WILD TROUT TRUST

Follow up Advisory Visit / Project Proposal:

R. Ure, Tanfield Angling Club (GB104027069461)

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1.0 Introduction

This report is the output of a site visit undertaken by Prof Jonny Grey of the Wild Trout Trust to the River Ure at the request of Tanfield Angling Club (TAC). The River Keeper accompanied the walkover and provided much useful information. The rationale was to independently assess in-river and riparian habitat quality, and to identify any remedial actions that might be implemented.

An earlier report by WTT was conducted in 2012; this was not reviewed until after the latest walkover. Since many of the original observations and recommendations made from the earlier visit remain valid, the current report will make reference back to those with some updates and more detailed proposals.

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.

2.0 Catchment / Fishery Overview

A detailed catchment review was provided in the 2012 report. Under the Water Framework Directive classification scheme, the Environment Agency consider the Ure from Thornton Steward Beck to River Skell as achieving *Moderate* ecological status (Table 1), driven by the *Moderate* score for Fish; all other ecological parameters return a *Good* or *High* score.

River	R Ure
Waterbody Name	Ure from Thornton Steward Beck to River Skell
Waterbody ID	GB104027069461
Management Catchment	SUNO
River Basin District	Humber
Current Ecological Quality	**Moderate** ecological status (2019 & 2022)
U/S Grid Ref inspected	SE 23861 77713
D/S Grid Ref inspected	SE 27652 78504
Length of river inspected	7.5km

Table 1. Overview of the waterbody. Information sourced from: https://environment.data.gov.uk/catchment-planning/WaterBody/GB104027069461

3.0 Habitat Assessment

The report is structured as though walking d/s from the confluence of Black Robin Beck with the Ure (SE 23861 77713) to the weir at Tanfield Mill (SE 27652 78504). Observations were made under low flow conditions with good water clarity.

In general, TAC waters encompass two extremes of Ure character. The upper beats (essentially u/s of Mickley) flow through mature deciduous woodland cover in a natural pinch point to the valley, and the channel morphology is governed by the underlying geology; bedrock seams, large boulders, varied channel wetted-width, and pool-riffle-glide sequences (Figs 1&2).

Fig 1. Good examples of physically diverse morphology where the channel interacted with bedrock and the banks were unmodified: top – broad shallower riffles; and bottom – narrow, deeper glide between large boulders in the tightest pinch point of the valley. Fantastic diversity in the riparian deciduous woodland to both banks.

Fig 2. Looking d/s, a deposition bar to the LB on the inside of the bend with increasing depth to the RB and fantastic low cover and shade provided by the riparian trees. Willow was managing to establish on the deposition bar (no livestock access) and will continue to stabilise the structure, as well as providing some canopy height diversity.

In stark contrast, the lower beats had been heavily modified, historically, primarily to increase drainage and make more contiguous land available for agriculture on the floodplain. This has involved realigning and straightening the river or engineering long, sweeping bends, and the removal (dredging) of the bed substrate which has been used subsequently to embank the channel and prevent both valuable floodplain inundation and re-establishment of a more natural (and dynamic) course.

Forcing the channel into an unnatural position within the floodplain has also altered its gradient with consequent impacts on the geomorphology. Hence, there are long, relatively deep and sluggish canalised sections where the gradient has been removed or the bed lowered, interspersed with long fast shallow riffles to compensate (Figs 3&4).

Fig 3. Examples of deep, impounded, sluggish canalised sections (relatively devoid of features) where the gradient had been reduced through artificial realignment. Note the fine sediment deposition to the LB in the lee of a small willow.

Fig 4. In contrast to Fig 3, fast shallow continuous riffles between canalised sections compensating for modifications to the gradient.

A consequence of this artificial incision has been to disconnect the river from its floodplain, preventing spate energy from dissipating and hence causing net loss of finer substrate fractions like gravels d/s. All the actions like embankment to prevent re-meandering of the channel, also inhibit channel recovery and effectively prevent the natural resupply of alluvial gravel laid down historically, except in a few locations; eg Fig 5.

Fig 5. One of the few sites of active erosion observed, this was a vital supply of finer substrate fractions like cobble and gravel, having been laid down historically by the river and currently being re-accessed.

Elements of these modifications can be seen in Figs 6 & 7 using LiDAR-derived terrain mapping and historical mapping, respectively, especially the channel straightening, incision and embankments. The extant channel is in stark contrast to the more meandering paleochannels evident across the entire floodplain in Fig 6.

Fig 6. Digital terrain model derived from LiDAR data of the Ure flowing from bottom left to top right with the shadow intensity especially to the LB (northern) emphasising how incised the straightened extant channel has become. Paleochannels, ghosts of the channel's position over time, are evident meandering across the full width of the floodplain.

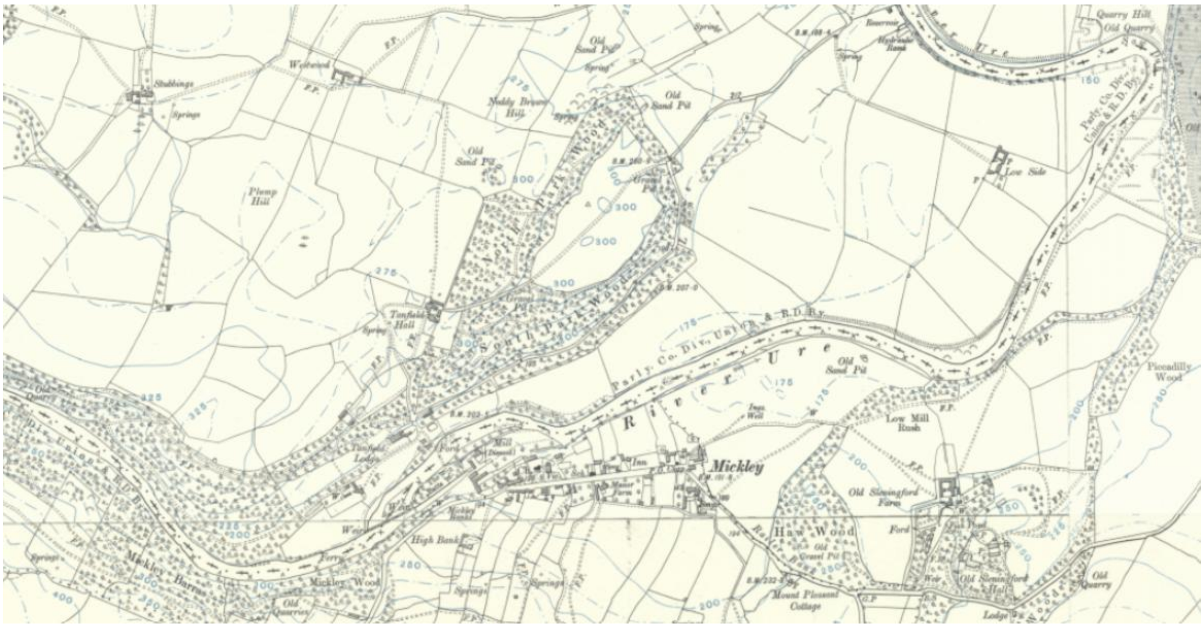

Fig 7. An excerpt from The Ordnance Survey six-inch map series from 1888-1915 (https://maps.nls.uk/) of the same reach in Fig 6 highlights that the modifications had already been instigated ~150y ago and there has been virtually no change since.

Without full channel restoration to reinstate a more natural course and gradient, the gold standard, it is difficult to counter the issues of incision and canalisation. Nevertheless, there are various improvements outlined below that the club could make to enhance the habitat and hence the prospects for the trout population and fishery.

3.1 Black Robin Beck

Black Robin Beck is used as the boundary marker between two estates. Wild Trout Trust has provided advice to both and there is great potential to improve the habitat with buy-in from both sides, certainly along the lower reaches from SE 24179 78077 to the confluence with the Ure, because both banks have an ample buffer of mixed deciduous woodland cover. On a previous visit, there was some evidence of windblown trees having been cut from over the channel, but with plenty of large woody material to work with, it should be relatively simple to reinstate good quality habitat, especially for spawning, as opportunities for that in the mainstem river are few and far between for reasons stated earlier.

Fig 8. The lowest reach of Black Robin Beck prior to the confluence with the Ure, comprised a flattish bedrock seam that extended ~50% across the width of the mainstem. As such, it presented naturally challenging access to the tributary because water depth was reduced to a thin skim of fluming flow.

The challenge for fish accessing the beck was the bedrock seam at the confluence resulting in a shallow skim of water and hence impassable during low summer flow (Fig 8). It is not clear whether the natural state of the bed should be bedrock here. Human modification of the channel may have removed its ability to retain smaller size-fractions of substrate. To counter this, introduction of large woody structure into the channel, lodged by standing trees on the adjacent banks, may improve retention of finer substrates on top of the bedrock and diversify the depth profile. The aim would be to make the habitat within the beck as structurally complex as possible, and hence potentially much more temporally dynamic as the beck pushes around, over and under that structure. This should improve the spawning and fry habitat whilst reducing the risk of predation and washout during spate flow. Given the ample width of buffer on both banks, it should not impact unduly upon either landowner.

3.2 Fencing

Generally, tree cover and herb understorey were good along the banks but there were some short sections where unfettered livestock access was preventing any natural regeneration of trees and causing accelerated lateral migration of the banks (Fig 9). Superficially, those sections may appear tree-lined, but those that were there were all mature with no clear succession options, and a mature one-tree-deep fringe is not very resilient.

Fig 9. Wherever livestock had unfettered access, there was no natural regeneration of trees and hence no potential succession. Deposition bars remained unconsolidated, there was little in the way of marginal herb understorey, and the bank toe was often vertical (see far bank) because of livestock causing lateral erosion.

Sheep and cattle trampling, poaching, grazing and repeated scratching / licking at the exposed soil for micronutrients destabilises the banks and increases erosion by the river under relatively minor lifts in flow. Classic signs of this are a vertical bank toe, often with bare soil, and exposed cobble and boulder in between with little respite from those actions to allow plants to colonise and help stabilise. It leads to an over-exposed margin, with very little shade because of the lack of herb vegetation, leaving the stone prone to excessive heating from the sun. The ideal would be a shaggy marginal herb fringe providing low, cool cover, especially important for weaker swimming trout and grayling fry.

Fig 10. Bare soil and exposed roots caused by stock activity seeking shade or browse, increasing the risk of the trees succumbing to disease and failure.

On steeper banks with mature trees, livestock often causes issues when seeking shade or trying to access browse, by trampling the soil and exposing and damaging root systems which could ultimately cause the demise of the tree and loss of a substantial chunk of bank in the process; see Fig 10.

Capital costs for flood-spec livestock fencing to protect riverbanks are reasonably simple to find, and there may be revenue payments available as well, depending upon the width (min 6-12m) of buffer afforded and type of land management scheme. Access arrangements can be incorporated for anglers, as well as alternative drinking supply (eg pasture or solar pumps) if there are no other reliable sources such as springs, seeps, or mains.

A ~500m stretch on the LB from SE 25637 77179 to SE 26087 77364 and the equivalent length on the RB would benefit from such a buffer. Another reach that would benefit: SE 26657 77588 to SE 26768 77755.

3.3 Stone return

Some livestock erosion scars around the bankside of more mature trees had been filled with stone (Fig 11). It was unclear whether this was material taken from the riverbed elsewhere or if it was stone winnowed from the arable fields adjacent. Either way, such unconsolidated material is unlikely to provide any further bank stabilisation. It is more likely to accentuate the destabilisation of the bank in the longer term, by preventing any natural understorey or tree succession from establishing. In the absence of full channel restoration, such stone would be better cast within one of the sluggish canalised reaches to be redistributed by the river under spate flow, and the section of bank protected from livestock with buffer fencing.

Fig 11. Cobble and boulder 'infill' of bank edges, hindering a naturally diverse herb and tree flora from developing, the roots of which would create true resilience to future spate flow events.

3.4 Large Woody Structure

Several large naturally fallen trees were observed during the visit at various locations and appeared to have been *in situ* for one or two winters at least, causing physical diversity within the margins and creating habitat (Fig 12). Natural tree fall is instrumental in channel geomorphology, but it is one of the key parameters that humans have been exceedingly fastidious in removing because of perceived flood risk and a tendency to tidiness.

It should be noted that such structure may only come into 'play' at certain times according to stage-height (water-level). A large trunk bedded-in to the bank or cobble bar above the water line at low flows may seem of little worth but provides vital refugia or causes depositional features downstream under spate flow.

Several tree trunks had been felled and tethered to replicate similar, and more could be done, either via hinging of pliant species such as crack willow, or lodging using opposing forces between other living stems, to reduce the amount of unnatural material used. These should be focussed in more depositional areas to reduce the stress on the structure under spate flow and reduce risk of it moving; see appendix.

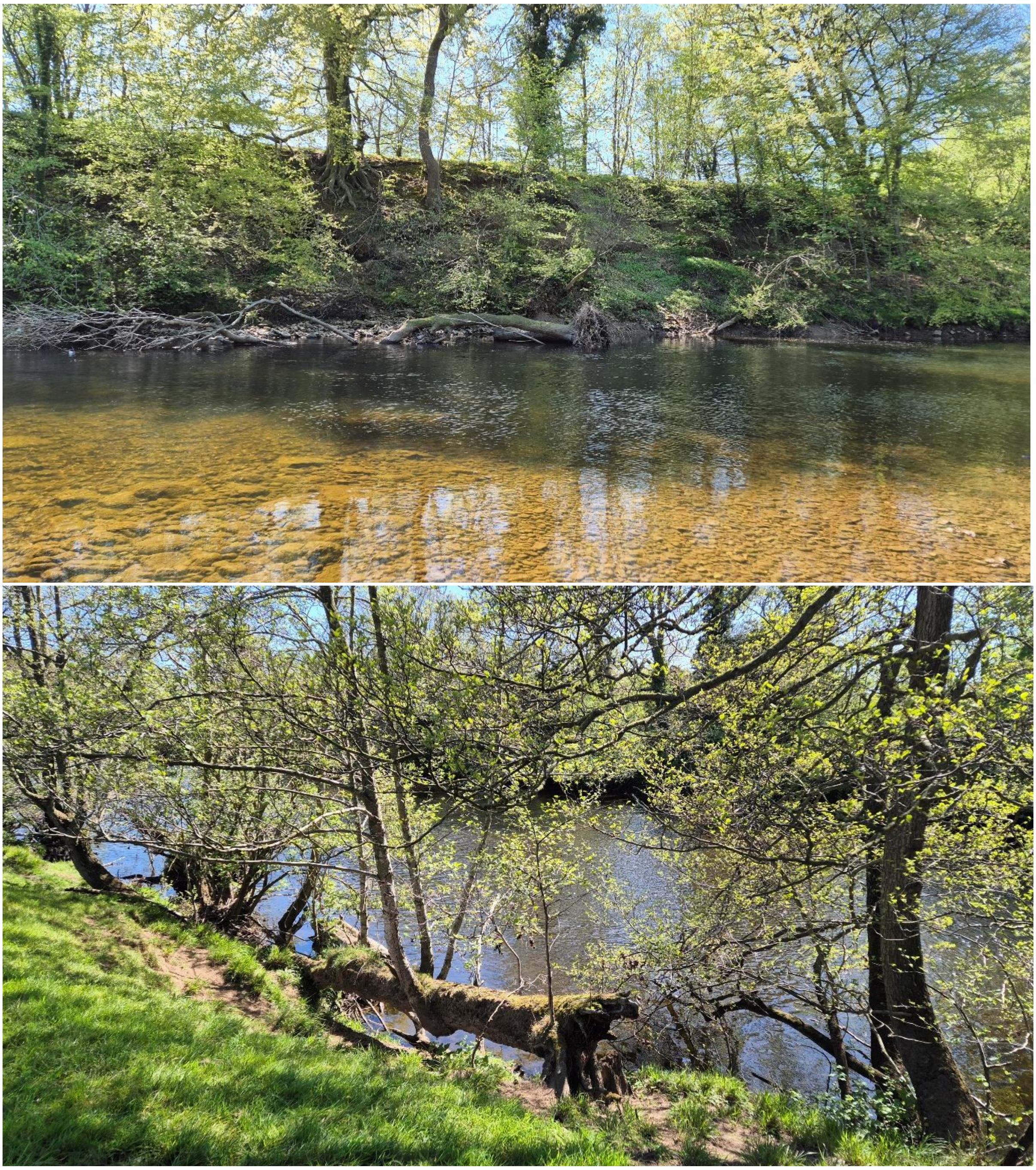

Fig 12. Two examples of naturally fallen woody structure creating good habitat.

3.5 Fish passage

The TAC waters are interrupted by two major weirs at Mickley (upper) and Tanfield Mill (lower). The former was not observed, has been retained because of hydropower and there is reportedly a functional fish pass installed (EA Fisheries Officer). Fish pass solutions are much less efficient in terms of passage than removal of the structure, and do nothing to alleviate the geomorphological damage of trapping sediment within a section (and hence starving the reach d/s).

Tanfield Mill weir also serves an offtake for a private hydropower scheme and presented a considerable issue for fish passage and sediment transport (Fig 13). The weir was ~65m wide, impounding the river for 550m, and was in poor condition with several points of failure noted (Fig 14). The aggradation of sediment u/s had reduced the depth markedly, and being overly-wide already, would be prone to warming. The reach d/s of the weir was dominated by bedrock seams but would probably not be if the thousands of tonnes of sediment trapped upstream of the weir could be remobilised and allowed to move through the system naturally.

Fig 13. SE 27553 78738: u/s of the 65m wide weir at Tanfield Mill, sediment had become aggraded (trapped) creating shallow featureless water prone to warming.

Fig 14. SE 27553 78738: Tanfield Mill weir was in a very poor state of repair, and could fail at one of several weak points under spate flow in the near future, with unknwn consequences. It is a major barrier to fish passage.

From an environmental and fishery perspective, removal would be the gold standard allowing unhindered fish movement in both directions and reinstating natural transport of sediment. Installation of a fish pass would be a very poor option, potentially very expensive, carrying the burden of future maintenance liability, especially given the clearly unsound nature of the aging structure.

4.0 Recommendations

As mentioned in the Introduction, all the recommendations proposed in the original report from 2012 still stand and should be revisited. The following bullet points expand upon some of the habitat issues identified:

- Spawning habitat on Black Robin Beck (3.1). Proposal for WTT to apply for EA Fishery Improvement Programme funding or similar to enable some large woody structure works within the lower reaches of the beck and work with volunteers to install. WTT can liaise with the neighbouring estate if TAC liaises with their landlords, and if agreed in principle, draw-up a more detailed plan. It is understood that TAC still stocks which could potentially negate any benefit of improving spawning habitat; see https://www.wildtrout.org/content/trout-stocking.
- Riparian buffer strip and livestock exclusion fencing requires buy-in from landowner / tenants. TAC to explore potential for reaches as outlined in 3.2.
- Stone return to the river (3.3) would work best as noted in conjunction with buffer strip creation.
- Several specific trees were identified during the walkover which would be suitable to hinge / lodge; eg leaning at a suitable angle in a d/s direction, of a suitable size / species, with multistems present to provide anchorage / lodging / protection on the u/s side, and in more depositional areas.
- Where uniform age stands / lines of eg willow or alder have managed to regenerate, consider hinging or light-touch coppicing of one or two stems to break up the uniformity and create gaps in the canopy structure (eg beneficial for mating swarms of various 'riverflies').
- Free-flowing, connected rivers, unimpeded by weirs are more resilient wild fisheries, so TAC should be supportive of any measures to improve fish passage via the EA or Great Yorkshire Rivers partnership (https://www.greatyorkshirerivers.org/)

More information on the measures discussed and many other enhancement and 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 Acknowledgement

The WTT would like to thank the Environment Agency for supporting the advisory and practical visit programme in England, through a partnership funded using rod licence income.

6.0 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 (eg 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 your watercourse.

Appendix

Tree-kickers, lodging & 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 15). This can be done with pliant, living species, but larger and/or dead trunks and many species are not suitable.

Fig 15. 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 16) 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 (10 or 12mm equivalent to 6.5 or 9.4 tonne breaking strain) and wire rope clamps should be used (Fig 17).

Fig 16. Simple lodging of material if there is the structure, in this case the fork, to make it work.

Fig 17. 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/