**Advisory Visit**

**River Rede – West Woodburn**

**20/04/2017**

**Undertaken by Gareth Pedley**

## Key findings

- The River Rede is a dynamic upland river that has clearly been subjected to past channel maintenance. This has impacted upon the morphology of the channel but beneficial characteristics are slowly recovering.
- Grazing of the banks is a major issue for the habitat quality and bank stability, and is contributing excess fine sediment to the system which degrades the substrate for fish spawning and invertebrates.
- Bankside trees are already in the process of being lost through erosion (resulting from livestock access/grazing) and more will be lost if livestock access is not prevented.
- The loss of natural tree regeneration resulting from livestock grazing is slowly but surely denuding the river banks of trees and shrubs over the longer-term.
- Buffer fencing/stock exclusion would be beneficial in all sections currently grazed.
- Once livestock is excluded, planting areas of the riverbanks/buffer with a range of native deciduous tree species would be beneficial.
- The source of the pollution entering the watercourse at NY 88837 86593 should be identified and stopped.
- It would be well worth undertaking a walkover of the Lisles Burn to identify any potential issues that might limit habitat utilisation and natural fish production of what is likely to be a prime spawning tributary.

## 1.0 Introduction

This report is the output of a site visit to the River Rede, West Woodburn, at the request of Alan Gray (Fishery Manager). The purpose of the visit was to provide a general habitat assessment and offer recommendations of how the river could be developed as a wild trout fishery. Mr Gray was also present during the visit to partake in discussion about the findings.

Normal convention is applied throughout this report with respect to bank identification, i.e. the banks are designated left bank (LB) or right bank (RB) whilst looking downstream. The Ordnance Survey National Grid Reference system is used for identifying specific locations and references to upstream and downstream are often abbreviated to u/s and d/s, respectively, for convenience.

## 2.0 Catchment and fishery overview

**Table 1. Overview of the waterbody details for the section of River Rede visited**

| | **Waterbody details** |
|---|---|
| **River** | Rede |
| **Waterbody Name** | Rede from Bellshiel Burn to North Tyne |
| **Waterbody ID** | GB103023075320 |
| **River Basin District** | Northumbria |
| **Current Ecological Quality 2015** | **Good** ('good' or 'high' for all parameters assessed). Surprisingly, despite significant channel modification the geomorphology of this waterbody is classed as 'supports good' ecological status and not classed as heavily modified. |
| **U/S Grid Ref of reach inspected** | NY 90127 87425 |
| **D/S Grid Ref of reach inspected** | NY 88317 85945 |
| **Length of river inspected (km)** | 3.6 |

**(http://environment.data.gov.uk/catchment-planning/WaterBody/GB103023075320)**

## 3.0 Catchment / Fishery Overview

The River Rede rises near the Scottish border, within the Northumberland National park, before meandering in a southerly direction to meet the River Tyne, near Redesmouth. The geology of the catchment comprises predominantly sandstone, limestone, siltstone and mudstone. Despite some influence of limestone, the peaty upper catchment limits the natural productivity and pH of the watercourse and it is generally categorised naturally oligotrophic. Superficial deposits (surface geology / soils) of till and alluvium do little to alter the productivity; however, modern day land use plays a part, with fertilisation of the surrounding land and subsequent runoff and erosion releasing nutrients to the watercourse and leading to some eutrophication/enrichment.
(http://mapapps.bgs.ac.uk/geologyofbritain/home.html?)

The West Woodburn Fishery is operated for the benefit of guests staying at the Redeswater Lakeside Lodges and consists of two discrete aspects: A small lake stocked with infertile triploid brown trout (*Salmo trutta*), and approximately 3.6km of the river, which is the subject of this report, where angling is undertaken for Atlantic salmon (*Salmo salar*), and brown and sea trout (*Salmo trutta*). Until last year the river was also stocked with farmed trout but as of the 2017 season will now be operated as a wild trout fishery.

## 4.0 Habitat Assessment

The river was assessed in a d/s direction, from the upstream extent of the fishery to its d/s extent. Most of the river between those two points was covered, excluding a short section of private gardens around West Woodburn.

Exposed bedrock at the upstream extent of the fishery limits the potential for improvements there, but provides valuable range of microhabitats for juvenile salmonids and invertebrates (Fig. 1). Bankside trees offer a natural balance of shade and light, with the channel being wide enough that over-shading is unlikely to ever be a problem – this is true for most of the fishery. When considering the optimal ratio of light and shade on a watercourse it is also important to consider whether aquatic vegetation would be there even without shading. In this case, the naturally peaty water, flashy flows and coarse substrate are likely to preclude abundant growth of macrophytes within the channel anyway, so work to reduce the availability of tree shade and cover would only be counterproductive, denuding other habitats. Bankside trees also provide a valuable source of terrestrial invertebrates and refuge for others emerging from the watercourse which will rest there while they moult, before returning to the river to lay their eggs.

***Figure 1. Natural bedrock areas provide a range of habitat primarily suited to juvenile fish and invertebrates.***

At a large, deep pool, the channel opens out to approximately twice its average width (Fig. 2). The size and depth of this pool makes it tricky to access the main fish lies within the flow along the true LB, leading to past tree maintenance which has removed all of the low hanging and trailing branches along the LB to allow access. That is one solution to a tricky situation; however, another option could have been to fish the pool from a small tethered boat, which would have allowed cover and structure along the fish-holding bank to actually be increased, thereby increasing the number of fish it is likely to hold and improving the angling prospects. If the alternative option were considered favourable, coppicing a few of the trees and tethering the resulting material to the stumps would create low-level regrowth and instant in-channel structure.

The channel d/s of the pool becomes more typical of a steep upland river, with fast riffles flowing into glide / shallow pool habitat (Fig. 3). Grazing on the RB impacts upon the bankside vegetation and bank stability, limiting the diversity of species present on the bank, and reducing structure within the ground, as energy is directed into replacing lost foliage rather than development of root systems. Note the contrast with the well treed, well vegetated, ungrazed / barely grazed far bank (Figs 3 & 4). Grazing usually leads to a loss of trees over time as the natural regeneration required to replace old trees is simply grazed off before new trees can establish.

***Figure 2. Wide, deep pool at the d/s end of the bedrock outcrop. Tricky to access the fish but an alternative angling strategy could allow habitat to be enhanced along the far (LB) bank, to the benefit of the fishing.***

***Figure 3. Riffle and glide habitat provides valuable habitat for invertebrates and all stages of the salmonid lifecycle, but note the grass monoculture of the RB bank (right of shot) resulting from grazing – no herbaceous vegetation or natural tree / shrub regeneration.***

***Figure 4. Poor bank stability and bankside habitat on the grazed, near bank, in contrast to high quality habitat of the relatively ungrazed, tree-lined and well vegetated far bank.***

A collapsed alder (*Alnus glutinosa*) tree on the RB offers excellent natural cover and structure that is vital on rivers, providing refuge for fry and other juvenile fish, along with shelter from high flows and structure in which fish can evade predators (Fig. 5). Where a lack of trees and in-channel structure is observed, willow can be quickly and easily planted as whips, to create new trees (providing that livestock can be excluded). Once established, willows can be laid into the channel to replicate naturally occurring cover. Existing willow trees / shrubs can also be treated in this manner; however, it is worth noting that wherever there is a long history of sheep grazing there is usually a lack of willows as they are a favoured species on which to browse. This point is demonstrated on the grazed RB (Fig. 6), which supports only mature trees and poor bankside habitat, whereas the ungrazed LB supports mature trees and a marginal fringe of willows (*Salix* spp.) and bird cherry (*Prunus padus*) providing far higher quality habitat.

Further grazing issues are evident d/s, where the lack of bankside vegetation, coupled with trampling / sheep scarring, has allowed major erosion around the base of the trees (Fig. 7). Unchecked, this will lead to loss of the trees through erosion in high flows and, without the potential for natural regeneration, the long-term result will be a complete loss of trees from the bank, loss of more land and over-widening and shallowing of the river, and increased sediment input and deposition on the bed.

***Figure 5. A naturally collapsed alder provides valuable in-channel cover and refuge structure.***

***Figure 6. Looking u/s at the grazed RB (left of shot) with a lack of vegetation and natural regeneration, which is in stark contrast to the ungrazed LB (right of shot), where a diverse margin provides high quality habitat structure and low and trailing cover (great protection from predators).***

***Figure 7. Grazing and trampling of the banks is leading to increased erosion and loss of trees, with no potential for natural regeneration as it is all grazed off.***

In stark contrast to the eroding, grazed areas, the stock-excluded area alongside the gardens, between the grazed fields and West Woodburn Village, provide high quality marginal habitat with emergent vegetation encroaching into the channel (Fig. 8). Such growth ensures that the toe of the bank is adequately protected from erosion and stable. It also ensures that the channel is naturally maintained to an appropriate width, with the ability to subsequently naturally encroach inwards if it does become too wide through scour in very high flows. It was no surprise to also see salmonid fry utilising the cover and structure in those areas. Willow in the ungrazed areas d/s on the left bank offer some potential for laying, to further enhance flows and in-channel habitat (Fig. 9). The opposite, grazed bank is again limited to mature trees, minimal vegetation and poor habitat.

The channel immediately d/s of West Woodburn Bridge is particularly straight for several hundred metres and therefore lacks depth variation (Fig. 10). This provides some juvenile habitat but limits the availability of larger adult trout habitat. Greater availability of structure to drive bed scour and to retain in-channel bed features could help to develop the morphology of the reach but the potential for impact upon conveyance and flood risk must be considered. A particularly high nutrient discharge was noted in this reach, possibly from a poorly maintained sceptic tank (Fig. 11 - NY 88837 86593). This should be addressed as a pollution and the source identified.

***Figure 8. In ungrazed areas marginal, emergent vegetation offers protection to the banks and ideal juvenile salmonid and invertebrate habitat. Such margins will naturally encroach into the channel as they trap fine sediment, but remain in-check by higher flows, thereby naturally to maintaining an appropriate bank width and sediment conveyance.***

***Figure 9. Willows on the RB offer potential for laying. The grazed opposite bank supports no willow trees and a lack of herbaceous vegetation / tree regeneration.***

***Figure 10. The long, straight section d/s of West Woodburn Bridge offers limited potential for larger adult trout but provides some juvenile salmonid habitat. It would be improved by a greater availability of cover/structure within the channel to help develop a more varied bed morphology.***

***Figure 11. High nutrient discharge entering the river, as evident by the sewage fungus / excessive biofilm growth within the channel.***

The lower end of the fishery different in character, being dredged and overly deep, rather than shallow. This limits the potential of much of that area for juvenile salmonid habitat (although some are sure to reside there) but does offer greater potential for larger resident fish holding, if the availability of shade, cover and structure can be increased (Fig. 12). Grazing is again an issue, with major erosion already having been addressed with willow spiling; however, the unprotected bank d/s remains in jeopardy. Strangely, a buffer fence is in place, but the gates at either end were left open and little difference was noted within the fence line, suggesting that this is a regular, notable problem. This seems strange when the tenant / landowner are clearly losing land to the erosion and risking further major destabilisation of the bank.

The lack of trees long this length is almost certainly due to the long history of grazing/livestock access as some extent of natural regeneration would be expected from propagules and seeds from u/s, even in areas largely devoid of trees. Sheep access to the existing willow spiling is also likely to be an issue as they gradually work their way through the shoots and kill the living bank protection. The ideal solution here is to completely exclude the livestock and undertake planting of mixed deciduous tree species along the bank to provide improved habitat and greater bank stability, thereby benefiting all concerned.

***Figure 12. The channel towards the d/s end of the fishery is uniformly deep and over capacity, with a lack of structure and bankside trees. Livestock access within the buffer strip is greatly compromising the bank stability and jeopardises the existing bank protection.***

A further point worthy of note is the population of freshwater pearl mussels the River Rede supports, which were observed during the visit (Fig. 13). This rare, protected species is managing to cling on within the catchment but is susceptible to major impact from fine sediment input and pollution – such stresses may well be some of the major issues inhibiting their recruitment. For this reason, along with the impacts upon invertebrate and salmonid spawning habitat, all issues of accelerated bank erosion should be addressed, with livestock ideally being permanently excluded from the riparian area.

***Figure 13. A freshwater pearl mussel looking rather overwhelmed by fine sediment.***

In addition to the main River Rede, a small tributary (the Lisles Burn) was observed to confluence along the far bank and, from the local gravel deposition, it appeared to have notable potential as a spawning and juvenile tributary (Fig. 14). It would be well worth investigating this burn to ascertain its full potential and whether any of the basic issues identified along the main channel are impacting upon it, so that they can be addressed to improve the habitat quality and natural fish production of the area. Key aspects to asses are overgrazing and fine sediment input, along with any manmade obstructions that might prevent access or limit utilisation of the burn.

***Figure 14. The confluence of a small tributary burn and the River Rede. Note the potential salmonid spawning substrate of the burn (red ellipse).***

## 5.0 Recommendations

The most significant benefit to this fishery would be won via installation of (or utilisation of the existing) buffer fencing to exclude livestock from the river bank. This would allow a greater diversity of bankside vegetation and shrubs to establish, providing improved habit and bank stability. Once established, some of this material could then be laid into the river to improve in-channel habitat.

In the d/s section, below West Woodburn, willow in particular could be planted directly into the bank/water interface on the inside of any slight bends to accentuate the sinuosity of the largely straightened channel. In addition to the cover and structural habitat benefits, this would perform two major functions, focussing flow over to the far bank and intercepting sediment transported from u/s. Over time, this should help the river channel to recover a more varied morphology and improve habitat quality.

### 5.1 Tree Laying

Where trees of a suitable species are already established along the banks (like the willow identified in Fig. 1), habitat improvements can be quickly and easily achieved by laying the trunks, or branches down into or over the watercourse. Laying is usually limited to pliable species, predominantly

willow (*Salix* spp.), hazel (*Corylus avellana*), elm (*Ulmus minor*) and small alders (*Alnus glutinosa*), but some others can be laid carefully when they are small. Willows are the best species' to lay into the water as they will thrive in the wet conditions, other species are usually better laid along the bank / water interface, so the majority of the canopy is not submerged.

The laying method involves cutting part way through the stem/trunk, a little at a time (ideally while it is under light tension), until it can be forced over into the river (Fig. 15). The depth of the cut should be limited to only that which is required to bend the limb over, as this will maintain maximum size and strength of the hinge and the health of the tree/shrub. Fast growing trees like willow can even be strategically planted in anticipation of employing this technique once they become established.

***Figure 15. Willow hinged into the river margin to increase cover and structure.***

## 5.2 Installation of woody material

Dead woody material can also be introduced to the channel to provide significant habitat enhancements and increase the level of protection from predators (particularly piscivorous birds). The technique involves cutting a tree/shrub and then cabling it to its own or an adjacent stump, to keep it in place (Figs 16-18). This would work for some of the LB trees on the large pool towards the u/s end of the fishery, if angling were to be undertaken from a boat tethered along the RB.

***Figure 16. The tree is felled into the river margin, then realigned parallel to the bank.***

***Figure 17. A basic tree kicker fastening using 4000 kg breaking strain cable and two pairs of cable clamps on either end. The webbing strap in the background is used to pull the kicker close to the stump for fastening but is removed once the cable is fully fixed in place.***

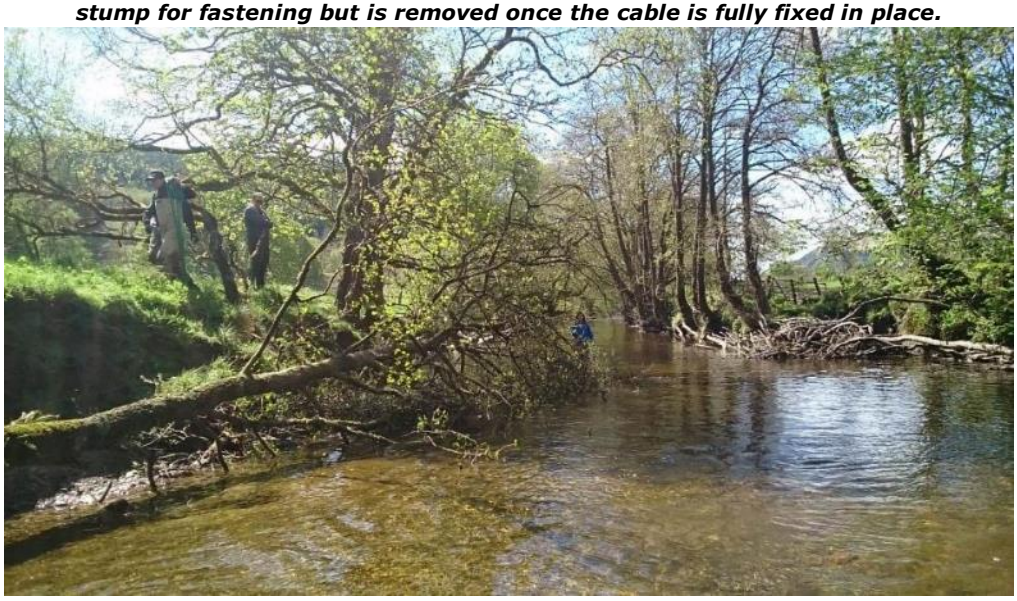

***Figure 18. The finished job – a tree kicker employed to provide cover within the river margin and focus flows down the far side of the channel. When installed on the shallower inside of a bend (depositional areas), this method can be employed to increase sediment deposition. When installed within the main flow, the technique can be employed to increase in-channel cover and fish-holding structure.***

### 5.3 Planting

It is recommended that planting with locally native, deciduous tree species is undertaken wherever cover is lacking along the banks, particularly in the lower section of the fishery. Saplings could be purchased or possibly obtained from the Woodland Trust (or possibly through Tyne River Trust), to provide a natural variety of species.

However, the quickest and easiest way of establishing trees is by pushing short sections of freshly cut willow whip into areas of wet ground, ideally close to the waterline. This can be undertaken at any time of the year, but will have the greatest success during the dormant season, shortly before spring growth begins (ideally late Jan-March). Whips should be planted into the ground so that there is a greater length ($^2/_3$) within the ground, to minimise the distance that water has to be transported up the stem and planting them on a shallow d/s angle will also ease water transport within the developing shrub and reduce the potential for it catching debris and being ripped out. Leaving 300-400mm of whip protruding from the ground is sufficient (providing this reaches past the surrounding vegetation, to allow access to light). Whips of 5mm-25mm diameter tend to take best, but even large branches can be used. Care should be taken not to leave excessive amounts of foliage on the whips as these greatly increase the surface area of the plant and can lead to their dehydration.

The species of willow whip that should be used will depend upon the required result. Small shrub willow / sallow species, particularly grey willow and goat willow (*Salix cinerea and S. caprea*) tend to be best for creating low, dense fish holding cover, with larger individual trees eventually growing out into the channel. Larger specimens can also be ideal for laying into the river margin. The larger species like crack willow (*Salix fragilis*) tend to grow fast and collapse under their own weight, so creating a great method of naturally introducing woody material and structure into a channel, but they can require maintenance in areas with flood risk. The desired outcome should dictate the species used.

## 6.0 Making it Happen

WTT may be able to offer further assistance such as:

- WTT Project Proposal
    - WTT can devise a more detailed project proposal (PP) report. This would usually detail the next steps to take in initiating improvements, highlighting specific areas for work and how it

can be undertaken. The PP report could then form part of any required consent applications.

- WTT Practical Visit
    - Where recipients are in need of assistance to carry out the improvements highlighted in an advisory visit report, there is the possibility of WTT staff conducting a practical visit. This would consist of 1-3 days' work, with a WTT Conservation Officer(s) teaming up with interested parties to demonstrate habitat enhancement methods (e.g. tree kickers and willow laying etc.). The recipient would be asked to contribute to the reasonable travel and subsistence costs of the WTT Officer.

In addition, the WTT website library has a wide range of free materials in video and PDF format on habitat management and improvement:

www.wildtrout.org/content/index

We have also produced a 70 minute DVD called 'Rivers: Working for Wild Trout' which graphically illustrates the challenges of managing river habitat for wild trout, with examples of good and poor habitat and practical demonstrations of habitat improvement. Additional sections of film cover key topics in greater depth, such as woody debris, enhancing fish stocks and managing invasive species.

The DVD is available to buy for £10.00 from our website shop http://www.wildtrout.org/product/rivers-working-wild-trout-dvd-0 or by calling the WTT office on 02392 570985.

## 7.0 Acknowledgement

The Wild Trout Trust would like to thank the Environment Agency for their continued support of the advisory visit service with funding from rod licence sales.

## 8.0 Disclaimer

This report is produced for guidance; 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.