



**By Brook – Ford Fly Fishers**



**An advisory visit carried out by the Wild Trout Trust – September 2009**

## **1. Introduction**

This report is the output of a Wild Trout Trust advisory visit undertaken on the By Brook near Ford in Wiltshire. The advisory visit was undertaken at the request of Mr. Robin Donald, who is the secretary of the Ford Fly Fishers. The FFF are a club that are currently reliant on trout stocking to provide a viable fishery but they are keen to explore opportunities to improve trout habitat in order to expand the wild component of the stock and to derive the maximum benefit from their introduced fish. Comments in this report are based on observations on the day of the site visit and discussions with Mr Donald and other serving members of the FFF, Tom Roberts, David Hume and David Christie.

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.

## **2. Catchment overview**

The By Brook is a tributary of the Bristol Avon. It rises from the limestone west of the village of Burton before flowing south down a gentle gradient before picking up other smaller tributaries north of Slaughterford. From here the river swings south west on its way to join the Avon near Batheaston. The local geology is dominated by clays, oolitic limestone and occasional outcrops of bathstone. It is thought that habitat quality has been damaged due to excessive abstraction pressures. More information on this issue should be available via the Environment Agency's local Catchment Abstraction Management Plan.

The By Brook throughout its length is known to support good populations of native brown trout (*Salmo trutta*) wherever there is sufficiently good habitat available to sustain them. At various stages in the past, many sections of the river have been heavily modified, particularly through the installation of dams and structures to provide a head of water for milling.

## **3. Fishery overview**

The Ford Fly Fishers beat extends to approximately 1 mile of double bank fishing running roughly from the village of Ford down to Slaughterford.

The river is characterised by large impoundments at both ends of the fishery, and these structures have a very substantial local effect on habitat. Upstream of the weirs, water is 'ponded back', resulting in deeper, slower water than would naturally result from the given gradient. The effect is to deposit silt in these sections, and to drown the natural pool and riffle sequence. Shallow glides and riffles over a clean gravel bed are essential for spawning and for juvenile trout whilst deep pockets are ideal habitat for adult trout.

These slow deep sections at the extremities of the fishery are where stocking and most angling effort tends to take place as access is good, with a central section being left comparatively wild, lightly managed and unstocked.

In places the channel is quite wide and deep for the given discharge, although it is understood that "out of bank" flooding events do occur during most winters. Concern was expressed over the impact of low flows on the By Brook and how this might impact on water as well as habitat quality.

There was considerable evidence of what appeared to be excessive filamentous algal growth, possibly indicative of nutrient enrichment. It was not clear if this is the result of point source discharges or due to diffuse pollution pressures from agricultural practices within the wider catchment. The initial impression of land use within the valley was of light grazing on flood plain meadows with some mixed woodlands on the steeper valley sides, certainly not land use that would normally give rise to immediate concern.



Marginal plants coated with a thick growth of filamentous algae – generally an indication of excessive nutrients

#### **4. Habitat assessment.**

At the top end of the fishery the river is slow flowing and comparatively deep, as it is heavily impounded by a large structure. In places the channel is so wide and deep that it was, at times, difficult to perceive any flow. Slow, deep water is generally not recognised as ideal trout habitat but it is understood that this section holds stocked trout comparatively well and that strong hatches of fly sustain good quality fishing opportunities.

As a direct result of the slow in-channel water velocities, marginal plants such as foals cress (*Apium nodiflorum*) and various emergent reeds such as burr reed (*Sparganium sp*), sweet grass (*Glyceria maxima*) and reed canary grass (*Phalaris sp*) were encroaching into the channel, particularly on those sections with little tree shading.

Near the upstream side of the weir, the river swings under a steep, tree-lined bank which provides deep shade resulting in limited in-channel macrophytes.

This section would benefit from some large woody debris (LWD) flow deflectors to create enhanced lies for trout. This is discussed in more detail in the conclusions and recommendations section.



Burr reed growing right across the channel near the top boundary



Another silty section choked with foals cress. Plant biomass of this order may have an adverse effect on water quality with possible dips in dissolved oxygen levels.



Another section a short distance downstream, where a combination of shade and weed management has provided some reasonable areas for trout to hold.



Undershot hatch on the weir screwed down to maintain upstream levels.

A quick inspection of the weir revealed a wide, fixed crest and a single undershot hatch which was screwed down to maintain upstream water levels. Below the weir sill the resultant pool appeared to be very large given the discharge of the river, possibly indicating the flashy nature of this stream following rainfall events. The bank adjacent to the weir is open for public access and this appears to be a popular site for visitors. It is assumed that the weir was originally constructed for milling purposes at this location, or to provide an elevated head of water for pushing elsewhere. This no longer appears to be necessary and tangible benefits to upstream habitats could be achieved simply by removing the hatch gate, or at least leaving it fully drawn at all times. The benefit would be to increase water velocity and allow the river to re-create a natural sequence of pools and riffles which provides habitat for all life stages of trout. The habitat benefits of managing structures in this way were recently well documented as part of the Avon LIFE project where similar gates on a structure on the River Nadder were fully drawn and the subsequent changes in habitat monitored. A summary of the report is attached as an appendix to this report.

Downstream of the weir the channel embarks on a series of sharp meanders. At one point it looks as though the river may be close to breaking through which could result in the loss of approximately 50m of channel and the formation of an oxbow feature. Although there are some wider conservation benefits in allowing river channels to move, it might be sensible in this particular case to defend the LB margin with some soft engineering techniques such as faggot revetment or perhaps some live willow revetment. The area should be temporarily fenced to prevent further cattle poaching and give the margin time to recover.



A tight meander with evidence of potentially serious bank erosion due to cattle poaching in the foreground

A short distance below the big meander a further structure was inspected. This structure was also having a big impact on in-channel habitat quality. It seems obvious that this section of river was originally chosen for milling because of its steep gradient, which has been drowned out by the numerous steps introduced to harness water power. There is little doubt that prior to the impoundments this section of river would have supported some first class habitat for brown trout.



Another big impoundment which fragments fish populations and restricts habitat recovery

Further bank damage through excessive cattle poaching was evident on several other sections. Some light trampling of stream margins can provide good habitat for a range of valuable invertebrates but care must be taken to ensure that the river does not become over wide as a result of frequent and excessive cattle poaching. Installing temporary fences to allow some sections to recover is a possible option. If the local farmers are concerned about access to the river for livestock to drink, then the installation of pasture pumps located behind a fence might satisfy demand, particularly in the case of young cattle reared for beef. If fencing is carried out some controlled grazing on the inside of bank-side fencing should also be considered to cut down on maintenance requirements.

Further downstream below the second weir the river takes on more natural characteristics of pool, riffle and glide. Habitat for all life stages of brown trout was evident and it was very interesting to compare the contrast in habitat quality to the sections found immediately upstream of the structures.



A pasture pump in use next to the River Test.



The tail of a glide – potentially an ideal location for trout spawning

At several locations through the middle section there were decent sized areas of potentially good trout spawning and nursery habitat. The gravels did appear to be compacted and, in places, heavily clogged with fine sediments. These areas would benefit from some pre-spawning treatment by breaking up the surface crust of gravels with a spike or rake or possibly undertaking some gravel washing using a high pressure pump or back-pack leaf blower. These and other techniques are fully described in the Wild Trout Trust Chalk Stream Habitat Manual. Some guidance on gravel cleaning is also attached to this report in appendix 2.

A good alternative to manually cleaning gravels is to temporarily peg in LWD flow deflectors. These can be configured onto glides to encourage some local bed scour and provide ideal spawning habitat, as well as promoting little pot habitats for holding trout.



A piece of LWD being secured to the river bed with steel re-enforcing bar. The deflector is configured to encourage bed scour to free up loose gravel for spawning

A short distance downstream there was a small weir roughly constructed of stone blocks. This was presumably installed to hold up water levels in the reach upstream. Unfortunately this has slowed down water velocities and encouraged sediments to settle in the reach above. A good compromise would be to remove the central third of the structure, which will still promote an interesting flume but will not significantly impound the water above.



A Low stone weir reducing upstream water velocities. Notching the centre third will help to improve habitat for wild trout in the section upstream

Towards the lower end of the “wild” reach, the channel starts to become much deeper and slower, due to the impounding influence of the large Environment Agency-owned weir. The purpose of this structure is unclear but presumably it was originally designed to provide some flood protection for Slaughterford a short distance downstream. The weir has what appear to be automated sluices but it is understood that these are not operational. Like the weir at the top end of the fishery, this will be a block to fish migration and is undoubtedly having a large impact on local river habitat quality.

Near to the bottom boundary of the fishery there is yet another old weir (Rag Mill) where the adjacent wing wall is leaking badly. This will require remedial works very soon if the whole bank is not to fail. An alternative solution would be to lower the weir which will have the added advantage of increasing water velocities and providing enhanced habitat for trout.



Large EA owned structure. The exact purpose and requirements for this structure should be explored as it severely restricts habitat recovery and fragments fish populations



Rag Mill Weir with the breach in the wing wall evident. Lowering the impoundment will take pressure off the leak and improve habitat.

Overall the level of riparian maintenance was felt to be about right with a nice mix of dappled light and shade and plenty of the marginal scrubby cover which is so vital for wild fish. The FFF have managed to get the balance right between access for anglers and cover for fish



A low scrubby willow provides some valuable shade and a source of terrestrial food items.

## 5.0 Trout stocking

There is mounting evidence that interbreeding between domesticated farmed trout and wild fish can lead to lower fitness and survival amongst the offspring, reducing the numbers of river-bred fish in the population. Recent changes to the Environment Agency's National Trout & Grayling Strategy reflect this concern, and by 2015 all farmed trout stocked to rivers will be required to be sterile all-female triploids, or derived from local broodstock. The WTT believes that if stocking is necessary, then it would be sensible to use all female sterile fish.

## 6. Conclusions

Habitat potential for wild trout on the FFF reach of the By Brook is severely impacted by the series of impoundments at either end of the fishery. Maintaining some deeper water for stock fish may be desirable, but wild fish need flow to carve out and maintain the full range of habitats required to complete their life cycles.

Tackling the two large structures near the top end of the fishery may well be too problematic to contemplate and even if the structures were lowered it would only enable a comparatively short section to be rehabilitated. Potentially the large EA controlled gate near the bottom boundary could provide the greatest

opportunity for habitat enhancement. Removing this structure would enable a long reach upstream to be repaired and provide excellent habitat both for wild fish and also stocked adults. There would also be a much greater opportunity for trout wishing to migrate upstream to some of the good quality spawning and nursery habitat that currently exists in the middle of the reach. The wider benefits derived from the continued presence of this structure may outweigh any ecological benefit but the questions should be asked: What purpose does this structure serve? Are there any other ways of providing the same service but using more modern and trout-friendly methods?

The River Basin District Plans under the Water Framework Directive should have already identified this and other structures as an issue (or 'pressure') which will prevent the By Brook achieving the required 'good ecological condition'.

Even without securing any increased water velocity through the lowering of any of the impoundments, improvements to in-channel habitat can be achieved. A very easy and proven method is to use large woody debris (LWD) material won from tree works which can then be used within the channel to promote some local narrowing and bed scour and sorting of river bed gravels.

The presence of LWD has been shown to be extremely important in several respects:

- An increase in the variety of flow patterns, depths and localised velocities.
- Development of high in-channel physical habitat diversity
- Significant benefits to the control of run-off at the catchment scale, as Woody Debris helps regulate the energy of running water by decreasing the velocity. Thus the 'travel time' of water across the catchment is increased resulting in a less 'flashy' regime.

LWD is a general term referring to all wood naturally occurring in streams including branches, stumps and logs. Almost all LWD in streams is derived from trees located within the riparian corridor. Streams with adequate LWD tend to have greater habitat diversity, a natural meandering shape and greater resistance to high water events. Therefore LWD is an essential component of a healthy stream's ecology and is beneficial by maintaining the diversity of biological communities and physical habitat.

Traditionally many land managers and riparian owners have treated LWD in streams as a nuisance and have removed it, often with uncertain consequences. This is often unnecessary and harmful: stream clearance can reduce the amount of organic material necessary to support the aquatic food web, remove vital in-stream habitats that fish will utilise for shelter and spawning and reduce the level of erosion resistance provided against high flows. In addition LWD improves the stream structure by enhancing the substrate and diverting the stream current in such a way that pools and spawning riffles are likely to develop. A stream with a heterogeneous substrate and pools and riffles is ideal for benthic (bottom dwelling) organisms as well as for fish species like wild trout.

If a tree trunk or branch is causing a severe problem then by all means move it but try and retain as much within the channel as possible. This will ultimately mean that some sections of river will be unfishable. The chances are, however, that trout stocks will improve. It is without doubt the simplest and easiest way to promote improved habitat on a stream like the By brook. Further advice on this area is available from the Wild Trout Trust.

On those sections of open channel where marginal plants have encroached into the channel it may help to promote some local shade by planting the occasional willow whip, particularly on the outside of any slight bend or where there is potential pool habitat. Thick fringes of marginal plants should be encouraged but where plants become established in the centre of the channel they should be removed and if possible re-planted where they will help form a margin rather than as a collection zone for sediments in the middle of the channel. The strategic positioning of LWD deflectors will also help to promote local scour not favoured by marginal plants thus maintaining some channel definition.

The middle sections of the beat do offer reasonable habitats for wild trout. Some care is required to ensure that vulnerable habitats are not damaged by excessive cattle poaching. If the local farmer is amenable then perhaps some fencing with controlled access for livestock would help to give this section enhanced protection. Keeping this section wild and comparatively unmanaged will help the wild component of the stock to develop.

Undertaking an autumn programme of gravel cleaning will help to boost trout egg survival rates.

The presence of so much algae is of concern. Are these conditions considered to be the norm for the By brook or are there some underlying water quality issues that need to be resolved? These are questions that should be put to your local Environment Agency teams. Many angling clubs now take part in the Anglers' Monitoring Initiative in order to maintain a close eye on water quality. One excellent method of self monitoring water quality is to link up with the Riverfly Partnership. The Partnership provides simple training and a robust method of assessing fly life through periodic sampling of macro invertebrates. This is a simple and effective way of keeping a close eye on water quality performance. More information can be found at [www.riverflies.org](http://www.riverflies.org)

**It is a legal requirement that some works to the river may require written Environment Agency consent prior to undertaking any works, either in-channel or within 8 metres of the bank. Any modifications to hard defences will require a land drainage consent on any river designated as "main river". Advice can be obtained from the EA's Development Control Officer.**



Gravel cleaning using a back pack leaf blower. Cleaning gravels on the very top section is recommended

## 6. Recommendations

- Open up a dialogue with the Environment Agency over operation and purpose of the large gated weir.

Find out if any of the structures on your reach have been identified as an issue under the Water Framework Objectives by reviewing the River Basin Management Plan These plans are currently in draft form but are due for publication in December 2009. They are available on the Environment Agency website:

<http://www.environment-agency.gov.uk/research/planning/33106.aspx>

- Consider lowering the levels of impounded reaches by pulling boards and lifting hatches wherever possible. It is understood that some depth may be required to support large stocked fish
- Open up a dialogue with the local farmer over the possibility of protecting some banks with new stock fencing and purpose built drinking stations
- Undertake a programme of early autumn gravel cleaning on the sections of shallow glide. Guidelines for gravel cleaning are attached as an appendix to this report. If the bed level drops too much then consider raising the bed to the original depth to reform the riffle using imported angular gravels.
- Remove marginal emergent plants where they appear in the centre of the river to try and re-establish a defined channel.
- Continue the sympathetic programme of tree works to maintain the dappled light and shade regime.

- Undertake a programme of tree planting with sallow or goat willow on the more open sections of channel to promote better holding opportunities
- Only use sterile stock fish to give wild fish the best possible opportunities for successful recruitment
- Consider joining the Anglers Monitoring Initiative. Training and support is given by the Riverfly Partnership

## **6. Making it happen**

There is the possibility that the WTT could help to start an enhancement programme. Physical enhancement works could be kick-started with the assistance of a WTT 'Practical Visit' (PV). PV's typically comprise a 1-3 day visit where approved WTT 'Wet-Work' experts will complete a demonstration plot on the site to be restored. This will enable project leaders and teams 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.

The WTT can fund the cost of labour (two/ three man team) and materials (max £1800). Recipients will be expected to cover travel and accommodation expenses of the contractor.

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 clubs, syndicates and landowners through guidance and linking them up with others that have had experience in improving trout fisheries.

## **Acknowledgement**

The WTT would like to thank the Environment Agency for supporting the advisory and practical visit programmes.

## **Disclaimer**

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