Wild Trout Trust habitat project proposal for the Lyme Brook between SJ 85278 45115 and SJ 85521 44950

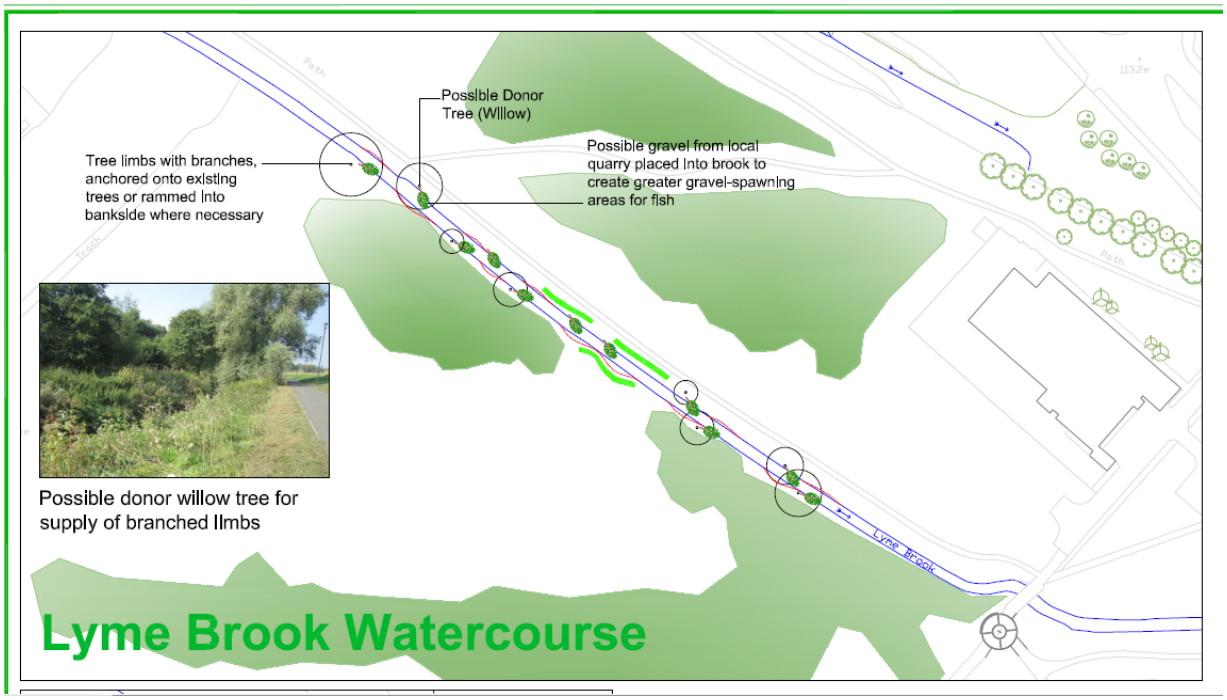

Figure 1: Groundwork West Midlands original sketch of potential scheme at Lyme Brook between upstream limit (top left tree kicker placement) at National Grid Reference (NGR) SJ 85278 45115 and downstream limit (footbridge lower right) at NGR SJ 85521 44950

Introduction and rationale

The Lyme Brook in Newcastle-under- Lyme flows through an urbanised catchment before joining the River Trent between the areas of Northwood and Hanford. Historic straightening of the channel has had the effect of increasing the steepness of the longitudinal slope of the riverbed (by reducing the path-length of the channel, whilst experiencing the same change in vertical height). Additionally the toe of the bank in the section depicted in the sketch (Fig. 1) above has been reinforced with cobble-sized stonework. In contrast to less dramatically-straightened sections just downstream of this reach (where fine bed-sediments are plentiful), these impacts greatly restrict the occurrence and persistence of gravels in the stream bed. Consequently, the invertebrates and fish species that require access to gravel face significant constraints in this reach.

In this reach, straightening of the channel simplifies the habitat such that refuge areas that could, otherwise, help to protect and invertebrates from spate flows and predation are rare. Native wild trout (*Salmo trutta*) are beginning to make a recovery in the Trent catchment, thanks to ongoing improvements in water-quality. This affords opportunities for improvements in habitat structure to aid that recovery. Furthermore, the requirements of trout for the varied habitat that is essential for the completion of their life-cycle mean that improving prospects for wild trout in streams such as the Lyme Brook will have knock-on benefits to wider biodiversity.

The section of the brook featured in Fig. 1 has been identified by Groundwork West Midlands as a potential site for habitat improvement – with the suggestion of using limbs from a large willow tree (due to be pollarded) to produce marginal cover. A broad suggestion that the introduction of gravel may also provide benefits has also been made. It is likely that additional benefits can be gained from low-tech and cost-effective techniques that will not impact the overall capacity of the brook from a flood-water point of view. Consequently, there are some modifications to the existing specification that need not cost any more money – but which would convey greater biodiversity benefits. In addition, the works will add to the visual appeal of the brook to users of the park whose footpath runs parallel to the reach in question.

Proposed measures

Three broad aims would be met by adopting simple measures:

1.) Increased diversity in flow (in terms of depth, velocity and meandering path)

2.) Increased diversity of bed-material particle-sizes

3.) Increased availability of submerged marginal refuge areas (from predation and spate flows)

Specific measures (and attendant locations) are suggested as follows:

Prescription 1: Construction of shallow, sloping marginal "berms" (e.g. Figs. 2-4) using brushwood won from pollarding/coppicing activities on site coupled with removal of the stone reinforcement of the bank-toe on the opposite bank from each berm. It is recommended that material for brushwood is won from tree species that **will *not*** readily strike roots and vigorously grow; i.e. large varieties of willow, requiring regular ongoing maintenance (unless such maintenance provision is easily available).In all cases, the stone-removal would be on the opposite bank to the footpath. This would, ideally also be coupled with pulling back the bank-line (utilising a mini-digger such as that pictured in Fig. 10) in such a way as to preserve/slightly increase the channel capacity at each installed berm. In other words, the bank opposite each berm would be pulled back to a distance equivalent to the ingression of the constructed berm into the channel.

Figure 2: Low marginal berm (longer than proposed installations on Lyme Brook)

Figure 3: Low marginal berm of approximately comparable scale to that proposed for Lyme Brook

Figure 4: Low Marginal berms on stream smaller than Lyme Brook

The specific locations for the marginal berm and opposing bank-toe-armouring removal are as follows:

SJ 85278 45115

Figure 5: Low marginal berm proposed for near bank (true left bank i.e. designated whilst looking downstream) with removal of bank toe rocks on opposite bank (true right bank). This would also potentially help to reduce impact of dog-run erosion into the channel as visible on the near bank here.

SJ85339 45064

Figure 6: Site of willow tree due for pollarding (base of trunk, right of frame). Note stone reinforcement of opposite bank toe. Construction of a low berm on the nearside bank (with removal of bank toe on opposite bank) and pulling back of opposite bank to preserve overall channel width proposed at this location.

SJ 85378 45042

Figure 7: Propose 2x marginal berms on the near bank (photo is taken looking upstream towards tree on opposite bank). Berms (yellow) to be sited one upstream and one downstream of the tree. Bank-toe cobbles removed and bank pulled back on the far bank (blue)

SJ 85427 45007

Figure 8: Berm on nearside bank (apex level with existing tree) and pull back opposite bank to retain channel width (removing bank reinforcecments on opposite bank to accommodate)

In addition – at **SJ 85453 44989** (Fig. 9) benefits would accrue from pinning a small amount of submerged marginal brash and also placing some of the larger cobbles taken from bank-toe modifications into the riffle here to create additional juvenile fish habitat.

Figure 9: Prime opportunity to add small amounts of submerged cover in the form of marginal brash and scattered large cobble placements (cobbles won from bank-toe modifications upstream)

Prescription 2: Introduction of gravel spawning riffles at 2 locations using flint rejects from quarrying activity (Fig. 10) and incorporation of pinned upstream-pointing tree limbs to aid retention and "sorting" of gravels into particle-size ranges (rather than aggregates of all particle-sizes)

Figure 10: Gravel installed into the heavily urban South London River Wandle (L) and resultant trout spawning efforts on installed gravels (R)

Figure 11: Upstream-pointing log promoting gravel-sorting (leading to trout "redd" or spawning site indicated by the bright patch of gravel). Such structures can help to retain gravels on their upstream edges and also promote localised scour and deposition on their downstream sides.

SJ 85323 45082

Figure 12: Site for gravel introduction coupled with pulling back the opposite bank to increase channel capacity slightly (promoting ability to retain gravel-sized particles during spate-flow conditions and also retaining capacity of channel to offset introduced material). It is important to note that once shaped into a streamlined deposit – gravel riffles are observed to have a negligible impact on overall channel conveyance. This effect, coupled with slight localised increase in channel capacity results in no change to overall flood risk potential for the site.

SJ 85492 44957

Figure 13: A slightly deeper section - with same measures proposed as those detailed for Fig. 12.

Summary

The measures outlined in this report could be carried out as part of a volunteer-centred event (run over two days) by a partnership between the Wild Trout Trust and Groundwork West Midlands. This would act as a pilot for comparable works to be taken forward on the Trent catchment by the Trent Catchment Based Approach partnership hosted by Staffordshire Wildlife Trust. Tree pollarding works for very large trees would need to be carried out in advance by separate contractors – but any coppicing of smaller trees to win material on-site could be carried out by WTT accredited chainsaw operators. In addition, it may be desirable to have mini-excavator works completed either in advance of volunteer works (approximately 1-day's work) – or as an alternative – at different locations to those where volunteers were working at any given time. Prior to commencement of works, it would be necessary to have a check performed to characterise likely risk of encountering underground services (telecommunications, energy/sanitation/water-supply utilities) when driving stakes and/or steel pins into the stream bed to securely anchor structures in place.

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