



Short-form Advisory Visit

River Witham, Barkston

July 2019



1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the River Witham at Barkston near Grantham on 5th July 2019. Comments in this report are based on observations on the day of the site visit and discussions with the Chairman and Riverkeeper of Grantham Angling Association Fly Fishing Section (GAAFFS).

Normal convention is applied throughout the report with respect to bank identification, i.e. the banks are designated left hand bank (LHB) or right hand bank (RHB) whilst looking downstream.

2.0 Overview

This section of the River Witham is downstream of the road bridge (White Bridge) at Barkston (NGR SK9272241592). Sections of the Witham controlled by GAAFFS were the subject of a major habitat restoration project carried out approximately 19 years ago by the Association and the contractor Windrush AEC. The beats listed below were inspected during the current walkover (corresponding to those in the habitat improvement proposals by Windrush AEC, 2000):

Beat G: White Bridge to Elnor's Weir

Beat H: Elnor's Weir to Sleeper Bridge

Beat I: Sleeper Bridge to railway viaduct

During the previous habitat improvement works, two weirs were removed and at least four riffles constructed in the above sections.

3.0 Habitat Assessment

Overall habitat quality in the section inspected was reasonably good for a lowland river which has been extensively modified for drainage. The past habitat improvement works have introduced some variety to the depth and width of the channel and cover is provided by in-stream vegetation and overhanging trees and bushes. These features provide habitat for adult and juvenile trout, but there were very few areas of suitable spawning habitat observed.

3.1 Spawning habitat improvement

The specification for the constructed riffles states >50mm mean diameter flint reject gravel as the top dressing. If this was the actual size used, it is too large for trout spawning, the preferred size being 10 – 30mm diameter (Figure 1). An important consideration when introducing gravel is whether it will stay put during bank-full flows, so the riffles may have been constructed with this in mind, erring on the side of caution.

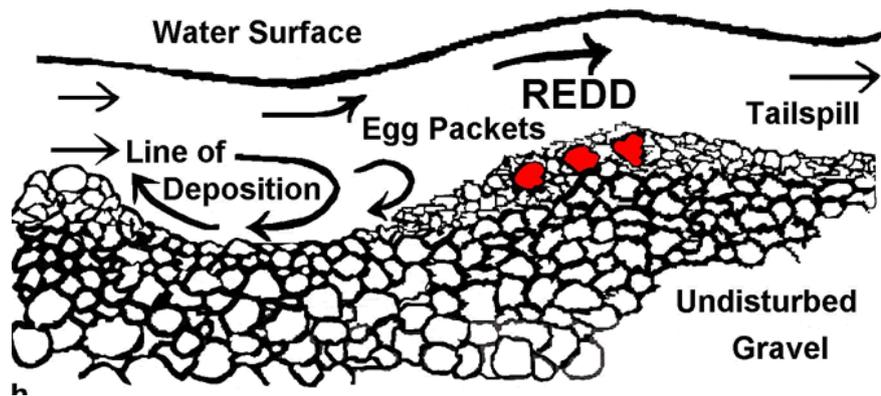


Figure 1 Trout bury their eggs in gravel displaced downstream by the female fish. The size of gravel and speed of flow are important factors in determining which spawning sites are chosen.

It is recommended that the riffles are inspected to determine the size of the gravel. This could be done in conjunction with raking in early autumn to winnow fine sediment and improve spawning conditions. The areas to target are where the water speeds up at the tail of a pool before breaking into the riffle downstream (Figure 2). If the size of the gravel particles is too big for spawning, then some smaller gravel could be introduced, initially in a test area to see if it is retained.

It is also worth introducing spawning-sized gravel to the areas immediately upstream of the sheet pile weir/bridge footings at White Bridge and above Elnor's weir. Either the gravel will be retained by the weir crests, or if it is displaced by high flows, it may settle at the run out from the weirpools (cover photo).

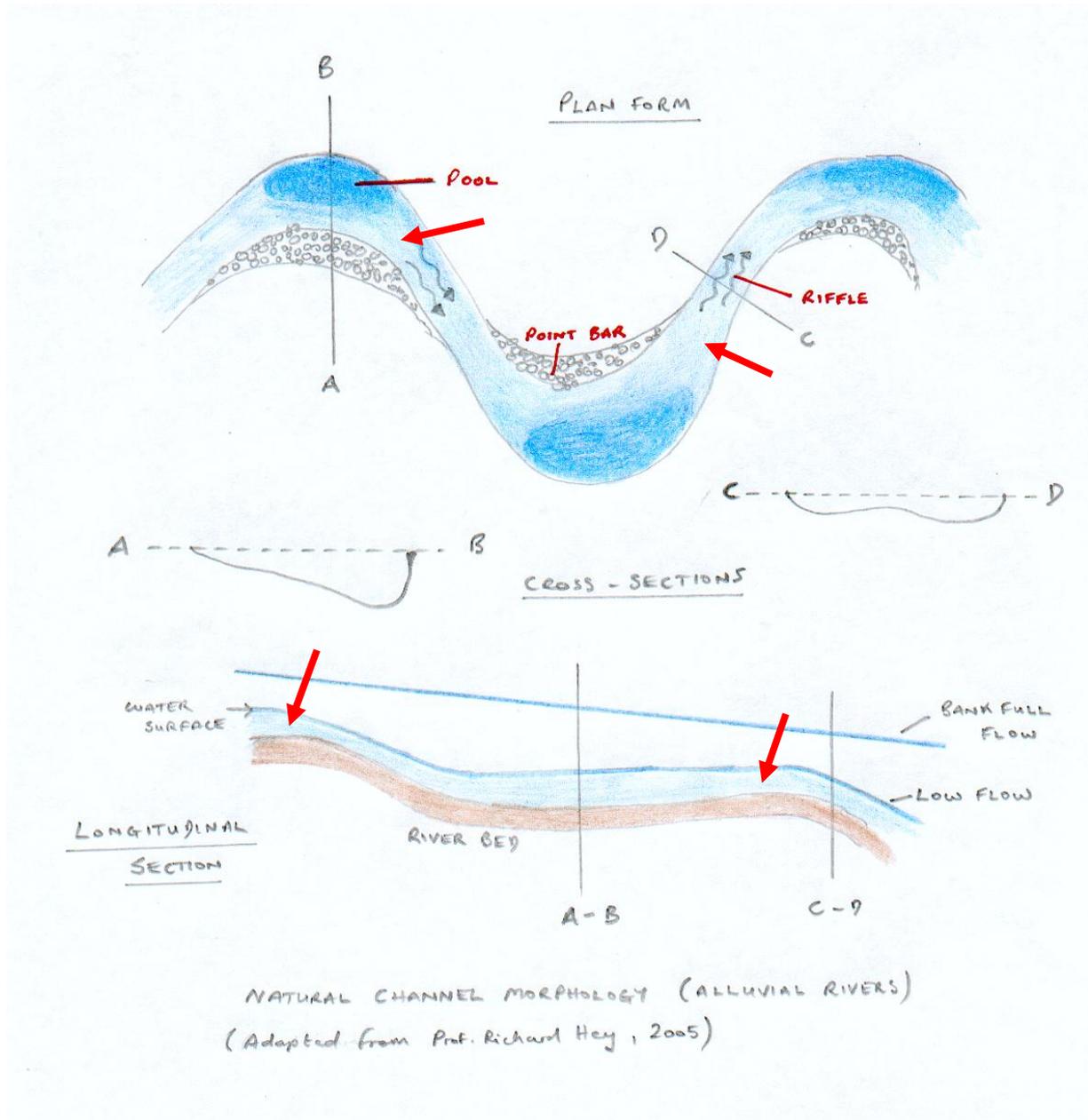


Figure 2 Trout will very often choose to spawn at the head of riffles / tail of pools. This is where there is a steepening of the river bed and acceleration of flow (the 'glassy' water before it breaks into the riffle). These sites promote water flow through the gravel particles, sustaining the trout eggs through their several weeks of incubation.

3.2 Cover habitat improvements

Cover habitat is provided by deeper water and physical structure such as aquatic weed, overhanging vegetation and large woody material (LWM) that has settled in the river channel. Deep water alone will hold adult trout, but it is usually far better in combination with physical structure. Physical structure can make the difference between moderate to shallow depths holding fish or not.

Cover that lasts over the winter is extremely important for the survival of wild trout, especially juveniles in their first year of life. Hence the longevity of physical cover is an important consideration. Aquatic weed (both streamer weed and marginals like reeds and rushes) provides valuable cover during the summer and autumn, but can die back in winter (or be cut back as part of flood risk management). Longer lasting cover such as hinged trees and staked brushwood are therefore very important; naturally occurring cover provided by trailing branches and LWM should be retained (Figure 3).

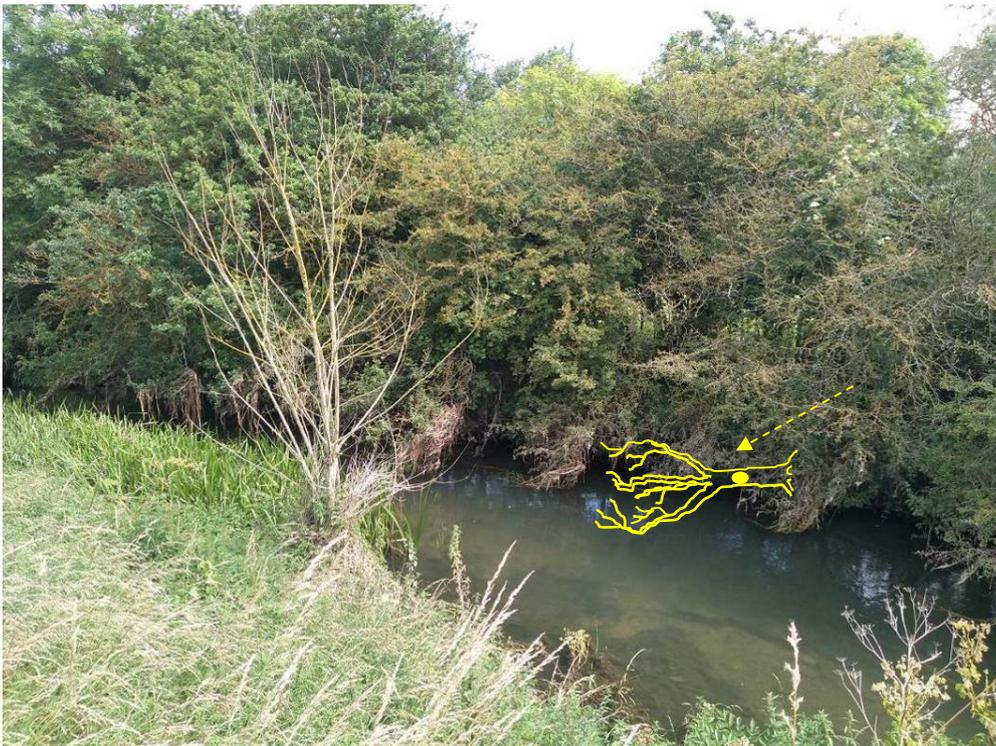


Figure 3 Good, low overhanging cover that should be retained. Such areas could also be enhanced by hinging selected trees into the margins.

One or two areas were highlighted where deep water occurred but fewer fish held there than might be expected. Planting trees near the toe of the bank on the outside of the bends where these pools occur is recommended. These should be sallows (grey or goat willow) and there are numerous existing trees on site from which whips can be sourced. Sallows are the oval-leaved, bushy willows rather than the narrow-leaved, taller growing varieties.

The easiest way of establishing willow is by pushing short sections of freshly cut willow whip into areas of wet ground, ideally close to the waterline. Whip planting can be undertaken at any time of the year but will have the greatest success during the dormant season, shortly before spring growth begins (ideally late Jan-March). This kind of planting should be undertaken sparingly to avoid overpopulation by willows.

Whips should be planted into the ground so that there is a greater length ($\frac{2}{3}$) within the ground, to minimise the distance that water has to be transported up the stem. Planting them on a shallow d/s angle will also ease water transport within the developing shrub and reduce the potential for it catching debris and being ripped out. Leaving 300-400mm of whip protruding from the ground is sufficient, providing they protrude well past the surrounding vegetation (to allow access to light). Whips of 5mm-25mm diameter tend to take best, but even large branches can be used. If undertaken during the growing season, care should be taken not to leave excessive amounts of foliage on the whips as these greatly increase the rate of transpiration and can lead to their dehydration.

3.3 Pool habitat improvements

Areas of poor in-stream habitat occur within this reach, where the river channel is straight and with uniform depth and width. Figure 4 shows such a reach a short distance upstream of Elnor's weir. This area could be improved by creation of depth variation using the 'dig-and-dump' technique.

This technique uses an excavator to re-profile the bed of the river, digging deeper pool areas and creating side bars with the resulting material. These bars pinch the width of the low-flow channel, fluming the flow into the deeper areas and maintaining their depth (Figures 5 - 7). The excavated material can be used to form paired bars opposite each other with a pool downstream in the centre of the channel, or they may be offset on alternate sides of the channel to create sinuosity (Figures 8 - 9).



Figure 4 Upstream of Elnor's Weir – a straight and uniform channel.



Figure 5 Pool creation using dig-and-dump

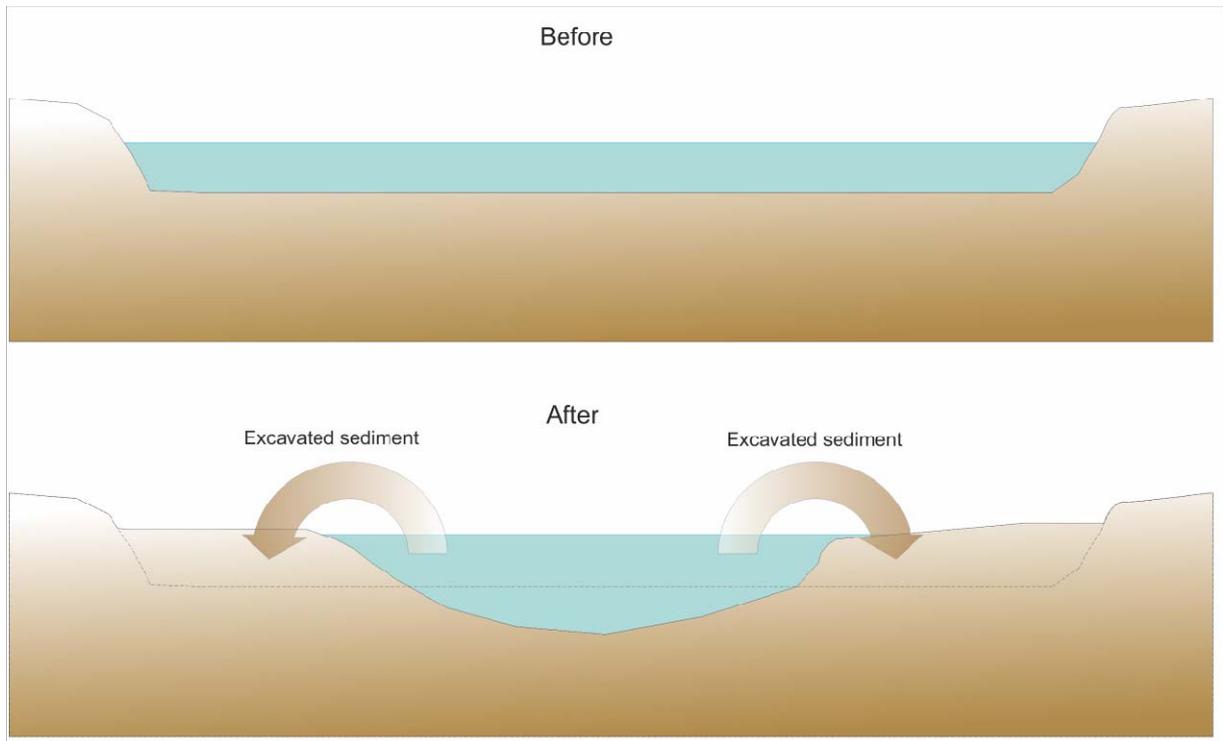


Figure 6

'Dig and Dump' channel re-profile

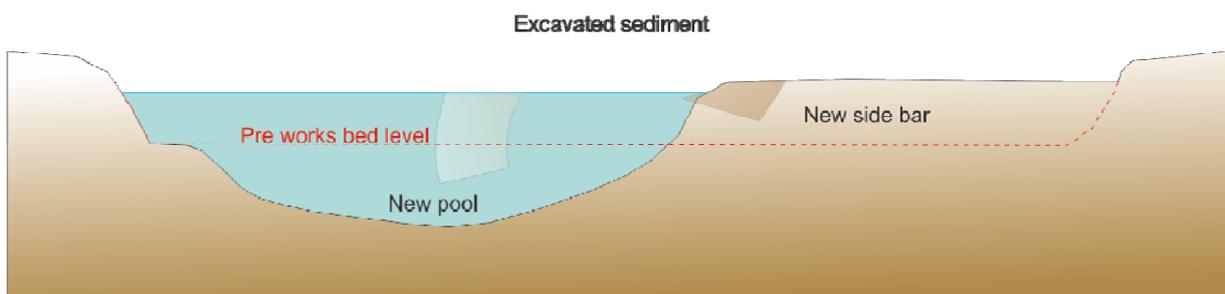


Figure 7



Figure 8 River Lark, Suffolk, before dig-and-dump (Picture © Ian Hawkins)



Figure 9 River Lark, Suffolk, after dig-and-dump (Picture © Ian Hawkins).

3.4 Fish passage improvements

Elnor's weir is a significant barrier to fish movement (Figure 10). The ability to move freely along a river is very important in maintaining healthy fish populations, allowing access to different habitats required for different life stages, over varying spatial and temporal scales. For example, the existence of a trout population in the middle reaches of a river may rely on accessing suitable spawning habitat each winter in headwaters or tributaries several miles upstream. Likewise, their offspring may take around two years to distribute downstream, utilising various feeding and refuge habitats along the way. Weirs fragment habitats and disrupt these natural movements; they also impede re-colonisation of fish following losses through pollution or extreme flood events.



Figure 10 Elnor's Weir

There are a number of barriers to fish migration on the Witham and the Environment Agency have prioritised these for improvement based upon cost-benefits and available funding. The EA would be a key partner in any project to improve fish passage here and it is recommended they are consulted.

The most effective way of improving fish passage here would be to remove the weir and replace it with a series of constructed riffles in the straight reach upstream (Figure 4; instead of the dig-and-dump suggestion above). This would reduce the size of the existing weir pool, but provide more pools downstream of each riffle.

An alternative that could be considered as an interim measure whilst a more ambitious and permanent solution is developed would be to retrofit an easement to the existing weir. A 'low-cost baffle' system would probably be the most appropriate and may have the potential to be delivered by GAAFFS (Figures 11 – 12).



Figure 11 Low-cost baffles being installed on a shallow sloping weir, showing the off-set gap between baffles.
(Picture: J.Grey).



Figure 12 Completed low cost baffles fitted to a flow gauging weir (line of gaps indicated by dashed line).

4.0 Making it Happen

- WTT will pursue obtaining the necessary consents for the cover habitat improvements described in section 3.2 above, with the aim of carrying out the works in the autumn of 2019.
- The other potential improvements can be discussed within GAAFFS and with the Environment Agency. Wild Trout Trust can then provide further support in developing more detailed proposals and gaining the necessary consents.

We have produced a 70 minute DVD called 'Rivers: Working for Wild Trout' which graphically illustrates the challenges of managing river habitat for wild trout, with examples of good and poor habitat and practical demonstrations of habitat improvement. Additional sections of film cover key topics in greater depth, such as woody debris, enhancing fish stocks and managing invasive species.

The DVD is available to buy for £10.00 from our website shop <http://www.wildtrout.org/product/rivers-working-wild-trout-dvd-0> or by calling the WTT office on 02392 570985.

The WTT website library has a wide range of materials in video and PDF format on habitat management and improvement: <http://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.