**Advisory Visit to the River Coquet**

**9th April, 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 Coquet on 9th April, 2014, at the request of the Northumbrian Anglers Federation (NAF). Comments in this report are based on observations on the day of the site visit and discussions with Mike Dodds and Willy Farndale of the Northumbrian Anglers Federation.

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

Northumbrian Anglers Federation has numerous sections of water across Northumberland, much of which lies on the River Coquet, however, this report focusses on the section between the upper limit on the Coquet and Pauperhaugh Bridge (NGR: NU040016 - NZ100994), around 8.75km.

This section of River Coquet lies within the "Ridlees Burn to Tidal Limit Waterbody" (Waterbody ID: GB103022076690) of the Northumbria River Basin District, as designated under the Water Framework Directive. The waterbody is classed as 'moderate' ecological quality as although it scores 'high' for macro-invertebrates, it only achieves 'moderate' status for macrophytes and diatoms (plants and algae). The waterbody is also 'high' status for physio-chemical quality and morphology, but classed as 'not high' for hydrology (maps.environment-agency.gov.uk).

The area forms part of the upper Coquet Valley, in the Border Uplands Natural Area. The geology of 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. (http://www.naturalareas.naturalengland.org.uk/Science/natural/NA_search.asp)

A consequence of this geology is 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 limestones. This helps to maintain an alkaline pH and increases the productivity of those waters.

The erodible nature of the sandy soils often leads to issues with bank erosion and subsequent sedimentation of the river bed and spawning gravels, particularly in grazed areas and around fording points. Furthermore, the steep gradient and gravel/cobble nature of the bed material leads to a naturally dynamic river and mobile substrate which creates a channel that is highly susceptible to changing course in high water events.

This situation is further exacerbated by historic attempts to dredge and straighten the river in many areas, which has resulted in lowering of the river bed, reduced storage of bed material within the channel and greater transport of materials downstream. This creates increased erosion as banks become perched above the river, leading to increased gravel depositions downstream as well as sedimentation of gravels as the friable topsoils slump into the river.

The River Coquet is designated as a SSSI, both for its woodlands and river and stream habitat and the area is included in a Catchment Sensitive Farming Delivery Initiative (2011-14), which although nearing its end demonstrates a drive for improved farming practice in the area (www.magic.gov.uk). Both of these factors could increase the eligibility of any riparian improvement work for funding through Natural England.

The Federation currently stock the river annually with 1000 280-330mm (11-13”) triploid brown trout, which are all introduced to the river on the same day, spread out between Rothbury, Pauperhaugh, Felton and Morwick. No catch returns are kept, but it is assumed that around 90% of fish caught are returned to the river alive.

## 3.0 Habitat Assessment

Upstream of Rothbury, several sections of the Coquet have been straightened, with new channels dredged out of the floodplain to realign the river away from its natural course to its current location. This creates an un-naturally straight, wide and deep channel with very little flow diversity, making such sections poor quality habitat for trout. Some adult trout and older parr may reside in the area, but in most cases they will be reliant upon the cover provided by overhanging and trailing willow (*Salix spp*.) and alder (*Alnus glutinosa*) branches (Figure 1).

**Figure 1. One of the realigned, straightened sections of the river where trout habitat is heavily reliant upon the bankside willow (left of shot) and alder trees (right of shot).**

Figure 2 shows a redundant channel section from which the river has been realigned. The low area that arcs around to the left is an earlier, more meandering river course. This kind of action was often taken to divert the river away from prime land or buildings, or simply to create more manageable field parcels. Realignment was also sometimes undertaken to

reduce erosion on bends, however, grazing is often the underlying cause of excessive erosion in the first place, as natural, well vegetated banks greatly reduce erosion rates.

**Figure 2. The depression in the centre of shot shows one of the former river channels. Note the rushes (*Juncus effusus*) in the left of shot and background which demonstrates that it is still a damp area of the field.**

Sheep grazing is a notable concern on the river as it denudes the banks of the herbaceous vegetation it should support, leaving a near monoculture of grass; grasses being the only thing that can regenerate fast enough to withstand the grazing pressure. This greatly reduces the foliage that would naturally protect the surface of the banks, but more importantly, reduces the diversity and extent of root systems that would ordinarily bind the banks together, leaving them susceptible to increased rates of erosion.

It has to be recognised that erosion of the river bed and bank is part of the river's natural process, but it can be massively accelerated by grazing, or by dredging/realignment that has lowered the bed to leave the banks perched, with erodible gravels and subsoil exposed (Figure 3).

A further consequence of grazing and the associated lack of root structure within the bank is that as the banks erode, the material that slumps breaks up and washes away more easily (Figures 3 & 4). Conversely, on better vegetated, banks the root structure makes it less susceptible to wash-out and allows it to consolidate naturally re-grade the bank line (Figure 5).

A gravel bar present in Figure 3 demonstrates the availability of salmonid spawning substrate on the river, which was present throughout the sections walked. It would, however, be of a higher quality if the erosion and sedimentation were reduced, and if there were better vegetated stable margins with overhanging cover in which emerging fry could seek refuge.

**Figure 3. Section of bank erosion exacerbated by grazing pressure. Some material has slumped and been retained to the right of shot, but all of the material in the centre and left of shot has been washed out. Note how the river is now free to erode into the friable sub-soil.**

**Figure 4. Erosion on a grazed bank. Some material is retained but a large portion has been lost and the friable sub-soils remain exposed.**

**Figure 5. Un-grazed section of bank directly downstream of Figure 4. Although erosion and slumping has occurred, the lack of grazing and increased vegetation has aided retention of bank material.**

In the section upstream of Rothbury, some areas of high quality tree cover were present, although, unfortunately, these were generally on the steeper-banked, incised sections, where sheep access is restricted and in-channel habitat quality was poorer. On the shallow riffle and more dynamic pool sections there was often a lack of tree cover. To a large extent this can be attributed to a history of sheep grazing, which is likely to have prevented natural regeneration, with most self-set saplings being grazed off before they can establish or severely damaged and stunted (Figure 6). In addition, it appears that some of the alders may have contracted alder disease (*Phytophthora sp*), which is likely to lead to the death of an even greater number of trees. Between these two issues is it likely that over time, the river will be subject to a net loss of bankside trees in the grazed sections.

It is also noted that in areas where trees are present, the lower branches appear to have been removed. While this could occur through high flows breaking off the limbs, it is more likely that this has been done deliberately in a misguided attempt to aid casting to likely lies. In actual fact, removal of the branches will have greatly lowered the habitat quality in that area and reduced the size and number of fish that the area can support. It may be slightly easier to get a fly to the spot where he fish were holding, but will they still be there in such numbers, or will they have moved on to another area with better cover?

**Figure 6. Where livestock have access, the occasional willow or other saplings that do become established are heavily targeted and damaged, particularly by sheep.**

**Figure 7. Alder tree displaying likely signs of *Phytopthora*.**

**Figure 8. A line of beneficial alders that are helping to protect the bank and providing some cover through their roots. The lack of low and trailing branches, however, greatly reduces their potential for providing low-level cover for trout.**

In the same way that grazing and the associated erosion issues deteriorate habitat and lead to increased erosion and sedimentation on the main river, the same is true for tributaries. Figure 9 shows how grazing and livestock poaching are greatly increasing the sediment input from the small tributary that enters the river c. 700m downstream of Lady's Bridge (opposite the golf course). Without this degradation, the tributary may possibly have been a potential spawning and juvenile area (Figure 10). The importance of even the smallest tributaries such as this for those purposes is only more recently being realised.

**Figure 9. Obvious signs of sedimentation where a small tributary discharges to the Coquet.**

**Figure 10. Habitat in the tributary depicted in Figure 9 could have potential as a spawning and juvenile area if livestock were excluded.**

Immediately downstream of Rothbury, the river descends into a narrower, gorge-like section of valley, unlike the wider upper floodplain. Through this section, a combination of stock exclusion and reduced accessibility for stock allows a more naturally tree-lined section of river. Here the bankside trees provide shade to around 50% of the channel, while providing both low-level and trailing branches along the river. The steeper nature of the watercourse in this section also means that rather than the pool and riffle type habitat found upstream, much of the section is riffle and glide with the occasional pool, interspersed with large boulders that create excellent flow disturbance. This makes ideal habitat for wild fish, with a range of depths and flow characteristics that is poorly suited to stocked fish.

**Figure 11. Excellent habitat immediately downstream of Rothbury, ideal for wild trout.**

Although there were numerous large boulders downstream of Rothbury, in general, there was a lack of in-channel structure in the upper section; however, below the narrower gorge section, where the river valley opens out again in the fields upstream of Pauperhaugh, more trailing branches and large woody debris (LWD) were present (Figure 12 & 13). These greatly enhance the habitat by providing cover and flow disturbance, particularly in the slower deeper sections. This structure also provides massively increased protection from piscivorous birds such as herons (*Ardea cinerea*), merganser (*Mergus serrator*), goosander (*Mergus merganser*) and cormorants (*Phalacrocorax carbo*), as fish can much more easily negotiate the structure than the birds can.

**Figure 12. LWD on the far side of the channel providing great habitat and refuge from predators. The structure also provides valuable flow disruption in the slower sections.**

**Figure 13. Excellent trailing branch structure where some of the limbs of a willow tree have collapsed into the river. This is a vital fish holding feature in an otherwise deep and relatively featureless area. Once the leaf is on the tree the structure provided is guaranteed to hold fish and should be retained at all cost.**

In the fields upstream of Pauperhaugh, the issues of sheep grazing again come to the fore, with obvious signs of accelerated erosion around the root-ball of many of the trees. This is because the shallower root systems of the grazed grass provide less protection to the banks, which are then more easily washed out in high flows. This eventually leads to the tree being out-flanked by the river and loss of the tree. Imagine these pools without the tree structure: they would be greatly lacking in features and much less capable of supporting healthy fish stocks.

**Figure 14. A perfect example of how sheep can kill or remove mature trees. Note how the trees to the right of shot are precariously hanging on to the bank and will likely be lost in future floods. Exclusion of livestock from the banks could have prevented the issue occurring and still could greatly reduce the extent of future tree loss.**

# 4.0 Recommendations

## 4.1 Buffer Fencing

Possibly the single greatest improvement that could be made to habitat on the river would be to install buffer fencing that would allow development of a more diverse vegetation structure on the banks and allow regeneration of trees. The siting of this would be paramount, as a spatey river like the Coquet would have to be allowed a good buffer over which the erosion could stabilise, and the fence would have to be located out of the immediate risk of flooding.

Investigation should be made into fencing all areas in which stock are currently not excluded from the river; however there are a couple of areas that could be fenced as quick-wins:

- Excluding the sheep along a short section at the upstream end of the golf course (at NGR: NU 04627 01089) would prevent their access along the river bank for a significant length. This would potentially also reduce the rate of erosion towards the golf course.
- Fencing both banks upstream of Pauperhaugh. The banks are steep along much of this length, so the fence could be installed reasonably high above the river (out of floods) without losing much land.

Areas currently fenced should also be inspected, as without maintenance they will become ineffective over time (Figure 15).

**Figure 15. Old buffer fencing that is no longer effective, upstream of Pauperhaugh Bridge on the RB.**

It is recommended that Natural England and the Environment Agency are both approached for assistance with any planned fencing work as it is highly likely to fit with their river management aspirations and they may be able to offer funding assistance and advice through programmes such as Catchment Sensitive Farming and/or Countryside Stewardship schemes.

## 4.2 Tree Management

### 4.2.1 Planting

Planting with species such as willow (*Salix spp*.), ash (*Fraxinus excelsior*), hazel (*Corylus avellana*) and rowan (*Sorbus aucuparia*) and (possibly alder, although there may be issues with *Phytophthora*) would be greatly beneficial in any areas where cover is lacking or bank stabilisation required. Stock exclusion is, however, paramount, as otherwise they are likely to eat any saplings.

The quickest and easiest way to plant willow is by pushing short sections of willow whip into the ground around the water line and wherever it will get plenty of water. This can be undertaken at any time of the year, but will have the greatest success if undertaken within the dormant season, shortly before spring growth begins (ideally late Jan-early March). 400-600mm (c.16-24”) whips should be planted into soft, wet earth/sediment so that there is a greater length within the ground than out of it to minimise the distance that water has to be transported up the stem. Leaving only 1/3 of the whip protruding from the ground is sufficient.

Willow can also be planted as living willow bundles, which consist of a several willow branches tied together into a faggot. These can then be staked along the waterline, ideally with the majority of the bundle submerged in most flows. This method can rapidly increase the availability of low, dense canopy over and within the water.

It is preferable to source willow locally, from adjacent areas of the bank. This ensures that it is suited to the conditions and helps to avoid potential issues with transportation of non-native species. There are numerous willow species found on river banks, but the smaller shrub varieties are usually the best for these habitat enhancements, as they remain small and low to the water and require less maintenance.

### 4.2.2 Pruning

It is recommended that, if it has been undertaken in the past, any pruning of branches along the bankside trees be ceased in favour of promoting such features. Where low-lying branches are present, they can even be bent/trained down into the water to create additional lies. This may make

some casts more difficult, but the overall increase in habitat and fish holding capacity will far outweigh any inconvenience.

### 4.2.3 Coppicing and tethering (LWD)

Coppicing is an excellent way to increase the availability of low-level cover in general, but particularly on trees that have lost their lower branches. A low coppice will encourage vigorous regrowth from the stump, providing just the type of cover that is required. As this action will decrease the level of shade and canopy cover short-term, it is recommended that only ever 3$^{rd}$ or 4$^{th}$ tree is treated in this way each year to maintain diversity of the canopy.

N.B. There is some evidence to show that coppicing diseased alders can reinvigorate them and at least prolong their life.

In many of the slower, deeper and featureless sections the trunks of the trees coppiced could be well employed as tree kickers (Figure 16), whereby the trunk is layed along the bank line and strongly cabled to its stump or another immovable anchor. This then provides the valuable cover and structure that is so often missing; furthermore, this can also assist in accumulating sediments downstream, behind the LWD and can facilitate narrowing of the channel to a more natural width, where required (e.g. the dredged, straightened sections).

**Figure 16. Tree Kicker employed on a shallow section of river, showing the accumulation of sediment downstream. This method would be equally applicable on deeper river sections.**

### 4.2.4 Laying/hinging

Where trees are already established along the bank side, habitat improvements can often be attained through laying some or all of the branches/trunks down into the watercourse to increase low cover and structure within the channel. This method is generally limited to species that can be easily manipulated without snapping (e.g. willow, elm, hazel, hawthorn and small alder). Also, for this reason, small to medium shrubs tend to work best, although large willow can be successfully laid.

The process involves cutting part way through the stem/trunk (a bit at a time) until it can be forced over into the channel (Figure 17). Care should be taken to limit the depth of the cut to only that which is required to bend the limb over, thereby a substantial hinge is retained to provide maximum strength and health of the tree. This treatment can be an aspirational

treatment for many of the willows planted, once they have reached a suitable size.

**Figure 17. Hinged willow.**

**For more details on the habitat enhancement and restoration techniques described in this report please visit the Wild Trout Trust website. (www.wildtrout.org/content/wtt-publications)**

**Before any work is undertaken to a watercourse, or within 8 metres (5 in some areas), it is important to first contact your local Environment Agency. The EA will be able to inform you whether there is a legal requirement for Flood Defence Consent, and 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 to assess and manage the potential flood risk and biodiversity implications of any work.**

### 4.3 Stocking

As NAF are the farthest upstream club to stock trout on the River Coquet and the upper end of the Federation waters are quite capable of producing and supporting wild trout in most areas, it is strongly recommended that the extent of stocking be limited to the lower beats, so that the potential negative impact of stocking upon wild trout stocks in the whole of the upper river can be reduced.

For best effect, it is recommended that stocking be confined to the sections of river downstream of the Pauperhaugh beat. Stocked trout will often migrate downstream within a short time after stocking, rarely staying in the stocking location for long, and as there is a significant length of river immediately downstream of Pauperhaugh not under NAF control, this could result in a loss of fish. Better to stock them in the lower, more sedate reaches where they have a better chance of holding and more of the water is controlled by NAF. In this way, reducing the numbers of fish stocked and targeting them in the lower Federation sections could provide better value returns from the stocking in the short-term while the impact of not stocking the upper section is assessed for a few years.

Many clubs have now found that, when stocking ceases, the removed impact of stocked fish upon the wild fish actually leads to an increase in wild fish production and retention, with clubs like Hutton Rudby (River Leven), Manchester Anglers (River Ribble), Penrith Anglers (River Eden) and Haddon Estate's Peacock Fly Fishing Club (Derbyshire Wye) showing better fishing and increased catches after ceasing stocking. To monitor the success of this action, it is also recommended that angler logbook/catch returns be kept, so that catches can be accurately recorded. Ideally this would be done in the years leading up to stopping stocking, but even without, it would be a very valuable dataset. This would also allow the catches within stocked and un-stocked sections to be compared.

Finally, if the stocked fish are marked, an accurate record could be kept of the returns from stocking that would help inform the future stocking practice. With the stocked fish identifiable from wild fish, it could also be recommended that all wild fish are returned to the river and only stocked fish be taken. This would greatly improve the level of protection afforded to the wild Coquet fish and promote the production and proliferation of those wild fish.

## 5.0 Making it Happen

WTT may be able to offer further assistance such as:

- 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 highlighting specific areas for work, with the report forming part of a land drainage consent application.
- WTT Practical Visit
  - Where clubs 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 day. This would consist of 1-3 days work with a WTT Conservation Officer teaming up with interested club members to demonstrate the habitat enhancement methods described above. The recipient would be asked to contribute only to 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 - 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

This report is produced for guidance only. Accordingly, 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 comments made in this report.