Advisory Walkover

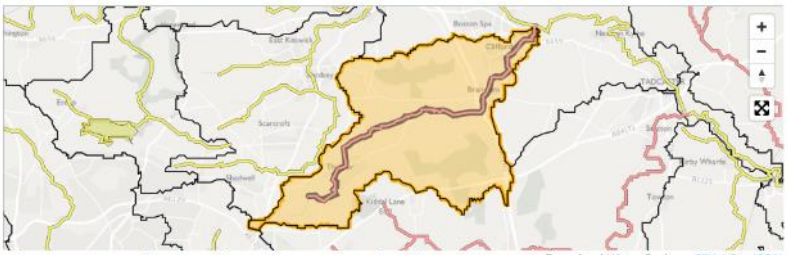
Thorner Beck, Wharfe Catchment

November 2018

1.0 Introduction

This brief report is the output of a site visit to Thorner Beck (GB104027063950), a tributary of the River Wharfe, W. Yorkshire. The visit was requested by Dr Marie Taylor (Project Officer, Yorkshire Dales Rivers Trust) for the 'Rivers in Elmet' project, and she accompanied Jonny Grey of the WTT on the walkover. A more comprehensive report has already been submitted for **Cock Beck** and the Recommendation details therein are useful also in the context of Thorner Beck.

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.



Thorner Beck Catchment (trib of Wharfe)
Overview

Download Water Body as CSV / GeoJSON

Overall classification for 2016
Bad

Id	GB104027063950
Type	River
Hydromorphological designation	not designated artificial or heavily modified
NGR	SE4044842443
Catchment area	3151.239 ha
Length	13.086 km
Surveillance Water Body	No
Catchment area	31.512 km2

Classifications

Cycle 2 classifications

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Classification Item	2013	2014	2015	2016
Overall Water Body	Good	Good	Bad	Bad
Ecological	Good	Good	Bad	Bad
Biological quality elements	-	High	Bad	Bad
Macrophytes and Phytobenthos Combined	-	High	High	High
Fish	-	-	Bad	Bad
Invertebrates	-	High	High	High
Hydromorphological Supporting Elements	Supports Good	Supports Good	Supports Good	Supports Good
Physico-chemical quality elements	High	High	High	High
Specific pollutants	High	High	-	-
Chemical	Good	Good	Good	Good

Cycle 1 classifications Show

Map & data extract from:
https://environment.data.gov.uk/catchment-planning/WaterBody/GB104027063950

The EA data give an overall classification of 'Bad' ecological status driven primarily by the failing for fish.

2.0 Habitat Assessment

The beck was walked between Thorner village and Wothersome Lake and then 'spot assessed' at various bridge locations to as close to the confluence with the Wharfe as possible. Despite no designation as 'artificial' or 'heavily modified', it is clear that the channel has been historically dredged and straightened, or repositioned to perch it above its natural position in the valley; much of this appears to have happened prior to the earliest available maps (i.e. pre 1845). Hence, the channel is typically over capacity for the majority of flows and there is extensive sedimentation of fine silts in the reaches with low gradient, smothering what otherwise would be sufficient gravels of appropriate sizes for invertebrates and potentially spawning substrate for fish like trout. There are multiple online ponds and lakes, some quite extensive but unfortunately not observed directly, only from old maps and Google Earth. Online ponds affect water quality (e.g. nutrient recycling and water temperature) and quantity (e.g. surface evaporation). It is likely that the repeated damming of the system has fragmented it to such an extent, that in conjunction with a deterioration in water quality (both within the ponds and from agricultural diffuse pollution), the fish populations have waned. The beck appeared devoid of fish until below Bramham.

Where the beck flowed through woodland or there was a fringe of native riparian trees and ample buffer strip, the habitat was generally better and indicated some potential to support fish populations. There was ample leaf litter and woody debris to provide food for invertebrates and refugia. However, invasive Himalayan balsam was present.

Some fields were fenced but generally in a dilapidated state to the extent that livestock could access the water's edge and cause severe poaching and sediment ingress. Several areas were noted clearly in breach of the new (2018) Farming Rules for Water.

The following images and legends exemplify good characteristics and issues observed:

Fig 1. Thorner Beck at SE 37866 41165, where it emerges from under Milner Lane on the outskirts of Thorner village. Immediately upstream there appeared to be a series of online, (now) ornamental ponds within private residences and hence close observation was impossible. Access into and through this culvert was clear, but flow was very sluggish.

Fig 2. Opposing views of banks at SE 38082 41381. Upper panel depicts the LB, with an adequate, roughly vegetated buffer zone of 10-15m width protecting the beck from an arable field; amidst the diverse herbage were many apparently self-set alder and occasional ash saplings. Lower panel depicts a poorly protected section of RB with a dilapidated fence, in places actually within the channel, doing little to prevent fine sediment ingress from livestock (predominantly sheep) poached pasture. The fencing needs replacing to prevent any livestock access: if there is a requirement for watering, it should be adequately separated from the beck via mains, pasture pump or equivalent rather than drinking bays as the wet soils of the bank appear extremely susceptible to poaching.

Fig 3. Where a footpath crosses the beck at SE 38292 41481, non-native snowberry was present on both banks and because it forms dense thickets preventing light penetration, it should be removed from the site.

Fig 4. The channel in the wood d/s of the footbridge appears to have re-naturalised, maintaining a meandering path aided by the presence of mature trees and their root masses at the toe of the bank, and via log jams and natural woody debris. However, any lower gradient sections were smothered with fine silts, presumably originating from the arable and pasture on the RB.

Fig 5. At SE 39182 41912, the remnants of a stone dam wall were evident which would have impounded a pool ~50m in length; the former silt bed remains very wet and mostly devoid of vegetative cover except for Himalayan balsam, raspberry, and nettle around the edges. The gradient of the beck was steep immediately d/s and large stones from the dam wall contribute to the bed substrate. More material could be removed from the wall remains to reinstate the natural gradient and better drain the soils u/s. Consultation of OS maps from 1850 onwards show kennels on the LB and a quarry on the RB, but no weir.

Fig 6. Further impoundment was evident ~120m d/s from the dam wall. The channel was pinned to the LB (upper panel) and there was pipework present which looked suspiciously like that used to flush slurry tankers (NB the agricultural building at the top of the slope – right of shot – had a manure pile outside it with no obvious bunding to prevent nutrients running down to the beck). Lower panel: a culvert pipe was found in what appeared to be the paleo-channel taking meagre overflow from the modified channel somewhere u/s. The channel appears to have been realigned prior to 1846, although clearly the culvert work is relatively recent.

Fig 7. The channel is pinned on a straight course along the left side of the valley for ~100m, prevented from returning to its natural path by an embankment of ~1.5m height.

Fig 8. The 'exit' from the modified channel depicted in Fig 7. There was evidence of stone walling to hold that channel in position but few other clues as to the former structure. At this point, the beck turned sharply right to descend to the valley floor, pick up the channel from the culvert (in Fig 6), and continue through the wood.

Fig 9. Root masses (upper) and woody debris (lower) forming semi-permanent and temporary leaky dams, respectively. Here, where the gradient was sufficient, relatively clean gravels were abundant, and cursory stone-turning revealed a depauperate macroinvertebrate community dominated by glossosomatid cased-caddis flies.

Fig 10. From around SE 39577 42009, the trapezoidal channel retained many more dredged characteristics: typically over-capacity, uniformly shallow with little sediment sorting and, where the gradient was low, sedimentation of fines (upper panel). On the occasional steeper reach, lateral bars of gravel had narrowed the wetted channel (lower panel) and the gravels were remarkably free from fines (inset).

Fig 11. Saturated soils, fine sediment accumulation in the channel, and a predominance of Himalayan balsam in the understory was evident for ~230m u/s of the dam wall in Fig 12. Flow was extremely sluggish and insufficient to remove even relatively small debris jams and leaf packs. OS maps from 1846 depict this whole area as Wothersome Lake.

Fig 12. Wothersome Lake (depicted on maps from 1846), which should have been created by a dam at SE 40173 42243 and overspilling via a perched channel at the left side of the dam, was 'dry'. The beck disappeared into a sink in the sediments toward the right side of the dam, and resurfaced as a seep ~100m d/s. The lake would be extremely shallow as fine sediments over the last (presumably) 170 years have accumulated and marginal succession was evident with willows clearly encroaching.

Fig 13. The beck passes under Thorner Rd at SE 40423 42435 and while the u/s side of the bridge was hindered by a former bridge component stone (which should be removed; upper panel), passage through and below was clear. The channel was more natural, both in position and cross section, and stone turning revealed a more diverse community dominated by gammarid shrimps and cased-caddis of various families, as well as heptageniids.

NB: Between here and Bramham it was not possible to see the beck but there are several online 'fishponds' which are probably in a similar state to Wothersome Lake judging from contemporary aerial photography relative to OS maps from 1846.

It will also be worth trying to assess the reach between SE 41419 42332 and SE 42427 42566 where it goes under the A1M. Aerial photography reveals arable fields with little to no buffer to the north of the beck. Access should be checked under the A1M.

Fig 14. Trash screen at Bramham (SE 42476 42894). On the d/s side of the bridge, the beck was flowing through an over-capacity, rectangular, walled channel through the village. Fines and small gravels dominated the unsorted bed material and appeared devoid of macroinvertebrates except for one or two leeches.

Fig 15. At Old Mill Lane (SE 43226 44167), a weir immediately u/s of the road bridge causes fish passage issues (upper) and impounds the reach (lower) as far as could be viewed. This was the only location where several fish were observed, freely rising. It would be useful to explore the ownership of this u/s reach and possibly back to Bramham as it appears to be better protected and hence offer potential for remediation work.

Fig 16. Views u/s and d/s from Bar Lane at SE 43566 44559. The character of the beck here was markedly different to elsewhere as submerged macrophytes imparted ecosystem engineering and the geomorphology responded accordingly with much more varied depth profiles. Despite being straightened historically, the quality and variety of the habitat was better for fish of all life-stages. A bullhead was recorded.

Fig 17. The last point of access was from the A659 bridge at SE 44143 45007, ~300m from the confluence with the Wharfe at Boston Spa. Immediately d/s was a serious incidence of livestock poaching and overwidening of the channel caused erosion of the banks. Fine sediment ingress was rife, a clear breach of the Farming Rules for Water brought into force in April 2018.

3.0 Recommendations

Despite quite extensive native woodland in the riparian zone and recent 'benign neglect' of its management, certainly in the upper reaches below Thorner village, fine sediment ingress is clearly an issue from certain fields, both from arable and pasture. In an ideal world, complete rehabilitation of the system would require removal of all the ornamental online ponds which would reinstate a more natural gradient, kick-start geomorphological process, and improve connectivity for fish. Cost alone could be prohibitive without overcoming the challenge of buy-in from multiple landowners, but it removes the ongoing management issues of maintaining the dam and / or removing silt that will eventually accumulate. An alternative is to explore options for taking the ponds 'off-line', effectively by-passing them, but there does not appear very much room to engineer a channel around these ponds. At each, there would be the added complication of engineering a channel to return the beck to it's natural course again.

A more pragmatic solution (in conjunction with livestock exclusion fencing wherever appropriate) might be to restore Wothersome Lake which would benefit local biodiversity while providing multiple ecosystem services, primarily as a sediment trap to protect the lower reaches, but also in terms of amenity value. While this idea retains fragmentation in the upper reaches, there are multiple barriers further d/s already effectively fragmenting the system. A focus on the lower ~2km of the system (d/s of Bramham) to bolster resilience of fish populations, especially those that will move between Thorner Beck and the Wharfe for feeding, spawning or refuge will then provide the most tangible benefits.

The following is a summary of possible options. More detail can be found in the **Cock Beck** report, previously drawn-up for the 'Rivers in Elmet' project.

Quick wins

- *Reinstatement or installation of riparian fencing and preferably removing the requirement for livestock drinking access by providing alternative means, or as a last resort, formalising approaches to cattle drinks / fords. Especially important on the upper & lowest sections (Figs 2, 6 & 17 but see note in legend of Fig 13). Reduces diffuse / point source soil ingress (pollution), thereby improving water quality.*

- *Rehabilitation of Wothersome Lake (Fig 12) via dredging of accumulated silt (with potential to use elsewhere on the estate) and identification of drainage issue, puddling the bed with locally won clay, and allowing to refill. There is an opportunity here to effectively take this lake off-line; during the works mentioned above, create a new stream channel right bank along the left margin of the lake to the currently dysfunctional overspill channel. Under high flow conditions, the beck could overtop into the lake, providing some flood storage.*
- *Use of the collapsed dam wall (Fig 5) and upper sections of the current water course and its natural channel (Figs 6 & 9) to formalise some leaky dams for natural flood management. The former dam is clearly still maintaining soils in a saturated state upstream.*
- *Enhancement or creation of woody material structure (either from laying / hinging or use of tree-kickers, and by installation of woody deflectors to specifically encourage and complement natural geomorphological process, especially in the lower 2km to the Wharfe confluence. This will extend the impact on parts of the beck that are starting to renaturalise, primarily to improve habitat for invertebrates and fish spawning. Fisheries Improvement Programme funds could be used for this work.*
- *Identify ownership of the weir under Old Mill Lane road bridge and gain access for better inspection to assess mitigation options for fish passage. It would also be useful to gauge any local perceptions of flooding associated with the aperture of the bridge culvert.*

4.0 Making it Happen

The WTT may be able to offer further assistance:

- WTT Project Proposal
  - Further to this report, the WTT can devise a more detailed project proposal report. This would usually detail the next steps to take and highlight specific areas for work, with the report forming part of a flood defence consent application.
- WTT Practical Visit
  - Where recipients 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 visit. This would consist of 1-3 days' work, with a WTT Conservation Officer teaming up with interested parties 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. This service is in high demand and so may not always be possible.
- WTT Fundraising advice
  - Help and advice on how to raise funds for habitat improvement work can be found on the WTT website - 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

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

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