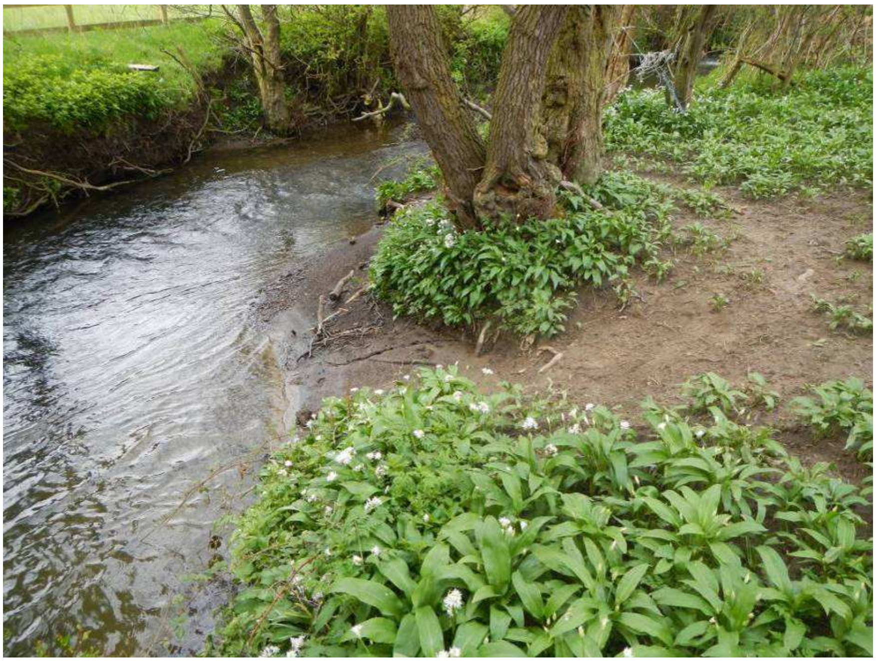
Picture 4. Clean naturally sorted bed material, ideal for salmonid spawning.

Continuing downstream high quality habitat capable of facilitating healthy populations of all the fish species expected to be present was observed, with many areas displaying the type of habitat shown in pictures 2, 3 & 5. However, on a watercourse with such high quality habits it was surprising that neither personnel participating in the walkover saw a single fish, or any sign of fish feeding in the upper 1.6km walked. A kingfisher and heron were spotted, which would suggest the presence of some fish.

Picture 5. Another example of the high quality habitat throughout the upper section of this reach.

There were in fact few issues observed within the upper section, although a small amount of poaching was evident where livestock had access to the watercourse, but even this was usually limited to discrete watering points (Picture 6). The impact of this is likely to be low due to the small extent, but will contribute some sediment input to the system and could be prevented by installing hard standing around restricted watering points, or installing an alternative water source (e.g. trough fed from the river or pasture pump).

The issues considered to be a significant impact on the upper section are the barriers. These range in size, but five consisted of telegraph pole gravel check weirs (SK3290875913, SK3302175842, SK3303475835, SK3307775830, SK3352575731), all similar to the one shown in picture 7. Although only likely to be an issue to 0+ fish, they could be turning the Brook into a one-way, downstream conveyor for those individuals. In addition they are also restricting the natural transportation of bed materials.



Picture 6. Small area of erosion resulting from stock access.

Picture 7. One of five gravel check weirs, which pose an obstacle to 0+ trout and smaller species (bullhead and lamprey etc). Without these, spawning substrate would be better distributed throughout the reach, potentially in more beneficial locations, without the impact of impounded water.

There were also three larger barriers on the Barlow Brook. One, a c.0.45m slotted concrete weir, which poses a significant barrier to smaller trout and smaller species (particularly lamprey) at most flows (Picture 8, SK3351675733), and two very large barriers, 2-3m high, which are impassable to most fish at most flows; one at (Picture 9, SK3341275705) and the other at the upstream limit of the fish farm (Picture 10, SK3364075748).

In addition, there was another impassable barrier on Crow Hole Brook, the tributary that joins Barlow Brook near the western end of Highlightley Lane (Picture 11, SK3361675713). The substrate of this watercourse appeared to be of a suitable size for trout spawning and it could be a significant loss as a spawning tributary.

Picture 8. Concrete weir with notch. This structure was relatively low, but flow velocities within the notch greatly limit its passability.

Picture 9. The first major weir encountered, posing an impassable barrier for all species at most flows. This weir, in conjunction with the one downstream (Picture 10) is likely to completely isolate the Upper Section of this waterbody from the downstream sections.

Picture 10. Large weir that is impassable at most flows, only likely to be passable by some larger salmonids at higher flows. This structure isolates the majority of the fish populations within the Lower and Middle Sections from the good quality habitat of the Upper Section.

Picture 11. Barrier just upstream of Barlow Brook on Crow Hole Beck.

Habitat in this upper section is generally of a high quality, with all the physical habitat requirements for a healthy trout population present. However, the trout populations in the whole of the upper river are likely to be compromised by a lack of habitat continuity and the prevented access created by the weirs. It also precludes the spawning/recruitment potential from fish populations throughout the river system downstream, as they are unable to migrate past the weir.

One other issue of note was the presence of a serious non-native invasive plant species, the North American skunk cabbage (*Lysichiton americanus*), recorded at SK3355875724 (Picture 12).

Picture 12. North American skunk cabbage.

3.2 Middle Section - Crow Hole (SK3362675800) to Cobnar Wood Weir (SK3556375522)

In this section the river and riparian trees were subject to a greater degree of management. The habitat was generally of a lower quality due to the fact that much of the WD types observed upstream had been removed from the channel. In many areas, tree limbs had also been removed, presumably to increase angler access and light to the channel. This does not necessarily compromise trout habitat quality, but where low-level cover and WD are removed within a straightened channel with a reduced presence of pool and riffle, it can begin to impact on habitat availability.

Three further significant sources of sediment input were observed in the location of the fish farm and fishery (SK3374175758, SK3383475678 and SK3398475618), where access tracks ford the brook. The issue is not limited to the fording points as the approach tracks also appear to be acting as a conduit for runoff and sediment entering the Brook (Picture 13). From around this area there was a notable increase in the fine sediment levels observed on, and within the substrate (Picture 14). It is also known that the during development of Crow Hole Reservoir, prosecutions were brought due to sediment pollution, and the Crow Hole Brook discharges to the Barlow Brook in this area. Residual sediment from this issue may still be having an impact both here, and throughout the waterbody downstream.

Sediment impacts have greatly degraded spawning habitat in this area, leaving it silty and less mobile. There was also a general reduction in the level of 10-40mm substrate observed throughout this section, likely due to the lack of supply past the weirs upstream.

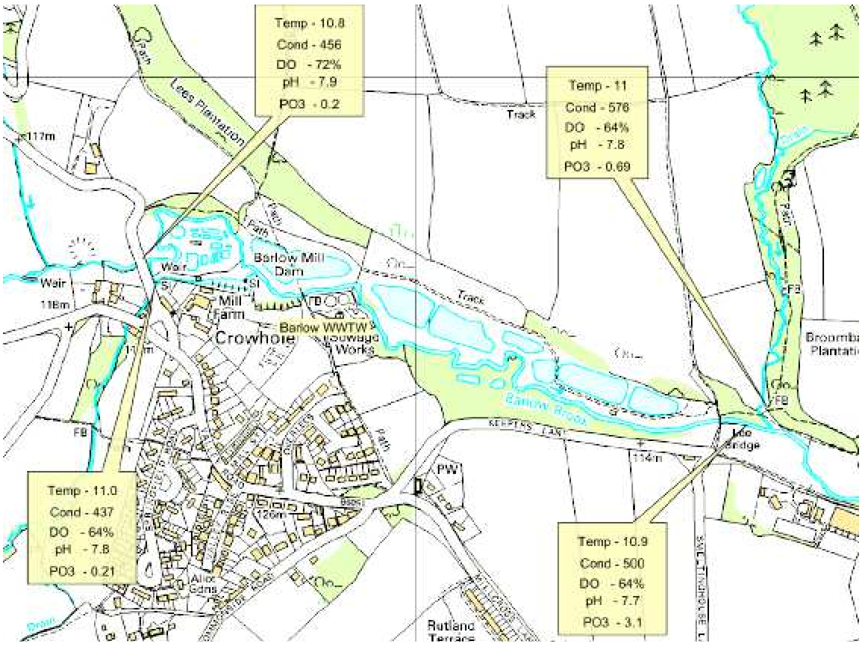
Compromised spawning substrate is always a significant issue, but in this instance it is even more so, as the impassable weirs upstream prevent access to and utilisation of the better quality habitat upstream, not just for spawning but all life stages. For this reason, it is considered that the weirs pose a significant issue to trout stocks on the river, in addition to the issues of sedimentation and enrichment (phosphate). Consequently, full removal of all these weirs should be investigated.

Picture 13. Fording point leading to bank erosion and supplying sediment from the access tracks.

Picture 14. Notable increase in the level of sediment accumulating in the river margins and within the bed material.

The channel is also subject to significant historical straightening as the Brook now follows a notably straight course alongside the fishery. This is likely to be exacerbating the issues with sediment as a naturally meandering pool and riffle sequence has a greater capacity for storage of sediment within the pools and sorting of gravel riffles. The removal of WD in this area will also be reducing the Brook’s natural ability to sort and clean gravels.

The waste water treatment works (WWTW) in this section (along with Holmesfiled WWTW downstream) is suspected to be the source of elevated phosphate within the Brook, as indicated by levels which increase from 0.2 and 0.21mg/l upstream of the works, to 3.1mg/l downstream (Picture 15). This does not, however, take into account that the fishery and fish farm effluent could also be contributing to elevated phosphate levels, as both the WWTWs and fish farm discharge between the same two sample points (Picture 15). While the WWTWs are likely to be the primary issue it is also worth considering that the fishery complex could also be contributing.



Picture 15. Both the WWTW and fish farm/fishery complex discharge within the section of the Barlow Brook in which the elevation of phosphate occurs.

In addition, significant, plainly visible algal growth on the riverbed was first noted at SK3405275597 (Picture 16), which is upstream of the fishery outlet, but downstream of the WWTW and fish farm (and possibly the fish farm outlet). This could also be associated with increased nutrient levels.

Picture 16. The first area of algal growth observed on the Bed of the brook in either of the upper two sections, observed downstream of the WWTW and fish farm.

Downstream of the fishery further sediment input issues were identified from the track over Lees Bridge, which was supplying surface runoff directly to the Brook (Picture 17, SK3446875503). This could be addressed by diverting the runoff to a better vegetated area of ground, or a purpose-dug soak away.

Continuing downstream, Holmesfield Brook is a potential spawning tributary with substrate suitable for salmonids. Unfortunately, the Brook is also compromised by sedimentation issues, likely to inhibit its contribution to recruitment (Picture 18). A quick glance on the Brook, upstream of the Barlow Brook confluence, revealed issues that could be reduced by livestock exclusion, thereby improving its potential (Picture 19).

Picture 17. Sediment pathway to the Brook from Lees Bridge. Obvious signs of direct runoff to the Brook were observed at this point, compounding sediment issues from upstream.

Picture 18. Obvious signs of sedimentation on the Holmesfield Brook, which could otherwise serve as a valuable spawning tributary for the Barlow Brook.

Picture 19. Sediment sources through livestock pressure on the banks of the Holmesfield brook.

Further issues with livestock poaching and trampling were encountered downstream, wherever livestock had access, but specifically between SK3458775416 and SK3478075371, and between SK3505175424 and SK3542575533. This is another fine sediment source to the Brook and adds to the problems already impacting the watercourse upstream. The issue is particularly bad in areas where stock have access to both banks (Picture 20, SK3470475348). It is likely that the fording point is being used as sole access to the opposite bank and it may be hard to prevent this. It may however be possible to install hard standing, or encourage fencing of the watercourse, with access gates to allow more restricted access for fording.

If access in these sections could even be restricted to one watering point per field the problem could be reduced. Alternatively, creating areas of hard standing at the watering points, or arrangement of alternate water supply to troughs or pasture pumps, depending upon the location, would be greatly beneficial.

Picture 20. Unrestricted livestock access to both banks, where the river is being forded, leading to increased siltation.

Areas of good quality trout habitat were available in this section. However, the issues of barriers upstream and within this section are likely to severely limit the full utilisation of all habitats available within the Barlow Brook. This is particularly pertinent when considered that this reach is fragmented by reduced passability at small weirs (Picture 21, SK3538375433), and isolated from the Upper Section (Picture 10) and Lower Section (Picture 22, SK3556375522) by large impassable weirs.

These weirs should all ideally be addressed if the full potential of the Barlow Brook is to be realised. Installation of fish passes would help but the removal of the weirs would provide greater passability, remove the impoundment and reinstate gravel continuity through the system.

This reach was also the first place that Himalayan balsam was observed, at SK3545475492 (picture 23), although at the current stage of growth it is possible that other areas upstream were missed.

Picture 21. Small concrete V weir greatly reducing passability for juvenile trout and smaller species.

Picture 22. Major impassable barrier isolating the Lower Section from the Middle and Upper sections.

Picture 23. The first stand of Himalayan balsam observed on the watercourse.

3.3 Lower Section - Cobnar Wood Weir (SK3556375522) to River Drone (SK3726974962)

Downstream of Cobnar Wood Weir the character of the Brook changes significantly, entering c.200m of straightened channel. This is further exacerbated by the prevention of substrate transport past the weir. This result is a deeply incised channel, with an absence of deeper pools and a predominantly cobble substrate, lacking in smaller, salmonid spawning size gravel (Picture 24). The incision of the channel has also exposed large areas of bank to erosion, increasing siltation of the watercourse.

Picture 24. Deeply incised channel lacking in cover through an absence of pools and low-level cover. Due to the lack of supply and fluming effect within the incised channel most of the smaller salmonid spawning sized substrate has washed out.

Downstream, there is little sinuosity for the remainder of the waterbody, with the Brook incised and constrained between the industrial estates on either side.

Where small bends occurred (Picture 25) and bank-side trees create flow deflection (Picture 26), the in-channel habitat improved through scour and pool creation, but a general lack of spawning sized substrate remains. This is likely due to the reduced supply from upstream and the constrained channel flushing out much of the smaller gravels won via erosion. Where sheltered areas occurred, some areas of spawning sized substrate were retained, but suffered from sedimentation issues (Picture 27).

If the level of WD and bank-side trees could be increased to improve flow diversity the habitat could be improved and trout habitat increased. This would however be enhancement of a heavily modified system and by no means returning it to an un-impacted state.

Picture 25. Localised scour and cover provided by WD/bank-side trees.

Picture 26. Increased sinuosity provided by trees, creating flow deflection on a heavily straightened section of the Brook.

Picture 27. Sediment liberated from potential spawning substrate.

Within this section Carr Wood Road crosses the Brook twice. The upper Culvert poses no major problems, but the Lower crossing creates an area of shallow water above a long stepped weir (Picture 28). This is another very significant barrier to fish passage, impassable by most species in most flows (probably a complete barrier to eels).

As removal of this structure is infeasible, due to the impacts on the road bridge and bank stability, the ideal solution would be to convert the stepped weir face into a rock ramp/rock chute type fish pass, thereby making it passable by most species. This is unlikely to compromise the integrity of the structure and should actually increase flow dissipation through the baffling effects of the rocks.

Numerous outfalls were also present throughout this section, as would be expected from an industrial area. On the day of the walkover most of these were relatively clean (possibly surface drainage), although one appeared to be a potential source of further enrichment/pollution (Picture 29, SK3577675507).

Picture 28. Stepped weir with very poor passability due to a lack of water depth. Conversion to a rock ramp would greatly improve passability.

Picture 29. Possible pollution source.

Two tributaries were present along this section; however, only the Sud Brook was considered to have potential for spawning, and even so, had a large impassable weir a short distance up from its confluence with the Barlow Brook that would need to be addressed (Picture 30). The substrate in Sud Brook appeared to be of a suitable size for spawning, if a bit silty, but later assessment of local maps suggests that it may also be culverted for a long section above the weir. The water quality is also unknown and it is suggested that this is investigated before any other potential improvements are considered.

Picture 30. Impassable weir on the Sud Brook. This tributary may have potential as a spawning tributary, but has several potentially large issues.

4.0 Conclusions

In addition to the known phosphate issues, the two known weirs, and sedimentation issues already identified by the EA on this waterbody, this investigation has also identified major impacts on the potential spawning tributaries, spawning substrate supply, and prevented access to the high quality habitat upstream through numerous small, and two major weirs. All of these factors are likely to have a significant impact on the resident fish populations and status of the waterbody.

The next stage must be a prioritisation of the order in which these issues are addressed. Phosphate, at the levels recorded, is certainly a primary potential impact on the waterbody, and waterbodies downstream, but is outside the scope of fisheries work and will need to be followed up within the relevant EA team.

It is therefore the finding of this investigation that highest priority factor affecting the Barlow Brook is the weirs, both from a fish passage perspective, and substrate supply. It could be argued that the sedimentation issues are equally significant, but with removal of the weirs fish populations would at least be able to access and utilise the good quality spawning and juvenile habitat available in the upper reaches. In addition, under the current scenario, the fish population of the upper sections are at risk through isolation, with little or no recruitment possible from individuals downstream. Should a pollution incident impact on those fish it would be very hard for recolonisation to occur. It may be that historic incidents have already impacted on those populations.

A major complication is the decision about which end of the system to address the fish passage issues first. Ordinarily, fish passage issues at the downstream end of a waterbody would be dealt with first; however, in this case it may be that addressing issues in the upper reaches and working downstream would give the greater benefit to fish stocks. This would increase the length of river with access to the higher quality habitat, and improve downstream habitats through improved supply of bed material. Tackling the downstream issues would only serve to open a greater length of the poor habitat until fish passage at all of the weirs is improved.

Sedimentation issues should also be tackled, in conjunction with the improvements to fish passage. Visual and physical inspection during the walkover confirmed a cumulative impact of sediment along the course of the waterbody, particularly from Crow Hole downstream. This observation is also supported by higher than expected levels of motile diatoms recorded in EA surveys downstream, which in the absence of filamentous algae often indicates an issue with fine sediment reducing light penetration.

EA spawning riffle assessment suggests no major problems with the substrate embeddedness. This was not the case at multiple locations throughout the Middle and Lower Sections, where many areas were severely compacted and the more mobile gravels contained high silt content. There were no spawning areas in the Middle or Lower Sections anywhere near the quality of those in the Upper Section, and in many of the spawning areas (i.e. riffles and tail of pools), particularly in the straightened reaches, the substrate was too coarse for small river resident trout to fully utilise.

Macroinvertebrate samples suggest that sediment is not an issue in at the Sheepbridge site; however, the issues with sediment are realised in slower flow areas, and the constrained straightened channel throughout much of the lower section of this waterbody is likely to keep much of the finer sediment mobile, with accumulation only occurring in the few areas that other finer substrate (like spawning gravels) occur. The straightened lower sections did have a notable shortage of gravel in many areas, due to a combination of channel dynamics and lack of supply.

Again, for the reasons discussed, starting at the upper issues and working downstream may deliver the greatest benefits. In this way the strength and extent of the fish populations can be increased. Once a healthy population is established and full habitat utilisation occurring, recruitment in the upper sections should start to seed the lower reaches.

Improvements to the tributaries in the lower reaches could potentially provide some of the habitat that is lacking, but there would still be significant areas of deficiency. There is a similar scenario with the physical habitat improvements that could be undertaken on the straightened and impounded areas of the lower section. This work could improve the habitat available to juvenile and adult fish, but would not address the substrate issues (spawning substrate supply and sedimentation), which are considered to be the overriding habitat deficiencies.

The main issues with delivery of the required work are likely to be financial constraints, as weir removal is an expensive process. Exclusion of livestock from a watercourse can also be a drawn out process, relying upon long-term negotiation with landowners and tenants and this is something that would need to be ongoing.

5.0 Recommendations

The following steps should be undertaken in order to progress a restoration project for this waterbody:

- Undertake removal of the small weirs in the upper section. This is likely to low cost as, due to their wooden construction. This may be a task that the local angling clubs or a Rivers Trust could undertake.

Description	Picture	NGR
Log Weir	Similar to 7	SK3290875913
Telegraph Pole Weir	7	SK3302175842
Telegraph Pole Weir	Similar to 7	SK3303475835
Log Weir	Similar to 7	SK3307775830
Stone Weir	Similar to 7	SK3352575731

- Removal of the major weirs, shown in table below, starting at the upstream extent. A basic map of weir locations can also be seen in appendix 3.

Description	Picture	NGR
Concrete Notch Weir	8	SK3351675733
Impassable Stone-sett Weir	9	SK3341275705
Concrete Faced Weir	10	SK3364075748
Concrete V Weir	21	SK3538375433
Cobnar Concrete Weir	22	SK3556375522

Removal of these weirs will be large-scale works, and likely to be most appropriately tackled as an EA fisheries project or by a competent Rivers Trust, with a likely cost of around £10-40k depending on individual size and site access.

The exception being that some could possibly be tackled by an angling club with EA support (Pictures 8, 9, 21 & 22); these type of structures have been tackled by angling clubs before, with a good example on the Cong Burn, Co Durham (Appendix 1). On the Cong Burn, a weir was removed, along with installation of 120m of culvert baffles for c. £20k (from recollection c.8k was for the weir removal). By this standard it is anticipated that the smaller weirs in question of the Barlow Brook could be tackled for £<10-20k each, with a local contractor possibly taking on the work as a job lot for a reduced price.

With suitable EA technical support it may be that even the larger weirs could be worked into collaborative projects with local stakeholders. However, it may be necessary to assess the potential impacts of natural bed re-grading that could occur upstream of the weirs post removal, particularly on the two larger weirs.

Other options that could be undertaken at the Cobnar Wood Weir is the reinstatement of some of the original Barlow Brook course, which appeared to originally take a large meander loop in the area of the current ponds. Reinstatement of this channel may be infeasible, due to later developments, but if a possible course remains, or new course could be created, this could avoid the requirement for weir removal and reinstate a longer section of natural watercourse.

An alternative solution on the Large Stepped Weir that could improve fish passage for larger species could be installation of a series of timber baulks, to create pools along the invert of the weir. Notches within the baulks could be provided to increase its passability at lower flows and for some smaller species. This would be a much cheaper design and easier to install than a rock ramp, but would be much less passable for smaller juvenile resident trout, and smaller species (minnow, bullhead, stone loach, lamprey and eels).

- Modification of Stepped Weir and Culvert (conversion to a rock ramp)

Description	Picture	NGR
Impassable Stepped Weir and Culvert with shallow water	28	SK3628175284

Design of a large scale rock ramp or rock easement type pass will require consultation with, and approval from the EA's Fish Pass Panel, but a cursory assessment of the area available and gradient suggests that it could certainly be used to create a pass/easement <10%. This is outside the Fish Pass Manual guidelines of 1-5%, but a rock ramp of c. 10% has been effective for sea trout in Wales.

An easement of similar dimensions was also installed at Ebchester on the River Derwent in Co. Durham, in conjunction with a weir restoration project by the local Council (Appendix 2. – cost, c. £13k). The passability by trout is not officially known, but it significantly improves the potential for trout to ascend the weir. Anecdotal evidence from locals is that trout now ascend the easement pre-spawning time, and minnows were observed ascending during its construction.

Another option would be to extend the pass downstream, or meander it across the width of the weir, to increase the length of the pass. The latter option could be more passable in low and medium flows, but would become supercharged at higher flows.

The main issues with this type of solution would be the cost, and site access for machinery. The substrate of the pass is also likely to require some form of pinning or concreting to the bed of the weir to secure the pass. It is, however, still considered that as removal is not possible, a rock type pass presents the optimal solution. A further point of note is that while causing some issues for fixing the pass, the concrete base may actually reduce the volume of flow lost through, rather than over the pass, thereby reducing the level of requirement for lining.

- Sediment input reduction

There are multiple locations within this waterbody that sedimentation issues need to be addressed, both through disconnection of surface pathways and livestock exclusion/buffer fencing from the riparian zone.

Impact	Description	Picture	NGR	Action
Low	Small area of erosion associated with livestock watering point	6	SK3311275840	Install Buffer Fencing on grazed fields restricting access to one point/install alternative water supply
High	Ford and access track	As 13	SK3374175758	Formalise access track and reduce usage if possible
High	Ford and access track	As 13	SK3383475678	Formalise access track and reduce usage if possible

High	Ford and access track	13	SK3398475618	Formalise access track and reduce usage if possible
Medium	Runoff from track/path	17	SK3446875503	Disconnect surface runoff from Brook
High	Erosion through livestock access Holmesfield Brook	19	SK3451075510	Install Buffer Fencing on grazed fields restricting access to one point/install alternative water supply
Medium	Livestock access to the watercourse leading to erosion and cumulative sediment	20	SK3458775416 - SK3478075371	Install Buffer Fencing on grazed fields restricting access to one point/install alternative water supply
Medium	Livestock access to the watercourse leading to erosion and cumulative sediment	As 20	SK3505175424 - SK3542575533	Install Buffer Fencing on grazed fields restricting access to one point/install alternative water supply

- Investigation of a possible additional pollution source at SK3577675507 should be undertaken (Picture 29).

- In-stream habitat works

  The installation and creation of in-stream habitat features, such as WD, tree kickers and flow deflectors if something that the Wild Trout Trust could undertake in conjunction with local angling clubs and Rivers Trusts. There would be benefits from doing this, for older juvenile trout and adult trout, but unless the other more serious issues are addressed the impact is likely to be very low, possibly undetectable, as a lack of spawning habitat availability and fish passage is seen to be the major limiting factor.

Richard Ward (Mob. 07753937707), of Barlow Brook Flyfishers has stated that he is happy to act as a contact in relation to any potential project or works arising from this report.

6.0 Acknowledgement

The Wild Trout Trust would like to thank the Environment Agency for the support which made this visit possible and Richard Ward for his participation on the walkover assessment.

Appendix 1

Weir on the Cong Burn before removal by Chester Le Street Angling Club.

Site of the Weir on Cong Burn after removal.

Appendix 2

Rock easement on the River Derwent Co. Durham.

Appendix 3


Far
Common
Lees
Plantation
Concrete Faced Weir
Concrete Notch Weir
Impassable Stone-sett Weir
Crowhole
Valley Road
Keepers Lane
Common
Side
Barlow Common
Commonside Road
Millcross La
Smeltinghouse Lane
The
Towers
124
Broombank
Plantation
Millbrook
Farm
99
Monk Wood
Monkwood
Farm
Cobnar Concrete Weir
Concrete V Weir
106