Ford Green Brook and Lyme Brook: Opportunities to Improve Habitat (incorporating volunteer-contribution potential)

Report and Proposal by the Wild Trout Trust – 15/03/2016

1 Introduction

Site visits and habitat appraisal was carried out by Paul Gaskell at the request of Groundwork West Midlands (Richard Schneider) and the Environment Agency (EA; Matt Lawrence) to explore the potential for habitat improvement on the Ford Green Brook and the Lyme Brook on the River Trent system. The Water Framework Directive (WFD) identifies the Ford Green Brook and the Lyme Brook as individual waterbodies via the Waterbody ID codes **GB104028053380** and **GB104028053340** respectively.

Throughout the report, normal convention is followed with respect to bank identification i.e. banks are designated **Left Bank** (**LB**) or **Right Bank** (**RB**) whilst looking downstream.

2 Habitat Assessment notes

2.1 Ford Green Brook

Starting at an Upstream limit at National Grid Reference (NGR) SJ 88759 51461, the Ford Green Brook was walked in a downstream direction. The presence of both filamentous green algae and high numbers of hoglouse (*Asellus aquaticus*) suggests a highly eutrophic (elevated nutrient level) watercourse. This will limit the potential for species – including trout - that depend on high dissolved oxygen levels to inhabit these reaches. Because the algae occurs throughout the reach and does not occur in discrete locations, the flow throughout this section must carry a high nutrient level. This points to either a large upstream source of organic pollution or multiple point-source/diffuse sources throughout the reach.

The poor water quality is a shame because the habitat is structurally varied (Figs. 1 – 3) and potentially valuable to a range of species. Whilst it is not possible to entirely rule out the prospect of trout surviving in this reach, it would (at best) be a fragile arrangement.

Figure 1: Ford Green Brook at the upstream limit visited (SJ 88759 51461) – benefiting from stable large (living) woody material.

Figure 2: Just downstream of location shown in Fig. 1, a meandering channel with lateral and longitudinal variation in depth (up to approx. 60 cm deep) and diverse current velocity - fringed with a variety of rough, scrubby vegetation. Structurally valuable - but apparently suffering from organic enrichment.

Figure 3: Approximately 50 metres downstream from location shown in Fig. 2, a gravel riffle and meandering channel. The rough heathland vegetation appears to be only very lightly managed as part of Whitfield Valley nature reserve. There are some light, localised impacts on vegetation and banks from foot-fall – but this may actually provide an overall benefit to structural variety. This is very different from uniform trampling/over-grazing impacts over long reaches of river.

The management of the area as part of a nature reserve (Whitfield Valley) is evident in the good representation of different riparian habitats. Figure 4 shows

tall grass/scrub contrasting with a copse of riparian trees – giving variety in cover and structural form (without being over-managed or too "tidy").

Figure 4: Variety in marginal cover and structure at SJ 88759 51430.

Although a drainage outfall was noted at SJ 88815 51306, there was no overt indication that it was operating significantly outside of designed/consented parameters (note the lack of extensive rag waste Fig. 5).

Figure 5: Outfall at SJ 88815 51306. Algal growth may indicate some nutrient enrichment. Whilst not particularly obvious, there was a subtle sign of potential "grey water" previously discharging from this outfall. This could indicate a blockage or misconnection and it would be worth maintaining a watching brief on this.

It may be worth investigating current consent levels for organic nutrients – as well as other potential sources in the catchment. It is possible that the combined effect of multiple outfalls carrying nutrients into a stream with such small potential for dilution would elevate the nutrient status within the Ford Green Brook. The filamentous green algae can be easily seen on riffles throughout the reach (e.g. Fig. 6).

Figure 6: Filamentous green algae growth covering cobbled substrate (in this case just below the outfall shown in Fig. 5). This type of growth - and associated organic-pollution-tolerant invertebrates – is common throughout the reach.

Although early in the season, some seedlings of Himalayan Balsam (*Impatiens glandulifera*) were noted – and control of this invasive, non-native species is strongly recommended. This will help to preserve the structurally varied riparian flora (and associated fauna) as well as potentially reducing fine-sediment inputs.

Some poorer habitat was noted within the straightened section of the brook as it is diverted around the lake within the reserve (Fig. 7). This is a relatively short section – although it could still be beneficial to increase diversity and "patchiness" of flow-depth and substrate particle-sizes. Since the course of the stream is constrained by the existence of the lake and associated access footpaths, re-meandering the brook is likely to be unfeasible. Instead, it may still be possible to create variation in depth via a longitudinal series of scour-pool and riffle "steps" by introducing small "log-jam" or comparable, stable woody material features.

Figure 7: Straightened channel and more uniform habitat adjacent to lake.

Evidence of the sandy upstream catchment – and the erosion/transport of fine sediment – can be seen beneath the B 5051 road bridge at SJ 88814 50904 (Fig. 8).

Figure 8: Fine sediment deposition in artificially-wide channel (built to accommodate bridge). It is likely that the invert level beneath the bridge also does not match the natural longitudinal bed-slope of the brook - compounding this "sediment trap" effect.

Overall, it appears that the water quality is by far the most significant factor controlling the potential for trout populations in the section of the Ford Green Brook upstream of the B5051 road bridge. Tackling this issue as a priority could, in the future, allow some benefits to be achieved through activities such as stable woody material (especially root-wads) into the channel. It is certainly worth controlling Himalayan Balsam – which will impact on aquatic and riparian biodiversity within the nature reserve.

Progressing downstream, the brook passes through an extensively straightened reach adjacent to housing (Fig. 9) before passing through an industrial estate (again, straightened – but not pictured due to lack of access). It then emerges from a culvert that consists of a wide (dry) flood channel and a smaller culvert exit that discharges over a rocky "ramp". This ramp may, potentially, allow a proportion of fish to access the upstream reaches of the brook (Fig. 10).

Downstream of the culvert, there is a dramatic shift in the character of the watercourse. A general increase in width and decrease in longitudinal bedslope combine to form habitat that is largely unsuitable for rheophilic (flow-loving) fish such as trout. Flow velocities are extremely low and in-channel vegetation begins to become far more prominent.

The river corridor in this section is an unusual combination of engineered landscape and the results of nature gradually reclaiming the valley. Some areas of the grassy/scrub-vegetation valley sides appear to be infrequently visited by the public – whereas areas closest to foot-bridges may see more footfall.

Figure 9: Straightened, narrow section adjacent to housing at SJ 88888 50811.

Figure 10: The main-flow carrying culvert exit at SJ 88925 50657. Note the rocky "ramp" that may provide some assistance to fish attempting to ascend this barrier. The flood channel of this culvert (out of the left border of the frame) is much larger – but dry under normal flow conditions.

Conditions that are typical of the reach below this culvert are shown in Figs. 11 and 12. The combination of physical habitat and the likelihood of nutrient enrichment (based on observations upstream) mean that this section is unlikely to be suitable for trout.

Figure 11: Low gradient, wide channel with extensive in-channel emergent vegetation (residential area that extends into the area pictured in Fig. 9 visible in background). The birch scrub that is recolonising the valley slopes is supporting abundant bird life.

Figure 12: Heavier footfall and probable mowing combine to produce a more compacted and short-turf coverage around the routes that pedestrians are encouraged to use (i.e. via paths and footbridges such as at SJ 88925 50595).

In some sections the channel is likely to be very difficult for fish to move up and downstream (particularly in high summer) due to the choking of the channel with emergent vegetation (Fig. 13).

Figure 13: Channel choked with emergent vegetation (likely to be a variety of *Phragmites sp*. reed).

Further downstream the brook crosses beneath the A road (Fig. 14) and passes into an area of wet woodland bordered by residential property, local road networks and a dismantled railway. The woodland also contains pond and stillwater habitats (at least one of which appears to support a coarse fishing amenity). Again, the likely nutrient status and habitat structure make this unwelcoming habitat for trout and other flow-loving fish (Fig. 15).

Figure 14: Ford Green Brook crossing under the A53 at SJ89594 50192.

Figure 15: Wet woodland/low-lying floodplain at SJ 89501 50223 (the catchment here is dominated by soft, sandy soil).

Downstream of this low-gradient section, some of the most promising habitat for trout and other rheophilic species was noted (Fig. 16). However, in terms of the scope for volunteer-led habitat works, there would not be much to improve here. The existing riparian woodland and in-channel structural variety already provides good trout habitat. Again, the true limiting factor is likely to be water quality.

Figure 16: Trout stream habitat at SJ 89687 50130 naturally arising in response to steeper gradient and relatively mature riparian woodland (with obvious coppicing management in place). This habitat is developing into higher quality environment for trout - even though constrained by walls and probable historic realignment of the channel.

The overall conclusion for the visited sections of the Ford Green Brook is that, aside from invasive plant control, there are few interventions that are currently warranted (or appropriate to volunteer groups). The major impact that is likely to prevent the habitat being high-value trout habitat is currently the apparently poor water quality.

2.2 Lyme Brook Reach 1

On the first of the two reaches visited on the Lyme Brook, the over-riding conclusion was the general unsuitability for volunteers to undertake work in this area. The banks (and especially the river-bed) were extremely soft and the water quite deep. The only practical activity would be removal of the plentiful Himalayan Balsam and fly tipping – although care would need to be taken due to the risk of sharps (including possible needles) within the refuse.

There is some potential for specialist intervention (e.g. Fig. 17) in the form of light rotational coppicing and introduction of stable woody debris (from arising material). This work would not be suitable for volunteer parties - due to the difficulty of access and deep, soft riverbed - and would be best undertaken by two or three appropriately-accredited professionals.

Figure 17: Good example of naturally-occurring, in-channel large woody material; as well as very uniform riparian tree canopy structure at SJ 84069 46190. Rotational coppicing here would stagger the height and density of the tree canopy – as well as providing a ready source of stable, in-channel woody material.

Further downstream there is a straightened section that is bounded on its LB by housing and on its RB by a footpath. There is some scope for introduction of stable woody material (and some existing pollarding and other tree management was noted to be ongoing – possibly as part of local council maintenance). The constraints of the site would mean that re-meandering is likely to be unfeasible. In addition, any work that needed to be carried out would entail un-bolting the fence railings that currently separate the footpath from the brook (e.g. Fig. 18).

Figure 18: Railings separating the footpath from the Lyme Brook at SJ 84255 46066. One or more panels of this fencing would need to be temporarily removed in order to provide access to perform any in-channel or riparian vegetation works. Note the tight constraints of footpath and housing either side of the brook.

2.3 Lyme Brook Reach 2

This section was divided into a natural, meandering channel in woodland (upper reach) and an extensively-straightened channel within amenity park-land (lower reach). Figure 19 typifies the habitat found in the upper reach and it is recommended that no significant interventions be undertaken. Aside from maintaining vigilance over potential invasive plant colonisation/removal of same, there are probably more benefits associated with a benign neglect than there would be with proactive alteration of habitats and species.

Figure 19: A good candidate reach for leaving nature to its own devices pictured at SJ 83495 47304.

A very thin seam of shale gravel was noted at (Fig. 20). Whether this could support successful trout spawning is very difficult to say. While it is far from ideal, any existing populations would need to already be well-adapted to using the available resources within the Lyme Brook. If the provision of opportunities specifically for wild trout to potentially thrive in the Lyme Brook is a priority, then the section pictured in Figs. 20 and 21 may be considered as potential areas for gravel introduction. In such a case, it would be necessary to also install woody material that would act to focus river flows so as to produce localised patches of relatively silt-free gravel.

Figure 20: Thin seam of gravels at SJ 83495 47273. The compaction of gravel particles (with the associated reduction in clear "pores" that would allow water to flow easily between gravel grains) is associated with poorer egg survival for species such as trout.

Figure 21: Facing upstream from gravel photographed in Fig. 20. There may be potential benefits to introducing additional gravel and woody material in this location (to provide a potential spawning resource).

Further downstream – between SJ 83495 47273 and SJ 83681 47056 there are clear opportunities to improve the habitat within the brook for a range of species. The nature of the surrounding land, available access and obvious channel realignment (to produce a straight drainage channel e.g. Fig. 22) all point towards relatively simple remedial measures. The uniform habitat produced by the artificial straightening can be improved by using the same approaches used on the Lyme Brook in Lyme Valley Park (e.g. https://youtu.be/xzZI6Ocjf-k).

Figure 22: Straightened channel passing through amenity parkland – the character pictured in this section is largely invariant between SJ 83495 47273 and SJ 83681 47056. Consequently, the same measures prescribed and completed throughout a similarly-straightened section of the Lyme Brook are appropriate here.

As is evident from the example video, the suite of proposed interventions works extremely well as a combination of targeted specialist plant hire and follow-up volunteer work. With Wild Trout Trust conservation officer(s) available to oversee the work carried out by contractors and volunteers, this can be a very cost-effective way to greatly improve the prospects for river corridor biodiversity.

3 Summary of Recommendations

3.1 Ford Green Brook

The over-riding impact on the Ford Green Brook (for overall biodiversity and for trout in particular) appears to be water quality. The nutrient enrichment indicated by aquatic plant and invertebrate life is likely to stem from the local combined sewer outfall network. Tackling this element first is critical to achieving improvements in either the upper or lower sections visited.

In the event that water quality improvements were made, in-channel structural diversity could be improved within the straightened section adjacent to the lake at Whitfield Valley nature reserve. However, in the sections downstream of the B5051, there is very little potential to create high quality trout habitat. This status continues all the way downstream until an increase in gradient and tree cover

combine to produce better trout habitat. For both poor and good habitat, therefore, there is little value in recommending interventions beyond water quality and connectivity (fish passage) improvements – coupled with invasive plant species control.

3.2 Lyme Brook Reach 1

In the uppermost section visited, control of Himalayan Balsam and fly tipping are desirable outcomes – but aside from these aims there is little that would be appropriate for volunteer workers to undertake. There is some potential (in the straightened section that is fenced off from public access) for some professional in-channel structure installation. This would be subject to a separate specific project proposal.

3.3Lyme Brook Reach 2

The greatest opportunities for habitat improvements that could be undertaken as a partnership (in the manor of previous Trent Valley Partnership "Catchment Based Approach" works on the Lyme Brook) are found in this section. Phase one of those previous works was illustrated in the previous (YouTube) video link in this report. The measures proposed for this section of the Lyme Brook are the same as those described in previous Wild Trout Trust project proposal documents as follows:
http://www.wildtrout.org/sites/default/files/private/LymeProjectProposal.pdf and http://www.wildtrout.org/sites/default/files/private/Lyme%20Brook%20PP.pdf.

In the event that the same partnership approach to securing permissions, funding and appropriate contractors (along with Groundwork West Midland's management and co-ordination role); this project should be possible to complete within a relatively short time-scale. It is noteworthy that the experience of the Wild Trout Trust during the existing project work delivery has been excellent with the Trent Valley Partnership under the Catchment Based Approach.

4 Acknowledgement

The WTT would like to thank the Environment Agency and Groundwork West Midlands for supporting the advisory work associated with this project.

5 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.