Advisory Visit

River Browney – River Wear

Co. Durham

21/02/15

1.0 Introduction

This report is the output of a site visit undertaken by Gareth Pedley of the Wild Trout Trust, to the River Browney, at the request of the landowner, Sophie Haagensen. A previous advisory visit has also been undertaken in the area for Ferryhill and District Angling Club waters, covering their water on the River Wear and lower 750m of the Browney to their confluence (see WTT website - www.wildtrout.org/av/river-wear-ferryhill-and-district-ac).

Normal convention is applied throughout the report with respect to bank identification, i.e. the banks are designated left bank (LB) or right bank (RB) whilst looking downstream (D/S). The Ordnance Survey National Grid Reference system is used for identifying locations. This visit was undertaken starting at the downstream end, progressing upstream, for convenience.

Table 1. Overview of the River Browney waterbody details

	Waterbody details
River	Browney
Waterbody Name	Browney from Deerness confluence to Wear
Waterbody ID	GB103024077552
Management Catchment	Wear
River Basin District	Northumbria
Current Ecological Quality	Moderate ('moderate' for fish, 'good' for invertebrates) not assessed for fish since 2009 (WFD cycle 1)
U/S Grid Ref	NZ 25772 40456
D/S Grid Ref	NZ 26314 38976
Length of river inspected (km)	2km

(http://environment.data.gov.uk/catchment-planning/WaterBody/GB103024077552)

The current ecological classification undertaken by the Environment Agency (EA) for this waterbody as part of the Water Framework Directive assessment is that the invertebrate assemblages present are of 'good' status, meaning that they are as would be expected in

natural or near natural conditions. When the fish populations were last assessed (2009) they scored only 'moderate' status, meaning that they were fewer in number and / or diversity than would be expected. In general, the water quality aspects assessed achieve 'good' or 'high' status, meaning that water quality on the River should not be a constraint for supporting healthy wild fish populations. However, a 'poor' status for phosphate suggests that nutrient enrichment may be an issue (often caused by sewage discharge and, or agricultural runoff upstream) and this may be impacting upon the status of macrophytes (plants) and phytobenthos (algae), which achieve only a 'moderate' status. These two aspects are also compromised by a high sediment loading which is often linked to agricultural runoff (http://environment.data.gov.uk/catchment-planning).

This report will assess the suitability of habitats along the reach, identifying issues and improvements that could be undertaken.

2.0 Catchment / Fishery Overview

The River Browney lies at the edge of the Northumbria Coal Measures Natural Area. This natural resource has been extensively exploited historically, as demonstrated by the altered land topography, and in the ochreous discharges which enter the River and other watercourses around the middle and lower River Wear catchment (www.naturalareas.naturalengland.org.uk). Land use within the catchment comprises a range of improved pasture and woodland in the upper reaches, which continues through the middle and lower river, along with areas of urbanisation and arable agriculture.

Evidence from EA electrofishing surveys show that the River Browney supports both trout and grayling, along with the occasional coarse fish and a range of other minor non-angling species.

An EA gauging weir a short distance downstream of the reach inspected poses a significant barrier to fish migration in most flows, although the EA and local Rivers Trusts are developing plans for an easement or fish pass at the structure. Observations of large redds (nests within the gravel containing fish eggs) during the visit provide evidence that large salmonids are spawning in the area. These are likely to have ascended the river from downstream of the gauging weir, but improving fish passage there will be highly beneficial in providing access for a greater number and range of fishes.

3.0 Habitat Assessment

Bedrock is a prominent feature along the reach inspected, particularly in the lower third, where surface outcrops limit bed scour and, consequently, river depth. The shallow water areas created provide some good fry and parr habitat, although loose gravel on which fish can spawn is limited. Occasional gravel bars are present (Photo. 1) although they are often marginal features, exposed at normal flows (not viable spawning areas). Fissures and lower areas in the bedrock do provide areas of deeper water capable of holding adult trout, particularly on the bends.

Another significant channel feature in the lower section is high, steep river banks. This contributes to the lack of gravel substrate in the area as high flows, unable to spill onto the floodplain and dissipate flow energy, will scour out much of the mobile substrate and transport it downstream. For the same reason, high flows will also pose a challenge to the fish stocks of the reach which will be reliant upon in-channel structure (boulders, roots, branches and Large Woody Debris (LWD)) amongst which they can shelter. The slower flow areas such features create allow sediment/gravel deposition, making them vital habitat features (Photo. 2). For this reason they should not be removed, and where possible, promoted and even replicated to optimise the habitat available.

As suspected by the 'moderate' macrophytes and phytobenthos status, it does appear that sedimentation is an impact on the river, as seen in Photo 3, where spaces between the boulder substrate have trapped fine sand and silt. Such sedimentation can be an issue for juvenile salmonid survival as it smothers eggs laid within the gravel; the same applies to certain beneficial invertebrate species, as silt smothers their habitat. In-channel structure can play a part in improving the situation, as by constricting the channel in places, flows are accelerated at focal points, scouring the bed clean, while wider areas allow sediment deposition in the margins.

Photograph 1. Bedrock outcrop, limiting water depth and suitability as adult trout habitat, but providing good juvenile habitat in normal flows.

Photograph 2. An excellent example of beneficial LWD that will provide cover, flow disruption and shelter through the additional in-channel structure.

Photograph 3. Reasonable juvenile salmonid habitat (a little lacking in cover/structure), but also note the significant sediment accumulation between the larger substrate particles.

Trees alongside the river provide valuable shade and cover, although there was evidence that channel maintenance/tree pruning may have been undertaken in areas, as evident by a lack of low branches (Photo. 4), and by elm (*Ulmus minor var. vulgaris*) and hazel (*Corylus avellana*) stools where coppicing has taken place (Photo. 5). The tree shading and high banks along this reach may also be reducing macrophyte growth; however, the bedrock and boulder substrate is not conducive to significant growth of aquatic vegetation and tree shade and cover can acts as a surrogate habitat type. Forth this reason, over pruning trees along such rugged channel types to improve macrophyte can be futile, and actually further denude habitat, as tree cover and shade is lost and significant growth of aquatic macrophytes are still unlikely.

Habitat can, however, be significantly enhanced by simply laying some of the more pliable tree species such as hazel, elm, hawthorn (*Crataegus monogyna*), and particularly willows (*Salix spp.),* down into the channel. This creates instant, valuable low-level cover and trailing structure along the river margins, replicating the natural, fallen alder (*Alnus glutinosa*) habitat shown in Photo. 6. The coppice re-growth in Photo 5 and the small saplings in Photo. 7 would be ideally suited to this treatment, as would the hawthorn in Photo. 8.

Photograph 4. Area with a lack of low-level cover and in-channel structure, possibly due to past maintenance.

Photograph 5. A coppiced stool, again suggesting historic channel maintenance.

Photograph 6. Valuable cover and structure provided by a fallen alder shrub.

Photograph 7. Small, pliable shrubs can be easily laid into the river channel/margin to enhance habitat.

Photograph 8. Even larger shrubs can be laid if they are a suitable species, like the hawthorn pictured above, which could be laid as per the red tree outline.

On a large bend, approximately mid-way through the reach visited a deeper pool providing excellent adult trout habitat was observed, with the remains of a big, old crack willow (*Salix fragilis*) protruding from the bank. The tree now appears to be dead, with only the roots remaining, but they do still provide valuable bank stabilisation. Planting of willow whips around this area would be beneficial to reinstate the cover that has been lost and help maintain the integrity of the bank. In the same area, the remains of a large stand of Himalayan balsam (*Impatiens glandulifera*) was also observed, the presence of which can also destabilise riverbanks, as the plant outcompetes native species before dying back for winter and leaving the banks devoid of any vegetation. Treating this issue by pulling the plants well before they have flowered, strimming them below the first node, or having them chemically treated by a user who is trained and licensed for use of herbicides near a watercourse.

A short distance further upstream, a good range of habitat was also observed. Shallow riffles provide a range of micro-habitats for fry and parr (Photo. 11), with deeper runs and naturally overhanging willow cover also present to support larger adult fish (Photo. 12).

Photograph 9. Area of bank where a large crack willow has died. Planting of this area would be beneficial to consolidate depositional material on the inside of the bend and maintain bank stability.

Photograph 10. All that remains in areas of Himalayan balsam during the winter.

Photograph 11. Fast and slow flow amongst variable substrate provides ideal habitat for a range of juvenile salmonid life stages.

Photograph 12. Deeper water with overhanging cover is ideal habitat for larger trout.

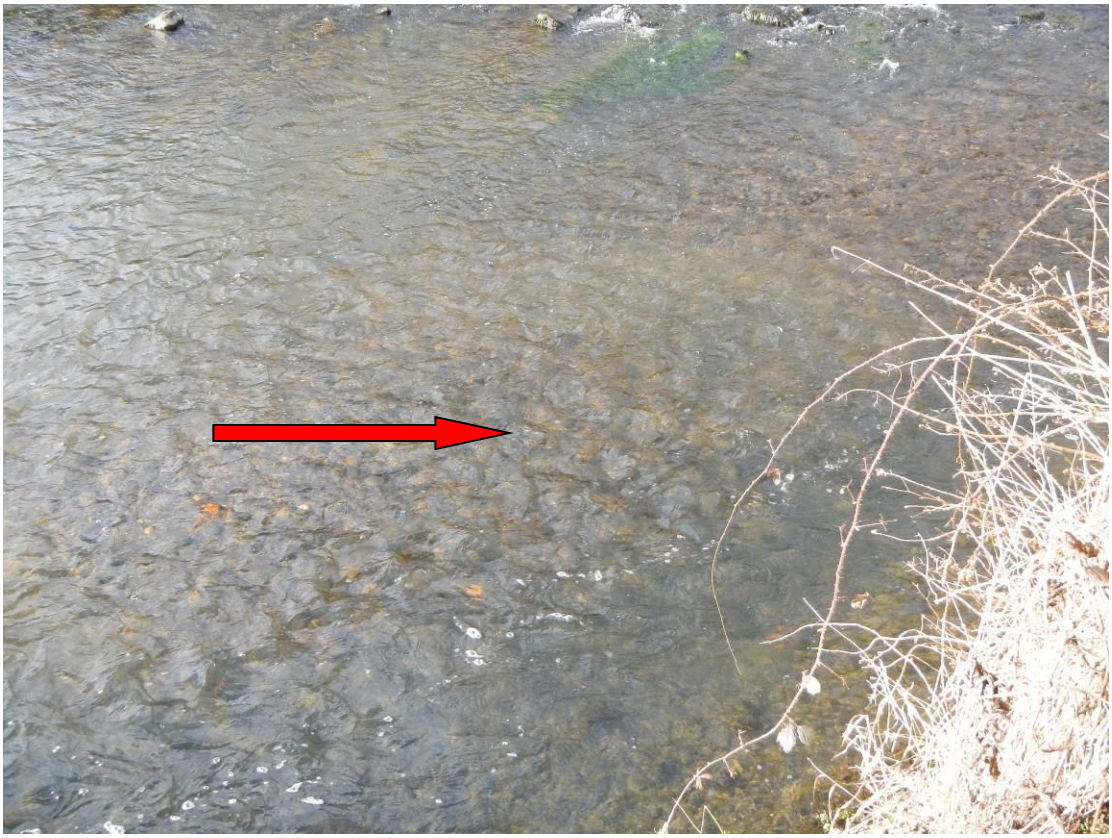
Large Woody Debris towards the upper end of the section provides valuable cover, flow disturbance and shelter, greatly enhancing habitat locally (Photo. 13). It can be understood why, historically, in-channel features such as these may have been removed (often as EA flood prevention measures), in an attempt to 'tidy' the river and remove blockages. However, where flooding is not an issue, the massive benefit to habitat far outweighs the unsightliness of a bit of debris and rubbish which may accumulate around the structure. Time and again, surveys have shown greatly increased numbers of fish and invertebrates inhabiting an area after the accumulation or installation of such structures.

Photograph 13. Highly beneficial LWD provided by a naturally collapsed willow lying into the channel (foreground) and a log (background). Note the focussed, accelerated flow in the centre of the channel and slower sheltered water in the foreground.

Small self-set willow shrubs also provide valuable, natural channel narrowing, as evident in Photo. 14, where accumulation and consolidation of sediment around the base is forming a new bankline. This will, again, increase flow velocities within the channel, cleaning and grading/sorting the substrate. The added cover and structure in the margin is also a great fish lie.

A short distance further upstream a large salmonid redd was also observed (Photo. 15). This is encouraging as spawning within this area is generally limited by a lack of suitable substrate.

Photograph 14. Self-set willow, encouraging natural channel narrowing. The extent of narrowing that will occur is dependent upon the river flows experienced, with high flows scouring and maintain the channel width required.



Photograph 15. Large salmonid redd (red arrow) on one of the few suitable gravel areas.

The valuable LWD habitat and fallen willows can be easily replicated to optimise habitat within the reach and this treatment would be suitable in many locations observed during the visit, such as that in Photo 16. This tree could be easily laid into the river margin by hinging it within 400-500mm from its base. The limb could also be cabled to its stump for extra security, if required.

Photograph 16. Medium-sized willow tree is ideally suited for laying into the river margin.

Towards the very upstream extent of the reach visited, a deep, straight channel section with slow flow provides some good adult trout and migratory salmonid holding water, but is generally lacking cover and flow diversity (Photo. 17). Small willow shrubs, sycamore (*Acer pseudoplatanus*) and alders along the margin do provide some enhancement.

In this area, a large area of slumped riverbank was also observed (Photo. 18). This is likely to be the result of undercutting on the outside of the bend causing the bank to collapse. The slumped material appears to have remained relatively stable due to the vegetation cover and associated root matrix within the soil, and it should remain that way. The area could be further protected by planting willow whips within the slumped material to increase the root matrix within the soil.

Photograph 17. Willow and other bankside trees provide some cover along a pool that is generally lacking in cover and flow diversity.

Photograph 18. Area of slumped bank that may benefit from willow whip planting to increase stability.

4.0 Recommendations

4.1 Tree Work

4.1.1 Planting

Planting is recommended wherever there is a lack of low cover and structure within the river margin. It will be of particular use if trees are planted along the waterline and trained into the channel to redirect flows. Most native deciduous species would be beneficial but willow is by far the easiest. One great benefit of using crack willow is that, as it grows, it will crack and collapse under its own weight, naturally creating in-channel LWD. This treatment may not be appropriate on all rivers, but on a low-management wild fishery, the full benefit of allowing natural processes can be gained.

The quickest and easiest way of planting is with willow, by pushing short sections of willow whip into the ground. 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-March). 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; 30-40cm of whip protruding from the ground is sufficient.

4.1.2 Laying

Where trees are already established along the bank, habitat improvements can be achieved by laying the trunks, or selected branches down into the watercourse to increase low cover and structure within the channel. The method is usually limited to species that can be easily manipulated without snapping (e.g. willow, elm, hazel, hawthorn and small alder), but some others can be laid carefully. Small to medium shrubs tend to work best, although quite large willow can be successfully laid.

The process involves cutting part way through the stem/trunk, a bit at a time (like laying a hawthorn hedge), until it can be forced over into the channel (Figures 19 & 20). The depth of the cut should be limited to that which is required to bend the limb over, to retain maximum strength and health of the tree/shrub.

Photograph 19. Hinged willow.

Photograph 20. Hinged hazel.

4.1.3 Coppicing

Where trees are present but the canopy is well above the water level (over 1m), coppicing can be undertaken to encourage low-level re-growth and rejuvenate the tree. This can also be used to promote a more dappled light regime and can encourage better in-channel weed growth. The treatment should be undertaken sparingly, as tree canopies also provide habitat for many other species and create valuable shade over a watercourse. When undertaking coppicing, existing low cover should also be retained and care should be taken to ensure that work does not disturb nesting birds, as this would constitute an offence under the Wildlife and Countryside Act 1981.

4.1.4 Tree kickers

The introduction of additional LWD and structures like tree kickers (live and dead) into the channel can also be used to encourage new areas of scour and deposition. Such structures can also help to concentrate flows in certain areas of the channel (usually towards the centre), and scour deeper pool habitat, while also creating slacker areas within the margins where deposition will increase (Photo. 21). The method simply involves cabling the trunk of a coppiced tree to its own stump (Photos. 22 & 23). (N.B. - This technique will require a Flood Defence Consent from the Environment Agency).

Photograph 21. Note the narrowing effect through significant sediment accumulation (foreground centre and right of shot) in the sheltered area downstream of the tree kicker.

Photograph 22. Stump cabling for a tree kicker.

Photograph 23. Trunk cabling for a tree kicker.

4.2 Himalayan balsam

The stand of balsam observed (Photo 10) should be treated (pulling, strimming or herbicide) if possible, which should help reduce issue. Local scale control (initial high effort – then a little ongoing weeding) can be extremely valuable to overall biodiversity, even when balsam is present in other areas of the catchment. The below link demonstrates how an urban volunteer group manage to maintain their small patch free of balsam despite massive stands upstream - http://urbantrout.blogspot.co.uk/2014/07/volunteer-action-on-urban-river.html.

The situation may also improve in the future as organisations like the Wear Rivers Trust seek funding to tackle non-native invasive species at a catchment level.

More information on the recommendations discussed and many other restoration techniques can be found in our various publications on the Wild Trout Trust website, under the library tab - www.wildtrout.org/content/library.

5.0 Making it Happen

Should additional advice or support be required, the Wild Trout Trust may be able to offer additional assistance through a practical visit (PV).

Where assistance is required to carry out the kind of improvements highlighted in this report, there is the possibility of WTT staff conducting practical visits or workshops for a recipient. This would consist of 1-3 days' work with a WTT Conservation Officer demonstrating the habitat enhancement methods described above. As with the advisory visit service, you would be asked to contribute only to reasonable travel and subsistence costs of the WTT Officer.

6.0 Acknowledgement

The Wild Trout Trust wish to thank the Environment Agency for the support and funding that 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**.**