Causley Brook, Stoke-on-Trent: Project Proposal

Project Proposal by the Wild Trout Trust – Following a Site Visit on 28/08/2015

1. Introduction

The opportunities and value in protecting and improving vital tributary streams on the Trent system have been demonstrated and highlighted by recent partnership works on the Lyme Brook in Newcastle-under-Lyme (http://urbantrout.blogspot.co.uk/2015/10/lyme-brook-habitat-work-explained-in.html). Further work is now required to improve other tributaries on the system, including the Causley Brook.

A site survey to Causley Brook was conducted at the request of Groundwork West Midlands and the Environment Agency acting as stakeholders of the Trent Catchment Partnership. The aim was to identify and address opportunities for habitat improvement on the Causley Brook in Stoke-On-Trent.

The whole of Causley Brook is captured under the Water Framework Directive (WFD) waterbody reference of GB104028053310.

This proposal refers to a reach between a downstream limit at SJ 90716 46982 and an upstream limit at SJ 90992 47065.

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

2. Proposed measures

The overall rationale for the specific suite of measures proposed for this reach is to improve the structural variety (and associated light/shade regime) in the riparian woodland canopy. Readily permeable, small-scale log-jam habitat will be employed to increase in-stream structural complexity and improve the ability of the channel to store and sort substrate, and to retain vital leaf-litter (an important source of nutrients).

Overall, the channel already exhibits some valuable geomorphological and ecological processes that include lateral scour, channel meandering and the recruitment of self-sustaining salmonid fish populations. It is extremely valuable to have dense shade represented - particularly considering its protective effect in mitigating high temperatures in low water conditions. However, there would be greater benefit to retaining several densely-shaded areas and creating other areas that feature dappled light/shade and a more varied woodland canopy height and density.

The following specific measures are proposed:

Figure 1: Relatively dense willow canopy all of a similar age/size. Himalayan balsam (*Impatiens glandulifera*) is beginning to dominate the understory on the RHB.

The willow canopy at SJ90754 47030 (Fig.1) would provide better habitat if subjected to a light rotational coppice regime. I would suggest 10% of trees be coppiced and allowed to regrow from stumps on an annual basis for a period of 10 years. In addition, some "laying" of thinner sapling growth into the channel will provide beneficial cover and shade for trout and other "cold water" organisms. Figure 2 shows some laid hazel as an example of this technique.

Figure 2: Hazel that has been laid into the LHB margins of a stream to provide cover and structural variety

Figure 3: Deposition and scour creating meandering planform and good channel morphology at SJ90754 47030. Tackling the Himalayan balsam infestation would be highly beneficial to the understory plant communities and will increase bank stability.

As well as increasing the proportion of dappled light to shade in this section, it will be important to control the invasive Himalayan balsam so that the riparian understory vegetation receives the greatest benefit from the changed light-regime.

Given the small size of the watercourse (Fig. 4), it would be a sensible precaution to leave some blocks of dense shade – to protect against high temperatures in low water conditions (Fig. 5).

Figure 4: A natural meander in the channel at SJ 90942 47047 where the tree canopy can be retained in its current condition (to ensure presence of cold water refuge areas)

Figure 5: Small blocks of near complete shade should be left in place – to act as cold-water refugia under low water/hot weather conditions

A naturally-occurring log-jam at SJ 90836 47057 gives an ideal blueprint for additional, deliberately-introduced, similar structures (Fig. 6). For this section, a maximum of four such structures are recommended. As well as increasing the structural variety within the channel and helping to promote "sorting" of substrate particles, these structures will also help to slow the rate of export of leaf litter.

In combination with more varied potential sources of within-stream primary production that will arise from light tree coppicing, the retention of leaf-litter nutrients will also benefit aquatic food-web productivity. A range of characteristic herbivores/detritivores specialise on these different sources of photosynthetic material. By providing a varied and plentiful supply of such energy sources it is possible to encourage and sustain species-rich, productive food-webs. Currently, much of the leaf material that enters the stream will be exported from the reach and larger areas of dense shade are limiting in-stream photosynthesis. Consequently, there are opportunities to improve the provision and retention of nutrients in this section of the Causley Brook.

The stability and porous nature of introduced log jams means that they do not present an increased flood risk within the context of the watercourse size and location. They also have the advantage of being extremely simple, low-tech interventions.

Figure 6: Naturally-arising large woody material that is securely jammed in place. Mimicking this in up to 4 additional locations within the surveyed reach would provide structural and aquatic food-web benefits.

All proposed measures should be complemented by instigating a programme of hand-pulling (and composting on site) of Himalayan balsam on this reach of the Causley Brook. It has been shown that, at the landscape scale, small patches where invasive species are controlled significantly improve overall biodiversity: (www.sciencecodex.com/global_plant_diversity_hinges_on_local_battles_against_invasive_species-105553). This is in spite of the fact that the ideal approach would be to seek eradication from the upstream limit of an infestation and work downstream. A summary of the impacts of Himalayan balsam is available here: http://himalayanbalsam.cabi.org/latest-news/himalayan-balsam-impact-on-invertebrates/

Delivery

The above works are feasible to deliver as a one day workshop for a small group of combined volunteers and interested professionals (as a skills training event as well as delivering the habitat improvements). The ideal number would probably be around 6 to 10 people receiving the training and two WTT staff.

Predicted costs would be 2 x £250 (WTT staff day-rate costs) plus mileage contributions totalling £108.90 (60 miles round trip x 0.45p per mile, plus 182 miles round trip x 0.45p per mile).

The combined total would therefore be: £608.90

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