Little Avon, Charfield, South Gloucestershire

An Advisory Visit by the Wild Trout Trust February 2016

Contents

1. Introduction

This report is the output of a visit undertaken by Mike Blackmore and Luke Kozak on behalf of the Wild Trout Trust on approximately 2.5 miles of the Little River Avon (from ST 70584 94349 to ST 7220893156) and its tributary the Ozleworth Brook (from ST 72474 93064 to ST 73448 93108) near Charfield, Gloucestershire. A walk-over of the site was requested by Billy Dickson and Jon Ogborne of Charfield Angling Association (CAA). The visit was primarily focussed on assessing habitat for wild trout (*Salmo trutta*) and biodiversity in general.

Comments in this report are based on observations on the day of the site visit. 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.

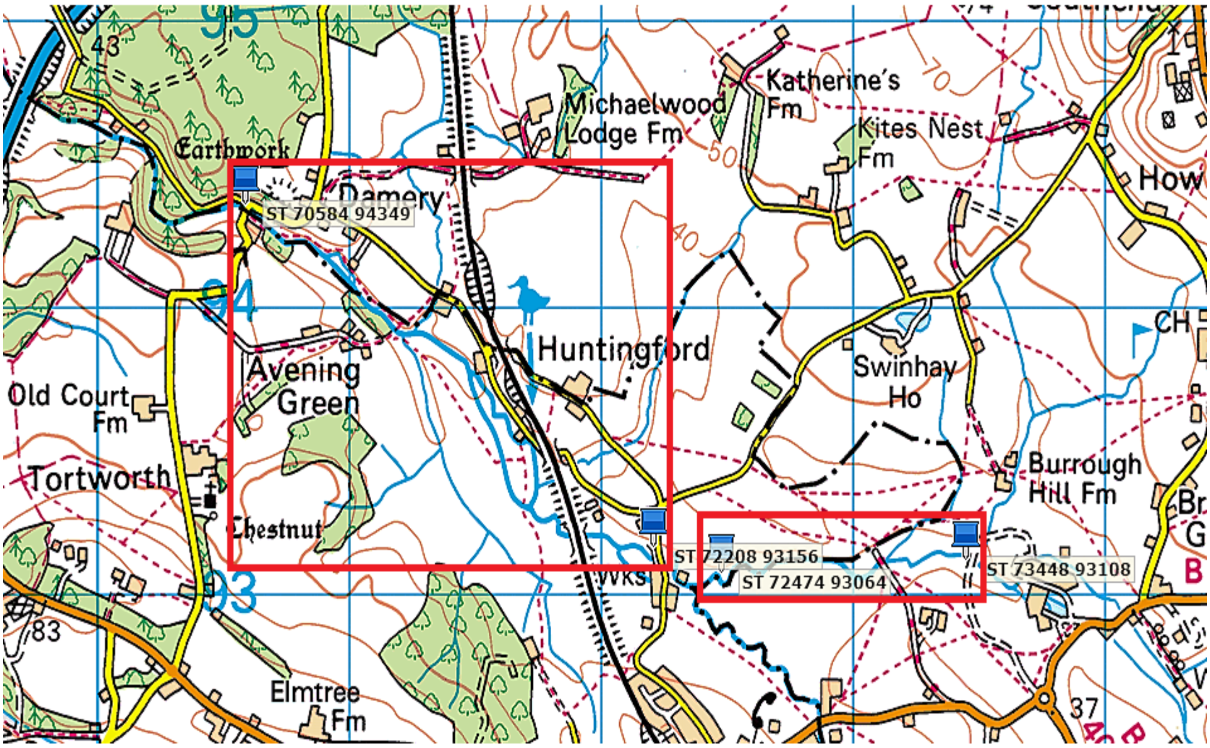

Figure 1: Map showing the location of the water visited

2. Catchment and Fishery Overview

The Little Avon rises just beyond the village of Horton, Gloucestershire and flows in a roughly north-westerly direction for 15km through the villages of Wickwar, Charfield and Huntingford before entering the River Severn at Berkeley. The main underlying geology is made up of Mercia mudstone, siltstone and sandstone. Higher in the catchment a large proportion of the spring fed flow comes from the western edge of the Cotswolds and rises from limestone geology, and as such the river is classed as calcareous or 'lime rich' in nature. The river bed is largely made up of a mixture of limestone gravels, clay and marl with occasional silt deposits. The planform is largely meandering and as such, many bends in the river show good entrainment of gravels and silt from alluvial deposits.

The river has an appreciable gradient throughout the survey reach and a characteristic pool, riffle, glide morphology which lends itself very well to salmonid species. This good morphology is, unfortunately, interrupted by several weirs, a few of which are redundant and have been partially removed, leaving the base stones but allowing some fish passage over the top (see photo 1.) The other intact weirs are severely limiting fish passage and the river's ability to distribute gravels, and sediment. The negative effect of these impoundments will be discussed in finer detail later in the report.

Photo 1: Remains of defunct weir on beat 1; note the base stones are intact allowing fish passage over the top

Brown trout (*Salmo trutta)* and grayling (*Thymallus thymallus)* are the dominant fish species on the CAA fishery, although members report populations of dace (*Leuciscus leuciscus)*, chub (*Leuciscus cephalus)* and roach (*Rutilus rutilus).*

The water framework directive (WFD) information (see table 1) suggests that overall biological quality is 'moderate' with the river failing on several ecological and biological quality elements; of note are high phosphate levels, suggesting input of sewage and septic tank effluent and/or sediment from local agriculture. Moderate scores for fish and aquatic plant life suggest that there are some negative physical and chemical issues to be addressed on the river in the long term. The hydromorphological elements are scored as moderate and are likely to be failing because of historic channel modification i.e. channel straightening and impoundment from the milling industry, which interrupt natural fluvial processes. More encouragingly, invertebrate scores are high, generally indicating good overall water quality and invertebrate habitat.

Table 1: WFD information for the Little Avon River visited

	2009 Cycle 1	2014 Cycle 2	Objectives
Overall Water Body	Moderate	Moderate	(Cycle 2) moderate
Ecological	Moderate	Moderate	(Cycle 2) moderate
Biological quality elements	Moderate	Moderate	(Cycle 2) high
Fish	Moderate	-	-
Invertebrates	High	High	(Cycle 2) high
Macrophytes and Phytobenthos Combined	-	Moderate	-
Hydromorphological Supporting Elements	Not-high	Not-high	(Cycle 2) not high
Physico-chemical quality elements	Moderate	Moderate	(Cycle 2) moderate
Ammonia (Phys-Chem)	High	High	(Cycle 2) high
Dissolved oxygen	High	High	(Cycle 2) high
pH	High	High	(Cycle 2) high
Phosphate	Moderate	Poor	(Cycle 2) moderate
Temperature	High	High	(Cycle 2) high
Specific pollutants	High	-	(Cycle 2) not assessed
Chemical	Does-not-require-assessment	Good	(Cycle 2) good

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

Although limited to certain stretches, there is some woody debris present in the channel over the survey reach (see photo 2.). Woody debris is a naturally occurring component in most rivers. Bank side trees, limbs or branches that fall or are washed into the river play an important role in natural river processes, sorting and scouring gravels, and creating backwaters immediately downstream. The habitat complexity provided by woody debris supports a range of invertebrate prey items for juvenile salmonids. The freshwater shrimp (*Gammarus pulex*) thrives in slower flowing conditions, feeding on rotting organic waste in slack areas of water. The larvae of invertebrates such as Mayfly (*Ephemera danica*) prefer to burrow into the sandy sediment of depositional zones created by large woody debris (LWD). The juveniles of brown trout and grayling often exploit the relative safety and cover of backwaters created by woody debris by darting in and out of the main flow, to feed on microscopic prey items.

The increased velocity of water over, around and underneath LWD often has the effect of throwing gravel into loose piles directly downstream, which brown trout may find suitable as spawning substrate. During spates, brown trout will often use large logs or branches as a 'baffle' protecting them from high flows. Large tree trunks or submerged branches can also be beneficial refuge during drought conditions providing overhead cover from predators such as otters (*Lutra lutra*) and herons (*Ardea cinerea*) when water levels are low.

Photo 2: An example of naturally occurring LWD on the lower beat

3. Habitat Assessment

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

Much of the Charfield Angling Associations (CAA) fishery runs through land owned by the Tortworth estate and comprises of pasture and arable fields. The upper catchment and watershed of both the Little River Avon and the Ozleworth brook is relatively steep and drains from the western edge of the Cotswold plateau and, as such, the river shows spate characteristics with flooding commonplace during the winter months. The banks are incised in several areas indicating powerful erosive forces are at work during flood events. Several bank slips caused by erosive winter flows and flood debris caught in the lower branches of bank side trees confirm this.

The upper fishery on the Ozleworth brook (beat 6) starts at the new bridge near the Renishaw factory and flows down towards the first of the historic weirs on the survey reach. The spraints of both of otter (*Lutra lutra*) the UK's largest freshwater mammal and the invasive American Mink (*Neovison vison*) were observed at the top of beat six on top of a concrete block next to the bank. Although the spraints were photographed next to each other, these animals rarely tolerate each other with the otter dominant over the mink. The presence of an apex predator like an otter on the fishery is encouraging and suggests a healthy and diverse ecosystem.

Photo 3: otter spraint on the Ozleworth brook

The cross sectional channel profile above the weir is trapezoidal (symmetrical, wide and deep with steeply sloping, near vertical sides.) Marginal vegetation is limited and emergent plants such as sedges and rushes struggle to gain a foothold. As is typical of many artificially modified channels, the lack of a sloping transitional zone between the river bed and the bank means that there is no substrate for marginal plants to root into. Marginal zones are an important interface between the river channel and the bank and provide shelter for a whole range of aquatic invertebrates, fish and mammals.

A diverse marginal zone and a varied assemblage of bankside plants are particularly important habitat components for watervoles (*Arvicola amphibius)*. The burrows of watervoles were observed during the survey and marginal vegetation adjacent to burrows was characteristically nibbled at 45 degrees. CAA report some sightings but numbers are thought to be low at present. This could be a combination of a lack of habitable marginal zones and food sources and an abundance of large predators such as mink. Watervoles are highly protected and are a priority species in the UK Biodiversity Action Plan (BAP). They are unfortunately Britain's fastest declining mammal due to habitat loss and predation, largely from the invasive American mink.

A dense marginal zone that comprises of a mixture of emergent and terrestrial plants also has a number of important habitat benefits for invertebrates. Several species of caddis flies (*Trichoptera)* use the stems of emergent plants to crawl out of the river, gripping the stems and crawling up them towards the surface to break through the surface tension in order to rest and become airborne before mating begins.

The flow conditions above the weir are slow and sluggish and the surface of the water is laminar or 'flat' with no apparent complexity in flow types. The lack of gravel riffles (raised areas of loose gravel accumulation) and the largely uniform depth continue until the influence of the impoundment is lost some 100m upstream. The impounding effect means that sediment drops out of suspension upstream of the weir, smothering and compacting the natural gravel bed by filling in the interstices between individual stones, limiting habitat availability and discouraging oxygenation, crucial for the larval or nymphal stage of mayflies *(Ephemeroptera),* caddisflies *(Trichoptera)* and stoneflies *(Plecoptera).* The homogenous, canal-like conditions are a clear indication of the negative effect that the impoundment is having on the rivers habitat.

The weir is constructed of concrete with stone block sides. A number of wooden sleepers act as boards that maintain the river level upstream. The river spills several feet over the top of the sleepers on to a solid apron (most likely to be blocks of stone or concrete) and drops a further foot on to the river bed below. It is likely to have been constructed for use by the woollen milling industry in the early 1800's. The weir currently serves no useful purpose and unfortunately, because of its height (some 4ft), allows no fish passage upstream. Several pipes can be seen to the side of the weir on the LB and these appear to allow overflow into the pool below when the river is in flood. It is possible that with careful planning and some investigation, this impoundment could be removed and made passable for fish and these options will be discussed in the recommendations section (4).

Photo 4: Weir on beat 6 (Ozleworth Brook); note deep slow, sluggish conditions above. The weir's height makes it completely impassable to fish.

The river flows into a weir pool downstream where immediately the natural gradient and meandering planform resumes. A range of favourable habitats comprised of gravel shoals, gently sloping sides and complex flow patterns, along with several windblown alder trees (naturally occurring LWD) in the backwater of the weir pool, create favourable habitat for salmonids and invertebrates. The deeper sections of the pool provide good cover for adult brown trout, although shading is dense around the pool itself suggesting that some structured coppicing of trees and a variation in canopy height would be beneficial allowing some light penetration to the pool.

Figure 2 and 3 show the effect of weirs on geomorphology and habitat.

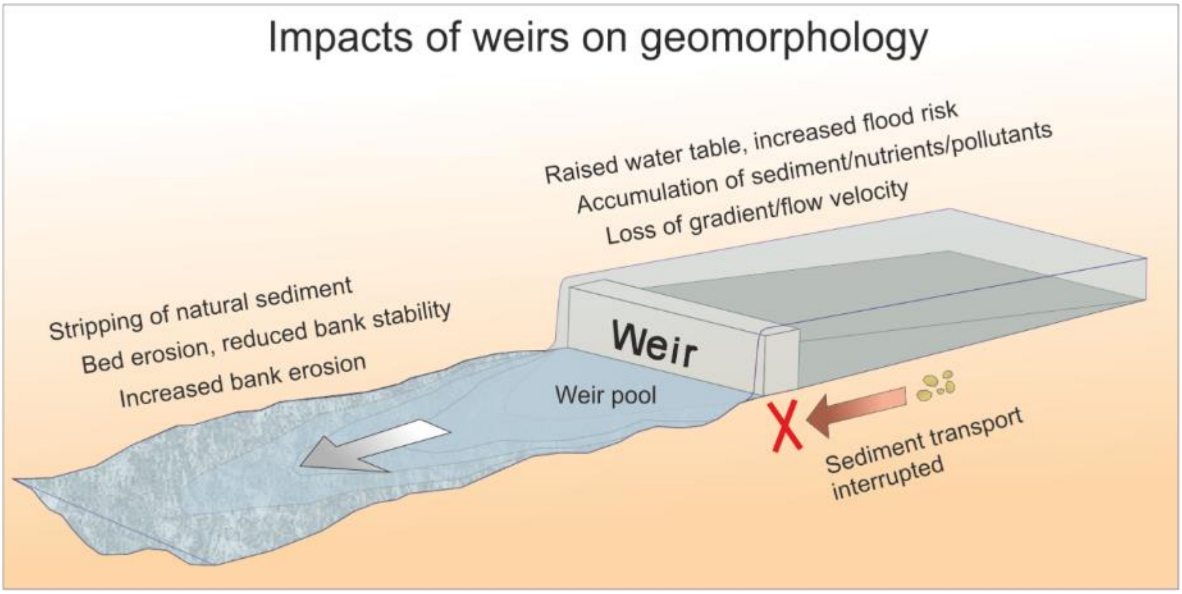

Fig 2 & 3: Illustrations of the impacts of weirs on geomorphology (above) and habitat (below)

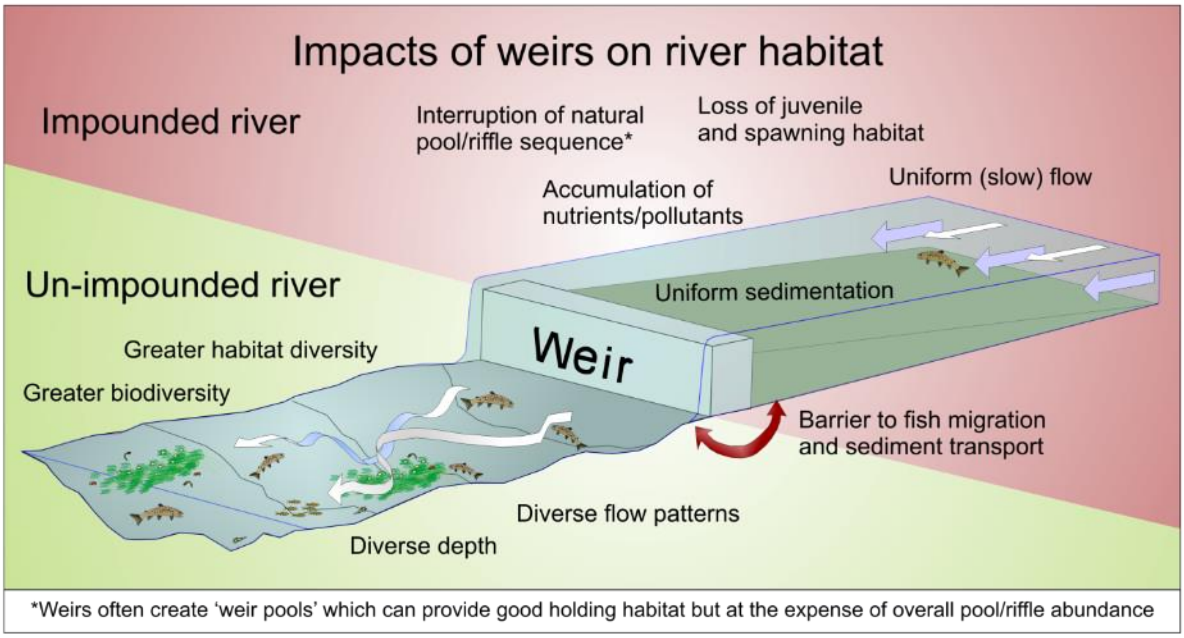

Photo 5: Beat 6 weir pool on Ozleworth Brook: Note the naturally fallen tree providing excellent fish refuge in the foreground

From Lower Barnes Bridge down to the confluence of with the Little River Avon, the channel has a largely meandering profile showing many characteristics of the classic pool, riffle and glide habitat that is suitable for brown trout. The middle of beat 5 appears to be unnaturally straight for several hundred metres or so, suggesting some historic modification. However, although modified at some point in the past, the river has partially recovered, largely due to the protruding root systems of bankside alder trees. These root systems not only protect the banks from erosion, they act as 'living flow deflectors', creating complex and localised flow patterns by loosening gravel in the central part of the channel, and leaving slower 'backwater' areas and depositional zones immediately downstream (see photo 6.). The dense root systems of alder and willow trees also provide submerged cover for fish and a range of invertebrate species.

Whilst bankside trees are useful in terms of instream habitat and bank protection against erosion, the effect of a continuous overhead tree canopy or 'tunnelling' can block out much of the available light, limiting the development of marginal and submerged plant communities. Many plants, particularly water crowfoot *(Ranunculus sp.)* rely on good light availability and water velocity in order to survive. Therefore, a structured coppicing regime that improves light penetration to the channel in some of the most heavily shaded areas is recommended.

Photo 6: Large alder root system affecting flow pattern midstream; note the slower depositional zone immediately downstream

At the top of beat 4 the Little River Avon divides into two channels just above New Street road bridge creating an island. The CAA fishes the northernmost channel and as the stream passes the island, a sewage treatment works (STW) is situated on the RB. (STW's will be discussed in the recommendation section.)

Beat 3 starts at the railway bridge and runs along an arable field through a tight meander loop reaching a sharp bend in the river. The channel divides as it meets another large partially intact impoundment, originally used to send water down a side channel to Huntingford Mill. Large concrete sides remain and a low level block and concrete base span the entire channel allowing several inches of water over the top. The remaining block base allows fish passage during winter flows, but low summer water levels may impede fish moving up or downstream. Options for improving fish passage on this structure will be discussed in the recommendation section.

A mid channel island has formed below the weir splitting the channel in two and creating an important backwater area on the RB suitable for juvenile brown trout. The channel running along the LB has good velocity and a relatively shallow depth as it leaves the weir pool which contains a mixture of well sorted gravels that may provide favourable spawning habitat for adult brown trout.

Photo 7: Remains of old structure on beat 3; note the back water area(left) and clean well sorted gravels (right)

As the river flows underneath an aluminium bridge and into a sharp bend on the LB, the entrainment of alluvial gravels from the outside bend has created several gravel bars. The undulating bed in this area affects the channel roughness, forming a series of complex flow patterns. A stand of alders has been partially eroded leaving a backwater area with excellent overhead tree cover and an under-scoured root ball. This particular area is a good example of mesohabitat (pool, riffle, glide) that increases the physical heterogeneity of the river channel making it suitable for a range of fish and invertebrate species.

Photo 8: Bend below aluminium bridge; note the backwater area with overhanging cover and rootball (left) and clean well sorted gravels and complex flow patterns (foreground)

Downstream from the aluminium bridge the river flows under a recently replaced concrete bridge. The original bridge and part of the RB was lost during spate conditions and the bank has been repaired with large limestone blocks to prevent erosion. The limestone blocks have been stacked vertically and although the gaps between the stones offer some habitat availability for plants and terrestrial mammals, the habitat for fish and invertebrates is limited. The vertical face of the large stones provides little opportunity for a marginal zone to form. Opportunities for enhancement will be discussed in the recommendation section.


Photo 9: Limestone block repair; the sheer vertical face presents problems for marginal and emergent plants to colonise.

Beat 2 starts from the concrete bridge where the overall habitat improves significantly without the influence of any impoundment for some 500m. The channel is significantly narrower and as such the velocity increases creating excellent pool, riffle and glide sequences. There are a number of opportunities to pin or fix LWD that has already fallen into the channel along this reach.

Photo 10: LWD has fallen naturally into the channel; this presents an ideal opportunity for pinning into the river bed along the RB (top of picture)

Half way along beat 2 the river reaches a sharp bend and meets a muddy track leading over a small stone bridge. A small feeder stream flows through plastic pipes underneath the stone bridge, entering the main channel at the bend. During the survey a large pile of manure was observed in close proximity to river bank and track. This is an example of bad farming practice. The dumping of manure close to a feeder stream and track has the potential to introduce ammonia to the water–course, which is directly toxic to fish, invertebrates and many other species. There is also a risk of sediment entering the channel from the track and this should be addressed in the short-term.

It is recommended that the club discusses this issue with the land owner. Moving manure well away from the river banks would reduce the risk of enrichment from manure and sedimentation from the track. Leaving a wider buffer strip around the feeder stream and main channel would reduce the probability of sediment loading and enrichment during wet periods. There is potential to build a vegetated catch pit at the feeder stream outlet at this point to reduce sediment loading. Appropriate design and costs for construction and on-going maintenance would need to be carefully considered if this were to be implemented.

Photo 11: Beat 2. Manure piled next to main river (left of picture) and feeder stream (right of picture, just out of sight)

There are two impoundments on beat 1 of the fishery. The first is located just below the stone bridge (see photo.2) and has been deconstructed leaving a block stone base currently passable to fish during winter flows. It is recommended that some minor adjustment or removal of the central part of the remaining block base would be beneficial for fish passage during low summer flows. This could be done inexpensively and will be described in the recommendations.

The second impoundment is an active sheet metal weir situated at the bottom of the fishery and currently presents a barrier to fish passage. There is potential for lifting of the sheet metal, effectively removing the impoundment. However, this would need to be discussed with the land owner and the local EA as its removal could drop the water level upstream. Remediation measures may be required upstream if the weir is removed completely.

The weir base left intact upstream should also be taken into consideration if the lower sheet metal weir is removed, as it could become more of an impoundment with a drop in water level. This could be addressed by creating natural 'pinch points' situated at the current weir positions that retain water levels upstream. There are signs of bank erosion below the sheet metal weir and it is likely that under high flows, turbulence is significantly increased in this area. This is exacerbated by the large root-balls of several alder trees which constrict the flow ‘throttling’ the channel and increasing bed and lateral erosion. It is likely that removal of the weir would reduce this throttling effect and slow the rate of erosion. This could be done in conjunction with some coppicing work to let light penetrate the immediate area, improving marginal plant growth and encouraging bank stabilization.

Photo 12: Lower weir on beat 1; note the lateral bank erosion on the left of picture

Downstream of the lower weir the footpath and fishing access run close to the RB on the outside bend. Large limestone blocks have been vertically stacked to prevent erosion. Although limited in terms of options for bank repair because of its relative position to the footpath and wooded area behind, the vertical limestone blocks could be planted with some beneficial native plant species such as the sedge plant (*Carex pendula*) to provide overhanging cover. (A list of planting and techniques will be included in the recommendation section). In order to encourage marginal plant growth along the limestone block revetment, some coppicing of trees adjacent to the bank would be beneficial. It’s also likely that the established root systems of marginal plants would provide some additional erosion resistance to the blocks and the adjacent footpath.

At the lower end of the fishery above the village of Damery (beat 1) both banks are tree lined, predominantly with alder (*Alnus glutinosa*) and some other mixed trees such as ash (*Fraxinus excelsior*) and willow (*Salix spp.*) Both banks are heavily shaded (particularly the non-fishing bank) by alder trees and light penetration to the channel is minimal. Marginal vegetation is limited, although root systems of the alder trees extend into the channel creating good cover for brown trout. Whilst some tree cover is beneficial along the reach, the 'tunnelling' effect of the tree canopy limits marginal and submergent plant communities. This reach would benefit from rotational coppicing over a 4-5 year period. The coppicing of any diseased alder trees is recommended and may reduce infection in adjacent trees. Although the LB is heavily shaded, focus on the RB (fishing bank) may prove easier and more effective in terms of light penetration because of the orientation to natural sunlight. It is recommended to retain any large mature trees with fissures or cracks or heavy ivy growth. Often these trees support large communities of invertebrates and mammals, particularly bats and nesting birds which are legally protected.

4. Recommendations:

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

Light penetration

This work should focus on coppicing and felling bank-side trees particularly over the most densely shaded areas, rotating the work over a 4-5 year period and creating a canopy of varying heights and sizes. An approximate 'rule of thumb' is to allow 50% dappled light, particularly over riffles, retaining 50% shade over the rest of river as a whole. It is sensible to leave slightly more shading over pools as these act as refuge areas for all life cycles of brown trout during low flows. Retaining some tree shading can limit extremely high 'spikes' in water temperature, reducing mortality caused by low dissolved oxygen levels.

Retaining large mature or ancient trees is important as they can support large communities of mammals and terrestrial invertebrate species. Large or complex shaped boughs or branches arising from tree works can be used for pinning into the river and are a good way to reuse woody material won from coppicing work. With good planning and a team of volunteers, this can be done at the same time as coppicing, removing the need to lift heavy pieces of wood from the channel. Allowing light to penetrate the channel will encourage the development of a varied marginal plant community. Sedge plants such as *Carex pendula* can provide a 'rough and scraggly' edge which is erosion resistant and makes excellent overhanging cover for trout and invertebrates. Increased light penetration will also encourage the growth of watercrowfoot (*Ranunculus spp*.). Large, dense stands of ranunculus can support a whole range of aquatic invertebrates and an abundance of this plant is likely to improve wild trout production over the CAA fishery as a whole.

Woody debris

Large woody debris can provide valuable habitat for salmonids and invertebrates in the channel and is an effective and relatively inexpensive way of enhancing the habitat of the Little River Avon. With an abundance of bank-side trees available on the fishery, there is plenty of opportunity to employ the following techniques:

- Utilise woody material that has already fallen into the channel by pinning it into the bed using chestnut posts and heavy gauge galvanised wire.

- Use large boughs or branches from on-going tree works and pin into channel to create scouring and sorting of gravels and provide cover and refuge for all life cycles of salmonids.

- Brash and smaller coarse woody debris (CWD) trimmed from tree works can be packed in behind larger boughs to create a complex matrix of branches which accrue silt quickly if positioned in depositional zones. A larger branch pinned upstream of smaller branches can act as a baffle, slowing flows and depositing silt over brash immediately downstream.

- Hinging of large branches or trees that are close to the water is a good way of introducing 'living' material into the channel. The tree can be partially severed leaving a 'hinge' attached so the tree or branch can still grow. Willow is an excellent tree to work with in this way because of its 'bendy' properties. Once hinged into the channel in the desired direction, it can be pinned to the bed accordingly. Hinging larger trees will require a qualified chainsaw user. Some smaller material can be hinged using hand-saws.

Pinning with chestnut posts and wire

A post should be driven into the river bed on either side of the log or branch (If the bed is hard then a pilot hole for the post should be driven using a sledge hammer and iron bar). Loop the galvanised fencing wire around the posts either side of the log and use fencing tacks (preferably large) to pin the wire to the posts. Leave several inches of slack wire above the log (this allows the wire to tighten down onto the log during post driving). Drive one post into the bed part way, then drive second post in until wire starts to tighten over the log. Do not over-tighten the wire. Eventually the wire should tighten over the log, pinning it to the river bed. It can be made easier if you have the weight of several people standing on top of the log to hold it down whilst the posts are being driven. Always use the personal protective equipment when working in this way i.e. hard hat gloves and eye protection.

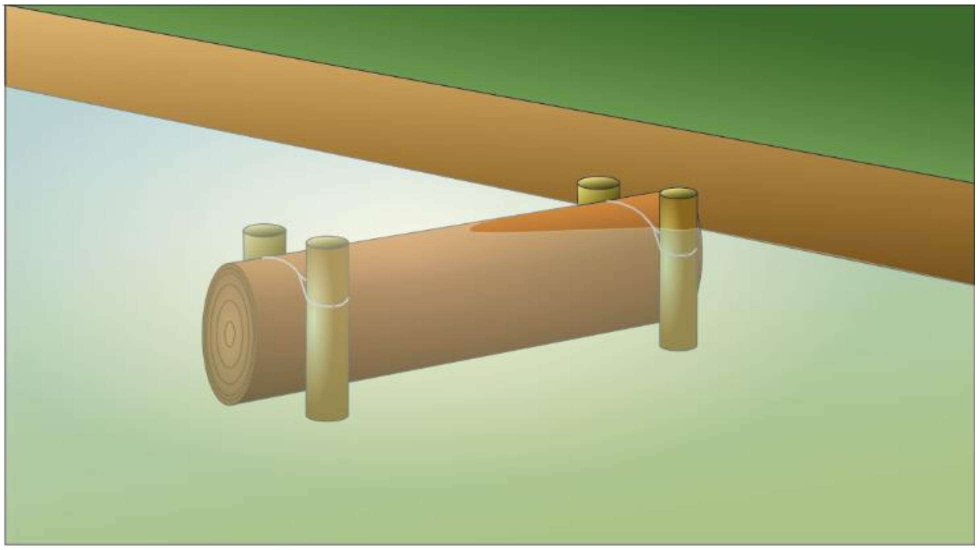

Fig 4: Close-up drawing of pinned LWD

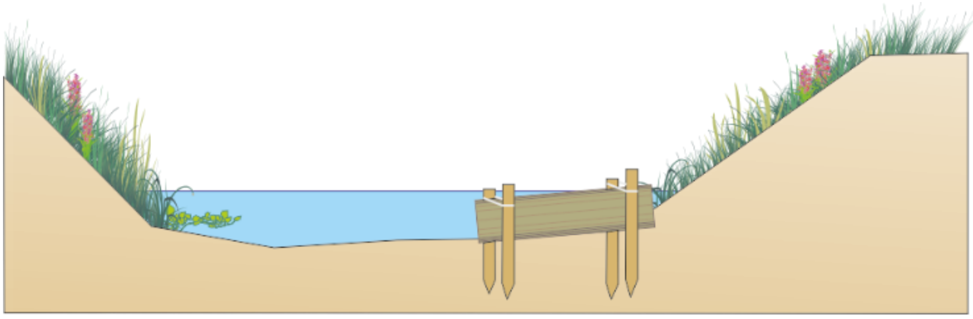

Fig 5: Pinned log deflector with paired posts and galvanised wire

Photo 13: Log deflector pinned with posts and wire (angled upstream, creating bed scour to gravel immediately downstream)

Photo 14: Alder tree with 'living hinge' still attached (angled downstream)

Photo 15: Large hinged Alder tree (Willow is just as good and often responds well to hinging)

Weir adjustment and removal

(Beat 6 Ozleworth Brook weir)

This is the largest and most significant impoundment on the fishery and currently does not allow any fish passage. Removal of this weir is likely to improve connectivity for brown trout and grayling populations between the Ozleworth Brook and the Little River Avon. There are a number of techniques available to overcome this problem but because of the potential scale of the project, it is recommended that the CAA consults the expert opinion of the local Environment Agency office before any decisions are made.

(Beat 3 Huntingford Mill weir - remaining base)

The remaining base of the weir currently allows fish passage over the top and adds some beneficial morphology to the channel in the immediate area. The weir base is useful to some degree as its partial interruption to the main flow creates a complex pattern of flow immediately downstream with some interesting results, not least a middle channel island which adds to habitat complexity. However, during low summer flows, the remaining weir base could act as a barrier to fish, particularly to juvenile salmonids and bullheads (*Cottus gobio*). Therefore, some minor adjustments could be made in the central part of the channel using petrol or hydraulic powered 'road breaker'. A team of two to four people with a road breaker, sledge hammers and iron bars, could break out one or two sections in the central part of the channel to allow fish passage. The arising material could be deposited downstream in a riffle area and would contribute to channel roughness, creating some more diverse flow conditions.

(Beat 1 Upper weir - remaining base)

This is the least significant of impoundments on the CAA fishery and as such could be left as it is with relatively little impact on local biodiversity. Currently this minor impoundment may only present a problem to fish passage in drought conditions. Alternatively, the same treatment as Huntingford Mill Weir (base) could be prescribed i.e. the physical removal by hand of several of the blocks or parts of the base in the central part of the channel to allow fish passage.

(Beat 1 Lower weir - sheet metal weir)

The lower weir on beat 1 currently presents a significant barrier to fish passage. Although only a foot in height, it creates slow and sluggish conditions upstream, interrupting the natural gradient of the river and the migration of bedload and gravel downstream. There is potential for it to be passable to fish during high flows, but during low flows it presents a significant barrier for fish moving up or downstream. There is good potential for the sheet metal weir to be removed by attaching chains to a large excavator and pulling the sheet metal free of the weir sides. This would need to be discussed with the local Environment Agency office and should not be attempted without prior investigation.

Sewage treatment works and Riverfly monitoring

STW's are present on many rivers and licences normally allow water companies to discharge (treated) water into nearby watercourses. Problems present when licence conditions are contravened by a lack of regular monitoring or negligence of processing equipment. This can result in loading of phosphates and nitrates as by- products. Many water companies are aware of these problems and do try to address and prevent issues. 'Phosphate strippers' are now being installed at many STW's but the process is slow and expensive.

It would be beneficial to monitor invertebrates regularly in the areas adjacent to STW's using the quantitative techniques recommended by the Riverfly Partnership (Anglers Riverfly Monitoring Initiative). Information can be found here: http://www.riverflies.org/rp-riverfly-monitoring-initiative

Any significant decreases in aquatic invertebrate numbers can be discussed with your local Environment Agency officer. There is also an EA hotline for any pollution incidents that may occur (0800 80 70 60).

Land management and sedimentation

The CAA water runs predominantly through pasture and arable land of the Tortworth estate. The relationship between the CAA and estate is excellent and good communication means that problems on the river are quickly addressed. This working relationship is to be applauded and is vital for the ongoing improvement of the rivers habitat. The presence of the manure pile observed on the survey is likely to have been an isolated incident and simple re location of waste manure away from the river bank is a basic and simple solution. Good communication between the estate and its tenant farmers regarding this problem is the best way to combat these issues.

It is also recommended that buffer strips next to the main river and feeder streams (particularly on arable crop fields) be made a wide as possible. A vegetated margin of bushes, trees and marginal plants will reduce sedimentation and runoff from the bare soil of arable fields during the winter months. There is potential for the CAA to seek professional help from the estate for ongoing tree works alongside the river. Both parties would benefit from some structured coppicing along the river banks. Increasing light penetration would stimulate marginal growth protecting banks from erosion in the most densely shaded areas. In the long term both the estate and the CAA would gain benefits from working together to improve the rivers overall ecological value.

Block limestone erosion repairs

In several areas on the CAA fishery the estate has worked with a local contractor to prevent erosion using large limestone blocks. Whilst more ecologically beneficial than other engineered solutions. The vertical piling of blocks to protect the banks could be adjusted to provide a more natural solution that is more erosion resistant and able to support a wider range of biodiversity, whilst also creating complex instream habitat for fish and invertebrates.

The limestone blocks could be stepped back at an angle of 45 degrees. The first stone should ideally be placed directly into the channel (ideally the top of the stone should be at water level height) with the next stone resting on the back edge of the first stone, staggering the heights and gradually working backward in a slope (rather than a vertical face) towards the top of the bank. The gaps between the large stones can then be filled with smaller angular rocks or flint gravels mixed with soil won from bank excavation to form the sloping bank. Once the gaps between the rocks are filled, a mixture of native marginal plants or willow whips can be used to stabilize and consolidate the structure. Installation of fencing at the top of the sloping bank, with a buffer strip of 3m between the fencing and the top of the structure are recommended in order to limit the grazing of marginal plants and poaching of the bank by livestock.

Recommended planting for bank stabilization:

Always use NATIVE UK plants, translocated from nearby or sourced from local provenance from a reputable supplier.

Carex pendula – sedge plant (plant anywhere on bank)

Filipendula ulmaria - meadowsweet (plant in the top half of the bank)

Carex acutiformis – sedge plant (plant anywhere)

Iris pseudacorus – yellow flag iris (plant near the water at the foot of the bank)

Lythrum salicaria –purple loosestrife (plant in the top half of bank – attracts invertebrates)

Lycopus europaeus – gypsywort (plant nearer the water's edge)

Eupatorium cannabinum- hemp agrimony (plant from mid to top of bank).

Edge and marsh plants for wetted areas:
Mentha aquatica-water mint, *Iris pseudacorus*- yellow flag iris, *Veronica beccabunga*- brooklime, *Menyanthes trifoliate*-bogbean, *Alisma plantago aquatica*- water plantain.

The plants listed have dense root networks and will provide erosion resistance whilst being beneficial for invertebrates.

5. Making It Happen

The creation of any structures within most rivers or within 8m of the riverbank (which may be the top of the flood-plain in some cases) normally requires formal Flood Defence Consent (FDC) from the Environment Agency. This enables the EA to assess possible flood risk and any possible ecological impacts. The headwaters of many rivers are not designated as 'Main River', in which case the body responsible for issuing consent will be the Local Authority. In any case, contacting the EA early and informally discussing any proposed works is recommended as a means of efficiently processing an application.

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.

There is also the possibility that the WTT could help via a Practical Visit (PV). PV's typically comprise a 1-3 day visit where WTT Conservation Officers will complete a demonstration plot on the site to be restored.

This enables recipients to obtain on the ground training regarding the appropriate use of conservation techniques and materials, including Health & Safety, equipment and requirements. This will then give projects the strongest possible start leading to successful completion of aims and objectives.

Recipients will be expected to cover travel and accommodation (if required) expenses of the WTT attendees.

There is currently a big demand for practical assistance and the WTT has to prioritise exactly where it can deploy its limited resources. The Trust is always available to provide free advice and help to organisations and landowners through guidance and linking them up with others that have had experience in improving river habitat.

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.