Advisory Visit for the Scrainwood Estate

Scrainwood Burn

(Wreigh Burn - Source to Netherton Burn - GB103022076760)

Date 20/07/2012

1.0 Introduction

This report is the output of a site visit undertaken by Gareth Pedley of the Wild Trout Trust to the Scrainwood Burn on 20th July, 2012. Comments in this report are based on observations on the day of the site visit and discussions with Tim Brown.

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 Scrainwood Burn forms part of the "Wreigh Burn from Source to Netherton Burn" waterbody within the River Coquet catchment. This in turn lies within the Northumbria River Basin District, as designated by the Environment Agency under the Water Framework directive. The waterbody is classed as good for fish, and good or high for all other aspects assessed, other than hydromorphological quality that was assessed as not good. http://maps.environment-agency.gov.uk

The Burn is located within the upper Coquet Valley in the Border Uplands Natural Area. The north of this area is dominated by andesitic and basaltic lava flows of Devonian age (around 390-380 Ma). These were intruded by basic dykes and by the Cheviot Granite. Overlying these volcanics is a succession of Carboniferous rocks, comprising sandstones, siltstones, clay-rich limestones and dolomites.

The overlying Fell Sandstone Group represents a series of lobate deltas migrating in a south westerly direction across the area. The overlying Late Carboniferous (330 Ma) Yoredale series (comprising sandstones, shales, limestones and thin coals) represents deposition on delta tops and margins with varying degrees of marine influence as sea levels fluctuated. The limestones form prominent landscape features in the southern part of the Natural Area.
(www.naturalareas.naturalengland.org.uk/Science/natural/NA_search.asp)

From a fisheries perspective this means that although being fed by moorland bogs, and flowing through areas of sandstone with friable sandy soils, the water quality in many of the upper tributaries of the Coquet, is buffered by areas of underlying limestone geology. This helps to maintain an alkaline pH and increases the productivity of those waters.

The erodible nature of the overlying soil type does, however, lead to issues with bank erosion and subsequent sedimentation of the riverbed and spawning gravels, particularly in grazed areas, and around river crossings. Furthermore, the steep gradient and gravel/cobble nature of the bed material leads to a naturally dynamic river channel that is susceptible to changing its course in high water events.

This situation is further exacerbated by historic attempts to dredge and straighten many of the watercourses, which has resulted in lowering of the river bed, reduced storage of bed material within the channel and greater transport of materials downstream. This can then lead to increased bank erosion and detrimental deposition of both sediment and coarse bed material around obstructions and areas of decreased flow, such as pools and wider areas of the river channel.

Scrainwood Estate controls approximately 3.3 km of the Burn in the vicinity of Scrainwood, all of which falls within the River Coquet and Coquet Valley Woodlands Site of Special Scientific Interest (SSSI). Consequently, there are certain features of the area, including species and habitats that are protected, and as such consultation with Natural England is required before any work is undertaken that may alter or impact on these features (www.magic.gov.uk/website/magic/).

The water is not managed as a fishery, but a shift from a mixed population of resident and migratory trout, to predominantly migratory trout has prompted investigation into the possibility of improving resident trout stocks.

3.0 Habitat Assessment

The first thing that became apparent upon arrival at the Burn was a general lack of the marginal vegetation and trees along the bank that would usually be associated with high quality trout habitat (Picture 1). This is almost certainly a legacy of the sheep grazing in this area, the result being a reduction in the tree species diversity and prevention of natural regeneration through self-set trees, meaning that as older trees reach the end of their lifespan they are not replaced.

Picture 1. Very open river valley with a lack of marginal tree and vegetation cover along the watercourse, typical of the area.

This creates a very open valley, with little aerial cover to provide secure lies for fish. The lack of woody material along the banks also means that the older trees that would normally supply beneficial woody debris (WD) to the channel as the trees die are also absent. Both of these features are vital in producing high quality habitat, particularly features capable of supporting larger resident trout.

Woody material within the channel provides cover and increases flow diversity, which in turn provides lies and sorts and cleans gravel. The woody material also provides vital nutrients to the watercourse and a source of food for many species of invertebrates on which the trout feed. The scouring effects of the material restricting the channel also create and maintain the deeper holding pools that larger fish inhabit.

Aerial tree and vegetation cover is also required to provide both shade and leaf litter to the channel; the shade helping to reduce water temperatures and provide safe refuge areas for trout, with the leaf litter also supplying food for invertebrates. Healthy vegetation along the banks will also benefit salmonid fry by providing additional shade, but also shelter from flow and predation, where it trails in the water. Invertebrates will also find refuge in the vegetation, with aquatic species utilising it as they emerge from the water and terrestrial insects using it as a home. Many of these will then end up in the water, providing beneficial trout food.

Grazing, even where it is relatively low density, tends to greatly reduce the abundance and diversity of bank side vegetation, also leading to a greatly reduced root mass within the soil. This is because different plant species have different root systems, which provide various combined benefits for soil stabilisation and bank protection. Furthermore, where vegetation is grazed, much of the growth is replacement of the material eaten above ground, rather than extending root growth within the soil. It is also unfortunate that as watercourses often act as barriers to livestock, the banksides tend to be grazed harder than other areas (as often occurs along fence lines for the same reason). Consequently, where grazing pressure is removed, trees and greater diversity of vegetation re-colonise, providing greater protection to the bank and increased cover within the channel for fish and invertebrates (Picture 2).

Picture 2. Increased vegetation where grazing has been reduced. This could be improved further through complete stock exclusion and increasing the number of bank side trees. These would increase cover and some could be laid into the channel to provide structure and flow diversity.

The other major issue impacting upon trout habitat in this area of the Burn is the historic channel maintenance that has been undertaken to protect assets and retain the valley bottom grazing. This work has entailed dredging and straightening of the channel, which is sometimes required to protect infrastructure such as tracks and bridges, but on the whole significantly exacerbates problems with erosion and deposition of bed materials.

The function of a river is reliant upon both erosion and depositional processes in a natural balance, both to scour pools and deposit/store bed material, particularly on a very mobile river system like the Coquet/Scrainwood Burn.

In areas where the channel has been straightened, the gradient of that section is increased as the distance the water has to travel down the slope is decreased. This can have multiple negative effects upon the function of the channel (Picture 3):

- The velocity of the water is increased due to the steeper gradient, increasing the Burn's power to erode its bed and banks;

- A reduction in the number of bends and slower, wider areas to store bed materials transported from upstream, meaning that bed material is more likely to be transported downstream and accumulate in problem areas like bridges and wider channel areas, also filling in pools;
- This lack of deposition means that there is a constant loss of bed material within the straightened section, leading to progressive incision/lowering of the bed. The banks then become undercut or perched, leading to greater erosion, further exacerbating the problems with over supply of bed materials downstream.

Picture 3. The blue line represents the original channel the red line represents the shorter, steeper, straightened channel. Note the bank erosion in the background due to the lowered bed level and increased velocities within the straightened channel. This will undoubtedly have also exacerbated erosion on the bend upstream (foreground of the picture) due to the lowered bed downstream taking and transporting bed material away from areas upstream.

Dredging can have similar negative impacts upon on the river channel (Picture 4):

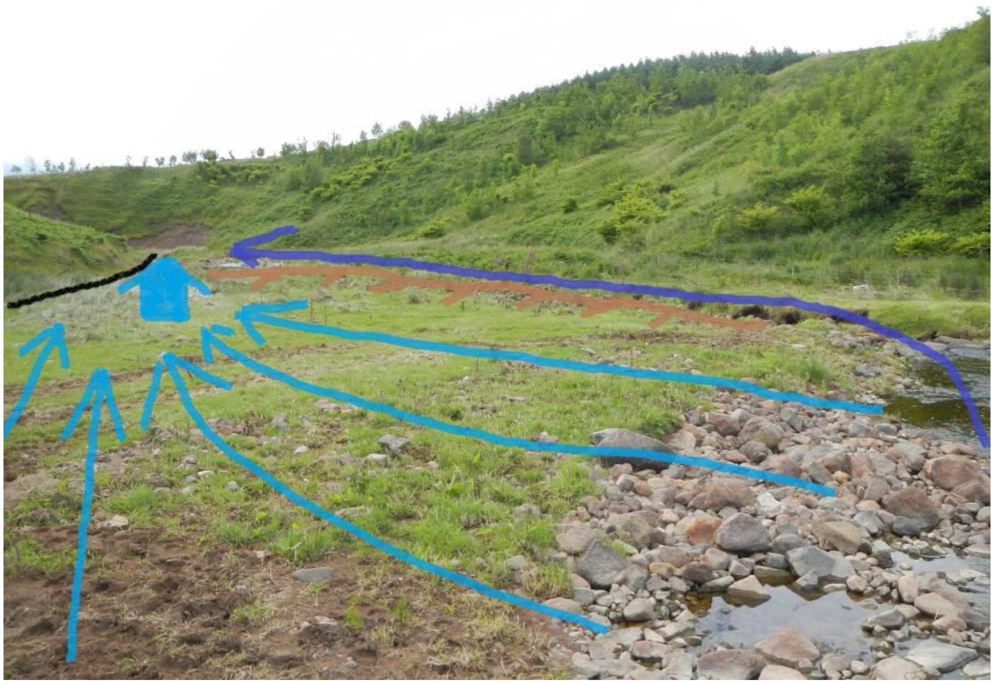
- The river often becomes over wide or deep for the volume of water it usually carries and the lower velocity within the pools encourages greater deposition of materials supplied from upstream that would ordinarily be transported through or stored on the inside of bends downstream, leading to increased deposition in that area;

- The dredging inevitably lowers the bed level, leaving the banks perched and more susceptible to erosion;
- The lowered bed encourages back cutting upstream of the dredged area, increasing erosion further upstream.

Picture 4. The foreground of this picture is the location of a recently dug pool that has filled in with material from upstream. This is primarily because the pool was over wide and deep, and effectively acting as a silt trap. The rock weir created at the tail of the pool also exacerbated this and is likely to have increased erosion around the weir. Also note the increased erosion upstream in the centre of shot (arrowed), resulting from the bed material upstream moving downstream to fill the void created by the pool.

In many areas the effect of past dredging is also impacting on the function of the river during floods in areas where the spoil has been left along the bank tops; the material is now becoming vegetated and causing a barrier that prevents high flood water escaping onto the floodplain. These embankments should be removed to allow high flows to spill out onto the fields and dissipate the energy of the flow, rather than constraining it within the channel where it will increase erosion. Interestingly, allowing high flows to spill onto the floodplain also allows finer sediments and nutrients to drop out of the water onto the surrounding farmland, increasing fertility and soil quality.

Bunds within the floodplain can also have other negative effects, operating in the opposite way. Picture 5 shows an area where one of these spoil bunds is actually preventing flood water from returning to the river channel from the floodplain and exacerbating erosion issues on the access track downstream, where flood water is constricted between the hill and the bund.



Picture 5. The black line represents the access track, the dark blue line represents the Burn channel at normal flows, the brown line and chevrons represents the dredged spoil bund and the light blue lines represent the flood flow that is prevented from re-entering the burn channel. The flood flow is then focussed between the bund and the hillside, over the track. The bund would be much better removed from the bank top and placed alongside the track to protect it and encourage floodwater back into the Burn.

The exact effect of channel alterations on erosion and deposition will always be uncertain, as it depends upon the frequency and severity of subsequent floods, but the simple solution to reduce these impacts is to greatly limit the extent and frequency of channel maintenance or cease altogether. Dredging and maintenance should be restricted to where it is required to maintain infrastructure, such as bridges and tracks, and even then limited to an absolute minimum to reduce its impacts both up and downstream.

(NB. It is recognised that the high eroding bank upstream of the access bridge and the area of track a short distance upstream may require additional protection, but once stabilised the advised reduction or cessation of dredging should significantly reduce the potential for these issues in the future. Establishing healthy vegetation, trees and shrubs around those structures will help to reduce future erosion).

This is only a basic overview of the hydrmorphology in this area; it is recommended that a more detailed assessment by a geomorphologist is undertaken if further clarification is required.

If the impacts discussed can be reduced it will then be much more feasible to start managing the river habitat in a way that is conducive to high quality trout habitat and the production of wild, resident trout stocks.

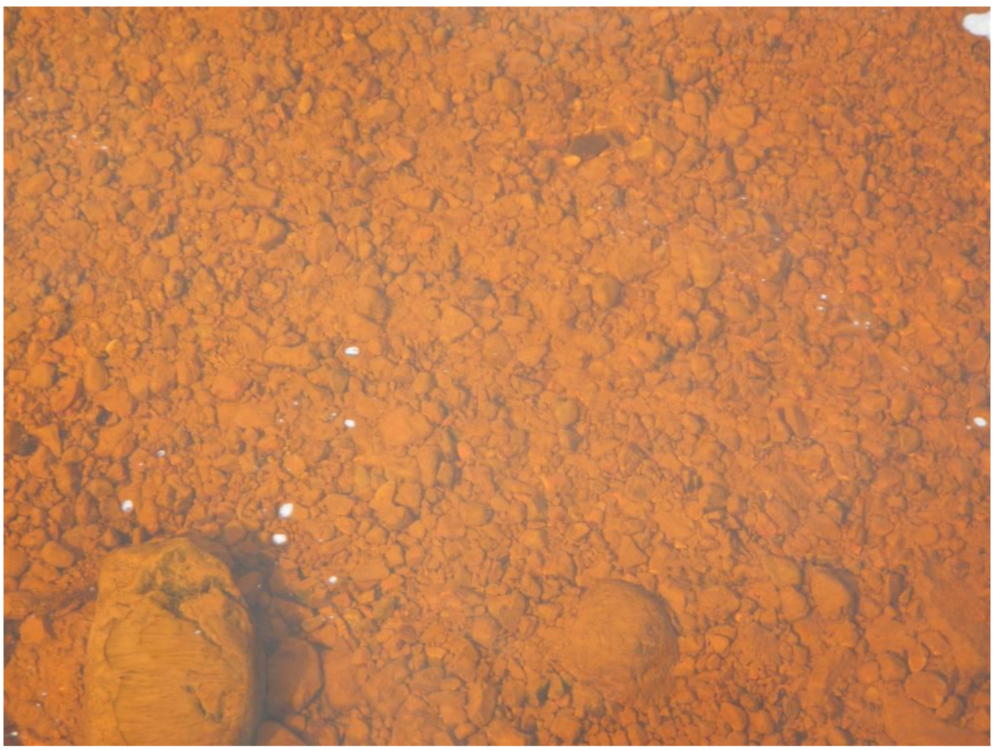
This is where the assistance of organisations like Natural England (NE) and the Environment Agency (EA) come into play. Under the current management regime, it may be cost prohibitive to fence off the river and allow it to erode and reinstate a more natural sinuous channel, and allow high water to spill out onto the flood plain. However, discussion with EA, Catchment Sensitive Farming (CSF) and NE HLS advisors is likely to highlight ways in which grant schemes can cover some of the costs and provide increased subsidy for the change in management practice.

As the land is in a CSF area, money should be available to cover the cost of buffer fencing. Similarly, the exclusion of livestock from the river to allow regeneration of scrub and vegetation may draw in Higher Level Stewardship (HLS) payments on the land that could offset the loss of grazing.

The ideal would be to allow a buffer fenced strip either side of the Burn and allow the river processes to naturally reinstate a more sinuous course that will both scour pools and store bed material, benefiting the function of the river habitats. Erosion and some short-term loss of land would have to be accepted, but after an initial period of adjustment the channel will increase in stability, with vegetation quickly re-colonise on areas of deposition that compensate for the land lost through erosion.

If this approach were taken real benefits to habitats along the watercourse could be achieved, facilitating an increase of beneficial aerial cover. By leaving the river to naturally adapt to the amount of water that it receives in this way, rather than trying to restrain it in its current channel, the balance of pools and riffles will also improve, providing some of the currently lacking pool habitat that will be kept clear naturally, as they were formed naturally.

Currently, it is not surprising to see that there are good numbers of juvenile salmonids in the burn. There are sufficient areas of suitable spawning areas present, even if many of them are compromised to an extent by sediment deposition (Picture 6). Habitat for juvenile salmonids is definitely sub optimal, due to a lack of cover and refuge, but there are sufficient areas of natural flow diversity and slightly deeper water to support a reasonable population. There was, however, a significant lack of habitat for any fish past the parr stage, due to a lack of deeper water, but more significantly the lack of aerial cover.



Picture 6 Silt-laden gravels typical of many areas of the Scrainwood Burn bed, lying outside the main flow. In most areas where the flow is low enough to accumulate smaller gravels suitable for resident trout, low flows and high sediment loading render them of poor suitability for spawning.

As the triggers for migration to sea within trout are known to be both genetic and environmental, it is therefore not surprising that a large percentage of the trout population within Scrainwood Burn do currently go to sea. The lack of deeper pools, clean areas of smaller gravels (c. 10-30mm, suitable for smaller river resident trout spawning), lack of cover, high summer temperatures (due to a lack of shade) and the lack of individual lies and structure within the channel all mean that the Burn is not currently suitable to support adult fish in most areas visited. If these issues could be rectified, as discussed, there is a far greater chance of retaining more adult fish within the Burn, rather than losing them to sea, or larger river sections downstream where the habitat is of a higher quality.

4.0 Recommendations

1. Contact Natural England to begin detailed discussions on how CSF and HLS monies may be available to facilitate creation of a generous buffer strip along the Burn.

2. Exclusion of livestock from the river and river banks. Note that ongoing fence maintenance will be required to ensure that livestock cannot access establishing buffer areas.

3. Cessation of dredging work within the channel other than limited work around bridges (if absolutely necessary). Ideally, any material removed should be returned to the channel downstream of the bridge.

4. Allow the reinstatement of a more natural channel morphology with bends (where pools can become established) and bars (where sediment and bed materials can accumulate throughout the reach, rather than individual problem points).

5. Once fenced and stock is excluded, kick-start the regeneration of bank side trees through planting of locally native species such as willows (*Salix cinerea & Salix caprea),* alder (*Alnus glutinosa*), ash (*Fraxinus excelsior*), and hawthorn (*Crataegus monogyna*).

6. In areas where the banks are already stable it may be beneficial to install living willow brash bundles (faggots), particularly in deeper pool areas where the benefit for increasing adult trout cover can be optimised and there is a lesser risk of erosion or wash out. These should be staked into the river bed or bank, against the bank, with at least 1/3 of the bundle submerged at normal flows. In time these bundles should take root and become bushes, increasing the shade and cover available locally.

5.0 Making it Happen

Outline of the steps necessary to put the recommendations into action. Further WTT assistance:

- WTT Project Proposal

Further to this report, WTT can devise a more detailed project proposal report. This would usually detail the next steps to take and highlight specific areas for work, with the report forming part of a land drainage consent application.

- WTT Practical Visit

Where assistance is required to carry out the kind of 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 teaming up with interested parties to demonstrate the habitat enhancement methods described. You would be asked to contribute only to the cost of materials and reasonable travel and subsistence costs of the WTT Officer.

- WTT Fundraising advice

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

7. Acknowledgement

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

8. Disclaimer