Advisory Visit

Sutton Brook, Derbyshire

April 2013

1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the Sutton Brook, Derbyshire on 25th April, 2013. Comments in this report are based on observations on the day of the site visit and discussions with Gary Anderson, Roger Bate, Adrian Lancaster and Don Stazicker of Blount Fly Fishers.

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 Sutton Brook is a tributary of the River Dove, its headwaters (primarily the Shirley and Brailsford Brooks) rising to the south east of Ashbourne and flowing south to confluence with the lower Dove near Egginton. Blount Fly Fishers have approximately 3 miles of fishing between Longford and Sutton on the Hill (Figure 1).

The brook has a moderate gradient of approximately 1 in 1000 and flows over a geology of Mercia mudstone with superficial deposits of alluvium and river terrace material; this is reflected in the bed substrate which is predominantly gravel. The brook falls within the Needwood and South Derbyshire Claylands Natural Area (http://www.naturalareas.naturalengland.org.uk/Science/natural/NA_search.asp). Land use in the catchment is predominantly agriculture with a mix of arable and livestock farming.

Under the Water Framework Directive, the brook is divided into two waterbodies; the upper catchment (waterbody ID GB104028052870), including Blount waters, is classified as being in good status. The lower catchment (GB104028052400) is moderate status because of high phosphate levels.

Blount Fly Fishers have approximately 20 members and stock the river annually with a total of 500 to 600 brown trout (12 – 14”) in three batches through the trout season (March – October). Wild brown trout are present along with coarse fish species including chub, pike, perch and grayling. The

invasive non-native signal crayfish is present in this section of the brook. Water quality is generally good and a brief hand search of pebbles and a fly board revealed abundant olives (Baetidae) and flat-bodied mayfly (Heptagenidae), plus caseless caddis and stoneflies.

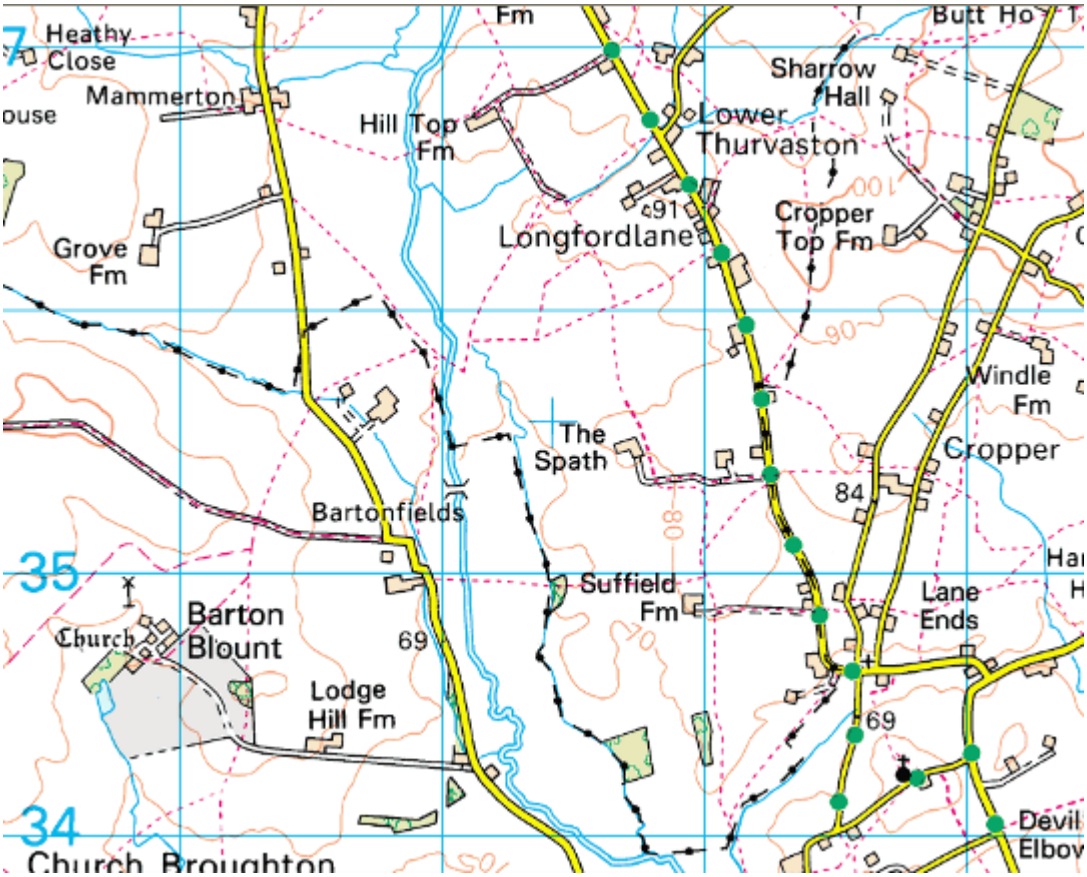

Figure 1 Sutton Brook. Note the mostly straight channel, compared with the natural meandering plan-form evident adjacent to Lodge Hill Farm.

3.0 Habitat Assessment

The brook was inspected from Bartonfields (National Grid Reference SK221353) upstream to the bifurcation of the channel south of Longford (SK218368).

For a wild trout population to thrive and support a fishery, the habitat requirements of the three main life stages (spawning, juvenile and adult) must be met. For spawning, trout require gravel (5 – 50 mm in diameter)

and a channel structure that allows water to percolate through the gravel. Typically, trout redds (nests) are found at the tail of pools before the water breaks into a riffle; this is where the gradient of the river bed increases and water flows through, as well as over, the gravel (Photo 1). Hence eggs buried in the gravel in the autumn and winter can survive and hatch the following spring because they have an adequate supply of fresh water.

This section of the Sutton Brook has abundant spawning habitat. The bed is comprised almost entirely of suitably-sized spawning gravel and there are numerous gradient breaks on the river bed which provide good locations for trout to make redds. It would be a useful exercise to walk the brook during the autumn and winter and observe where trout choose to spawn; this would inform efforts to protect these areas and to provide better juvenile habitat in the right areas.

Adult trout habitat consists of areas which provide larger fish with cover and a secure bolt hole. Whilst adult fish may be seen (and caught) in areas of open and relatively shallow water, these will never be far from the cover provided by deep water (pools), undercut banks, submerged tree roots and fallen trees and branches (woody debris). The Sutton Brook has a moderate amount of good adult habitat.

The deeper pools which provide adult trout habitat tend to occur on the outside of meanders where ‘lateral scour’ takes place, whilst riffles occur in the straighter sections between bends (Figure 2). The number and quality of pools (and riffles) can be heavily influenced by channel engineering and maintenance. For example, straightening the river reduces the number of bends and leads to a shallower, steeper gradient channel, lacking pool habitat (hence holding fewer adult trout). The Sutton Brook appears to have been extensively straightened in the past (probably by the then River/Water Authority), as evidenced by the plan-form on the map (Figure 1) and the presence of bunds of dredged material and a stone toe to many banks (Photos 2, 4). The brook narrowly avoided a major land drainage scheme to lower the river bed in the 1980s (A. Crawford, pers.comm.). More recently a localised area of river has been straightened by the landowner (Photo 3).

Photo 1 A gravel bed and gradient changes in the river bed like this make ideal trout spawning areas

Photo 2 The brook channel has been historically straightened for much of its course and probably dredged in some areas such as this (a gravel spoil bank is present on the true right bank, left of picture). This has caused to a relative lack of pool habitat.

Photo 3 More recent river engineering where the inside of a meander has been removed (far bank), further straightening and over-widening the channel to the detriment of in-stream habitat.

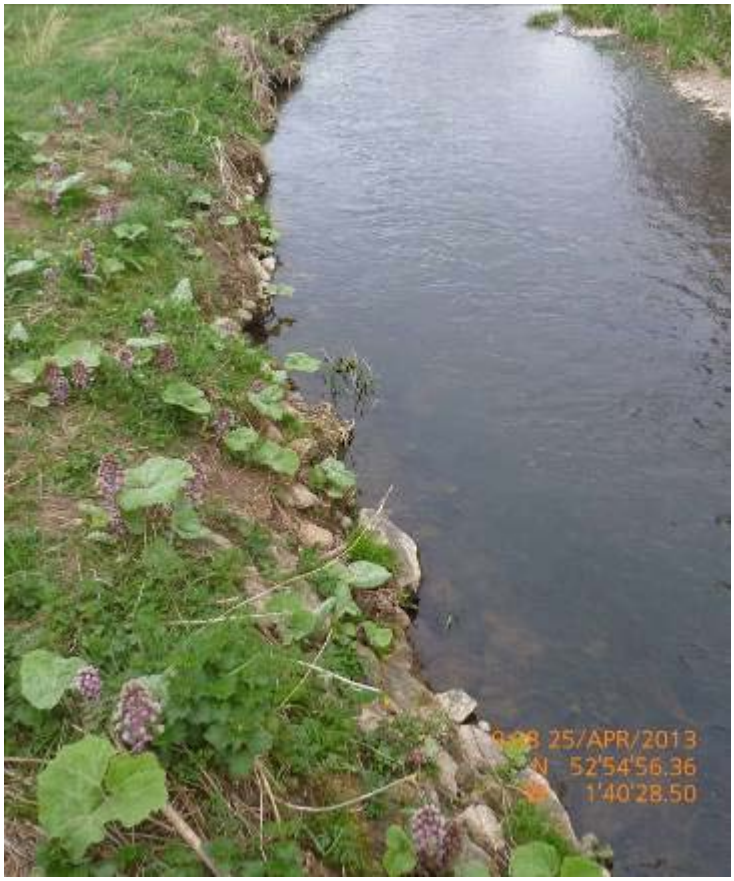

Photo 4 Stone pitching at the toe of the bank – common to many watercourses in this area and dating back to River / Water Authority land drainage works.

The resilience of the river banks also has an important influence on channel shape and habitat quality. Banks with trees are resistant to erosion and promote a narrower, deeper channel with better habitat. Banks with a wide buffer zone between the river and fields have a moderate resistance to erosion, whilst those with a narrow or non-existent buffer zone are very susceptible to erosion. Where accelerated rates of erosion occur, the river channel becomes wider and shallower with poorer habitat.

There are some excellent examples of good management alongside the river on the Sutton Brook. There are wide buffer zones between the river and fields, particularly on the right bank, and many areas have mature trees (alder and willow) lining the banks. In some places, small copses of trees are present; this provides excellent bank stability and a 'back up' if the trees closest to the river are lost. In contrast, other areas of bank lack trees and have little or no buffer zone between the river and field; erosion is occurring at a fast rate in these areas.

Photo 5 Different land use on each bank resulting if differing resilience to erosion. An ungrazed, uncultivated zone on the left bank with plentiful tree growth provides good erosion resistance and good habitat.

Photo 6 A wide, uncultivated strip alongside the river is very beneficial. Establishing trees within such an area would provide even more long-term protection from accelerated rates of bank erosion.

Photo 7 The ideal river corridor – a wide buffer zone of uncultivated land with plentiful trees, providing good bank resilience and good habitat. If protected from grazing, the trees could be rotationally coppiced to provide materials for bank protection works or firewood.

Photo 8 The absence of any kind of buffer zone between the river and agricultural land here is leading to greatly accelerated rates of erosion. This bank needs protection with brushwood revetment and a wide, uncultivated field margin establishing.

Photo 9 Another example of the differing land management on each bank and the resulting effect on stream habitat. Land managed as woodland on the left of picture creates a soft, vegetated margin, whereas the treeless, grazed bank on the right has a steep earth face which provides little trout habitat value.

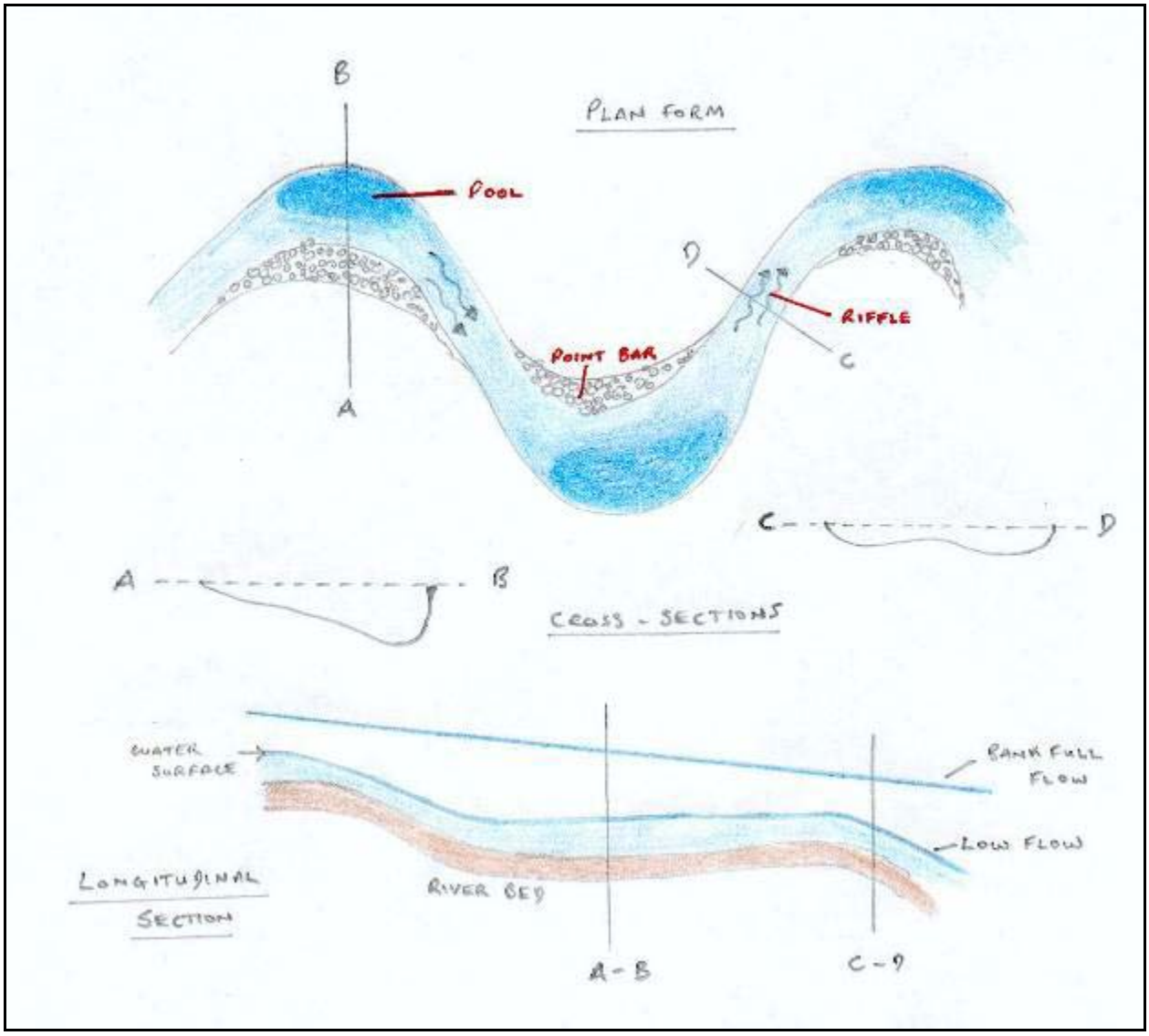

Figure 2 Natural channel morphology on alluvial rivers (adapted from Prof. R. Hey, 2005)

Juvenile habitat can be harder to define than spawning and adult habitat. Essentially it is dense cover which provides refuge for small fish from predators (such as herons, sawbill ducks, cormorants, otter, mink, larger fish, etc.). Such cover is provided by marginal and bankside vegetation ("shaggy" margins trailing in the water), beds of water crowfoot, and low cover over and in the water (from bushes, trees, roots, and woody debris).

Mortality rates for trout during their first year of life are normally very high (95% plus), but even a small improvement in this figure can lead to a much greater abundance of adult trout. Even with excellent spawning and adult habitat, lack of juvenile habitat can be a significant bottleneck which limits adult trout numbers. Juvenile habitat is limited in extent on the Sutton Brook and it could be improved relatively easily (see recommendations).

The same factors as described above (channel engineering and bankside management) have a big influence of juvenile habitat. Where banks are stable, marginal vegetation can develop and provide a 'shaggy' border to the river, providing good juvenile cover. In contrast, rapidly eroding banks tend to have an unstable, vertical, bare earth margin which is very unfavourable habitat.

At the upstream end of the reach visited are two weirs. The lower has been breached by erosion to the left bank and partially repaired. Whilst weirs may provide some attractive habitat in a localised area downstream of the structure, this is at the expense of the habitat upstream where flow is impounded and sediment settles out (See www.wildtrout.org/sites/default/files/library/weir%20experiment%20comp.pdf). Weirs are also a barrier to the free movement of fish, for example preventing access to upstream spawning grounds. As in this case, weirs are prone to failure and washout around the side of the structure; if the head of water impounded by the weir is no longer needed, the best course of action would be removal.

The upstream weir is located at the confluence of two channels (SK218368), the left (east) channel falling over the weir to join the right (west) channel. These channels originate from the mill pond at Longford, the right channel also containing the flow from the Alkmonton Brook. Further investigation of upstream water levels and flow diversions would be required before any alteration to this structure could be contemplated; also the benefits for fish passage would be limited unless the barrier presented by the mill pond at Longford was also considered.

Of concern is the discovery of a crayfish trap alongside the upper weir which appears to have been washed downstream and become lodged in a fence. The trap is of the collapsible type which has been known to cause the death of protected aquatic mammals such as otters and water voles (see www.ukfishersonline.com/ea-otters-crayfish.html). Crayfish trapping is regulated by Environment Agency byelaws to prevent such occurrences and written EA consent is required before trapping can be carried out. It is recommended that this issue is publicised locally and the dangers to wildlife highlighted.

Photo 10 Breached weir – removal of the weir is probably the best option here.

Photo 11 Weir at the confluence of two channels near the upstream extent of the visit.

4.0 Recommendations

Trout habitat should be improved by:

- Extending the good management of the banks that is currently taking place to the whole of the stretch. This includes a wide buffer zone between the river and fields, ideally where trees are allowed to establish (or be planted).

- Carrying out 'soft' revetment using brushwood against eroding banks (Photo 12). This technique has the advantage of both slowing the rate of erosion and providing very good cover for juvenile fish (see www.wildtrout.org/sites/default/files/library/TJ%20Looking%20after%20youngsters18-19%20SALMO%2011.pdf).

  The brushwood forms a matrix which absorbs the energy of the flow and encourages deposition of sediment, allowing the bank to consolidate and vegetate. Combined with the creation of buffer zones and tree establishment (Figure 3), this approach could greatly improve bank stability, habitat quality and reduce land loss.

- Avoid further straightening of the river channel to preserve existing pool habitat. Constructive dialogue with the landowner is essential for this and a trial of the soft revetment and tree establishment approach may help.

Photo 12 Example of brushwood revetment.

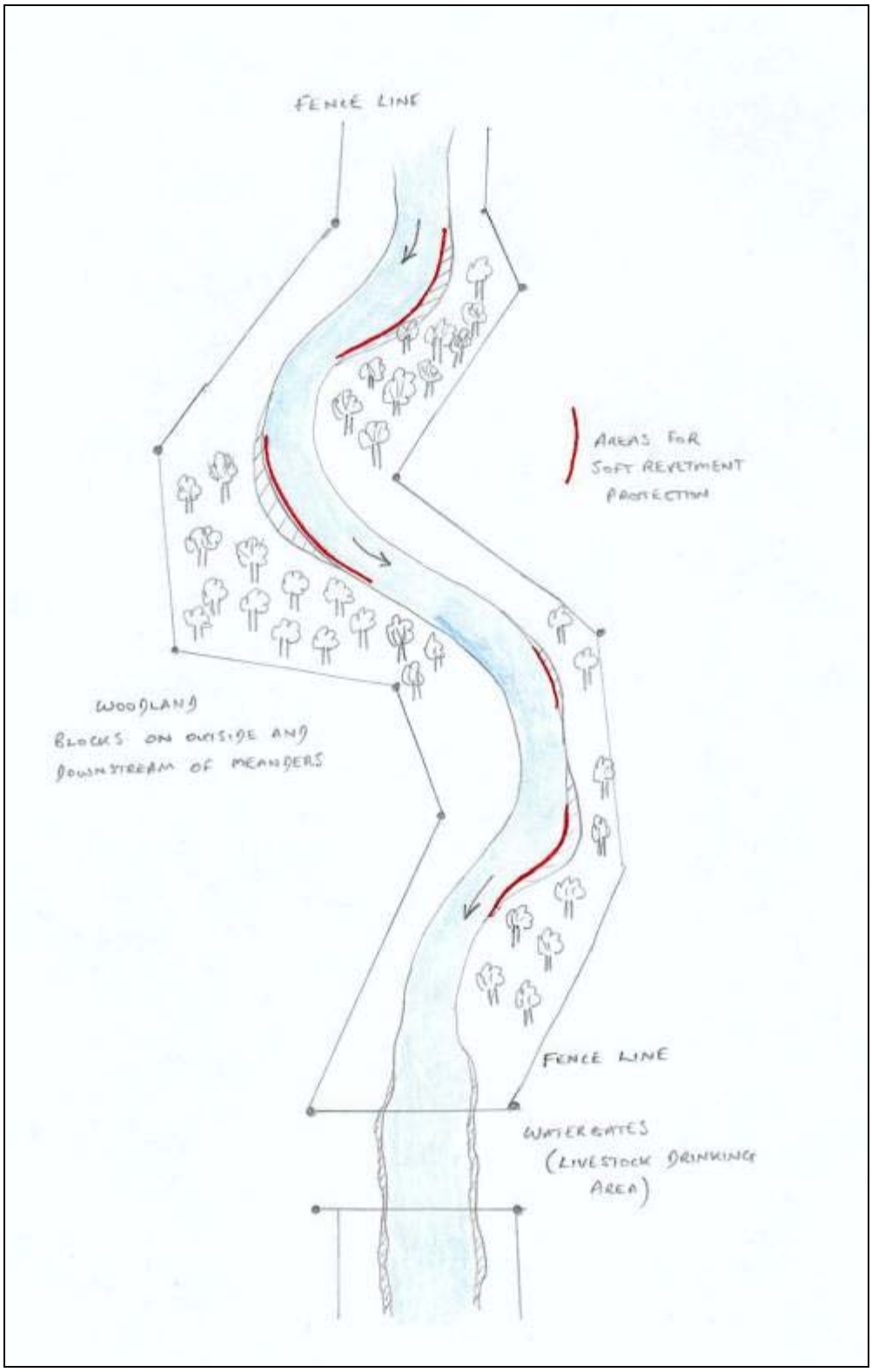

Figure 3 Creating buffer zones alongside the river and strategic tree planting, combined with soft revetment of currently eroding banks, could significantly increase bank stability and habitat quality. Fencing is only required if fields are used for livestock.

Blount FF requested advice on stocking trout with a view to possibly reducing the numbers of introduced fish if wild stocks can be improved. There are a number of factors to consider:

- A river with good habitat can support approximately one adult trout for around every 50 m^2 of water surface area. If the Blount water is 5km long and 4m wide, that represents 20,000 m^2 or 400 adult fish. As mentioned above, adult habitat on this section of the brook is moderate because of a relative lack of pools due to channel straightening. The capacity for supporting adult trout is therefore likely to be lower than this.

- Trout have a "pecking order" for favourable lies (where they get maximum food for minimum effort) and have "fights" (chasing behaviour) to establish this order. When farmed trout are introduced alongside wild fish, such competition between fish is increased (Bachman, 1984) leading to increased stress and displacement of fish (both stocked and wild). Introducing 500 to 600 adult trout annually to this section of the Sutton Brook is therefore likely to compromise the numbers of wild fish which can become established.

- It is important to consider how angling practice affects fish stocks and to have catch returns to inform fishery management. Stocking levels have remained the same in many clubs despite an increase in the rates of catch-and-release. If the numbers of fish harvested by anglers is well below the numbers stocked, there is potential to reduce stocking levels and hence the negative interactions with wild fish.

- Despite the well-documented poor survival of farmed trout in streams (very few overwinter), interbreeding between wild and farmed fish can adversely impact upon the wild trout population and reduce its abundance. This is a complex issue, but is neatly summed up in the two recently published videos on the Wild Trout Trust website (www.wildtrout.org/content/trout-stocking#fertile). Any fish stocked should be infertile triploids to eliminate the risk of interbreeding with wild fish.

- Stocked fish do not survive well in the wild, so it makes sense to selectively harvest them and return wild fish, assuming they can be

reliably distinguished (e.g. by tagging, fin clipping or just difference in appearance, e.g. fin deformities in stock fish).

An approach to stocking that many clubs have adopted successfully is to reduce the numbers of fish introduced year-on-year whilst monitoring catches. Many clubs have seen catches either maintained at previous levels or improve, with an increase in the contribution of wild fish.

Blount FF currently operate the upper part of the fishery as a catch-and-release section; this area could be left unstocked to reduce competition with wild fish. Elsewhere, stocking could be proportionally reduced as suggested.

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

5.0 Making it Happen

The Wild Trout Trust could provide further assistance by preparing a more detailed project proposal and assisting with consent applications for the habitat improvement recommendations made above. A practical visit could be provided to demonstrate the techniques; this would involve 1 – 3 days on the river with Wild Trout Trust staff and angling club volunteers to complete a demonstration plot on the site to be restored. This will enable recipients to obtain on the ground training regarding the appropriate use of conservation techniques and materials, including Health & Safety, equipment and requirements. This will then give projects the strongest possible start leading to successful completion of aims and objectives.

6.0 Acknowledgement

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

7.0 Disclaimer

This report is produced for guidance and not for specific advice; 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 guidance made in this report.

References

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