Advisory Visit to the River Roe, Cumbria

Roe Beck (Lower) Waterbody - GB102076073770

06 March 2014

1.0 Introduction

This report is the output of a site visit undertaken by Gareth Pedley of the Wild Trout Trust to the River Roe, on 6th March 2014. Comments in this report are based on observations on the day of the visit and discussions with Lucy Butler (ERT) and Jonathan Coulthard. 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.

Land management within the Roe catchment is suspected to be contributing to increasing issues with sediment transport, erosion and flooding. In response, a local resident group, the Roe Catchment Community Water Management Group have begun management of riparian trees and erosion issues, with aspirations to investigate issues across the wider catchment. As part of the initiative, advice was requested from Eden Rivers Trust (ERT) and the Wild Trout Trust (WTT) to guide work in the Stockdalewath area.

The section of River Ive visited lies within a waterbody currently classed as being in 'moderate status' under the Water Framework Directive (WFD), as identified from the Scottish Environment Protection Agency's (SEPA) website.

(http://apps.sepa.org.uk/rbmp/pdf/GB102076073770.pdf)

Data available on the website indicates that this is a result of the waterbody achieving only 'moderate' classification for both fish and phytobenthos. When occurring together, a moderate or lower status for these two parameters often suggests issues with sedimentation, as it will adversely affect both.

2.0 Assessment

Initial assessment of the site identified several factors impacting upon river bank stability. The surrounding sandstone geology of the Roe and Ive catchment mean that topsoils comprise a high proportion of in-cohesive, inorganic sandy material, which has a tendency to erode in high flows. The shady, wooded nature of the site also reduces vegetation colonisation of the

banks and surrounding ground; vegetation that would ordinarily provide consolidation of the highly friable soils through its root matrix (Figure 1).

Adding to the issue on the steep gradient LB, is the presence of relatively impermeable clays and clay-based sub soil. This restricts much of the tree and vegetation root growth to the shallow surface layers, reducing deeper ground penetration that would increase bank stabilisation. The impermeable clays also prevent rainfall from penetrating the ground, leading to water-logging of the topsoil, particularly in wet conditions. As consequence, the soil becomes saturated and increasingly susceptible to slumping down the slope. Trees help consolidate the soil, but larger trees, create additional pressure on the bank through increased weight and leverage. Consequently, larger trees may topple or slip down the bank (Figure 2).

Figure 1. Initial bank revetment work along-side a steep, in-cohesive sandy bank.

Figure 2. Slumped tree leaving the clay sub-strata exposed.

3.0 Recommendations

3.1 Right bank (RB) issues

Initial attempts have already been made to protect RB with log revetment (Figure 2). This is a great initial step which will create a base on which to install additional bank protection, but left simply as a log toe, this is likely to deflect flow energy around the logs, rather than dissipating it, and may create other erosion issues over time.

Installation of additional softer brash type protections between and around the logs would help to mitigate this by creating a diffuse barrier that baffles and dissipates the energy rather than simply deflecting it onto another area. This will facilitate deposition of a portion of the sediments transported by the river to be deposited within the bank revetment, turning the previous area of erosion into an area of deposition and assisting formation of a new

consolidated bank. The current root matrix provided by the RB trees are currently also protecting the bank and will assist with further consolidation as they grow into the deposited material.

If living willow is incorporated and maintained in contact with water and earth, the branches are likely to take root, further aiding bank protection. The technique is demonstrated in Figure 3, where brash is packed along the bank face and secured with wire criss-crossed between chestnut posts, and Figure 4, where willow brash bundles are used to create a line along the base of the bank, again, secured with wire and chestnut posts.

Ideally, smaller shrub species of willow (like goat willow and gray sallow) should be used for this to reduce the requirement for future maintenance. The exact species is not critical, but mature trees of native species that can be found locally along the river will be best, as they are suited to the conditions and can be selected by their size.

Figure 3. Brash revetment (willow and hawthorn) installed by the WTT along an eroding bank.

Figure 4. Willow bundles (faggots) installed during a previous WTT workshop to create a line of living willow that dissipate flows and accumulate sediments to stabilise the base of an eroding bank.

3.2 Left bank (LB) issues

Tree maintenance work undertaken along the LB has reduced some of the leverage and pressure acting upon the bank by removing many of the leaning limbs and slumped trees. This is again, a great first step, but greater stabilisation of the bank can be achieved through additional work.

Stabilisation could be further assisted by retention of the two fallen trees that now lay along the base of the bank (Figure 5). These are acting as natural 'tree kickers' (trees that are anchored along river banks to provide flow dissipation, bank protection and habitat) and should be retained.

Installation of a brash mattress (ideally incorporating living willow) over areas of bare earth/clay/soil would also be highly beneficial, to protect the bank, retain sediment in high flows and form a substrate for colonisation by other vegetation (similar to Figures 3, 4 & 6).

Figure 5. Fallen trees now lying along the bank, providing flow dissipation and bank protection.

Figure 6. Over-wired brash to increase sediment accumulation around a previously eroding bank.

In the erosion bays around tree stumps and slumped banks, further sections of brash, wired along and below the waterline, would help to reduce erosion and provide valuable habitat structure (similar to the previous prescriptions e.g. Figure 6). Willow stakes/whips driven directly into the bare areas would also accelerate recolonisation of the area and bank stabilisation (Figure 8).

Ideally, cuttings should be taken from willow branches/whips and driven directly into the ground. The whips need only be 500-800mm and protrude 1/3 of their total length out of the ground. Burying 2/3 of the stake into the ground provides plenty of material from which the vital root system can sprout, giving the greatest potential for acquisition of water and reducing the distance it must be transported within the shrub.

Figure 8. Bare earth where stabilisation could be assisted through planting of multiple willow stakes and possibly brash mattress (area indicated with green arrow). The brown arrow indicated the erosion area that could also be in-filled with brash.

4.0 Next steps

Further to the considerations highlighted, a brief glance at other areas along the river indicates further potential for improvements through sympathetic management of riparian trees and in-channel woody material (retaining these features wherever possible). It is important to consider that, while large-scale blockages within the channel may cause issues, as described previously, channel roughness also plays a vital role in management and dissipation of flow energy. In-channel features and marginal structure therefore play a vital role in sediment management, as well as providing habitat for fish and wildlife.

If managed correctly, trees and branches along the margins and within the channel will act as natural bank protection, dissipating flows and storing river substrate (silt, sand, gravels and cobbles) in areas where they pose little risk to flooding. This then reduces accumulation of those materials around flood prone areas like bridges. Equally, in other areas, in-channel trees/woody materials can focus river flows, facilitating beneficial scour of the bed to create deeper pool habitats and maintain river channel capacity that will be utilised during high flow events and reduce flooding. The key is maintaining a natural rate of bed material transport along a watercourse (reducing the problematic accumulations than can create flooding and unwanted erosion by deflecting flows into the river bank).

For these reasons, simply pruning all of the low and trailing branches along the watercourse or removing all of the fallen trees, is likely to create additional issues and complications with flooding and river/bank maintenance. A knock on impact being a significant deterioration of habitat quality and wildlife abundance, particularly fish.

The methods employed when pruning and coppicing bankside trees must also be carefully considered, as the optimal treatment for different tree species will vary (e.g. species such as willow and alder can be coppiced low to rejuvenate them; however, this same treatment will often kill mature ash, which would be better cut as a pollard to preserve the tree, and therefore, the valuable root matrix it provides).It is vital to take all of these considerations into account whenever planning any work on the catchment. As such, advice should be sought from qualified personnel before further work is undertaken.

Before any work is undertaken to a watercourse, or within 8 metres, it is important to first contact your local Environment Agency. The EA will inform you as to whether there is a legal requirement to obtain Flood Defence Consent for the works. This consenting process may be covered by the EA (for main river sites) or the local County Council (if the watercourse is classed as 'ordinary'). The relevant organisation will be able supply you with any necessary forms, which they or the WTT will be able to assist you in completing.

The Flood Defence Consent process allows the Environment Agency, and County Council to assess and manage the potential flood risk and biodiversity implications of any work.

5.0 Making it Happen

The Wild Trout Trust may also be able to offer further assistance in initiating some of the recommendations of this report, such as:

- WTT Practical Visit
  - Where recipients are in need of assistance to carry out the kind of improvements highlighted in an advisory visit report, there is the possibility of WTT staff conducting a practical visit or workshop. This would consist of 1-3 days work with a WTT Conservation Officer teaming up with interested parties to demonstrate the habitat enhancement methods described above. You would be asked to contribute only to reasonable travel and subsistence costs of the WTT Officer, as required.

- WTT Fundraising advice
  - Help and advice on how to raise funds for habitat improvement work can be found on the WTT website - http://www.wildtrout.org/content/project-funding

The WTT officer responsible for fundraising advice is Denise Ashton: dashton@wildtrout.org

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

http://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.

6.0 Acknowledgement

The Wild trout Trust would like to thank the Environment Agency for their continued support of the advisory visit service.

7.0 Disclaimer

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