Advisory Visit

River Perry, Whittington, Shropshire

2nd November, 2010

1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the River Perry on 2nd November, 2010 on behalf of Rupert and Harriet Harvey of the Halston Estate. Comments in this report are based on observations on the day of the site visit and discussions with Ian Morris, keeper for the Halston Estate.

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

2.0 Catchment / Fishery Overview

The River Perry rises in the low hills on the boundary of the North Shropshire sandstone plain and flows south to join the Severn near Shrewsbury. The underlying geology is mostly Bunter Sandstone, overlain with a complex mixture of glacial deposits and soils. In its headwaters it is a stony-bedded stream with a gradient falling from 30 to 15 metres per kilometre ($m.km^{-1}$), reducing to between 5 and 7 $m.km^{-1}$ below Gobowen where it flows through alluvial silts and clays (Harper, 1990).

The Perry then enters Baggy Moor, a large depression of basin peat where the river gradient is 1 $m.km^{-1}$ or less. Much of the channel in the upper catchment of the Perry has been heavily modified to improve drainage for agriculture. Main and tributary channels have been extensively canalised; for example a scheme in 1985-88 lowered the river bed by 1 metre between Rednal and Ruyton to increase the drainage of Baggy Moor and intensify agricultural land use.

The Perry has been the subject of studies into the effects of canalisation (land drainage) on fish populations, and the effectiveness of in-stream structures in mitigating these effects (Swales, 1982; Swales & O'Hara, 1983); More recent studies have been completed by Ros Challis of the Environment Agency.

After Baggy Moor and downstream of Ruyton the character of the river changes markedly. Its gradient increases to 2 $m.km^{-1}$ and it flows over boulder clay and glacial debris, the channel bed becoming predominantly stony, interspersed with large rocks and boulders. This is the only section remaining downstream of Gobowen with its natural meander patterns and pool-riffle sequences (Harper 1990).

The reach visited is located near Whittington, below Gobowen, and extends for approximately 3 km in the vicinity of Halston Hall (Figure 1).

Figure 1 Location map. Red arrows indicate upstream and downstream limits. (Image produced from Ordnance Survey's Get-a-map service. Image reproduced with permission of Ordnance Survey and Ordnance Survey of Northern Ireland)

There is currently no organised angling on the river and no introductions of fish take place. Trout are known to be present having been observed and occasionally caught; chub are also present. No conservation designations (such as SSSI) apply to this section of river, but it is known to support otters and native white-clawed crayfish.

This section of the River Perry is classified as poor in the Severn River Basin Management Plan (RBMP) under the Water Framework Directive (WFD); further information on WFD can be found at www.environment-agency.gov.uk/research/planning/33106.aspx and the relevant entry for the Perry in the RMBP is duplicated in appendix 2. The reason for this classification is the impoverished nature of the fish stocks.

3.0 Habitat Assessment

The course of the Perry through Halston Estate has been extensively modified to create ornamental estate lakes (Figure 1). The river can be divided into the following sections:

- Upstream boundary down to Noddy's Bridge
- Horseshoe weir down to the track bridge
- Wooded section downstream of the track bridge
- The back river

<u>Upstream boundary to Noddy's Bridge</u>

Wild brown trout require a range of habitat types in order to complete their life-cycle. These include gravels well-supplied with fast-flowing, oxygenated water in which to lay eggs; plenty of in-stream cover from rocks, plants, overhanging vegetation and woody debris in which juveniles can hide and feed; and deeper pool areas and cover for adult fish. Many of these requirements are met in natural streams where the meander pattern and pool-and-riffle sequence provide the required variety of habitats (Figure 2).

This section of the Perry has been previously modified for land drainage and unfortunately now lacks most of the requirements to sustain a wild trout population. The channel has a trapezoidal cross-section, is over-wide, uniformly shallow and has a bed consisting primarily of fine sediment. The over-wide nature of the channel promotes the deposition of fine sediment and the colonisation of emergent plants like rushes; the latter are removed on an annual basis by the Environment Agency river maintenance team (Photo 1).

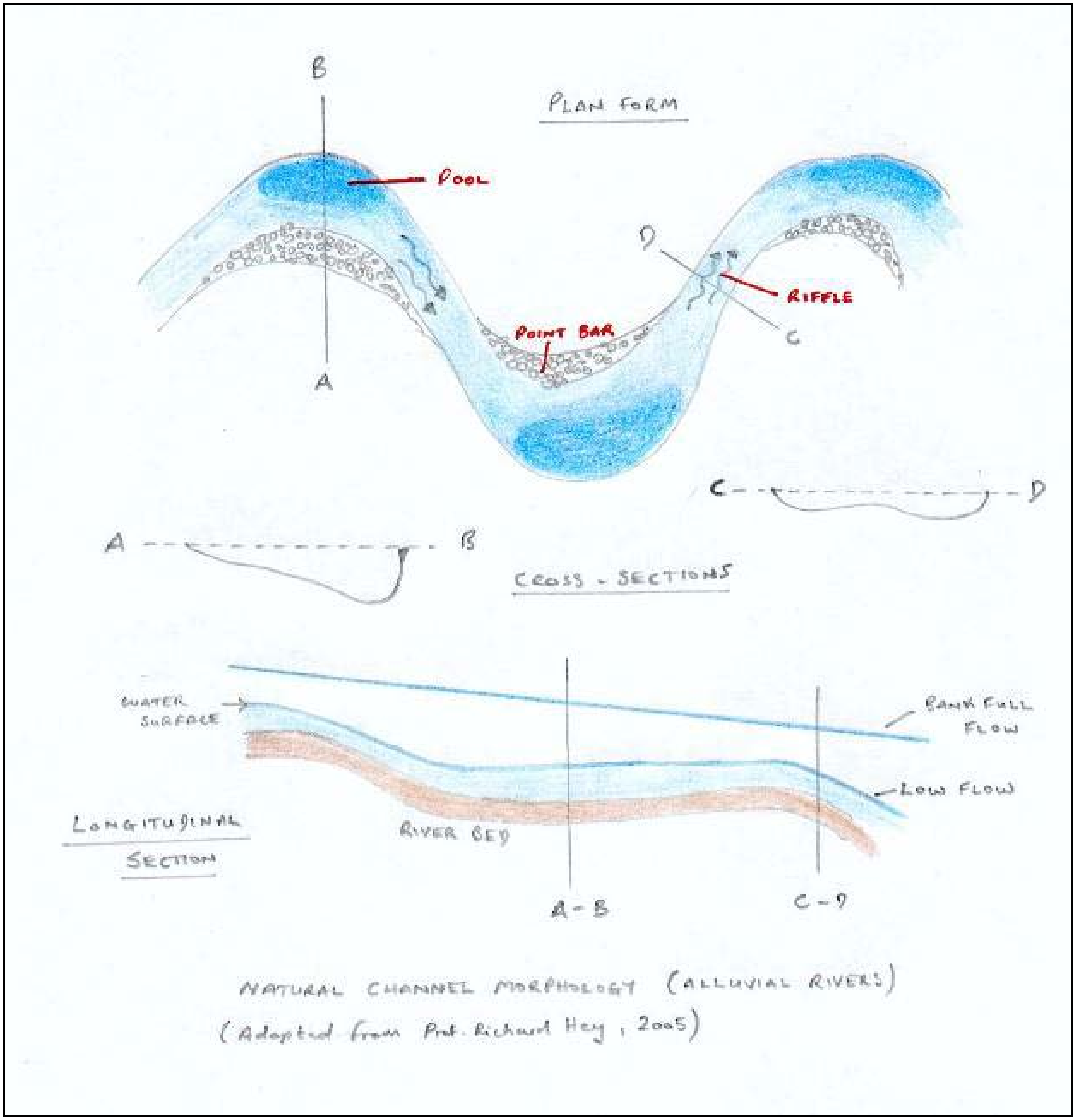


Figure 2 Showing the meander pattern and pool-riffle sequence in a natural alluvial river (adapted from Hey, 2005).

Photo 1 Showing straightened, trapezoidal cross-section, shallow channel. No buffer zone is present between agricultural land and the river. Emergent vegetation is removed annually and can be seen deposited on the near bank.

In places arable farming and grazing is taking place immediately adjacent to the river (Photo 1). This has an impact on the riparian zone, that is the habitat alongside the river, which has an important influence on the overall habitat quality of the river. An uncultivated and ungrazed margin between field and river is desirable and this can often be incorporated into agri-environment schemes such as Entry Level Stewardship, Higher Level Stewardship and Countryside Stewardship (www.defra.gov.uk/rural/rdpe/erdp/schemes/index.htm). The protection afforded by these strips alongside the river allows excellent marginal habitat to develop, providing good habitat for fish (in the form of trees, shrubs and overhanging vegetation), largely stable banks with little erosion, shading of the channel (which helps control weed growth) and good habitat for wildlife, including otter and kingfisher. It is important that a marginal fringe of vegetation is retained when creating access for angling, and preferably access and egress points are created, between which the river is fished by wading.

Downstream of the old railway crossing, some gravel is evident in places on the river bed; this is a suitable size for trout spawning (10 – 40 mm diameter) but the gravel layer is thin and heavily infiltrated with fine sediments. Trout require about 30 cm depth of gravel for spawning and egg survival rates depend upon a good flow of water through the spaces between the gravel where the eggs reside for several weeks in the winter; fine sediment accumulations greatly reduce egg survival. It would be worthwhile cleaning areas of gravel by raking or jetting to break up the crust and dislodge fine sediments. See Appendix 1 for gravel cleaning advice.

There is the occasional area of better habitat such as downstream of the farm track bridge (Coed-y-tye) and below a section of gravel just upstream of the wood. However, generally this section of river requires restoration to provide a variety of depths and flow patterns. This could be achieved by using various flow deflectors, channel narrowing techniques and introducing woody debris and gravel (see recommendations).

From the main road bridge downstream, the river becomes slower and deeper because it is impounded by the level of the river bed at Noddy's Bridge where the river flows through a narrow ornamental cascade into the first of a series of lakes in the hall grounds. Habitat restoration potential in this impounded section (between the road and Noddy's Bridge) is limited by the slow flows and would not be worthwhile unless the impoundment is removed.

Photo 2 Deeper scour pool downstream of farm bridge

Photo 3 Gravel riffle area with deeper scour pool downstream

Horseshoe weir down to the track bridge

Below Noddy's Bridge is a small lake which is directly connected to a second lake (adjacent to the church). The level in these lakes is controlled by sluices on the church lake and the horseshoe weir on the Perry and the piling weir on the back river (Figure 3). A third lake is located downstream.

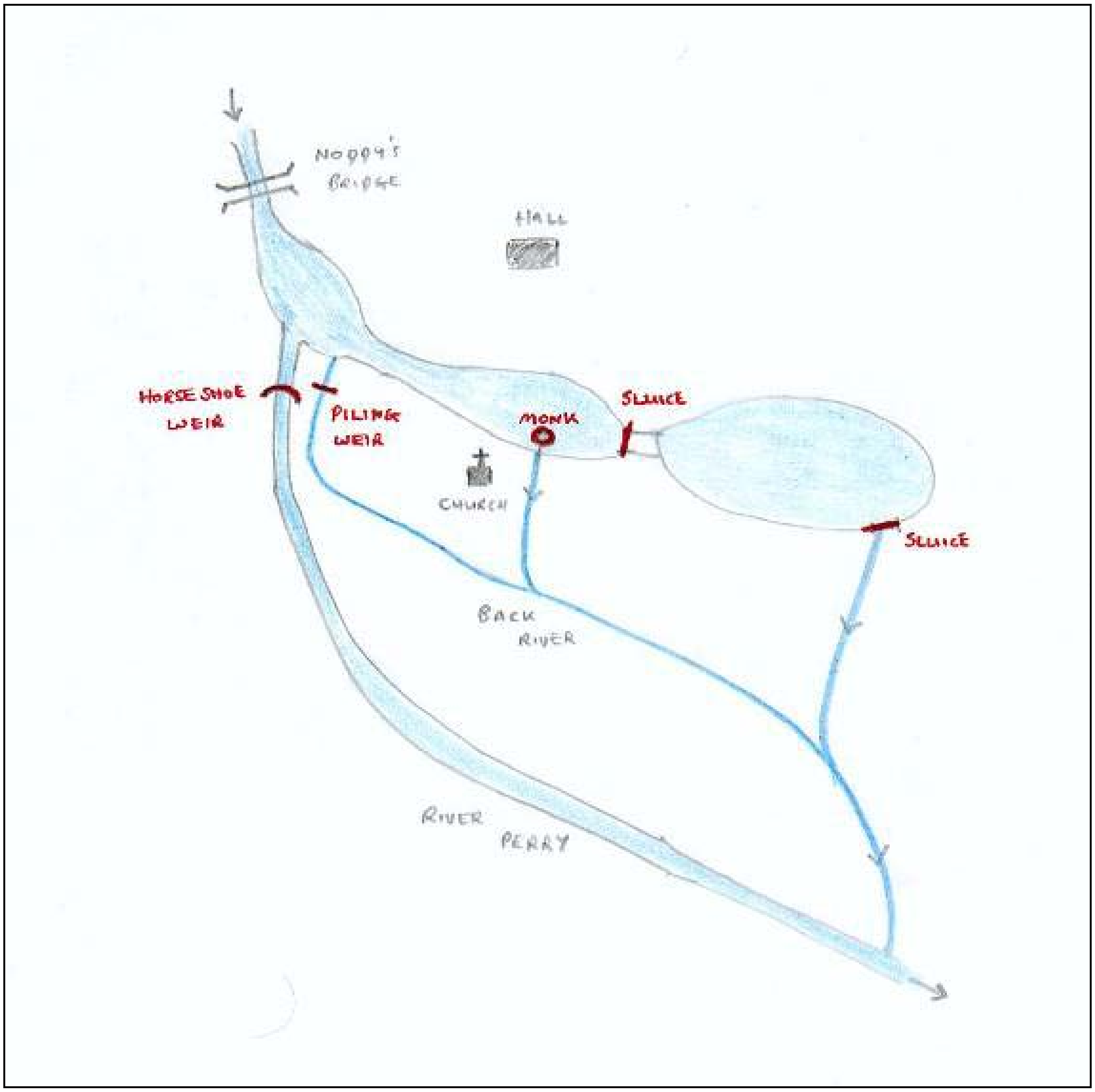


Figure 3 Schematic diagram of the lakes and channels near the Hall. Flow control structures shown in red.

Photo 4 Horseshoe weir

Photo 5 Piling weir replacing the broken-down brick structure

The horseshoe weir and piling weir are both barriers to the free movement of fish within the river. This is significant because most fish species migrate to some degree during their life-cycle, for example for spawning, feeding or to fulfil seasonal or daily habitat requirements (e.g. reaching refuge areas). Barriers which prevent or delay such migrations lead to impoverished fish populations. Barrier removal or the installation of fish passes or easements improve this situation.

Downstream of the horseshoe weir the river has been straightened resulting in a canal-like section with slow flows and a bed comprising fine sediments (Photo 6). The gradient of the river here appears to be very shallow and this limits the opportunities for improving habitats. However with progress downstream, the gradient steepens and there is more potential for the installation of flow deflectors, etc. (see recommendations). Some areas of gravel are evident although again these are relatively thin deposits with lots of fine sediment entrained.

It appears that there may have been some initial "testing" by trout of the suitability of the gravel for spawning as there were a number of cleaner patches of gravel (Photo 7). Female fish often try out areas of gravel before selecting a suitable site to cut a redd (excavate a "nest" in the river bed by wafting away gravel with her tail) in late autumn.

It would be worthwhile cleaning suitable areas of gravel by raking or jetting to break up the crust and dislodge fine sediments. See Appendix for gravel cleaning advice.

Photo 6 Long, straight, low-gradient section below the horseshoe weir

Photo 7 Lighter patches on the gravel may be where trout have tested it for spawning suitability

Wooded section downstream of the track bridge

Downstream of the track bridge there are three fields on the right bank which are under separate land ownership. The fields are used for grazing livestock which have free access to the river; this has resulted in some severe poaching of the banks and widening of the river channel (Photo 8). Large amounts of fine sediment are entering the river from these areas and deposits of this are evident in slower parts of the river throughout the rest of the section. The left bank is wooded opposite these fields, then the river enters a wood on both banks.

The character of the river changes markedly in this section and there is a more natural appearance to the river. The river is more connected to its floodplain and the river bed substrate is predominantly gravel. The channel is still relatively straight compared with an un-modified river, but there is a pool-riffle sequence and much better in-stream habitat than the rest of the river (Photo 9 and 10). There is however still a lack of deeper pool areas and this could be improved by introducing large woody debris (LWD).

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. Many land managers treat LWD as a nuisance and remove it from rivers and streams. However, streams with LWD have greater habitat diversity as it promotes localised scour, depth variation and a natural meandering shape. LWD is an essential component of a healthy stream's ecology and is beneficial by maintaining the diversity of biological communities and physical habitat. Stream clearance reduces the amount of organic material which supports the aquatic food web, removes vital in-stream habitats that fish will utilise for shelter and spawning and reduces the level of erosion resistance provided against high flows. A relaxed approach to managing LWD is far easier and cheaper than installing flow deflectors and groynes, and usually achieves similar or better results.

Photo 8 Poached banks leading to over-widening of the river and excessive sediment input

Photo 9 More natural channel features exist in the downstream section of the main river.

Photo 10 In the wooded section

The back river

The back river is a small channel which begins at the smaller outlet from the lake below Noddy's Bridge. The old brick weir at this outlet collapsed in summer of this year and was replaced by steel pilings (Photo 5); since then the flow in the upper end of the back river has been reduced, possibly because the crest of the pilings is higher than the previous weir level. The back river also receives the outfalls from the other two lakes on the estate (Figure 3).

The channel is narrow and straight and flows through open fields before entering the wood and re-joining the main river. The open section has a dense growth of low vegetation fringing the channel (Photo 12) which contrasts with the shady, wooded section where there is far less cover (Photo 11). Trout are known to inhabit the back river and have been caught here and observed in the deeper pool area below a pipe culvert where the track crosses (Photo 13).

The presence of trout indicates that there is sufficient habitat in the back river to sustain a small population. However this is likely to be heavily dependent upon the small areas of gravel suitable for spawning and the good cover afforded by the shaggy marginal vegetation. There is certainly scope for improving trout habitat by creating deeper pool areas and more spawning gravel whilst retaining the good marginal cover.

Photo 11

Photo 12 On the open section of the back river shaggy marginal vegetation provides excellent cover for fish

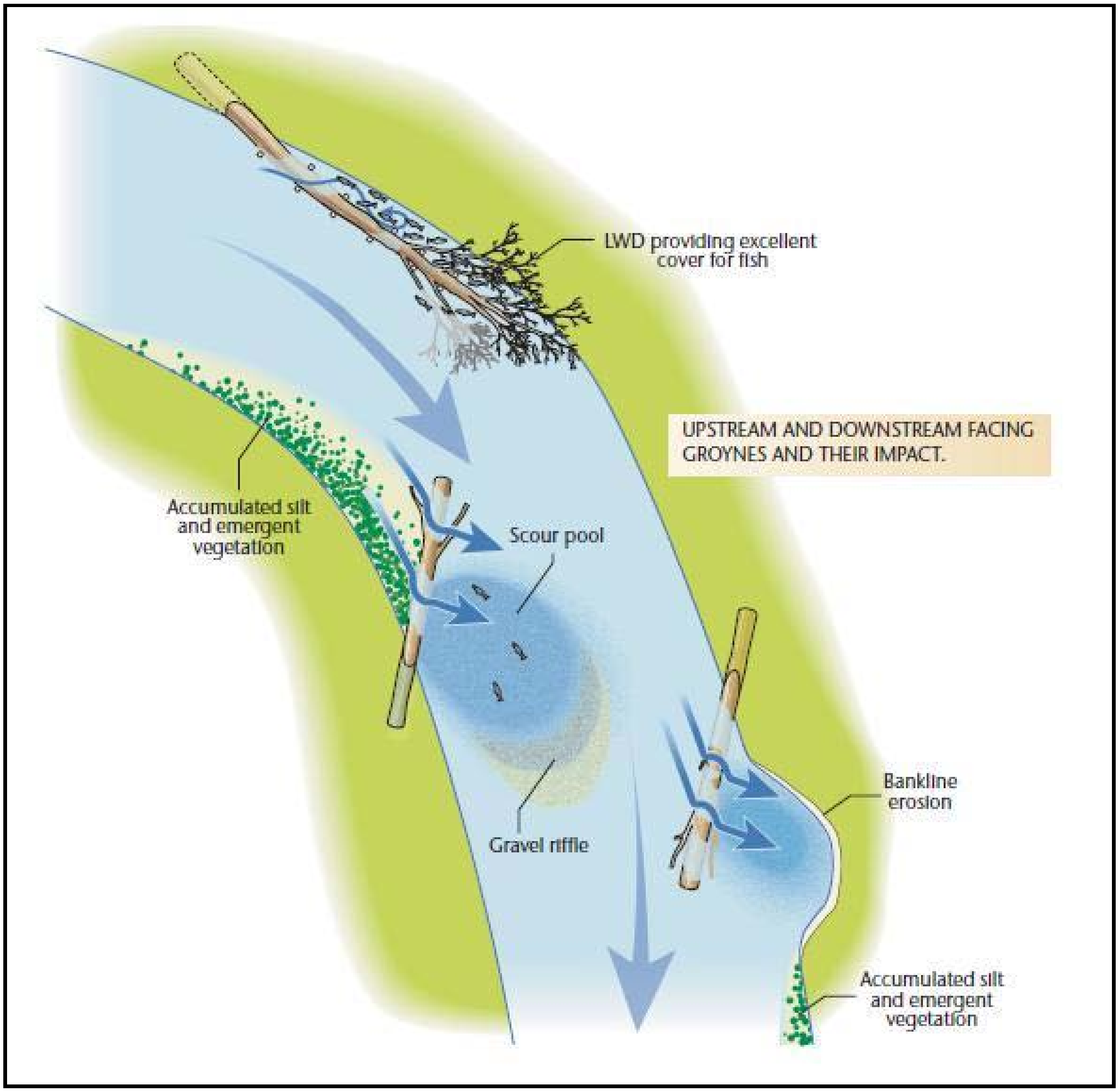
Photo 13 Pool below the bridge culvert on the back river which holds trout. (The cattle drinker on the left of the bridge would be better positioned away from the watercourse to prevent silt from the muddy ground washing into the watercourse).

4.0 Recommendations

The upstream section above the main road should have the channel narrowed to re-create a more natural base width to the river and gravel and large woody debris introduced. Various techniques can be used and these are detailed in the manuals supplied on the visit: the Wild Trout Survival Guide (p 40-45) and particularly the Chalkstream Habitat Manual.

Before (above left) and after shots of narrowing a section of over-wide channel. Immediately after completeion (top right); One year later (bottom left). An undershot flow deflector has also been installed.

Flow deflectors, groynes and large woody debris could be installed along the uniform sections of river. The effects of positioning such structures are shown below; they are generally best positioned pointing upstream to avoid bank erosion.



The existing areas of gravel should be improved for spawning by raking or jetting to displace fine sediments (see appendix 1). Upstream-pointing flow deflectors (as shown above) should be installed on gravel sections to promote localised scour. In the longer term, gravel could be imported to supplement the existing deposits (See Wild Trout Survival Guide and Habitat Manuals).

A buffer zone should be created alongside the river to reduce the impact of agriculture on habitat and water quality in the river; options are available under various agri-environment schemes. Livestock should be fenced out of the watercourse and the provided with drinking troughs, pasture pumps or dedicated watering points. (see Upland Habitat Manual for details).

Photo 14 Example of a cattle drink with hard standing area.

The weirs shown in Photos 4 and 5 should be modified to improve access for fish across them. Installing engineered fish passes is expensive, but easements such as pre-barrages are a cheaper solution. Pre-barrages are installed to break up the head difference across a barrier into manageable portions for fish to be able to cross. The principle is illustrated in Figure 4 and Photo 15.

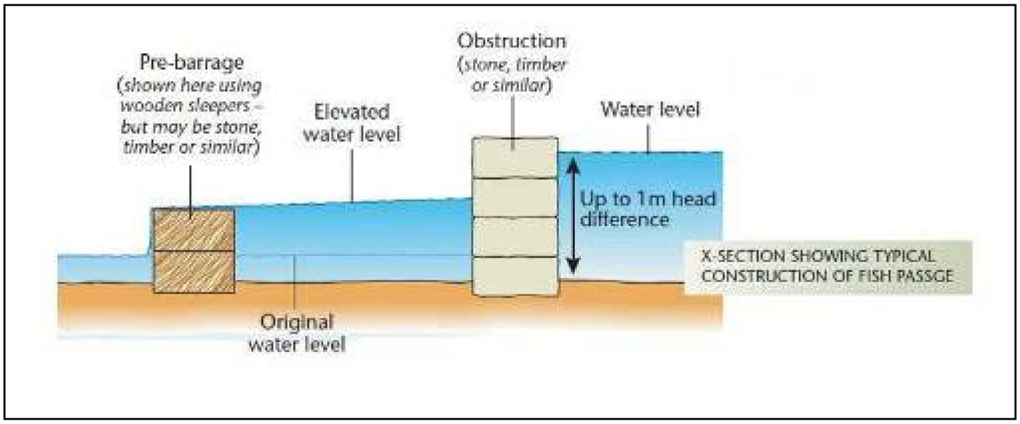


Figure 4 Pre-barrage principle

Photo 15 Pre-barrages can be installed in series to overcome the head difference at a barrier

On the back river, it is recommended that some pool areas are created by using logs to construct low weir structures. It is important to stress that these structures should be designed **not** to impound water upstream, but to focus flows downstream of the structure creating scour and maintaining depth. There are various designs which can be used (e.g. Figures 5-7), but in such a small channel, simply experimenting with fixing logs at an angle across the channel (bearing in mind the downstream scour principle) should be sufficient. Gravel could also be introduced in combination with these structures to improve spawning habitat.

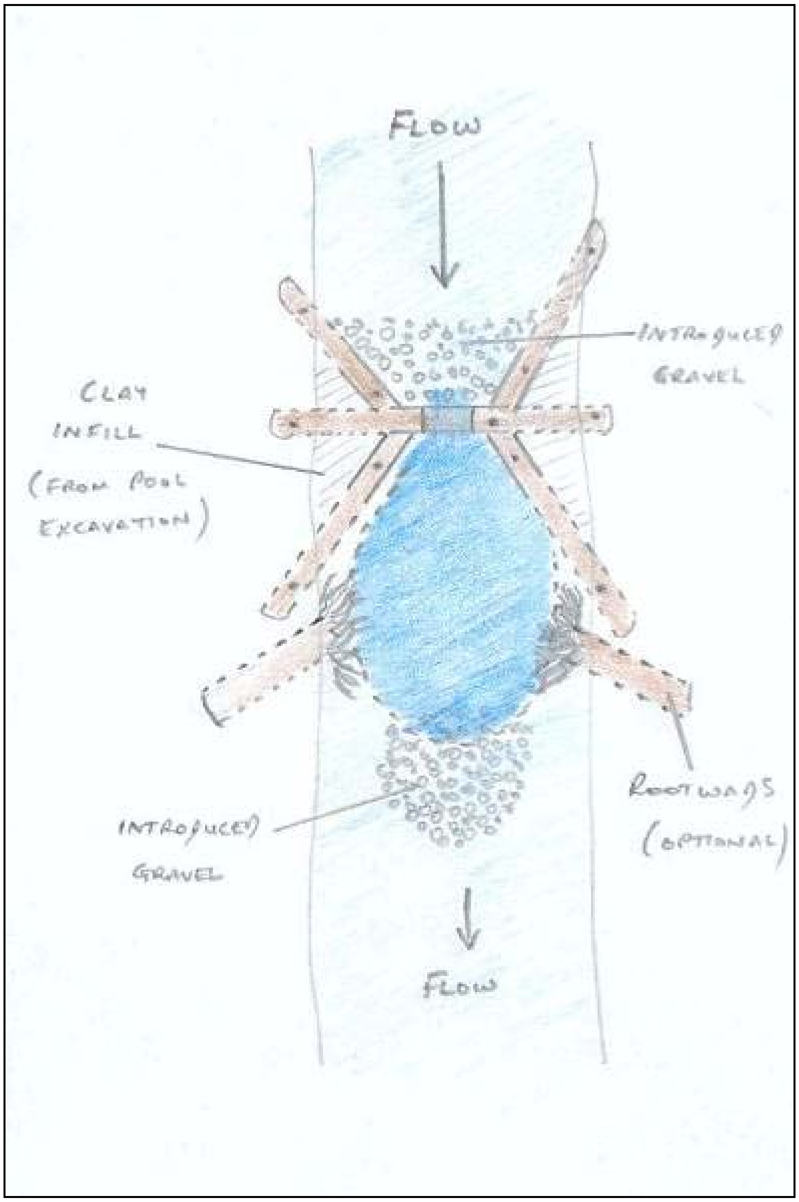


Figure 5 K-dam plan view

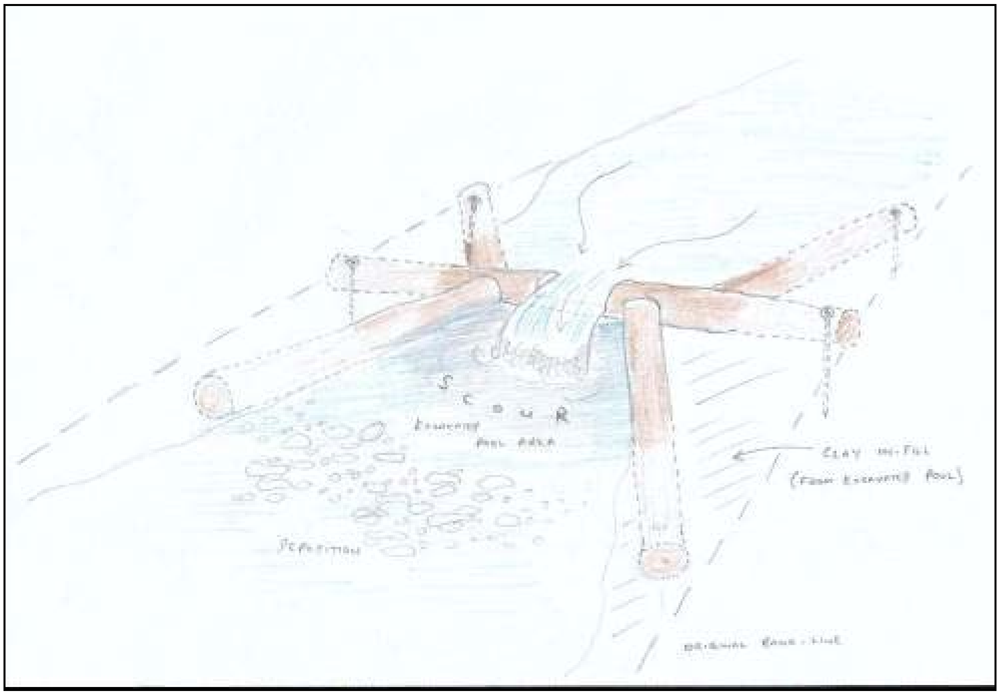


Figure 6 K-dam schematic

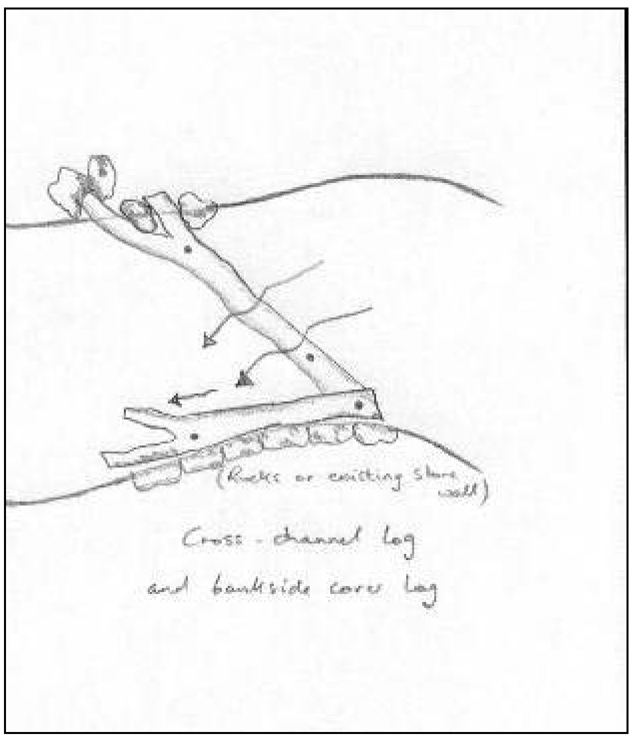


Figure 7 Cross-channel log

In addition to introducing structures, it is important to make the most of those that occur naturally, such as woody debris which has fallen into the channel. Woody debris promotes the development of a range of habitats including localised scour which keeps patches of gravel clean and sediment free; these will be actively sought out by spawning fish (Photo 11). Adopt a policy of retaining it in the river channel wherever possible. The West Country Rivers Trust provides a useful guide to the management of natural woody debris:

1. Is the debris fixed, if yes then continue to 2, if not continue to 5.

2. Is the debris causing excess erosion by redirecting the current into a vulnerable bank? If yes then go to 5 if not then go to 3.

3. Would fish be able to migrate past it (take into account high river flows). If yes got to 4, if no go to 5.

4. **Retain the woody debris in the river**.

5. **Reposition or extract the debris.**

Note: If the debris dam needs to be removed but there is still a significant amount of the root system attached to the bank then it is recommended that the stump be retained for its wildlife habitat value and its stabilising effect on the bank.

Photo 16 Example of woody debris enhancing habitat. A scour pool has formed downstream of these leaning trees on the back river, providing valuable fish habitat.

It should be remembered that the nationally threatened white-clawed crayfish is present at this site so suitable precautions should be taken to avoid damaging them and particularly to avoid introducing crayfish plague. This is a fungal disease carried by non-native crayfish and transferable between watercourses on wet equipment and materials. Materials should be locally sourced rather than imported to site and all equipment thoroughly disinfected (with iodine based product such as used in dairies) or dried in sunlight if it has been used elsewhere. See http://www.environment-agency.gov.uk/static/documents/crayfish_and_river_users_pdf.pdf for further information.

Please note, it is a legal requirement that all the works to the river require written Environment Agency (EA) consent prior to undertaking any works, either in-channel or within 8 metres of the bank.

Further recommendations:

- Take part in the anglers' invertebrate monitoring initiative instigated by the Riverfly Partnership. This will enable volunteers to monitor water quality in the river and provide an early warning of pollution and a deterrent to potential polluters. Details of sampling strategies and training days can be obtained from the Riverfly website at www.riverflies.org . Contact Bridget Peacock riverflies@salmon-trout.org for further details. Suitable nets for sampling macroinvertebrates can be obtained from Alana Ecology www.alanaecology.com Tel: 01588 630173

- A significant issue facing the fishery on the Perry is the sediment input from agricultural practices, and this is something that needs to be addressed on a catchment-wide basis. It is recommended that support is given to organisations tackling issues at this level, such as the newly formed Severn Rivers Trust (www.severnriverstrust.org.uk).

5.0 Making it Happen

It is recommended that this report is discussed with the Environment Agency to see if there are any opportunities for working in partnership to implement the recommendations. The 'poor' status of this part of the Perry in the Severn River Basin Management Plan should provide an impetus to tackle the problem, which is most likely to be due to poor habitat.

The Wild Trout Trust (WTT) may be able to provide further assistance in preparing a more detailed proposal and costing for works and assisting with the preparation of Land Drainage Act consent applications. Please note that this process can take several months.

Once appropriate plans and consents have been completed, the WTT can also provide assistance in the form of practical visits (PVs) where habitat improvement techniques are demonstrated to those who will continue the work subsequently. The WTT will fund the cost of labour (two-man team for up to 3 days) and materials; recipients will be expected to cover travel and accommodation expenses of the advisers. The use of specialist plant will be by separate negotiation. Demand for PVs is currently high; please enquire at projects@wildtrout.org.

6.0 Acknowledgement

Wild Trout Trust would like to thank the Environment Agency for supporting its programme of advisory visits.

7.0 Disclaimer

This report is produced for guidance only and should not be used as a substitute for full professional advice. Accordingly, 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 comments made in this report.

References

Harper, D.M. (1990) The ecology of a lowland sandstone river: the River Perry, Shropshire *Field Studies* **7**, 451-486. www.field-studies-council.org/fieldstudies/documents/vol7.3_198.pdf

Swales, S. (1982) Notes on the construction, installation and environmental effects of habitat improvement structures in a small lowland river in Shropshire. *Fisheries Management* **13**, 1-10.

Swales, S. & O'Hara, K. (1983) A short-term study of the effects of a habitat improvement programme on the distribution and abundance of fish stocks in a small lowland river in Shropshire. *Fisheries Management* **14**, 135-144.

Appendix 1 – Gravel cleaning advice

Leaf-blower method

The WTT have recently purchased a leaf blower for gravel cleaning. It is a Stihl BR600 backpack 2-stroke.

I have used the blower several times and it's big advantage is portability. It is not as precise or controlled as the water pump/lance method, and this would be my first choice, but if access is a problem then the leaf blower is a good substitute. On compacted gravels you need to break them up a bit with a crowbar before using the blower. A full face mask and trawlerman's oilskin is very useful as well!

Water pump and lance method

A suggested equipment specification, including approximate costs is listed below:

Pump - Honda WH20X water pump - **£475**

15m length 1" clear braided hose (outlet) - **£45**

2m length 22" green PVC suction hose (inlet) - **£25**

1.5m length 25mm steel pipe (attached to outlet and flattened at end to increase pressure) - **£10**

Adaptors 2" BSP swivel x 1" BSP male (to attach pump to outlet) - **£45**

Hose fitting 1" BSP female swivel x 1" tail (to attach outlet to pump) - **£15**

Jetting riffles

To reduce impacts of silts moving downstream ‘Sedimats’ can be used. These are pinned to the riverbed downstream of the cleaning and collect the silt blown up by the pumps. Being made of hessian they can then be removed from the river planted up and used for any bank work. They cost approximately £42 each.

Points to note:

1) Spawning gravels are also important habitat for invertebrates and plants and operators should avoid the temptation to clean 100% of the available spawning resource. WTT recommend a 4-year rotation doing no more than 25% in any one year; this gives invertebrates the chance to re-colonise and is a good compromise between improving spawning success and minimising invertebrate damage. The invertebrates do re-colonise very quickly, and

often in greater numbers and diversity than pre-cleaning, so any declines are short-lived.

2) Spend the winter preceding any jetting operations to identify areas were trout redds occur. This will enable you to target your time more efficiently.

3).Gravels need to be cleaned in September / October, prior to spawning (Nov-Jan) to an approximate depth of 20-30cm; on no account do it later than this or you may be causing more damage than you are trying to rectify. Concreted gravels need to be broken up, by bashing away at them with the steel lance (or a crow bar), they do break up to leave loose gravel, it's just hard work! Work in a downstream direction to avoid mobilising silt into areas already cleaned.

4) Evaluate your efforts - are there any redds in evidence in the winter after your efforts? How many and where?

5) Health & Safety - Work in pairs and use goggles/ safety glasses to protect your eyes. Undertake a risk assessment.

6) Let the Environment Agency know what you intend to do - you may need special permission.

7) Jetting does not solve the problems of excessive siltation. It merely mitigates against the effects. To tackle this issue effectively you must look at land use and address problems at the catchment level.

Waterbody Category and Map Code.:	River - R15	**Surveillance site:** No
Waterbody ID and Name:	GB109054054970	R Perry - conf Common Bk to conf Tetchill Bk
National Grid Reference:	SJ 36341 29898	
Current Overall Status	Poor	
Status Objective (Overall):	Good by 2027	(For Protected Area Objectives see Annex D)
Status Objective(s):	Good Ecological Status by 2027	
Justification if overall objective is not good status by 2015:	Technically infeasible	
Protected Area Designation:	Freshwater Fish Directive, Nitrates Directive	
SSSI (Non-N2K) related:	No	
Hydromorphological Designation:	Not Designated A/HMWB	
Reason for Designation:		
Downstream Waterbody ID:	GB109054050030	

Ecological Status

Current Status (and certainty that status is less than good) Poor (Very Certain)

Biological elements

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Fish	Poor (Very Certain)	Poor	Technically infeasible (B2p)
Invertebrates	Good	Good	

Supporting conditions

Element	Current status (and certainty of less than good)	Predicted Status by 2015	Justification for not achieving good status by 2015
Quantity and Dynamics of Flow	Supports Good	Supports Good	
Morphology	Supports Good	Supports Good	

Chemical Status

Current Status (and certainty that status is less than good) Does not require assessment