



Advisory Visit

River Stour, Warwickshire

August 2016



1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the River Stour, Barcheston, Warwickshire, on 29th August 2016. Comments in this report are based on observations on the day of the site visit and discussions with the landowner, Russell Swinbourne.

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

River	River Stour
Waterbody Name	Stour - conf Nethercote Bk to conf Back Bk
Waterbody ID	GB109054039922
Management Catchment	Avon Warwickshire (Operational catchment: Avon Rural, Rivers and Lakes)
River Basin District	Severn
Current Ecological Quality	Overall status of Moderate * ecological status through two assessment cycles from 2013 – 2015.
U/S Grid Ref inspected	SP2637039789
D/S Grid Ref inspected	SP2621940018
Length of river inspected	~500m

*The Environment Agency rate the quality of waterbodies under the Water Framework Directive using a range of measures of ecological, chemical and physical quality (giving ranks of high, good, moderate, poor or bad). The lowest rank in any measure gives the overall status. In this case, the waterbody scores high for invertebrates, good for fish, but only moderate for macrophytes and phytoenthos (aquatic plants and algae); the latter is likely linked to a poor score for phosphate in 2015.

The River Stour is a tributary of the Warwickshire Avon, rising on Wigginton Heath and flowing west, then north-west for 58km, through Shipston-on-Stour to join the Avon south of Stratford-upon-Avon. It is a lowland river, flowing through a landscape of mixed arable, pasture and broadleaved woodland, over clay/loam soils.

The section inspected on this visit was at the Old Mill House, Barcheston, near Shipston-on-Stour, a former mill property recently acquired by Mr. Swinbourne. The river flows in a loop approximately 500m long to the west of the property. A mill leat channel leaves the main river immediately upstream of the property (Figure 1, bottom left), flows into a walled mill pond area (Figure 1, top right) and then onwards to rejoin the main river. A gabion dam is located at the downstream end of the leat (Figure 1, top left); the reason for this is unclear as it only backs up water for a short distance and water levels in the mill pond are not dependent upon this structure. The great majority of the flow occupies the main river channel, with the flow into the mill channel dependent upon the water height maintained by a low weir in the main river channel (Figure 1, bottom right). This weir is comprised of rough stone blocks and according to the previous owners, requires annual maintenance/rebuilding to maintain flows into the mill leat. The mill property has a history of flooding.



Figure 1

3.0 Habitat Assessment

The river was walked in a downstream direction from the mill to the confluence of the mill leat and the main river.

The weir at the head of the main river channel is a key structure because it determines the proportion of the flow going down the main river and the mill leat. Currently, the weir crest is set at a low level and prioritises flow in the main river, which is beneficial for the river habitat. The low crest, rough construction and temporary nature of the weir means it is also reasonably “friendly” in terms of fish passage across the weir, an important consideration so fish can migrate between habitats to complete their life cycle. For example, the trout present in this reach may depend upon spawning habitat in headwaters or side streams further upstream.

Mr. Swinbourne is keen to maintain a flow down the mill leat, keep the mill pond and possibly construct another pond on the land between the two channels. The mill leat also acts as a conduit for flood flows. If the weir was made into a more permanent structure, it is recommended that the crest level is kept at the current level or lower to ensure the majority of dry weather flow continues down the main river channel. Also, the structure should be passable to fish and a low-gradient rock ramp design would be a favourable option (see recommendations).

The gabion dam at the downstream end of the mill leat is holding back water for a short distance upstream, but much of the channel downstream of the mill pond is free-flowing and un-impounded. The dam is not serving any useful purpose, is degrading habitat and may increase flood risk, so would be best removed. In the absence of this impoundment some natural gravels may be exposed (or some could be introduced) to provide spawning areas for fish such as trout, dace and chub.

On the main river channel, downstream of the weir, the gradient is relatively steep with riffles and glides present (Photo 1). The river bed substrate is quite coarse, comprising large gravels and cobbles (fist size and above), which are not well suited to river fish spawning (too big). This may be a consequence of finer gravels being trapped above the weir and their net loss from downstream (Figure 2). It may also be a product of the relatively steep gradient found in this section of the channel, probably resulting from historic river diversion when the mill was constructed.

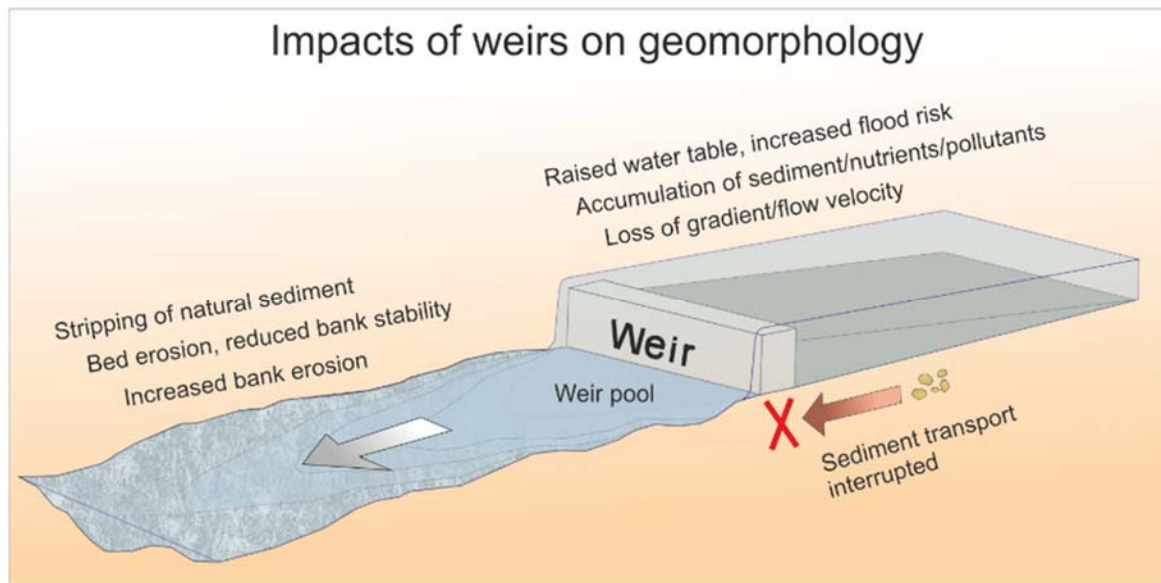


Figure 2 Weirs interrupt sediment transport, trapping it upstream whilst it continues to be transported away downstream of the weir, leading to a net loss of smaller particles (gravels) there.

Small stands of water crowfoot (*Ranunculus* sp.) are present in un-shaded areas of faster flow. However, the river bed is covered in excessive algal growth reflecting the “poor” status of this waterbody for phosphate levels.

A small tributary (Pig Brook) enters on the left bank and below this, the gradient of the river lessens and the instream habitat becomes a slow-flowing glide (Photo 2). Land use on each bank is low intensity, being the grounds of the mill house on the right bank and a Guide camp on the left bank. The river has a nice balance of shade provided by bankside trees including willow, alder, ash and sycamore. Shade provides an important role in keeping water temperatures down during low flows and hot weather, an important consideration for fish such as trout which has a maximum temperature tolerance in the low to mid-twenties Celsius.

Downstream of the glide the river establishes a pool-and-riffle sequence with some high quality instream habitat (Photos 3 – 8). The river bed is predominantly gravel, with a tendency for decreasing particle size with progress downstream.



Photo 1 Downstream of the weir, faster flowing riffle and glide habitat with water crowfoot present.



Photo 2 Slower glide section.



Photo 3 Downstream of the slow glide section, the gradient increases and a pool-riffle sequence establishes.



Photo 4 Good low cover over the water which should be retained. Trimming trailing brambles (arrow) to facilitate casting is not a problem, but resist the temptation to cut back the branches.



Photo 5 Nice instream habitat: a pool on the outside of the bend with a gravel shoal on the inside.



Photo 6 Another nice riffle leading into a pool on a bend.



Photo 7 Gravel of a suitable size for trout spawning, towards the downstream end of the reach. Its deposition here may be a product of a less-incised bankfull channel.



Photo 8 Shallow gravel glide which would benefit from some large woody material.

Gravel of a suitable size for trout spawning (10 – 40 mm diameter) is present towards the downstream end of the reach, possibly reflecting an increase in the cross-sectional area of the bankfull channel; this increased channel capacity may facilitate the settling out of the finer gravel particles in flood flows.

Bankside habitat continues to be very good, with plenty of low cover over the water from overhanging tree branches and marginal vegetation. In-stream structure is present in the form of submerged tree roots and occasional pieces of fallen woody material. The “shaggy” nature of the river provides very good habitat and should be preserved. If areas are to be trimmed back to facilitate angling access, low cover (that within 3ft of the water surface) should be retained. Any tree maintenance (such as pollarding willows) should be carried out on a rotational basis to promote a range different stages of re-growth. The emphasis should very much be on having a light touch.

At the downstream extent of the reach (Photo 8), there is a relatively straight, shallow, gravel-bedded glide. This area would benefit from the introduction of some large woody material to diversify the flow and depth profile. There are ample trees on the right bank which could be hinged and pegged in place to achieve this (see recommendations).

The river channel is deeply incised through many areas of the reach reflecting historic river engineering (bed lowering) in common with most lowland watercourses. As described above, this has implications for the transport and retention of sediment (gravels) where the channel cross-section is narrow and deep (promoting high-energy flood flows). Re-profiling the river banks to a shallower angle on the inside of bends can help to restore more natural river morphology and sediment transport processes. For example, the formation of gravel shoals (see recommendations).

4.0 Recommendations

- The weir at the head of the main river channel should be maintained at the current crest height or lower to ensure dry weather flows are prioritised in the main river channel. If it is made a more permanent structure, it should provide for free fish passage. A rock ramp design

would be the easiest way to achieve this. Rock ramps consist of a low gradient (between 1% and 5%) constructed from rows of coarse boulders, infilled with cobbles and coarse gravel. Slots within the rows of boulders provide pathways for fish passage (Figure 1, Photo 9).

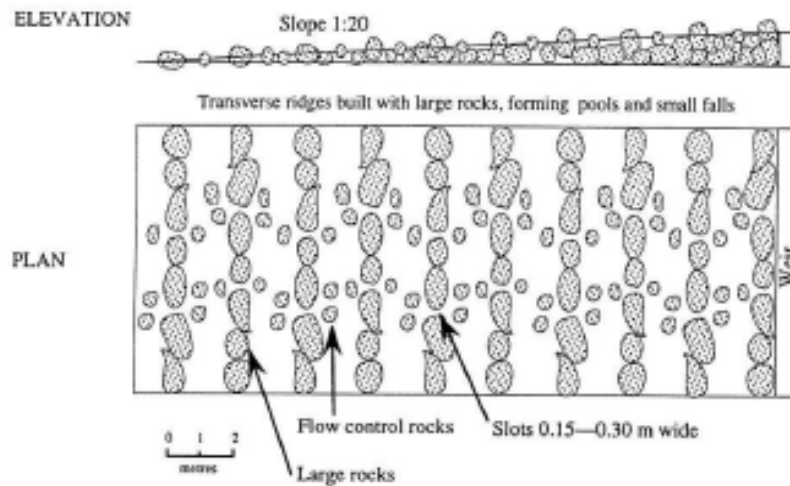


Figure 3 The general design layout of experimental rock-ramp fishways in New South Wales, Australia (after Harris et al, 1998) – from Environment Agency Fish Pass Manual, pp 156-159. (https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/298053/geho0910bthp-e-e.pdf).

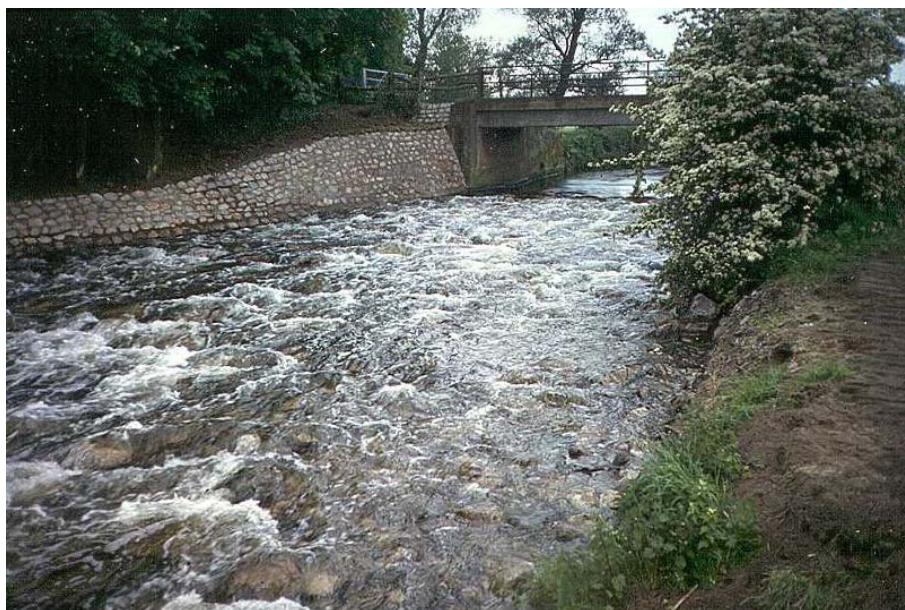


Photo 9 Rock ramp installed downstream of a pre-existing weir, River Trent, Staffordshire.

Keying-in the downstream end of the rock ramp, well below existing bed level, is very important to prevent it becoming undermined and leading to the disintegration of the ramp.

- Remove the gabion dam at the downstream end of the mill leat. See if natural gravels are exposed. If not consider introducing areas of 10 – 40 mm diameter gravels.
- Retain the current level of shading of the channel. Have a light touch when it comes to tree maintenance and creating access for angling. Retain low cover over the water.
- Introduce some large woody material to the river channel in selected areas, for example the shallow glide in Photo 8. Figure 4 shows the type of effects which can be promoted by careful placement of woody material. Trees can be partially cut and hinged over into the channel (Photo 10), providing a robust anchor point. Additional fixing with stakes and wire can also be used.



Photo 10

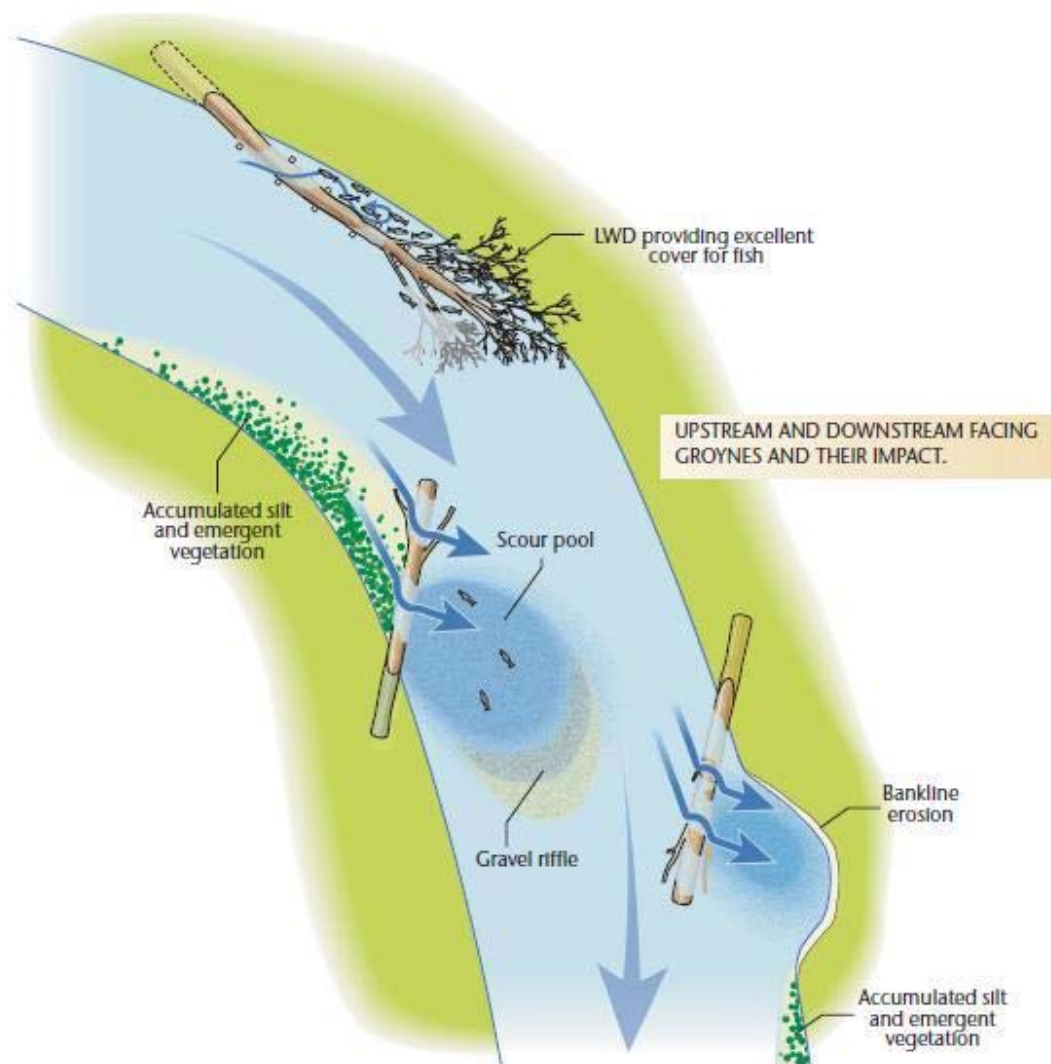


Figure 4

- If the opportunity arises during construction works at the mill property, or during pond construction, the banks of the river on the inside of bends could be re-profiled to a shallower angle (Photo 11).



Photo 11 Bank reprofiling on the inside of a bend.

Please note that all works within the river channel or to the river banks require a flood defence permit from the Environment Agency (for “main rivers”) or the Local Authority (“ordinary watercourses”). Early consultation with the relevant authority is recommended, prior to submission of a permit application.

5.0 Making it Happen

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

www.wildtrout.org/content/library

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 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 more specific Project Proposal (PP). This service is designed to help land owners, fishing clubs and community groups put together the necessary plans and documentation to obtain the relevant permissions to undertake a project.

The WTT could also help with a Practical Visit (PV). PV's typically comprise a 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 high demand for advice and 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.

6.0 Acknowledgement

The WTT would like to thank the Environment Agency for supporting the advisory and practical visit programme in England, through a partnership funded using rod licence income.

7.0 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.