Walkover Report

River Wear – Ferryhill and District AC

July 2014

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1.0 Introduction

This report is the output of a site visit undertaken by Gareth Pedley of the Wild Trout Trust to the Rivers Wear and Browney (Ferryham and Brockbank) on 17th July, 2014, which comprise two of several Ferryhill and District Angling Club (FDAC) river beats. Comments in this report are based on observations on the days of the site visit and discussions with Jim Wood (FDAC).

FDAC is a relatively large club, with around 380 members; only a few of these members regularly get involved with improvements on club waters. Of the club membership it was suspected that around 60% focus on the stillwaters, with the remaining 40% mainly fishing on the river fisheries (J. Wood, pers. comm., 17th July 2014). Club rules on the section of river visited dictate that any method can be used, however, no maggots or groundbait are allowed until June 16th.

The aims of the visit and this report are to:

- assess habitat within the identified sections
- identify priority areas for in-stream habitat improvements
- provide sufficient details to support a Flood Defence Consent application to the Environment Agency
- produce an approximate bill of quantities for the proposed works.

Normal convention is applied throughout the report with respect to bank identification, i.e. the banks are designated left hand bank (LHB) or right hand bank (RHB) whilst looking downstream.

2.0 Lower River Browney - Honest Lawyer Pub to River Wear (NGR: NZ 26663 38143 - NZ 27140 38525)

The lower section of the River Browney was walked from a starting point at the A167 road bridge, proceeding downstream to the confluence with the River Wear. As with many of the tributaries that traverse the Wear flood plain, the Browney is subject to significant dredging and straightening; something that was undertaken historically to increase flood conveyance and create more easily manageable field boundaries. However, the long term benefits of these actions are often questionable when the ongoing maintenance requirements and loss of natural river function are considered.

Looking downstream from the A167 bridge (Fig. 1), the straightened nature of the channel and generally uniform dimensions can be seen. Viewing the site on Google maps also show the flood banks along the river which result from the past dredging activity. These impacts have produced a channel in which habitat is significantly degraded; generally being uniformly wide and shallow. Some pools do exist where bends remain (Fig. 2), but are far fewer in number than would naturally be present.

Figure 1. Straight, uniform section of channel downstream of the A167

Figure 2. One of the few deeper pools on the lower Browney, with good cover provided by willow (right of shot). Also note the Himalayan balsam (foreground)

A significant issue with dredged channels is that, being over-capacity, much of the energy is lost at low and medium flows. This results in increased sediment deposition within the modified areas as the water slows and materials supplied from upstream are deposited on what could be valuable habitat, rather than being transported through the reach as would occur with natural channel dimensions. The lack of flow velocity and diversity within an oversized channel also limits bed scouring, resulting in silty gravels that are of little use for salmonid and rheophilic (flow-loving) coarse fish spawning.

Rivers are, however, adaptable and over time additional materials will aggregate in more sheltered areas, forming bars and shoals within the channel (Fig. 3). These will help to narrow the channel and focus flows, eventually becoming vegetated to reinstate a more natural width. Similarly, bankside trees (particularly willow) will encroach into the channel (Fig. 4), as was occurring in several locations, further accelerating flow in some areas and creating slack water in others (where additional

depositional bars can form). Water Crowfoot (*Ranunculus* spp.) also helps to reduce the channel cross-section, accelerating flows, trapping sediments and helping to scour and sort the river bed. These natural processes must be allowed to occur in order that the river can naturally repair its channel; they can also be assisted through tree planting and installation of in-channel structures as described in the **Recommendations** section.

Himalayan balsam (Fig. 2), which is visible in all photographs (pink flowers), is a major issue as it shades out other bankside species during the summer, only to die back in the winter, leaving little bank protection increased erosion risk (the associated inputs of fine sediment can choke gravels). This issue is even more significant on rivers with sandy, friable banks, as on Wear and Browney. Balsam can inhibit formation of the vegetated gravel bars and natural channel narrowing as these features often wash out over winter without the protection of vegetation. In addition, Balsam can also create significant implications for upon invertebrate populations (see link - http://cabiinvasives.wordpress.com/2013/12/10/himalayan-balsam-and-its-impact-on-uk-invertebrates/)

Figure 3. Naturally forming gravel bar which reinstates some sinuosity and narrows the channel

Figure 4. Willow naturally encroaching into the channel. Over time this will aid beneficial narrowing of the over-wide channel, increasing deposition in the river margin. The narrowing effect then works to scour and maintain deeper holding areas within the channel

3.0 **River Wear -** Browney confluence to downstream limit (NGR: NZ 27140 38525 - NZ 27474 39566)

Progressing downstream onto the River Wear it becomes apparent that the main River Wear is subject to similar straightening and dredging activity as the Browney, with similar consequences for the channel, which is also over-capacity in many places and lacking several large bends that would ordinarily create areas of sediment deposition and facilitate pool creation through scouring.

In many areas, the river banks are steep and unstable and this is likely to be, in part, due to the bed lowering resulting from the dredging, which has had the effect of increasing the gradient. A major consequence of this legacy of past maintenance

activity is that high flows are trapped within the high banks (unable to spill onto the floodplain), often causing the river to incise further into its bed at peak flows; this destabilises the banks further, often also leading to the loss of bankside trees (Fig. 5). A further consequence is that at lower flows, material supplied from upstream is often deposited uniformly across the straight, flat channel, rather than bars being deposited in the inside of bends (as would occur in a sinuous channel), leading to further shallowing of pool areas.

The net result is an overly uniform bed profile. The trees that persist in the margins do provide valuable cover and flow diversity, but are often ultimately lost during large floods if they are not well anchored by their roots. Over time the river will attempt to reinstate a more sinuous course but it likely to take a very long time on a heavily impacted river such as the river Wear. Accumulations of Large Woody Debris (LWD) and tree colonisation (also planting) in the river margins and on the lower bank will both kick-start the process (see **Proposed Actions** section).

Again, the presence of Himalayan balsam and associated lack of other vegetation along the river banks is also exacerbating erosion problems, leading to further bank failure, and increased sediment and excessive nutrient input to the river.

Figure 5. Over-wide, and shallow section of river with bank erosion issues are causing tree loss. At present, the area around the slumped tree provides the only high quality habitat in the pool but still lacks the level of shade and cover that a living tree canopy provides

Valuable bed scouring has occurred where an old bank revetment has become out-flanked and disintegrated in the centre of the channel, which has created croy that pinches and diverts the flow (Fig. 6). This represents one of the few deeper pools on the section of the Wear and provides a vital holding pool for all fish species present. Diversion of the flows towards the LHB has also facilitated increased deposition on the RHB, providing much-needed channel narrowing and helping to retain willow shrubs which now also stabilise the RHB and provide good cover. Ensuring that sufficient willow is growing behind the bank revetment/croy, and on the depositional area will be important to protect the RHB in high flows.

This is a perfect example of how the river could be encouraged to recover naturally in the over-wide, shallow, uniform sections; however, large woody debris and trees could be employed to better effect than rock croys to achieve the result.

Figure 6. Deeper pool area created by a rock flow deflector that focusses flows and increases bed scour. Also note the valuable deposition and channel narrowing it is facilitation along the RHB (right of shot).

Downstream on the RHB a fallen tree (Fig. 6) represents natural LWD in an otherwise uniform channel and demonstrates the type of feature that could be easily recreated throughout the section with 'tree kicker' type structures. In addition, installing living willow around the LWD will help to increase sediment deposition, locking the materials in place and kick-starting natural channel narrowing. Adjacent to the LWD, a run of osier willow shrubs (*Salix viminalis*) provide good marginal cover, protect the banks from balsam and over time will facilitate valuable channel narrowing. Interspersed with the osier are several crack willows (*S. fragilis*) which also provide great habitat as they collapse into the channel. This is one of the species' methods of spreading, propagating through broken branches that root to create new trees, as well as through catkins/seeds.

Opposite, on the LHB, work using predominantly osier willow has helped to stabilise a previously highly unstable bank. Some of the spiling has washed out in high flows, but in most areas the willow has taken and is suppressing balsam growth.

Figure 7. Natural LWD on the RHB with osier and crack willows downstream. Willow spiling on the LHB

At the downstream limit of the section several mature crack willows provide valuable cover and bank stability (Fig 8.). The most upstream tree in shot demonstrates how the limbs of the species are prone to collapsing under their own weight and fall into the channel (Fig. 9). This provides high quality cover habitat for fish.

Figure 8. Well established mature willow provides good cover and bank protection.

Figure 9. A crack willow limb that has collapsed into the river provides excellent habitat and can be recreated through the laying technique; much like laying a hawthorn hedge.

4.0 Recommendations

4.1 **Lower River Browney -** Honest Lawyer Pub to River Wear (NGR: NZ 26663 38143 - NZ 27140 38525)

4.1.1 **Planting**

Planting with a variety of species such as willow (*Salix spp*.), hazel (*Corylus avellana*) and alder (*Alnus glutinosa*), would all be greatly beneficial in any areas where cover is lacking or bank stabilisation is required, providing that adequate access is maintained. Planting will be equally beneficial on any overly straight sections, where variation in flow is required.

As both crack (large trees) and osier (smaller shrub) willow grow locally it is recommended to utilise them both, employing osier where low dense cover is required and crack where larger trees and greater future encroachment into the channel is required.

Method

The cheapest and most effective method to plant willow is by pushing short sections of willow (cut from willow whips/branches of a living tree/shrub) into the ground around the water line and in areas where bank stabilisation is required. Greatest success will be achieved in damp areas where they will get plenty of water. This work can be undertaken at any time of the year, but survival is improved if undertaken within the dormant season, ideally late Jan-early March shortly before spring growth (can be done Nov-March).

The technique is to drive 400-600mm (c.16-24”) sections of willow into soft, wet earth/sediment, leaving only 1/3 of the whip protruding from the ground to minimise the distance that water has to be transported up the stem. Any diameter of branch can be used for this but 10-30mm (1/2 - 1”) is ideal.

Willow can be planted as living willow bundles c.1000mm - 1500mm long (3’ – 4.5’), which consist of a several willow branches tied together into a faggot. These can then be pegged with willow stakes along the waterline, ideally with the bundle half submerged in normal flows. This method can rapidly increase the availability of low, dense canopy over and within the water, but provides slightly less bank stability than whips initially.

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. Both crack willow and osier willow can be found locally on the river banks and each can be used to good effect.

4.1.2 Tree laying

Where trees are already established along the bank side, significant habitat improvements can be attained by laying some 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 gradually cutting part way through the trunk to leave a hinge, so that it can be forced over into the channel while remaining attached to its stump (Figure 10). The depth of the cut should be limited to only that which is required to bend the limb over, thereby retaining substantial hinge to provide maximum strength and health of the tree. This treatment can also be undertaken on any planted willows, once they have reached a suitable size.

Figure 10. Hinged willow

- This action would be particularly beneficial in the area upstream of the River Wear confluence (Fig. 4). The smaller willow could be easily laid down into the water to facilitate channel narrowing. The same action could also be taken on other similar shrubs throughout the section.
- This could also be undertaken on the larger willow in the background of Fig. 4, to lay it down alongside the smaller shrub.

4.1.3 In-channel structures

Introducing LWD and structures like tree kickers (branches, or whole trees anchored in place to produce cover and flow deflection) will concentrate flows to certain areas of the channel (usually towards the centre), scouring out deeper pool habitat while creating slacker areas within the margins where deposition will increase (Figure 11). Where trees are close to the river they can be felled and the trunk easily secured in place with cables to create the 'kicker', thereby alleviating any flood risk (Figure 12).

- As with the tree laying, tree kickers could be created from several trees along the stretch, particularly the large willow immediately upstream of the confluence with the River Wear (Fig. 4). It may be preferable, to attempt to lay the large willow initially, making a tree kicker of it only if the hinge breaks.
- On a small river like the Browney it is also worth employing smaller willow branches/shrubs that can be cut by hand and secured in place along the river margin with stakes. Using living willow means that, as well as the flow variation and sediment deposition created, there is a high likelihood of the branch rooting and forming a new tree, especially if much of the branch is in contact with water and parts of it are driven into the bank or bed sediment.

Figure 11. Note the narrowing effect through sediment accumulation in the sheltered area downstream of the tree kicker (centre and right of shot)

Figure 12. Cabling for a tree kicker.

4.1.4 Balsam Treatment

It is strongly advised that efforts are made to tackle the issue of Himalayan balsam. The simplest method to tackle balsam is though working parties undertaking periodic balsam pulling events, which should occur before the plants have flowered. Pulled balsam should then be composted well back from the high water line.

Alternatively, if a strimmer is available, this can be a useful tool for tackling larger areas of balsam, but may need undertaking several times in a year. If a strimmer is used, it is important to hit the plant below the 1st node to prevent re-growth.

Effectively tackling balsam can be a difficult task, particularly bearing in mind the location of the site within the River Wear catchment. However, a targeted approach on the River Browney, staring at the upstream end and progressing downstream may be feasible at an angling club level. These type of events may also be something that Wear Rivers Trust can assist with the planning and coordination of if willing volunteers were made available. It may also be possible for WRT or the angling club to secure additional funding for the work through charitable trusts or the Environment Agency.

4.2 River Wear - Browney confluence to downstream limit

4.2.1 Planting

Planting with a variety of species such as willow (*Salix spp*.), hazel (*Corylus avellana*) and alder (*Alnus glutinosa*), would all be greatly beneficial in any areas where cover is lacking or bank stabilisation required. Willow planting to stabilise the bank will also help suppress balsam growth and ultimately, lead to natural channel narrowing.

- This would be particularly beneficial on the unstable section of RHB downstream of the Browney confluence (around NGR: NZ 27136 38545). Owing to the instability of the bank in that area it is recommended that willow pegs/whips are utilised as a cheap and easy way of consolidating the bank and providing cover. It is recommended that osier willow be utilised for this, at least in the short term, as the resulting shrubs will remain smaller and denser and offer greater bank protection.
- The willow spiling previously undertaken around NGR: NZ 27013 38826 is now at a stage where maintenance would be beneficial. A portion of the willow (c.60%) should be cut at around 600mm (2’) above ground level, to be used for pegs to re-plant the bank in sparsely vegetated areas and along the waterline. The remainder of branches, ideally ones along the water’s edge,

should then be laid into the river margin to increase cover and structure, and to stabilise the bank toe (see **Tree laying** 4.1.2).

- Planting of additional crack willow in and behind the spiling would also add variation to the cover and habitat provided, and naturally provide LWD and trailing branches as the trees grow and collapse under their own weight. Planting them behind the osier/spiling reduces the risk of destabilising the toe of the bank.

See section **4.1.1 Planting** for more information.

4.2.2 Tree laying

- Laying some of the willows at the downstream end of the section would be beneficial to increase the level of cover and flow disruption. Any of the trees along the RHB as shown in Fig. 8 could potentially be given this treatment to recreate what has naturally occurred in Fig. 9.

See section 4.1.2 **Tree laying** for more information.

4.2.3 In-channel structures

- Increasing in-channel structure, particularly in the form of tree kickers would be greatly beneficial in all pools where features and structure is lacking. It is understood that there have been issues with gaining consent for this type of work in the past, this may mean that the technique has to be limited to areas where 'kickers' can be cabled to rooted tree stumps. This too would be ideally suited to the downstream end of the section in the area around Fig. 8.

See section 4.1.3 **In-channel structures** for more information.

4.2.4 Balsam Treatment

As on the Browney, the balsam issue is something that the club should seek to get involved with. Working with WRT, the EA and the other clubs along the Wear is likely to be the only way to effectively tackle the issue. Coordinated schemes in areas on the River Tweed and on the River Monnow have shown that in time, targeted action can effectively control balsam on a catchment.

4.2.5 Septic tank Discharge

- At downstream end of the section a suspected septic tank issue was noted at NGR: NZ2688339291. In the interest of maintaining relationships with the adjacent landowners it is recommended that this issue be broached with the landowner first, but if the issue persists it should be reported to the Environment Agency's pollution hotline on tel. 0800 80 70 60.

5.0 Summary of recommendations

5.1 River Browney

Action	Location	Number of structures	Materials	Cost (£)
Planting	Liberally along all open sections	100+ whips/pegs distributed throughout the reach Willow brash bundles secured with willow stakes	Willow sourced from riverbank	Just time to cut the branches and plant them
Small tree laying	Just upstream of the Wear confluence with occasional trees throughout	3-5 – just enough to lower the canopy of certain bushes where required	Willow present on riverbank	Just volunteer time to lay the branches with a handsaw
Large tree laying	Just upstream of the Wear confluence	1 to demonstrate the technique	Chainsaw trained personnel	c.£250/ day tree surgeon or WTT CO.
In-channel structures	3 in the straight section D/S of the A167, but also potentially a further 5 throughout the rest of the length	8	Willow sourced from riverbank. Spool of 2mm wire (£60), 4 x 2" – 3" stakes (£2.00 ea.) and	Time/manpower + £74 (materials)

			pack of staples (£6)	
Balsam	Whole River Browney catchment			Volunteer time
TOTAL				**£74 (**or £324 with tree laying**) + Volunteer time**

5.2 River wear

Action	Location	Number of structures	Materials	Cost (£)
Planting	Liberally along all open sections	1000+ whips/pegs distributed throughout the reach Willow brash bundles secured with willow stakes	Willow sourced from riverbank	Just volunteer time to cut the branches and plant them
Small tree laying with saw or bending/forcing the branch	Throughout the section of willow spiling, predominantly to branches along the waterline		Willow present on riverbank	Just volunteer time to lay the branches with a handsaw
Large tree laying	Opposite the willow spiling Around the downstream access	3-6 depending upon number of trees that can be successfully laid	Tree surgeon or WTT CO (£250/ day) + 8mm dia. Wire rope/cable (£400) + 2 x fixings (£0.75) + drill/auger	£651.50
In-channel structures		3-6 depending upon number of trees that	Tree surgeon or WTT CO (£250/ day) +) + 2 x fixings	£251.50

		can be successfully laid	(£0.75) + drill/auger	
Balsam	Whole River Browney catchment			Volunteer time
Sceptic tank discharge	NGR: NZ2688339291			
TOTAL				**c. £903 + Volunteer time**

N.B. Steel cable is usually supplied by the roll @ c.£400 hence the high cost – this will do > 30 kickers. Alternatively, if steel rope can be supplied locally or by the WTT as part of a workshop the cost would be c. £4/m; significantly reducing the overall cost.

6.0 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.