WILD TROUT TRUST

wildtrout.org

Advisory Walkover, Nov 2023

R Aire (Newfield): GB104027063100

Prof J Grey (jgrey@wildtrout.org)

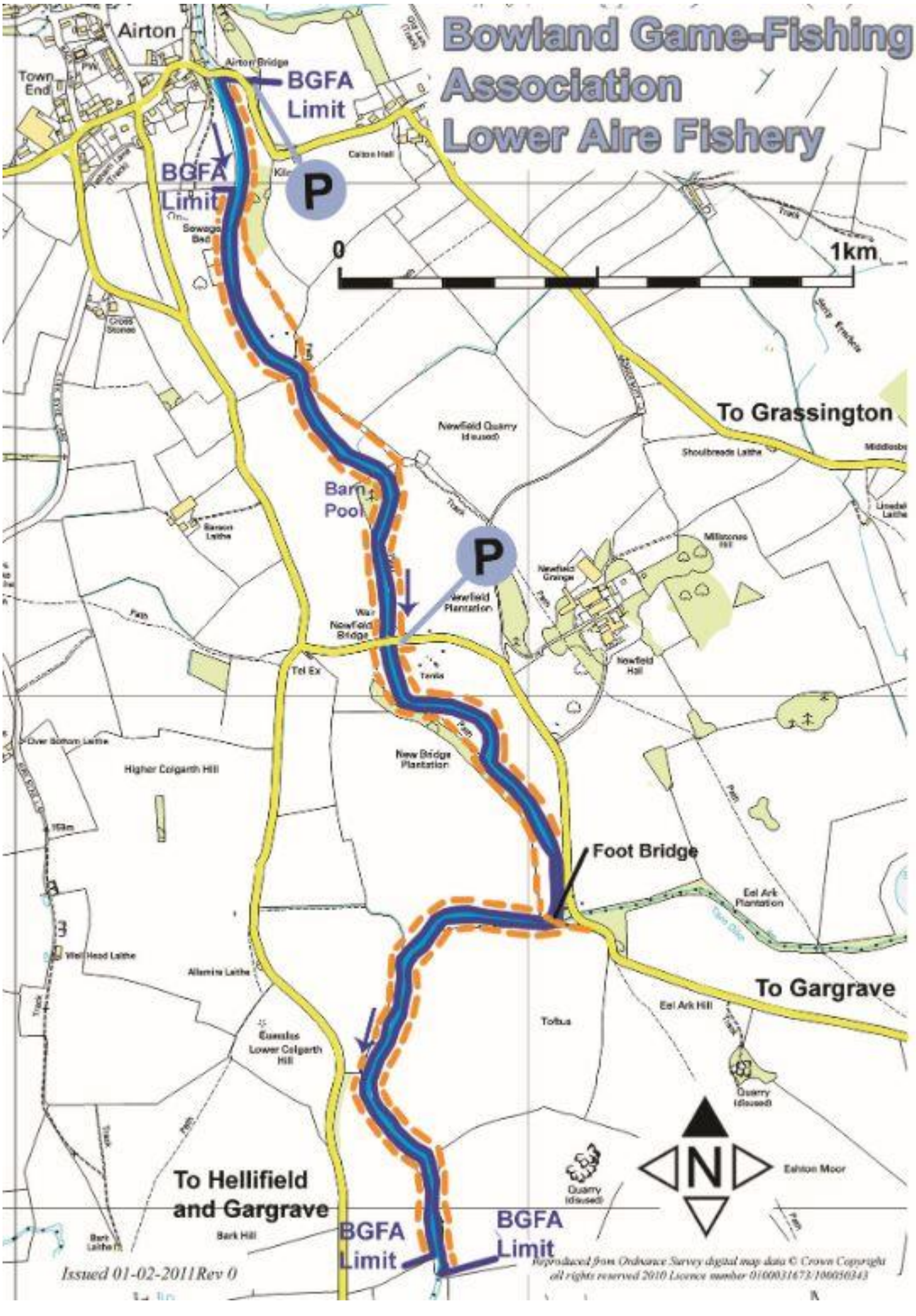
1.0 Introduction

An advisory walkover was requested by the Bowland Game Fisheries Association to provide a benchmark for future planning on managing the river. The rationale was to assess instream and riparian habitat and propose solutions for improvement of the fishery. Outputs from this report can be used to inform and support future management or applications for funding.

Note that this short report should be reviewed in conjunction with an earlier Advisory Report from 2011 which still contains much relevant information, as well as the 2023 report for the Hanlith reach upstream.

Throughout the report, normal convention is applied with respect to bank identification, i.e. left bank (LB) or right bank (RB) whilst looking downstream. Upstream and downstream references are often abbreviated to u/s and d/s, respectively, for convenience. The Ordnance Survey National Grid Reference system is used for identifying locations.

The Lower Aire beats around Newfield fall within the Aire from Malham Beck to Otterburn Beck waterbody, which has been assessed as achieving Good Ecological Status under EU Water Framework Directive criteria.



Map 1. BGFA Lower Aire Fishery

2.0 Habitat Assessment

2.1 Downstream of Newfield Bridge.

Starting at the lower limit and working u/s, the channel has been severely straightened and realigned to the eastern side of the valley where it was pinned out of position to ultimately provide a head of water at the Bell Busk weir ~425m d/s on Coniston Hall Estate. The field to the RB contains many paleochannels, the ghosts of former courses of the Aire prior to it being moved, visible to the naked eye and hinting at how sinuous a course it should have naturally (Fig 1).

Fig 1. D/s limit of the beat (red bar), the extant Aire channel was shunted in straightened sections through the floodplain and then pinned against the eastern side to provide head at a weir d/s. Note in contrast, the sinuosity of the paleochannels in the floodplain (ringed). The deposition bars of exposed cobble, maintained bare by livestock, were also obvious from this perspective.

There was limited low cover provided by thorn trees on the LB of the first field; because the channel was pinned against the valley side, the LB was slightly steeper, discouraging livestock and allowing a line of trees to cling on (Fig 2). Several were mature ash exhibiting *Chalara* (ash dieback) infection, and hence unlikely to survive for much longer, so could be proactively felled and tethered or lodged to provide habitat benefits. With continued livestock access, there was scant evidence of self-set trees regenerating and ensuring succession when the mature trees ultimately are lost.

Fig 2. Remnants of a tree line along the LB, but the mature specimens were ash that will soon be lost. They could be used proactively to provide localised habitat, rather than falling and being washed away. In several places, the river had managed to undermine the boulder revetment to the RB (exacerbated by livestock) and was trying to return to a more natural position within the floodplain – note the nascent reconnection with a paleochannel in the upper panel. A point bar (blue arrow) had developed parallel to the LB and created a smaller side channel (white arrow) which would provide flow refugia for weaker swimming fauna.

There was also evidence of the channel trying to renaturalise, breaking through some of the old boulder revetment especially where it blocked old paleochannels (eg Fig 2 upper panel). A point bar had also developed adjacent to the LB and had caused some slight pinching and focus of flow. Between the bar and the LB, a small side channel provided some flow refuge for fry and invertebrates.

Managed as pasture for both cattle and sheep with unfettered access, most of the first two fields were devoid of any riparian zone cover, and the channel was suffering from excessive lateral erosion caused by poaching and trampling of the banks, and continuous grazing reducing the root matrix in the soil, hence reducing resilience (Fig 3).

Fig 3. Looking back d/s along a straightened section forced diagonally across the floodplain: overly wide and very exposed. Stock access both banks during low flows. The white arrow identifies the area highlighted in the lower panel where livestock had eroded the hillslope into terraces and bare earth.

Consequently, the channel was consistently overly wide and uniform in cross-sectional profile, shallow, and dominated by riffle. Without any cover, fish are susceptible to predation and warming of the water. There were nascent cobble deposition bars where the channel was trying to readjust to a more natural width for the flow regime (Fig 3). These should evolve slowly into more stable structures as plants colonise and help to bind the matrix of substrate together. However, again with livestock access, constant disturbance from trampling or grazing maintained the bars as unconsolidated material. Bare rock also warms and conducts heat more efficiently than plant material so the fringe of cobble to either side exacerbates the water temperature issues.

A fine contrast was provided by the restoration scheme undertaken by the Upper Aire Project to exclude livestock from 350m of the channel (continuing a further 300m along the steep slope of the eastern side of the valley). Fencing and watergates with augmented tree planting have transformed the riparian buffer (Fig 4). A diverse, shaggy herb flora now extends from the channel edge across the floodplain, imparting hydraulic roughness to slow the flow which is incredibly important not only for weak swimming fry to find refugia to the sides of the channel but also to slow the flow across the floodplain when the river is in full spate. The floral diversity also begets invertebrate diversity, a proportion of which may end up in the river to become fish food.

Fig 4. Clear evidence of the impact of livestock on the landscape on either side of the buffer fence. The (now protected) slope in the background used to look like that in Fig 3; indeed, it is part of the same field.

It was also notable in this protected reach that deposition bars of cobble to the sides of the channel were vegetated, unlike the ones outside the buffer fence, and were already providing greater ecological benefit by focussing the flow and trapping further fine sediment in their lee.

Fig 5. In stark contrast to the bare, grazed banks d/s (Fig 3), the herb flora within the buffer fencing was lush and species-rich, with lots of 'shagginess' at the edges. Where cobble deposition bars had formed, plants had colonised them and were beginning to stabilise them, thereby pinching the width of the wetted channel.

The next straightened section of channel up to the footbridge was relatively featureless because of that historic modification (Fig 6 upper panel). The club had historically inserted some 'low water cills' which have all since failed. With the benefit of hindsight, it is now widely recognised that the costs to habitat far outweigh the benefits of these structures for fisheries. The boulders used, which are now scattered within the channel, could be rearranged to better effect on one side or the other to induce some channel sinuosity and focus of deeper water under low-flow conditions.

Both u/s and d/s of the footbridge, there were short sections of tree planting instigated by the club, but the fencing has not been maintained (Fig 6). A clear browse line was evident on most trees, reducing the low cover aspect that would be more beneficial. The trees were sufficiently large so that some of the trunks could be used for habitat works, especially in conjunction with the rearrangement of boulders. Either hinging and laying, or felling and lodging/tethering selected stems into the channel would create low cover and flow diversity in an otherwise relatively featureless reach. The coppiced stumps would be retained alive with reinvigorated low growth. U/s of the footbridge, there were several short stands of predominantly willow from which one or two pliant stems should be simply hinged and laid at a d/s angle to increase cover (Fig 6). It would be worth trying to replenish the fences.

Fig 6. Upper panel – the straightened reach immediately d/s of the footbridge. All panels exemplify short lines of trees planted by BGFA. The original fencing had not been maintained and while the established trees provided certain benefits, the full potential (eg ongoing protection for natural regeneration and succession, low branches for cover) had not been realised. However, the trees could be managed to enhance habitat – see text.

Where the trees were better protected, low branches trailing onto and submerged within the channel were providing multiple benefits (Fig 7). Trapping of fine debris 'little and often' prevents all that material accumulating en masse at man-made pinchpoints like bridges and weirs where it might cause flooding issues. That trapped material provides resource (food and shelter) *in situ* for many aquatic invertebrates, as well as diversifying channel morphology and flow patterns, in this case creating a slackwater refuge on the d/s side evident in Fig 7 (lower panel).

Fig 7. Upper - fine debris trapped in the trailing and submerged stems of willow and alder. When viewed from d/s (lower), the slack water refuge was clear to see. Note the clear browse line on the trees in the field exposed to livestock (lower panel).

Unfortunately, the long field up to Newfield Bridge experiences heavy grazing pressure and the banks were bare and subject to erosional stress. Numerous paleochannels wend across the wide floodplain at this point, but the extant channel has been pinned into place at various junctures by boulder revetment and by redundant pipework left over from the old pumphouse that used to supply water to Newfield Hall (Fig 8, 10 & 11). Gold standard restoration of the channel would involve unshackling the channel, allowing it to access the floodplain more freely and returning to a dynamic, sinuous course evidenced by the paleochannels. This is an aspiration of the Upper Aire Project but would obviously involve considerable buy-in from the tenant farmer.

More cills were installed into this reach, but the majority were degraded to such an extent that they do not cause major issues anymore. Again, some judicious rearrangement of the boulders to accentuate sinuosity, rather than rob the river of gradient, would be beneficial. Several crack willow were reaching considerable height, and showed evidence of historic pollarding; similar management would relieve the crown burden whilst also providing tree-kicker material to lay into the channel (Fig 9).

Fig 8. Constraints on the channel. Upper – walling to the RB to accommodate the Pennine Way, and lower – pipework from the pumphouse infrastructure (just visible top right) buried in former alluvial substrate within the LB and now eroding into the channel.

Fig 9. Potential tree management below Newfield Bridge. Tall crack willows could be hinged or pollarded, as appears to have been done historically to at least the large specimen in the centre of shot. The large stems arising could be tethered in the channel using the remaining living trees as anchors. The ash to the right of shot were suffering from *Chalara* and could also be proactively felled and used for habitat.

Fig 10. Looking d/s from Newfield Bridge: upper - degraded condition of the banks and lack of cover due to livestock, and the paleochannels evident within the field; and lower – the overwidened channel caused partially by 'release' from the pinchpoint of the bridge and subsequent deposition d/s, exacerbated by livestock using this point as a ford. Rushes on the RB hint at another paleochannel.

2.2 Upstream from Newfield Bridge

Immediately u/s of the bridge was the weir that used to create the offtake for the pumphouse and water supply to the Hall (Fig 11). Removed in 2021, free fish passage and sediment transport have been restored, with the channel evolving to a more natural profile. Unfortunately, the channel is still constrained with walling to the LB to prevent it migrating back into the field where it would naturally be, and instead keeping it arrow straight and aimed at the bridge aperture.

Fig 11. Newfield weir prior to removal in 2021, and the retained wall stubs still visible in 2023 – no longer a barrier to fish or sediment.

While there was a row of mature trees along the wall providing some shade and low cover in places, quite a few were ash, and with no opportunity for succession because of browsing pressure, the numbers will dwindle (Fig 11). With a drystone wall boundary already in place between 3-5m from the channel on the RB, fencing and a watergate to protect both banks for ~100m u/s of the weir has been set aside within the Upper Aire Project but to date, the land agent and the tenant have not formally agreed. Unfortunately, the condition of the RB in particular continues to degrade, as does the drystone wall, because of cattle access.

A reasonably sized copse of native deciduous trees provides some shade over the water around the Barn Pool, but the channel is still relatively homogenous because of the walling or revetment to the LB. The copse is also maturing and there is no sign of future proofing for the loss of trees.

Fig 12. Upper – looking u/s towards the Barn Pool with a small, mature copse on the RB providing some shade but little low or marginal cover. Lower – the Barn Pool itself is somewhat artificially created by a pinch of the channel by walling and large boulder revetment and walling to the LB which has begun to fail recently and there was evidence of erosion to both banks caused by cattle crossing.

The next short field u/s had some tree cover instigated by the club on the RB and, as before, a few willow stems should be selected for hinging into the channel. Mature ash trunks could also be proactively felled and lodged or tethered *in situ*.

Fig 13. Another single line of trees planted by BGFA to bolster the cover which could now be managed to better effect.

The top reach, almost 20% of the beat in one long field to the u/s limit at Caton Bridge, Airton, has undergone significant improvement over the last 18mo. The landowner has made strides to 'rewild' the 7ha plot which surrounds a small Yorkshire Water wastewater treatment plant (which currently does not have discharge monitoring, although there has been scant evidence of issues whilst work was carried out on site). The project has involved removing sheep grazing pressure, allowing scrub encroachment and planting of some standard trees in the wider plot, and scattered alder whips along the LB. Fencing now prevents the public and dogs from walking along the bank top, a former desire line straying from the Pennine Way (Fig 14). There is a plan to use low density, conservation style grazing by native breed cattle to manage the wet meadow. Two dead ash trees were felled from the YW asset site and winched and tethered into position in the channel as tree-kickers (Fig 15), and the artificial embankments on the LB have been lowered in three places to allow better lateral connection with the floodplain (Fig 16). At the most d/s site, stone from the embankment which had been used to block a paleochannel was returned to the Aire as a low berm to kick the flow across to the RB. All of these actions will have improved the fishery.

Fig 14. Pre works drone flight over the upper reach highlighting the long sweeping engineered bend and the desire line of footfall running parallel to the bank top. White dotted line indicates the fencing to keep people on the Pennine Way, and the area given over for renaturalisation. 18mo prior to this image, all the grass along the river looked like the closely grazed sward in adjacent fields.

Fig 15. Felled ash being relocated and buried into the LB with available plant on an otherwise straightened and uniform reach.

Fig 16. Lowering the LB artificial embankment to improve connectivity with a paleochannel in the floodplain, and returning any stone arising to the channel as a low bar to the LB.

3.0 Recommendations

It is difficult to think of a relatively short length of a Dales river where the benefits of livestock exclusion can be seen in the channel form and riparian zone in such stark contrast to adjoining fields where there was unfettered stock access; Figs 3-5 encapsulate the issues and the solution.

Fencing:

- Engagement with the tenant farmers to protect more of the riparian zone. At the very least, trying to reinstate fencing along those sections where the club has planted trees in the past would prevent browsing and trampling from the bank edge and give natural regeneration and succession a chance. If the latter, then focus on sections where stock are unlikely to wade across the channel under low flow to browse.

Tree management:

- Trees established by BGFA are now of a size where they could be managed for better habitat gains. Hinging and laying, or felling and lodging or tethering into the channel, especially from multi-stem specimens would introduce more instream habitat diversity.
- Consider proactively hinging or pollarding the large crack willows and using the arisings before they crack and someone else 'tidies' up.
- Monitor any ash that are likely to succumb to disease and proactively use, as above.
- The felled hawthorn in the already protected area (visible in Fig 5) could be winched into the channel and tethered using a ground anchor.

Instream habitat:

- Retention of large woody material wherever possible, as above.
- Further rearrangement of boulder material arising from failing cills to form low bars to one side of the channel or the other, and hence increase sinuosity.

Much of the above can be achieved, with input from the club, through the Upper Aire Land Management Project via WTT.

4.0 Acknowledgement

The Wild Trout Trust would like to thank the Environment Agency for their continued support of the advisory visit service, in part funded through monies from rod licence sales. The advice and recommendations in this report are based solely on the expert and impartial view of WTT’s conservation team.

5.0 Disclaimer

This report is produced for guidance; 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.

Legal permissions must be sought before commencing work on site. These are not limited to landowner permissions but will also involve regulatory authorities such as the Environment Agency – and any other relevant bodies (e.g. Natural England and Forestry Commission) or stakeholders. Alongside permissions, risk assessment and adhering to health and safety legislation and guidance is also an essential component of any interventions or activities in and around the watercourse.

Appendix

Tree & tethering

Tree-kickers simply emulate the fall and retention of natural woody material but can be used where there has been historic removal or where a river system has been too heavily modified to retain material safely (ie risk of dislodged material blocking man-made pinch-points like bridges). It is a step further than simply laying or hinging stems into the channel whereby the material is retained via a living hinge (Fig A1). This can be done with pliant, living species but larger and/or dead trunks and many species are not suitable.

Fig A1. Two stems from a previously coppiced and hence multi-stem crack willow laid into the channel and aligned close to the bank to provide low / submerged cover. The living upright stems on the u/s side protect the hinge.

Ideally, if the trunk can be retained without a tether, eg by lodging around or opposing forces between living trunks (Fig A2) as a tree-hanger, then that reduces the amount of non-natural material used. If not, or to minimise risk, appropriate gauge stainless steel cable (6, 10 or 12mm equivalent to 3, 6.5 or 9.4 tonne breaking strain) and wire rope clamps should be used (Fig A3).

Fig A2. Simple lodging of material if there is the structure, in this case the fork, to make it work.

Fig A3. Alder of ~350mm girth felled and cabled back to the living stump as a tree-kicker. The coppiced stump will regrow vigorously, providing further low cover and screening of the cable.

Uprooted trees or individual trunks can be retained *in situ* or nearby by winching and cabling to an appropriate living anchor. If none are nearby, consider the use of a ground anchor, eg https://platipus-anchors.com/