Advisory Visit

Rea Brook, near Shrewsbury

November 2015

1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the Rea Brook near Shrewsbury, Shropshire on 9th November, 2015. Comments in this report are based on observations on the day of the site visit and discussions with Rick North, Rob Hudson and Max Canham of Hook-a-Gate Angling Club; Peter Wigley and Glyn Roberts of Pontesbury Angling Club; and Liz Etheridge, Caroline Savage and David Carrington of the Environment Agency (EA).

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. The Ordnance Survey National Grid Reference (NGR) system is used to identify specific locations, for example the road bridge at Hook-a-Gate (NGR SJ 46625 09247).

2.0 Catchment / Fishery Overview

The Rea Brook rises to the south west of Shrewsbury and flows in a north-easterly direction to join the River Severn in the centre of the town. The Brook is a lowland river flowing over clay, falling approximately 50 metres over its 40-km course.

The Brook was inspected in two locations, firstly between Hanwood (SJ 44290 09412) and Hook-a-Gate (SJ 46625 09247), a 3-km reach controlled by Hook-a-Gate AC and secondly downstream of Farley (SJ 38820 07777) on 2 km of water controlled by Pontesbury AC. The Brook in these areas is a mixed fishery containing trout, grayling, chub and dace.

Hook-a-Gate AC (HAC) has approximately 50 members, around two-thirds of whom are trout fishers. Two-hundred 11-13” brown trout are stocked annually by the club, but at the last AGM a plan was introduced to cease stocking, reducing the numbers of introduced fish annually over the next five years. Pontesbury AC (PAC) have about 18 members and have stocked trout in the past, although limited membership and resources have restricted this more recently.

Under the Water Framework Directive, rivers and streams are divided into geographical areas called waterbodies and their ecological, chemical and

physical quality assessed on a scale of bad, poor, moderate, good or high. The overall quality of a waterbody is determined by the lowest rank in each of these areas and there are targets to bring waterbodies to a minimum of good status. The HAC section falls within the waterbody *Rea Brook – confluence of Pontesford Brook to confluence of River Severn* (GB109054049630) which has an overall classification of moderate (assessed 2014); the parameters which prevent the brook from achieving a higher status are high phosphate levels and a poorer than expected community of plants and algae (probably because of the high phosphate levels, which are likely to originate from diffuse pollution from agriculture). Invertebrates were recorded as high status in 2014 and 2009, and fish as good in 2009 (no data 2014).

The PAC section falls within the upstream waterbody *Rea Brook – confluence of Minsterley Brook to confluence Pontesford Brook* (GB109054049570) and has an overall classification of moderate. The individual parameters for fish, invertebrates and plants & algae are good or high in the 2014 assessment, whereas phosphate is poor. Some specific pollutants (including cadmium and lead) are also recorded as failing, but it is unclear why this has not influenced the overall status of the waterbody.

Land use in the catchment is largely agricultural with a mixture of arable and livestock. Most of the land alongside the brook is in entry level stewardship (www.magic.gov.uk). There are no designated conservation sites close to the reaches inspected.

3.0 Habitat Assessment

3.1 Hanwood to Hook-a-Gate

The river was walked in a downstream direction from Hanwood. Alongside the village of Hanwood, the river is bordered on the LHB by houses and gardens and on the RHB by pasture and woodland. The general physical habitat of the river is reasonably good with a meandering plan-form and a pool-riffle sequence (Photo 1). Gravel is present which is of a suitable size for successful trout spawning (Photo 2) and a recent electric fishing survey on a riffle area near the upstream end of this reach produced good numbers of juvenile trout (David Carrington, pers.comm.).

Good numbers of trees and bushes are present along the LHB which stabilise the bank and provide shade and cover in the form of overhanging and

submerged branches and root structures (Photo 3). This is extremely important habitat for fish as it provides refuge areas from predators. Cormorants have been observed on the brook and during the visit, goosanders were seen and otter spraints were found. Having dense cover within the water, which persists throughout the winter, greatly increases the survival rates of fish, particularly young-of-the-year trout. Such cover can be enhanced by partially cutting and laying bankside trees and bushes into the river margins (Photo 4) and by installing brushwood into the margins (see Recommendations).

Where the gardens of properties border the river on the LHB, there are generally fewer trees and bushes and less valuable cover. Hard bank revetments are present in a number of locations, which is not good marginal habitat for fish, but changing this would be difficult given the multiple residential ownerships involved (Photo 5). Several examples of garden waste (grass and hedge clippings, soil and rubble) being tipped from gardens onto the LHB were observed (Photo 6). Distribution of an EA warning letter to riparian properties in Hanwood could deter this practice.

The section of river between the railway bridges at SJ 44715 09917 and SJ 45687 09772 was not inspected during this visit, although it was visited earlier in the year. This section is bordered by open grassland and grazed on both banks, with fewer riparian trees than in other sections. This makes the banks less stable and more prone to erosion, widening and shallowing the river channel. The LHB has a fenced margin which should allow natural regeneration of trees. It would be beneficial to have the same on the RHB, either along the whole section, or fenced headlands that could be planted with native tree species. Areas of bank erosion could be stabilised with brushwood revetment, incorporating live sallow (*Salix cinerea* and *S. caprea*), which would grow and improve bank stability and cover.

Photo 1 Good river morphology at the upstream end of the reach – meandering plan-form and a pool-riffle sequence.

Photo 2 Gravel suitable for riverine fish (trout, chub, dace) spawning is present on the riffles.

Photo 3 Tree roots, overhanging and partially submerged vegetation and shaggy marginal vegetation – all great habitat which should be retained.

Photo 4 Example of trees on the true RHB (left of picture) suitable for hinging and laying to improve cover for fish.

Photo 5 Hard revetment on LHB

Photo 6 Tipping of garden waste on the LHB

Below the downstream railway bridge, the river enters an area with deciduous woodland on the LHB and grazing on the RHB. At SJ 45869 09644 there are the remains of an old weir (Photo 7), reputedly built with stone removed from Shrewsbury Abbey, which used to divert water down a leat on the LHB to a mill at Hook-a-Gate. The remains of the leat can be seen in the woodland as an overgrown ditch. Only the side walls of the weir remain, the main structure having been removed in the first half of the C20th (Max Canham, pers. comm.). A small bay caused by former bank scour remains on the LHB, although this is gradually silting up. There is no remaining upstream impoundment from the structure (Photo 8).

The RHB here is relatively exposed and shows signs of moderate rates of erosion. There are some alders displaying signs of disease (*Phytophthora* sp.) which would benefit from coppicing before they are lost entirely (Photos 9, 10). There are also some smaller trees which could be hinged to provide low cover over the water. Establishing more bankside trees would benefit the habitat and bank stability in this location. A brushwood revetment at the toe of the bank, incorporating live sallow would help to kick start this process. Managing grazing pressure with fencing would be required to establish a broader strip of riparian trees.

Downstream of this point the river channel is relatively straight, probably as a result of historic channel engineering for milling and/or land drainage purposes (Photo 11). This section has less variation in depth because of the lack of lateral scour associated with straightened channels and could benefit from the introduction of log flow deflectors positioned to promote bed scour (see recommendations).

A little further downstream, concern was expressed about bank erosion on the LHB on the outside of a bend. The rate of bank erosion here does not seem excessive, with the toe of the bank appearing to have stabilised and vegetated. There is one scallop out of the bank where a back eddy is causing scour, which could be plugged with brushwood (Photo 12). One of the concerns is vehicle access along the top of the bank here between the river and the woodland. Cutting back some of the trees at the edge of the wood (and using the brash to plug the scour hole) may be a more cost effective solution than bank protection.

The section down to the gauging weir at Hook-a-Gate is the most popular with HAC members because of good access. There is some excellent

riparian habitat along this reach, with very good low cover over the water provided by overhanging trees and bushes, predominantly on the steeper RHB (Photo 13). This cover provides lies for fish and compensates to some degree for the lack of deeper water in this straightened reach. Carefully positioned log flow deflectors could create deeper areas associated with existing cover to improve adult fish habitat. With progress downstream the flow slows due to the impounding effect of the gauging weir (SJ4657109224); flow deflectors need to be located upstream of this impounded section to be effective in creating bed scour.

The gauging weir is a compound crump design with a centre channel accommodating lower flows (Photo 14). It presents a barrier to fish passage because of the speed of flow over the face of the weir, particularly for species with weaker swimming abilities (such as coarse fish and grayling) and for smaller salmonids. Improving fish passage at this site would strengthen fish populations in the Rea Brook by linking habitats required by different fish life stages and would facilitate recolonization, in the event of a future fish kill (such as a pollution incident). Low-cost baffle fish passes have been successfully deployed at other gauging weir sites and this weir has been put forward for the EA's programme of fish passage improvements on its own assets. Unfortunately, the compound design of the weir presents some difficulties (currently ISO-approved low-cost baffle designs have been developed only for simple crump weirs). In addition, the Rea Brook is not failing its WFD assessment for fish. These factors combined mean other structures are currently taking priority. A recent survey of the weir revealed some structural problems, so it may be that a replacement, fish-friendly flow gauge is installed in future (Chris Bainger and Chris Grzesiok, pers. comm.).

Photo 7 Former weir structure.

Photo 8 Good habitat upstream of the former weir.

Photo 9 Stand of alders affected by disease. These could be coppiced to preserve the root ball within the bank.

Photo 10 Relatively bare RHB. Brushwood revetment and tree planting would benefit the marginal habitat here.

Photo 11 Straightened section where log flow deflectors could be installed.

Photo 12 Area of concern for bank erosion. The scallop in the bank in the foreground (arrow) could be filled with brushwood.

Photo 13 Excellent low cover over / in the water provides numerous lies for fish.

Photo 14 Hook-a-Gate flow gauging weir

3.2 Pontesbury AC section

The section of river from SJ3989007485 upstream to the road bridge between Boycott and Farley (SJ3883407788) was inspected.

The channel here is deeply incised with steep banks as a result of past river engineering works for land drainage purposes. The channel cross-section is a typical engineered trapezoidal shape, with less variation in depth than would be found in an unaltered channel (Photo 15). The plan-form of the river is less meandering than would be expected, indicating it there has been a degree of channel straightening. This contrasts with the reach downstream of the Pontesford Brook confluence, a short distance downstream which retains a meandering plan-form.

Despite the relatively poor underlying physical habitat resulting from past channel engineering, the river has re-established some pool-and-riffle structure and has developed good riparian habitat in the form of trees, bushes and shaggy vegetation (Photo 16). In some areas, such as the lower end of the reach inspected, previously coppiced crack willows (*Salix fragilis*) have re-grown vigorously (Photo 17) and are in need of management. Coppicing, singling and pollarding on a rotational basis would be ideal here. Replacement of some of these trees with other, slower growing native species is an option to reduce the future maintenance burden.

Most of the brook in this section is fenced, either with barbed wire or electric fencing, which has allowed the valuable marginal habitat to develop. Livestock drinking areas are well-defined but could be improved with the installation of some hard standing at the toe of the bank to reduce fine sediment input to the river (Photo 18). A couple of stands of Japanese knotweed (*Fallopia japonica*) are present; this is an invasive, non-native plant which should be eliminated before it spreads (Photo 19). It should not be strimmed or flailed as the individual fragments can propagate. Targeted herbicide use is probably most effective and advice should be sought from the EA regarding the use of herbicide alongside watercourses. A couple of areas were observed where soil or ditch dredgings had been disposed of on the bank close to the river (Photo 20). This risks fine sediment washing into the river and the material would be better spread thinly on the fields.

Some sections of the bank are less steep, where they have slumped and stabilised, creating valuable low shelves alongside the river (Photo 21). Re-

creating these features by deliberately re-profiling the banks would improve the in-stream habitat in this reach (Photo 22). Re-profiling should be targeted on the inside of bends to create an asymmetric cross-sectional profile (see Recommendations).

In the straighter glides, where there is little depth variation, log flow deflectors could be installed to promote bed scour. Where suitable bankside trees are located, these could be hinged and laid into the margins to create cover and refuge areas from high flow; this is not recommended for crack willows which will root and grow vigorously, creating an ongoing maintenance requirement (Photo 23).

Photo 15 Trapezoidal cross-section of the channel due to past land drainage engineering.

Photo 16 Good marginal habitat made possible by the well-maintained fencing along the watercourse. Some re-establishment of a pool-riffle sequence is evident.

Photo 17 Re-growth of previously coppiced crack willow encroaching across the channel. These trees need to be managed and the right bank fenced to improve marginal habitat and resistance to erosion.

Photo 18 Livestock drinking area defined by electric fencing. Some hard standing would lessen the input of fine sediment to the brook.

Photo 19 Japanese knotweed is present in a couple of locations.

Photo 20 Spoil disposed of on the river bank

Photo 21 Lower area of bank

Photo 22 Potential area for bank re-profiling on the inside of the bend. This would provide valuable slower, flowing marginal areas at all flow stages.

Photo 23 Suitable trees could be hinged into the margins to create valuable cover and bed scour.

4.0 Recommendations

- Hinge small trees and branches into the margins of the brook in the areas highlighted (Photo 24).
- Introduce logs and rootwads, keyed into the bank with an excavator (or by hand) to form structures which will promote bed and bank scour, increasing depth variation and promoting meander formation (Photo 26). Figure 1 shows how the angle of introduced structures influences where the scour takes place. The locations of these structures should be on straighter areas of the brook as highlighted above.
- Install brushwood revetments along the toe of banks in the areas highlighted. Trees such as sallows (*Salix cinerea* and *S. caprea*) could be incorporated to improve marginal tree numbers in open areas (Photo 27).
- Re-profile the banks of the brook on the inside of meanders to restore natural flow patterns and promote the formation of gravel point bars and provide slack water marginal refuge areas (Photo 25).

Please note, it is a legal requirement that all the works to the river require written consent from the lead flood authority (Environment Agency or County Council depending on watercourse classification) prior to undertaking any works.

Photo 24 Example of small trees hinged into the margins (like hedge laying).

Photo 25 Bank re-profiling on the inside of a meander. The toe of the bank could be taken even lower than illustrated here, down to normal water level.

Photo 26 Rootwads being keyed into the banks of a small brook, with root plates extending into the channel. Arrow indicates one already in position.

Photo 27 Example of brushwood revetment, installed against the far bank.

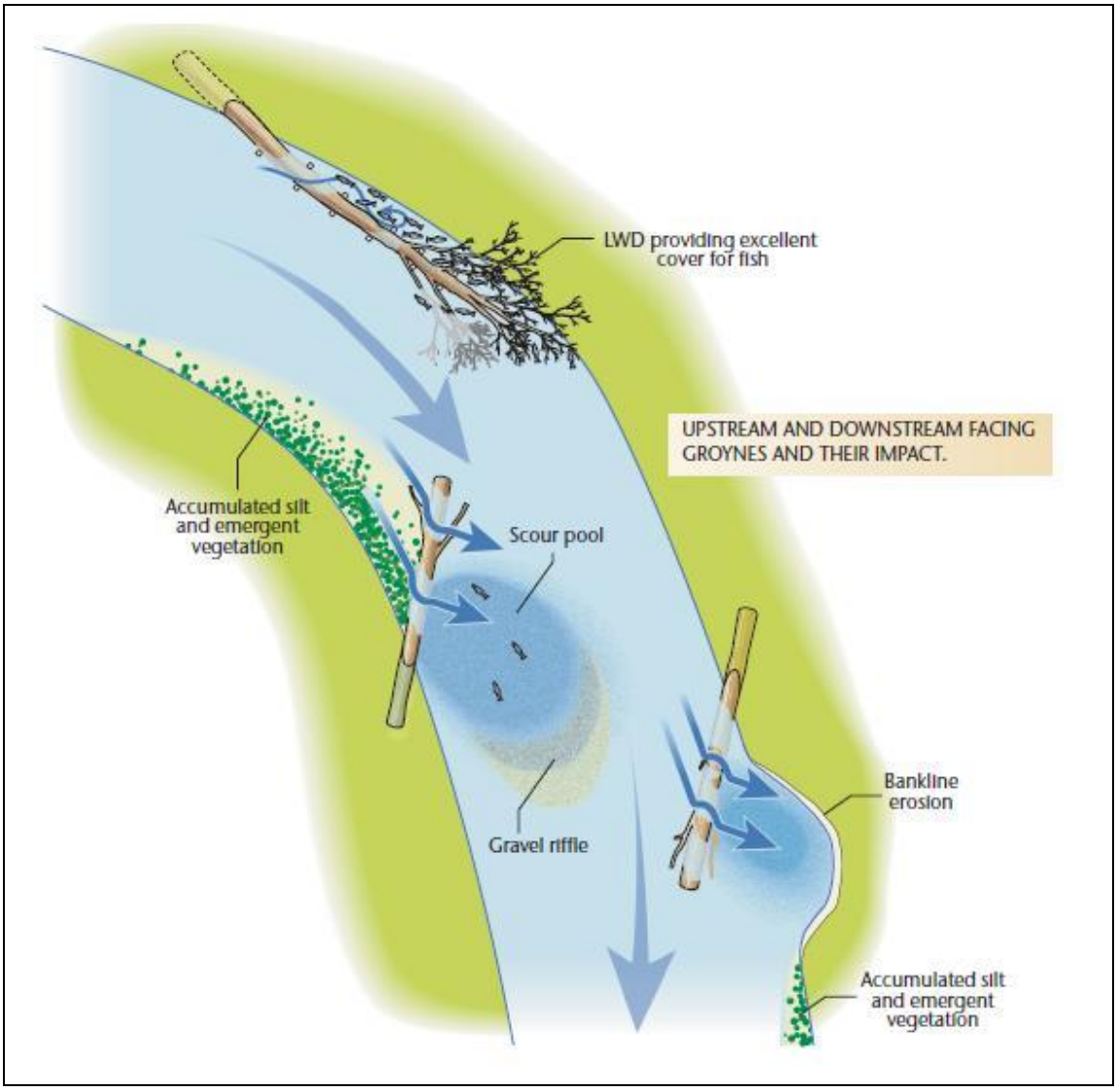

Figure 1 The effects of positioning woody structures upon where scour takes place. Upstream pointing structures (left) scour the river bed, whereas downstream pointing structures scour the bank and can be used to encourage meandering to occur.

With the planned reduction in stocking of trout, the clubs should review their rules regarding exploitation of fish stocks. Currently HAC have a bag limit of 3 trout per visit, which could easily deplete wild trout stocks with cumulative visits. Measures to protect wild trout stocks could include:

- Catch-and-release (www.wildtrout.org/content/wild-trout-fishing#catchandrelease)

- Slot limits, where only trout within a certain size range, such as 10 - 12” may be taken. This protects larger fish which are valuable for spawning and angling.
- Reduced bag limit, including a maximum seasonal allowance per angler. Bear in mind that even a seemingly modest allowance of say 10 fish per angler could equate to the removal of 500 adult fish by 50 members. If that is compared to the number of adult trout found per unit length of river on electric fishing surveys, an indication of the impact upon fish stocks can be estimated.

5.0 Making it Happen

The Wild Trout Trust can provide further assistance in the following ways:

- Preparing more detailed project proposals and help in obtaining Flood Defence Consent
- Providing practical demonstration days for volunteers to teach techniques such as brushwood revetment, tree laying and installing in-stream structures
- On-site supervision and support with activities such as bank re-profiling and woody debris installation.

Please contact Tim Jacklin for further information.

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/index

6.0 Acknowledgement

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7.0 Disclaimer