Hampshire Avon, Countess, Wiltshire

An Advisory Visit by the Wild Trout Trust November 2017

Contents

Key Findings

- The River Avon at Countess is suffering as a result of historic channel modifications. The channel is overly straight, wide and deep in several places and is relatively uniform in cross-section throughout.

- Previous restoration works on the reach have had a mixed success with an enhancement of natural processes resulting in some channel narrowing and enhanced habitat in places. However, these interventions have not necessarily addressed the key issues impacting the reach, which remains deep and slow flowing in many areas, particularly where impounded by structures downstream.

- A significant bed raising project, probably involving the introduction of several hundreds, if not thousands, of tonnes of flint gravel and/or chalk, or the excavation of a new channel bypassing the impacted reach would probably be required to fully restore the lower part of the fishery.

- Despite the substantial cost and resource implications of the scale of works required for restoring the lower reach, ample opportunities exist to further enhance the existing habitat and introduce additional habitat features

- It is possible to improve certain aspects of the existing reach with a long-term goal of being able to undertake a bed raising project that will compliment (rather than negate) this work.

Introduction

	Salisbury and District Angling Club's water at Countess
River	Hampshire Avon
Waterbody Name	Hampshire Avon (Upper) d/s Nine Mile River confl.
Waterbody ID	GB108043022352
Management Catchment	Hampshire Avon
River Basin District	Avon Hampshire
Current Ecological Quality	Moderate (previously Good)
U/S Grid Ref inspected	SU 15449 42981
D/S Grid Ref inspected	SU 15871 42190
Length of river inspected	~1km in total

This report is the output of a visit undertaken by Mike Blackmore of the Wild Trout Trust on approximately 1km of the Hampshire Avon between Snake Bend and Countess roundabout, near Amesbury, Wiltshire (national grid reference (NGR) SU 15449 42981 to SU 15871 42190). A walk-over of the site was requested by Mr John Stoddart, Vice Chairman of the game section of Salisbury and District Angling Club (SADAC) and was accompanied by Mr Stoddart and River Keeper, Paul Clancy. The visit was primarily focussed on assessing habitat for trout (*Salmo trutta*) and biodiversity in general, and also identifying opportunities for habitat enhancement and river restoration.

Comments in this report are based on observations on the day of the site visit and discussions with Mr Stoddart and Mr Clancy as well as SADAC's General Manager Andreas Topintzis and Russell Spencer of the Environment Agency. 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.

Catchment and Fishery Overview

Figure 1: Map showing the location of the water visited

The Hampshire Avon is recognised as one of the most important river habitats in the UK. It supports a diverse range of fish and invertebrates and over 180 different aquatic plant species. The Avon (and its surrounding water meadows) has been designated as a Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC); however, the catchment is not without its problems and much of the Avon and its tributaries have been significantly modified for milling, land drainage, agriculture and fisheries.

The Avon begins its life as two separate streams known as the Avon West and the Avon East, rising near Devizes and the Vale of Pewsey respectively. The Avon West is designated as a SSSI whilst for reasons unknown, the Avon East is not. The two rivers meet at Rushall near Upavon. The Avon then flows south towards Salisbury through Upavon, Netheravon, Bulford and Amesbury, then skirts the western edge of The New Forest, flowing through Ringwood and meets the English Channel at Christchurch.

The geology of the catchment above Amesbury is almost entirely white chalk with occasional formations of greensand and mudstone. The catchment geology creates a relatively stable flow of cold, clear, base-rich water. The SSSI and SAC designations are owed to the diverse range of plant species flourishing in the mineral-rich chalk stream. This diverse aquatic and marginal floral communities support a substantial invertebrate community which in turn supports a healthy wild trout and grayling (*Thymallus thymallus*) population.

The health of the Hampshire Avon has been an important issue for anglers for generations. Frank Sawyer's famous 'Great Clean Up' on the Upper Avon was pivotal in the birth of the river restoration movement. Many of the key organisations involved in river conservation and restoration were formed, either partially or in wholly on the banks of the Avon, and continue to be championed by its anglers. The Wild Trout Trust, Riverfly Partnership, Salmon and Trout Conservation UK, Rivers Trusts and Angling Trust to name but a few.

As a club, SADAC has, over the best part of the last decade, implemented significant changes in its management of the Avon. This has primarily involved a shift of focus away from rigorous bank management and stocking, towards conservation and enhancement of wild stocks through habitat enhancement and river restoration. The ongoing stewardship of the river and its wild fish populations is recognised as being vital to the sustainable future of the club.

The Environment Agency (EA)'s *Strategic Restoration of the River Avon*, otherwise known as the *River Avon Restoration Programme* (RARP) was developed to restore the Hampshire Avon and its tributaries, with a goal of moving towards *more naturally functioning and less constrained rivers that can adjust and respond to changes with minimal intervention.*

Under the strategy, SADAC's Countess water as is listed as **Reach Code A_602** *River Avon south of Durrington* and **Reach Code A_603** *Countess Channel north of Amesbury.* The strategy lists 'Riparian Tree Planting' as the key restoration option for the A_602 and bed raising, re-connection to the floodplain, weir removal and enhancements to flow diversity for A_603. A cost was estimated at approximately £200,000 for this work in 2012.

The Upper Avon was recently reclassified as being in 'Moderate' ecological condition; a downgrade from the previous classification of 'Good' under the European Water Framework Directive. This is due to elevated levels of phosphate originating from sewage treatment works and diffuse sources from agriculture. There is also a degree of natural mineralisation of phosphate occurring in the catchment, making the river particularly sensitive to additional (artificial) inputs.

Table 1: Water Framework Directive information for the water visited

	2013 Cycle 2	2015 Cycle 2	Objectives
Overall Water Body	Good	Moderate	Good by 2021
Ecological	Good	Moderate	Good by 2021
Biological quality elements	Good	Good	Good by 2015
Hydromorphological Supporting Elements	Supports good	Supports good	Supports good by 2015
Physico-chemical quality elements	Good	Moderate	Good by 2021
Ammonia (Phys-Chem)	High	High	High by 2015
Dissolved oxygen	High	High	High by 2015
pH	High	High	Good by 2015
Phosphate	Good	Moderate	Good by 2021
Temperature	High	High	Good by 2015
Specific pollutants	High	-	Not Assessed by 2015
Supporting elements (Surface Water)	-	-	Not Assessed by 2015
Chemical	Good	Good	Good by 2015

Note: Anything classified as less than 'good' is failing quality targets

Habitat Assessment

For the purposes of this report, the water visited will be described from the upstream to the downstream extents of the visit.

At the upstream extent of the water visited, SADAC shares a half-water with the Snake Bend fishing syndicate. The river is relatively uniform in width but there are several opportunities to introduce some flow-deflecting habitat features that would significantly improve habitat diversity and potentially create some new feeding lies which would provide good sport for anglers. Hinging bankside willow limbs into the river and securing with wooden (ideally untreated sweet-chestnut) stakes will provide excellent cover habitat as well as pockets of slack water alongside runs of faster flow – ideal conditions for trout to hold up and snap up passing prey (Figure 2).

Figure 2: An illustration showing where a bankside willow could be hinged and secured

In addition, the accelerated flow will exert localised scour on the riverbed, flushing away fine sediment and depositing it in the lee of the deflector, diversifying habitat on the bed. In order to obtain the maximum benefit from flow deflection, structures should be positioned protruding from both banks in an alternating pattern. This will create a meandering pattern of scour and deposition that over time will help re-structure the river, creating a helping to diversidy the cross-sectional depth profile and provide more resilience to low flows. Achieving this will require the co-operation of the Snake Bend syndicate and may also require the introduction of flow deflectors where bankside trees are not ideally situated or aligned for hinging. Fortunately, there are plenty of trees situated back from the path along the RB. A few small trees or large limbs should could be won and simply secured into the river margin to function as deflectors (see example Figure 3).

Figure 3: An example of a felled (not hinged) alder secured into the River Test near Whitchurch, Hampshire.

Ideally, hinges and deflectors should be kept as naturalistic as possible, mimicking the type of habitat created when a tree/limb naturally falls into the river. However, depending on the location and angler access requirements, it may be necessary to trim down branches and create simpler, more 'engineered' features. When considering such options it is important to consider the alignment of the structure. Natural, branched trees and limbs, as with hinges, should be positioned with the butt end upstream and the branches downstream. This is the orientation that naturally fallen woody debris will align in most cases. This alignment will also help prevent the structure being torn away from the bank by passing debris during spate flows. Simple, straight log deflectors should be positioned protruding out from the bank at approximately 45 degrees upstream. Water flowing over a log will be deflected by approximately 90 degrees to the long axis of the log. This is counter-intuitive at first sight. Consequently, positioning them in an upstream alignment ensures that flow is deflected across the channel and not into the bank where it could accelerate erosion. Log deflectors should be keyed into the bank and also slope down from the bank towards bed. This ensures that at least part of the log will be over-topped by flowing water over a wide range of flow conditions (Figure 4).

Figure 4: An example of a log deflector facing upstream and keyed in and sloping down from the bank towards the bed.

Towards the downstream extent of the water shared with Snake Bend, next to the southernmost of the fishing lakes, some extremely insensitive bank clearance has almost completely denuded all marginal habitat from the LB (Figure 5). Some engagement with the land owner is advised before implementing further habitat improvements at this location.

Figure 5: This extremely insensitive bank clearance work is detrimental to river ecology and is unlikely to have been consented.

A short distance downstream, alongside the sewage treatment works (STW), the river becomes generally deeper and flows become slower and more laminar. Tree cover on the LB is initially dense and consists mostly of shrubby goat willows (*Salix caprea*). Hinging occasional clusters of branches (as opposed to single, large limbs) into the river would introduce some much needed diversity and flow deflection (Figure 6). Doing so will also help break up the canopy which is currently at a relatively uniform height and density and casts uniform shade over the river margin.

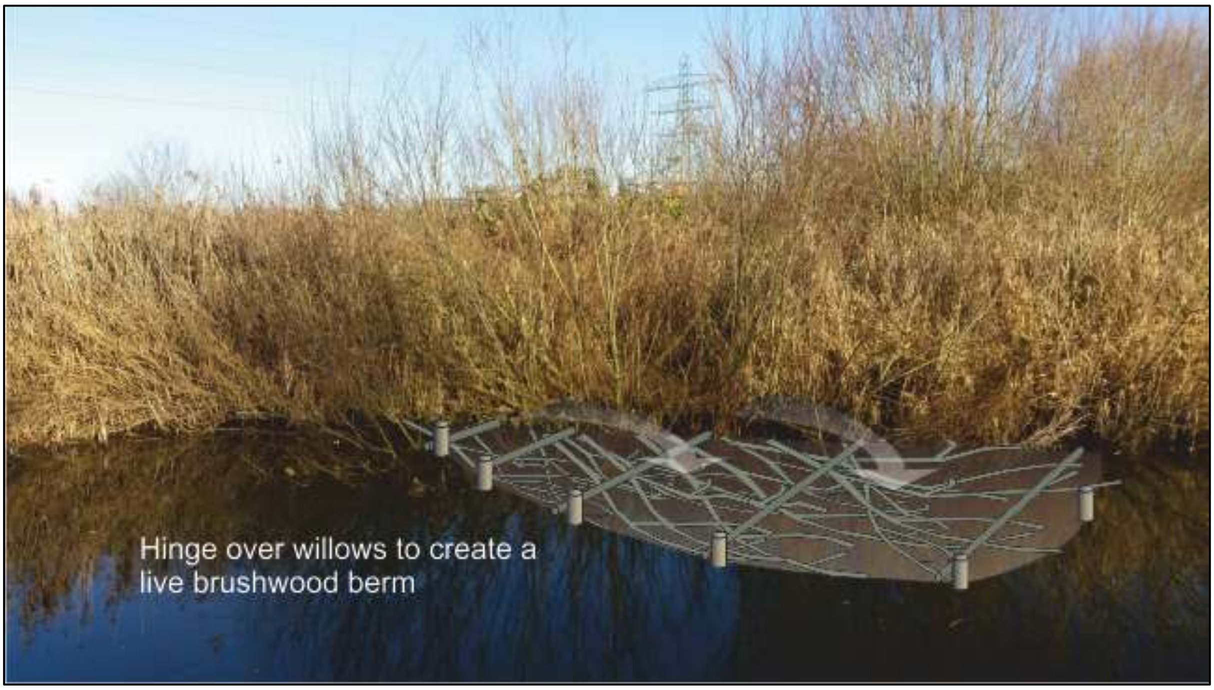

Figure 6: An illustration showing how clusters of branches could be hinged and secured to create a living brushwood berm

Downstream of the goat willows the LB is then dominated by common reed (*Phragmites australis*). Reed beds such as this provide important bird and mammal habitat but can become a monoculture. If necessary, planting a few willows by clearing a few small sections of the reed and driving willows whips (cut from nearby) into the bank during late autumn to early spring (when the willow is dormant) should provide some dappled shade that will limit reed growth in patches, providing opportunities for other marginal species to establish.

The RB along this reach is steep, almost vertical in places (Figure 7). Fortunately there is ample space and access on the upper bank for some bank re-grading works. Creating a new bank toe from logs or brushwood and then grading the bank down to the toe with an excavator will better connect the river with its floodplain, provide a transitional habitat for a succession of marginal plants and also create some low-level angler access. Such works would also be an opportunity to slightly narrow the channel and create a more sinuous bank edge, diversifying flow patterns and boosting biodiversity (Figures 8 and 9).

Figure 7: The right-hand bank is steep, almost vertical in places

Figure 8: A new bank edge is constructed from site-won woody material on the River Dever, Hampshire.

Figure 9: The same site with the bank re-graded to narrow the river, create additional marginal habitat and improve angler access.

As the river bends to the right downstream of the STW, tree cover on the LB becomes sparse whilst a small copse of goat willows dominates the RB. A cursory inspection of the willows identified where limbs had been previously hinged and secured (Figure 10). This was undertaken as part of the Demonstrating Strategic Restoration And Management (STREAM) project (2008) in which the large woody debris (LWD) was also installed downstream towards the A303 along with some bank re-grading below the bridge and some localised bed raising with imported gravel.

The bank around the hinged willow consists of consolidated fine sediment trapped by the hinged limbs over time. The willow limbs were initially hinged into the river margin. This increased friction and the rate of deposition, resulting in a soft berm on the inside of the bend, accentuating the meander and narrowing the river. This is an excellent example of a simple management practice working with natural processes to instate change over time. As new shoots growing from the hinged limbs have now grown tall, there is an opportunity to pinch the river yet further by cutting additional hinges and again laying them down into the wet margin.

Figure 10: Hinged willows were initially laid into the river. The resulting deposition means they are now on solid bank

As these willows were cut at approximately the same time, the resulting re-growth has formed a thicket of uniform canopy height and density, casting uniform shade over the river margin (Figure 11). Undertaking some selective coppicing will diversify light conditions, benefitting biodiversity and also giving rise to live willow brushwood that could be used to create some live willow berms. Strategically placed, these berms could help to pinch the river, deflect flows and provide additional marginal habitat. The river is relatively shallow at this location (compared to much of the water visited) and was probably the site of the bed raising element of the project (Figure 12). Some additional flow deflection could help clean and sort what gravel is available, improving it as a spawning site for flow loving fish such as brook lamprey (*Lampetra planeri*), chub (*Squalius cephalus*) and dace (*Leuciscus leuciscus*) and possibly providing clean enough gravel to provide some spawning habitat for salmonids.

Figure 11: Willows growing to uniform height and density. Selective tree works will diversify habitat and provide material for habitat enhancements elsewhere.

Figure 12: A section of shallower water is probably the site of bed raising works undertaken as part of the STREAM project.

Downstream the river becomes straight, uniformly wide and very deep as it flows toward the A303 bridge. There is also a paucity of bankside tree cover. As part of the STREAM project, LWD flow deflectors were introduced alternating along the banks. This part of the project has had some limited success in proving cover and marginal habitat (where fine sediment has deposited in the lee of the structures and promoted emergent vegetation). However, the rate of deposition has not been sufficient to consolidate into a firm bank and as such the river margins are inaccessible to anglers and flows remain sluggish and laminar (Figure 13). Recent electrofishing surveys (Pers. Comm. Russell Spencer, Avon Catchment Co-ordinator) seem to confirm angler accounts (Pers. Comm. John Stoddart and Paul Clancy) that the reach is lacking in juvenile and small wild trout and is dominated by a small number of large (probably stocked) trout which are probably making use of the deep water and cover to prey on smaller fish.

Figure 13: LWD has increased the rate of deposition but this has not been sufficient to consolidate new banks. As a result the river is difficult to access for anglers and remains straight and wide.

The river is deep and slow at this location because it is impounded by weirs at Bowles Hatches on the outskirts of Amesbury and has also probably been dredged in the past. Maps dating as far back as 1870 show the river upstream of the A303 was already straightened before the road was created. However, before the A303 was constructed the river used to meander sharply to the right at the approximate location of the bridge, then bend left and right again before Lord's Walk. In the 1970s when the A303 was built, a short section of the river was moved into the gentle right-hand bend now situated downstream of the bridge. This did not necessarily shorten the river but did remove some bends that would have probably provided some diversity of flow and depth conditions. The existence of the A303 also limits the number of options available for restoring the river. The fact that the river must flow under the road at the specific location of the bridge (Figure 14) and exerting minimal erosive force, could make the option of excavating a new, shallower and more sinuous channel unfeasible.

Figure 14: The Avon flows under the A303 towards Lord's Walk and Amesbury.

It is likely that the only practicable means of restoring habitat diversity to this reach is via a programme of bed raising and/or via the removal of the impoundments at Bowles Hatches. These actions are potentially very expensive and could require five or six figure budgets. The STREAM project was almost-certainly undertaken with an aim of mitigating against the symptoms of the impoundment and straightening and did not have the budget or scope to address these issues directly.

Despite the cost implications of large-scale bed raising and the limited success of the LWD installations, there remains ample scope to improve the river with more affordable interventions. Lessons learned from the project highlight how coarse woody features can consolidate fine sediment and create solid banks over time. The LWD features have increased the rate of deposition in their lees but this has not been sufficient for the river to develop a more meandering planform.

Applying the principles observed upstream at the hinged willows, to the deeper reach downstream, a project involving the introduction of additional LWD (whole tree sized pieces) installed around the existing features could increase the rate of deposition and consolidate the fine sediment. If a great enough effect can be achieved, this should create berms that over time will become solid enough to walk on, improving angler access and increasing channel sinuosity (Figures 15 and 16). Of course, this alone will not address the problems associated with the uniformly deep water, but it will provide a more natural channel form which will mean that rather than a wholesale bed raising requiring thousands of tonnes of aggregate, short sections of bed raising could be undertaken to compliment the more sinuous channel. Reducing the amount of required bed raising to two or three glides could also allow for other additional works (such as bank re-grading) to be included in a capital project (Figure 17).

In natural (un-dredged, un-impounded and un-straightened) river systems, a sequence of pools, glides and riffles normally forms in correlation with the frequency at which the river meanders. Bed material is scoured out from the outside of bends and larger gravels deposited at the tail of the pool in the section before the next meander. Finer material is generally deposited on the inside of the next bend (hence the rapid deposition on the bend with the hinged willows). Helping the river to develop a more sinuous path above the A303 should give rise to obvious locations where short sections of bed can be raised that require significantly less material than a wholesale raising. This would essentially result in a sequence of shallow glides and deep pools and should provide a wider range of habitat niches for fish of different year classes and different species of invertebrates.

The woody component of these works should be affordable and practicable for a club with the resources of SADAC (perhaps with hiring in some additional large plant machinery) and will create an opportunity for the EA or Natural England to improve a long section of SSSI, SAC chalkstream at a more affordable project cost. With designs and mitigation measures being planned and discussed for the proposed A303 Stonehenge tunnel, it is quite possible that funding required to raise at least some sections of the bed may become available in the next few years. Acting to increase channel sinuosity in the short term could significantly increase the chances of a targeted bed raising project happening in the near future.

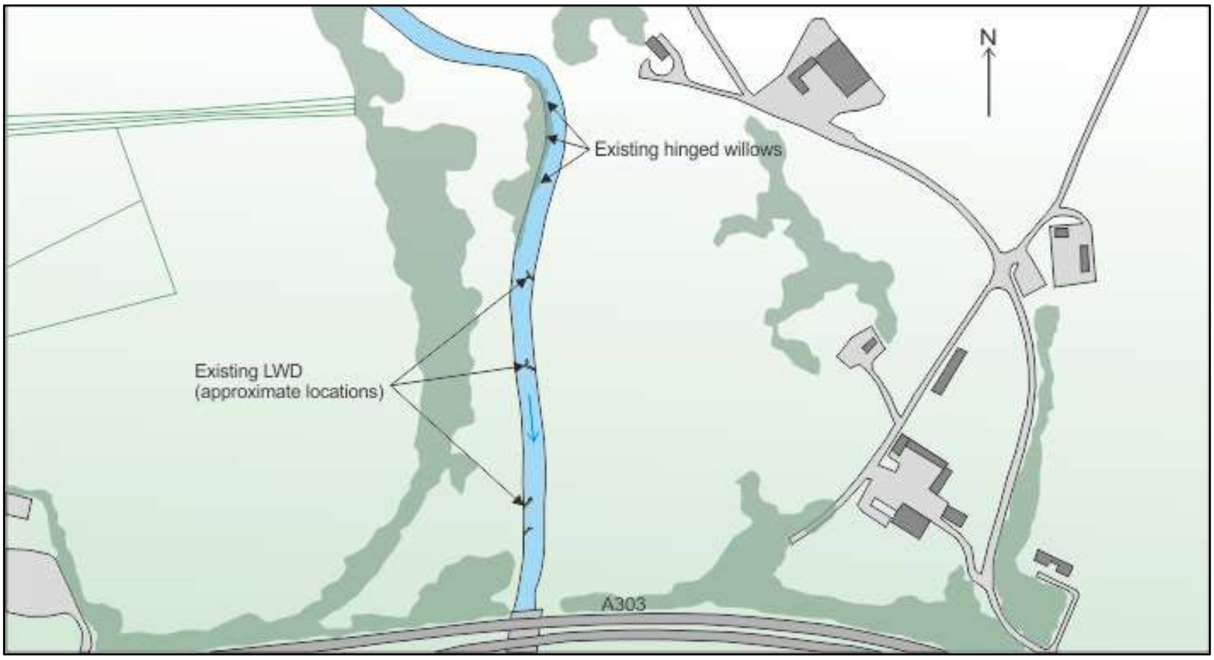

Figure 15: An illustration showing the locations of structures installed as part of the STREAM project

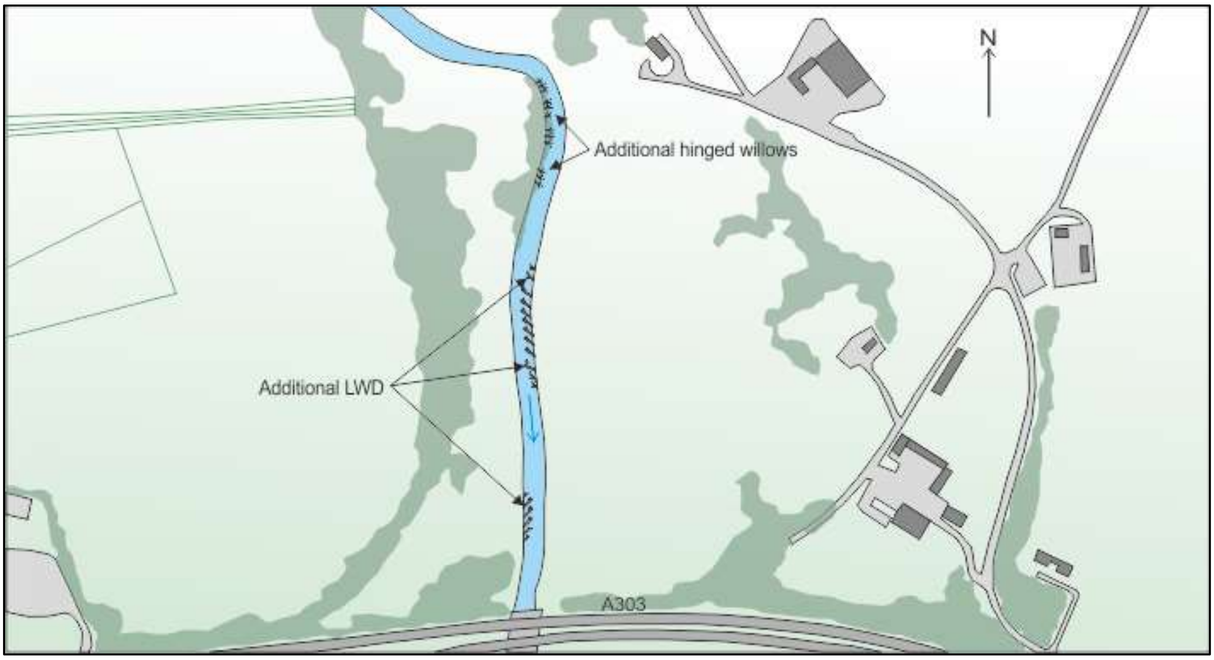

Figure 16: An illustration proposing the introduction of additional woody material building on the morphological changes started by the STREAM project

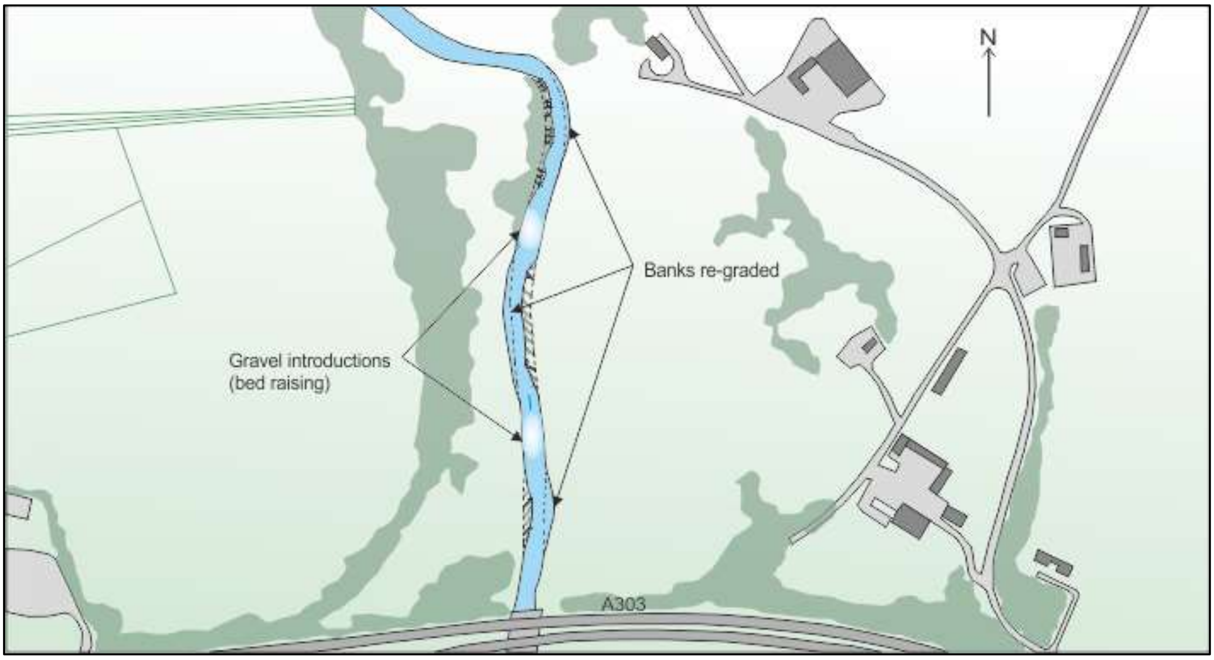

Figure 17: An illustration proposing possible 'phase 2' works (bed raising and bank re-grading) following consolidation of the berms and once funds become available

Once the river has achieved (or been given) a more sinuous plan form and received some degree of bed raising, the final step would be to plant trees along both banks to compliment the changes. Increasing shade over deep pools whilst retaining direct sunlight over shallow glides and gentle banks will provide good cover and thermal refuge for fish whilst also maintaining productivity and diversity of aquatic and marginal plants.

Recommendations:

In order for the River Avon at Countess to achieve its full potential for biodiversity and as a good quality habitat, capable of supporting healthy, self-sustaining populations of wild brown trout, the following actions are recommended:

1. Engage with the Snake Bend syndicate and the land owner at the upstream extent of the fishery and plan a project involving the introduction of naturalistic, flow-deflecting woody habitat features. Also discuss more sensitive approaches to bank management.

2. Identify and capitalise on other opportunities for habitat enhancement such as hinging stands of live willow into the river.

3. Consider re-grading sections of bank to provide low, bankside angler access, and opportunities for a succession of different marginal plant species to establish and thrive. NB – Surveys and appropriate mitigation measures for water vole (*Arvicola amphibius*) will almost certainly be required.

4. Build on the work undertaken as part of the STREAM project, introducing additional woody material to speed up the rate of deposition and consolidate berms into new riverbank.

5. Continue to foster good relationships with Natural England and the Environment Agency keeping in mind that funding for more expensive restoration techniques (bed raising etc.) may become available in the medium term.

Making It Happen

The creation of any structures within most 'Main Rivers' or within 8m of the channel boundary (which may be the top of the flood-plain in some cases) normally require a formal permit from the Environment Agency. This enables the EA to assess possible flood risk, and also any possible ecological impacts. Lower flood risk watercourses are designated as 'Ordinary Watercourses', in which case the body responsible for issuing consent will be the Local Authority. Contacting the EA early and informally discussing any proposed works is recommended as a means of identifying the relevant authority and efficiently processing an application. The Wild Trout Trust is able to provide support and advice to help with this process.

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

http://www.wildtrout.org/content/index

The Wild Trout Trust has also 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.

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.