Advisory Visit

River Teme, Leintwardine

February 2015

1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the River Teme, Leintwardine, Herefordshire, on 18th February, 2015. Comments in this report are based on observations on the day of the site visit and discussions with Barney Rolfe, Lawrence Parker and Cliff Gammon of Leintwardine Angling Club and Liz Etheridge and Peter Giles of the Environment Agency.

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 Teme is a major tributary of the River Severn and Leintwardine Angling Club (LAC) fish a nine-mile reach between Lingen Bridge (SO3583172908) and Bow Bridge (SO4304973133) near Leintwardine, Herefordshire. The River Clun joins the Teme just upstream of Leintwardine Bridge about halfway along LAC waters. Only the section of river downstream of Leintwardine Bridge was inspected during this visit.

The club has been in existence since 1840 and currently has 36 members. Fishing is fly-only for trout and grayling and the club introduce 500 12-inch brown trout (triploids from 2015) annually to the river in the area around Leintwardine Bridge. Approximately 200 trout were caught by members last season.

The Teme has a run of salmon and the Environment Agency carry out annual redd counts to estimate salmon egg deposition. Good numbers of salmon redds were observed in the Trippleton area of the Leintwardine water this winter.

The River Teme is a Site of Special Scientific Interest (SSSI), the designation for which can be found on the Natural England website: http://designatedsites.naturalengland.org.uk. The reason for designation is:

The channel is of special interest as a representative, near-natural and biologically-rich river type associated with sandstone and mudstones. This *type has a mainly northern and western distribution in Britain but is especially characteristic of the Welsh Marches.*

The Teme demonstrates a close relationship with the underlying geology. A short, rapid-flowing upland section, with nutrient-poor and relatively acidic waters, changes to a more basic and naturally nutrient-rich system for most of the river's length as it passes over Silurian shales and mudstones, and the Old Red Sandstone strata. At its lowest section, the Teme is a sluggish, lowland river on soft deposits.

These attributes and the high water quality, support significant river plant, fish and invertebrate communities and otter populations. A small section of the lower River Clun is included in the SSSI for a notable species (freshwater pearl mussel).

The Teme rises at 460 m on Cilfaesty Hill, Powys and falls steeply to Knighton, descending 122 m over 1.6 kms of the English/Welsh border. It then flows through a more gentle landscape via Ludlow and Tenbury Wells to join the River Severn just below Worcester. The river is actively eroding and fast flowing, with many shingle bars, especially above Leintwardine. Where the river cuts through the sandstone, the bed is often formed of submerged rock platforms. The banks are well tree-lined with alder Alnus glutinosa, with some willow Salix spp. stands.

The SSSI supports the following species covered by Council Directive 92/43/EEC on the conservation of Natural Habitats and of Wild Flora and Fauna. Twaite shad *Alosa fallax* and sea lamprey *Petromyzon marimus* (only found in the lower reaches); brook lamprey *Lampetra planeri*; salmon *Salmo salar*; bullhead *Cottus gobio*; grayling *Thymallus thymallus*; otter *Lutra lutra*; Atlantic stream crayfish *Austropotomobius pallipes*; freshwater pearl mussel *Margaritifera margaritifera.* In the LAC section of the Teme, fish species present are brown trout, grayling, salmon, bullhead and brook lamprey.

The SSSI is divided into six units, all of which are in unfavourable condition. The reasons for this are given as inappropriate weirs, dams and other structures; invasive freshwater species; siltation and water pollution (agriculture/run off). The Teme is a priority catchment and a capital grant scheme target area under the Catchment Sensitive Farming Delivery Initiative England (2011-16).

Under the Water Framework Directive, this section of the River Teme (Waterbody ID GB109054044500, confluence of River Clun to confluence of River Onny) was classified as "good" overall status in 2009, with "high" status (the best category) for biological elements (fish, invertebrates, plants, etc.). In 2013, the overall status had dropped to "moderate" although this appears to be due to a failure in a single water quality parameter (copper), with biological elements remaining at "high" status.

3.0 Habitat Assessment

Trippleton (SO4098073395) to Criftin Ford Bridge (SO4199772012)

This section of river illustrates how different land management practices affect the river channel and hence the habitat for fish. Where the banks are inaccessible to livestock (Photos 1 – 3), there is a healthy riparian zone with trees present, which provide bank stability and cover for fish. In contrast, where the banks are grazed, few trees are present, bank stability is much reduced and erosion is taking place at an accelerated rate (Photos 1, 2, 4 and 5).

Erosion is a natural river process which seeds sediment into the river, including gravels and cobbles vital for trout and salmon spawning. Indeed, abundant salmon redds have been recorded in the area in Photo 4 where accelerated erosion rates are increasing locally the rate of supply of coarse sediment to the river. However, this must be set against two negative factors:

- Accelerated erosion also increases the supply of fine sediment to the river, which can adversely affect salmonid egg survival by clogging redds.
- The poor quality (bare) riparian habitat provided by eroding banks greatly reduces the survival rate of juvenile trout and salmon and can be a population bottleneck, despite good spawning (Figure 1).

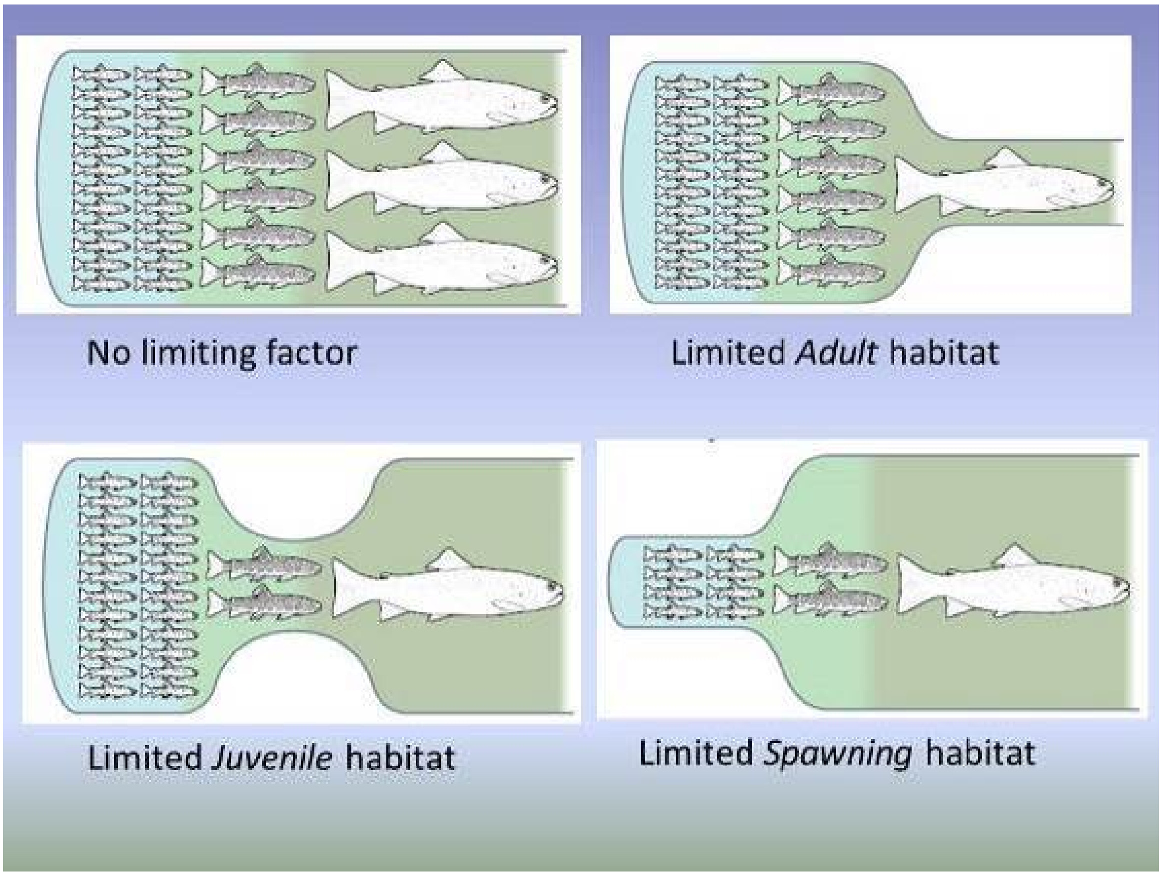


Figure 1. The knock-on impacts to fish populations caused by a lack (or degradation) of specific types of habitat at three crucial lifecycle stages; spawning, juvenile/nursery and adult. Spawning trout require loose gravel deposits with a good flow of oxygenated water between gravel grains. Juvenile trout require shallow water (quite variable around an average of 20 cm) with plenty of dense submerged/tangled structure for protection against predators and wash-out during spates. Adult trout require deeper pool habitat (generally > 30cm depth) with nearby robust structural cover such as undercut boulders, sunken trees/tree limbs and/or low overhanging cover (ideally within 30cm of the water's surface).

The rough, shaggy marginal habitat within the fenced areas provides cover throughout the crucial first winter of life for juvenile fish, protecting them from predation. Further information on this topic can be found in this short video on the Wild Trout Trust website www.wildtrout.org/content/case-study-videos#wufbuffer (buffer strips and fencing – third video down the page).

Excluding grazing from the river banks in open areas (such as those in Photo 4) is recommended, to allow regeneration of coarser vegetation and trees. Liaison with the landowners and tenants is key to achieving this as is understanding the opportunities and constraints provided by agri-environment and grant schemes. Where livestock can be excluded, the riparian habitat can be given a kick start by installing brushwood cover in the margins; this has the dual advantage of slowing erosion rates and providing instant cover which increases the survival rates of juvenile salmonids (see Recommendations).

A complication with excluding livestock from the river bank is the presence of the invasive, non-native plant Himalayan balsam (*Impatiens glandulifera*), which can proliferate in the absence of grazing (Photos 1, 2). Large stands of Himalayan balsam can reduce the diversity of native vegetation and the associated invertebrate life and being an annual, it dies back in winter to leave bare ground vulnerable to erosion; it can also be a nuisance for access to the river.

Means of control for Himalayan balsam are either mechanical or by herbicide (www.ceh.ac.uk/sci_programmes/documents/himalayanbalsam.pdf). The plant is easy to cut, either by hand or machine, provided there is adequate access. Unless the plant is cut below the lowest node, it will regrow and flower later in the season. Thus, a single cut is only effective if made very close to the soil level. Regular cutting will also control this plant even if the cutting level is above the lowest node, provided the frequency is sufficient to prevent the formation of flowers and seeds. Mechanical control is likely to be effective only in those locations where good access is available to ground smooth enough for close mowing and free of shrubs or bushes.

Small infestations can be controlled by hand pulling as the plant is shallow rooted. The seedbank lasts for approximately 18 months, so two years control should eradicate the plant if there is no further infestation from upstream.

Himalayan Balsam can be controlled by spraying the foliage with glyphosate. The plants should be sprayed in the spring, before flowering but late enough to ensure that germinating seedlings have grown up sufficiently to be adequately covered by the spray. Small infestations and individual plants can be controlled by using glyphosate in a weed wiper. This has the advantage of preserving native plants and grasses which would otherwise be killed by the glyphosate. Prior permission in writing for using herbicide must be obtained from the Environment Agency and from Natural England because of the SSSI status of the river. The EA form and guidance notes are available via the following links:

www.gov.uk/government/uploads/system/uploads/attachment_data/file/296858/geho0110brzi-e-e.pdf

www.gov.uk/government/uploads/system/uploads/attachment_data/file/296857/geho0110brzk-e-e.pdf

The Monnow Rivers Association have waged a very successful campaign against Himalayan balsam, combining herbicide application to large stands, followed up by hand-pulling (www.monnow.org).

Upstream of Criftin Ford Bridge, the dynamic nature of the Teme is evident (Photos 5, 6), with actively eroding banks on the outside of meanders and rapidly accumulating sediment on the inside. Reducing the rate at which these processes are occurring would be desirable from a river habitat perspective, but trying to slow or stop the erosion in such active areas using bank reinforcement would be an extremely expensive and likely futile exercise. Only a change in land use to allow more deeply-rooted vegetation (ideally trees) to develop will achieve this aim in the long term.

Photo 1 Upstream view from Trippleton towards Leintwardine. Good riparian habitat, although Himalayan balsam is a problem here.

Photo 2 Downstream view from Trippleton, showing the grazed, eroding right (far) bank. The near bank is fenced but has stands of Himalayan balsam.

Photo 3 Fenced left bank at Trippleton provides good bank stability and marginal habitat.

Photo 4 Unfenced banks at Trippleton with accelerated erosion. This area is known for salmon spawning, but habitat for subsequent juvenile stages is relatively poor.

Photo 5 Upstream of Criftin Ford Bridge (Black Bridge). The dynamic nature of the Teme is evident here, with active erosion and deposition respectively on the outside and inside of a meander.

Photo 6 Just downstream of Photo 5, showing a valuable stable woody debris accumulation against a vegetated gravel shoal.

Downstream of Criftin Ford Bridge

Downstream of the bridge, an alder tree has fallen into the river and become lodged on the river bed (Photo 7). Such "large woody material" (LWM) creates very good instream habitat for trout and salmon. It provides cover for fish to avoid predation; traps leaf litter and other organic detritus which feeds invertebrates, increasing food availability for fish (and fly hatches); and it creates localised variation in current speeds and depths which in turn sorts and grades the river bed sediment into different sizes. This graded sediment provides a range of habitats, the coarser material being suitable for fish spawning and stone-clinging nymphs such as March brown, brook dun and olive upright (Heptageniidae), whilst the finer materials support brook lamprey and Mayfly nymphs (*Ephemera* sp.).

The presumption should be to leave such LWM *in situ* for the benefit of river habitats and the following decision tree is useful to aid such decisions:

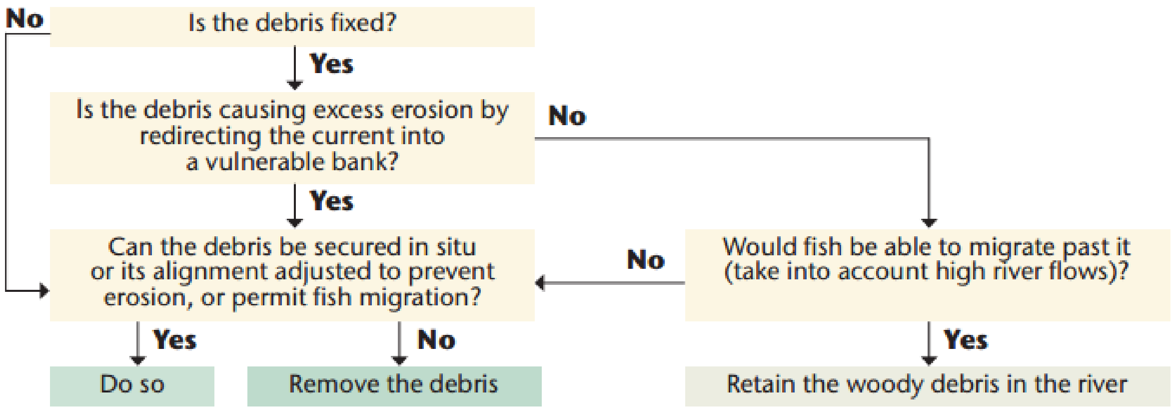


Figure 2 Decision tree for managing large woody material (from WTT habitat management sheet www.wildtrout.org/sites/default/files/library/Woody_Debris_Apr2012_WEB.pdf).

Further downstream from the bridge there is a marked contrast between river bank habitat, the right bank being well-vegetated with trees and coarse marginal plants, but the left bank being grazed and relatively bare. The former provides excellent habitat which will support good numbers of fish, whereas the latter does not and is much more vulnerable to erosion (Photos 8, 9). This is illustrated at the meander bend in Photos 10 and 11, where the bank is actually eroding on the inside of the meander bend, rather than the usual outside. The fallen trees here are backing-up the water at high levels and causing the river to find a new course around them; the lesser stability of the treeless, grazed left bank being the course of least resistance.

The dynamic nature of the river here produces some good in-stream habitat in the form of exposed gravel bars and significant accumulations of LWM. However, the rate of erosion of grazed banks does give cause for concern in terms of the rate of sediment supply and the lack of tree succession. Only a change in riparian land use would make any significant difference to this issue.

Photo 7 Stable large woody material in the river channel provides excellent instream habitat and should be retained wherever possible.

Photo 8 Excellent riparian habitat on the right bank of the river, in contrast to the grazed left bank.

Photo 9 As above: the grazing pressure on the left bank makes it far less stable and prone to erosion like this. If grazing pressure is removed from this bank, increased vegetation cover and root matrices would stabilise the bank and greatly reduce erosion.

Photo 10 Fallen trees at grid reference SO4222271717 (downstream view). Such large accumulations of woody material are rare on British rivers and are very good habitat features. The river is cutting across the inside of a meander bend here to the left of the picture.

Photo 11 Upstream view from the same position as previous photo.

Upstream of Burrington Bridge (SO4358972052)

Just upstream of the bridge there is extensive bank erosion on the grazed left bank (Photo 12), which contrasts with the well-vegetated bank opposite. Further erosion in this area threatens the road bridge and consideration should be given to the relative costs of changing the land use on this headland to increase bank stability, compared with a future engineering solution.

Further upstream, the right bank continues to be well-vegetated with a healthy riparian zone. The left bank has mature trees (mainly alders) but is losing these to accelerated rates of bank erosion. The “scalloping” of the bank shown in Photo 14 is typical of the process that results from grazing around the base of riparian trees and will eventually lead to the same situation as that in Photo 12. The process can be slowed by filling the eroding bays with dense brushwood, for example, hinging in hawthorn trees, but fencing to promote the growth of vegetation and natural tree succession is required to preserve long-term bank stability.

There are a number of areas on the right bank with abundant young trees. Some of these could be hinged and laid into the margins to provide good cover for fish, for example the area in Photo 15 (see Recommendations).

An area alongside the river on the left bank at approximate grid reference SO433718 is in a stewardship agreement which maintains a wide, uncultivated buffer between the river and arable land (Photo 16). The conditions of the agreement only allow cutting of vegetation in late summer, which presents an access problem for members of the fishing club. The club should discuss this with Natural England and the land manager to see if a dispensation could be negotiated to maintain foot access; this would not detract from the purpose of the buffer strip which is doing an excellent job in protecting the river from agricultural run-off and soil erosion.

Photo 12 Erosion of the left bank upstream of Burrington Bridge

Photo 13 View upstream from same position as previous photo.

Photo 14 "Scalloping" of the bank which is the result of excessive rates of erosion of the grazed left bank. It results in the loss of trees and eventually the same situation as Photo 12. Areas like the above could be tackled by laying the bushy growth into the water to still the erosive forces near the bank, but fencing off grazing and allowing tree regeneration is also required for a long-term solution.

Photo 15 Riparian trees which have fallen into the river margins provide excellent cover for fish. Partially cutting and laying smaller trees such as these is an easy way of improving fish numbers.

Photo 16 A buffer strip separating arable land from the river. This is excellent practice for protecting the river, but the restrictions on mowing until late summer impact adversely on angling access. Some flexibility to allow foot access to be maintained is desirable.

4.0 Recommendations

Overall, the Leintwardine Angling Club waters seen during this visit support good in-stream habitat which supports a good head of wild trout, grayling and salmon and reflects the SSSI status of the river. The dynamic nature of the river results in valuable features such as meanders, pool and riffle structure, exposed gravels and accumulations of large woody material.

The overarching issue affecting the river is the relationship between the rate at which these dynamic processes take place and riparian land use. Where grazing takes place alongside the river, bank stability is greatly reduced and rates of erosion are accelerated. Given that fine sediment input is a recognised problem for the Teme (it is a priority catchment for Catchment Sensitive Farming), the increased rate of sediment supply due to riparian grazing practices should be taken into consideration, in addition to arable / soil erosion inputs.

Increasing bank stability through changed land use would be a long-term project requiring the co-operation of land managers and Natural England and an understanding of the agri-environment schemes available. Figure 2 shows the concept of planting blocks of trees to form headlands which would increase bank stability. Soft revetment techniques could be used in some areas to slow bank erosion, although the size of the Teme at this point would make this a considerable undertaking; photos 17-19 illustrate the technique. Exclusion of livestock is essential to reduce the rate of erosion and examples of successful fencing projects on a large spate river (the Cumbrian Eden) are shown in the appendix, along with fencing techniques.

The Woodland Trust may be able to advise and help with riparian tree planting projects. A project has been completed on the nearby River Clun which involved the Woodland Trust and the Environment Agency. More information can be found in the video on the Woodalnd Trust website here www.woodlandtrust.org.uk/publications/search/?subject=100007524 , along with much other useful information.

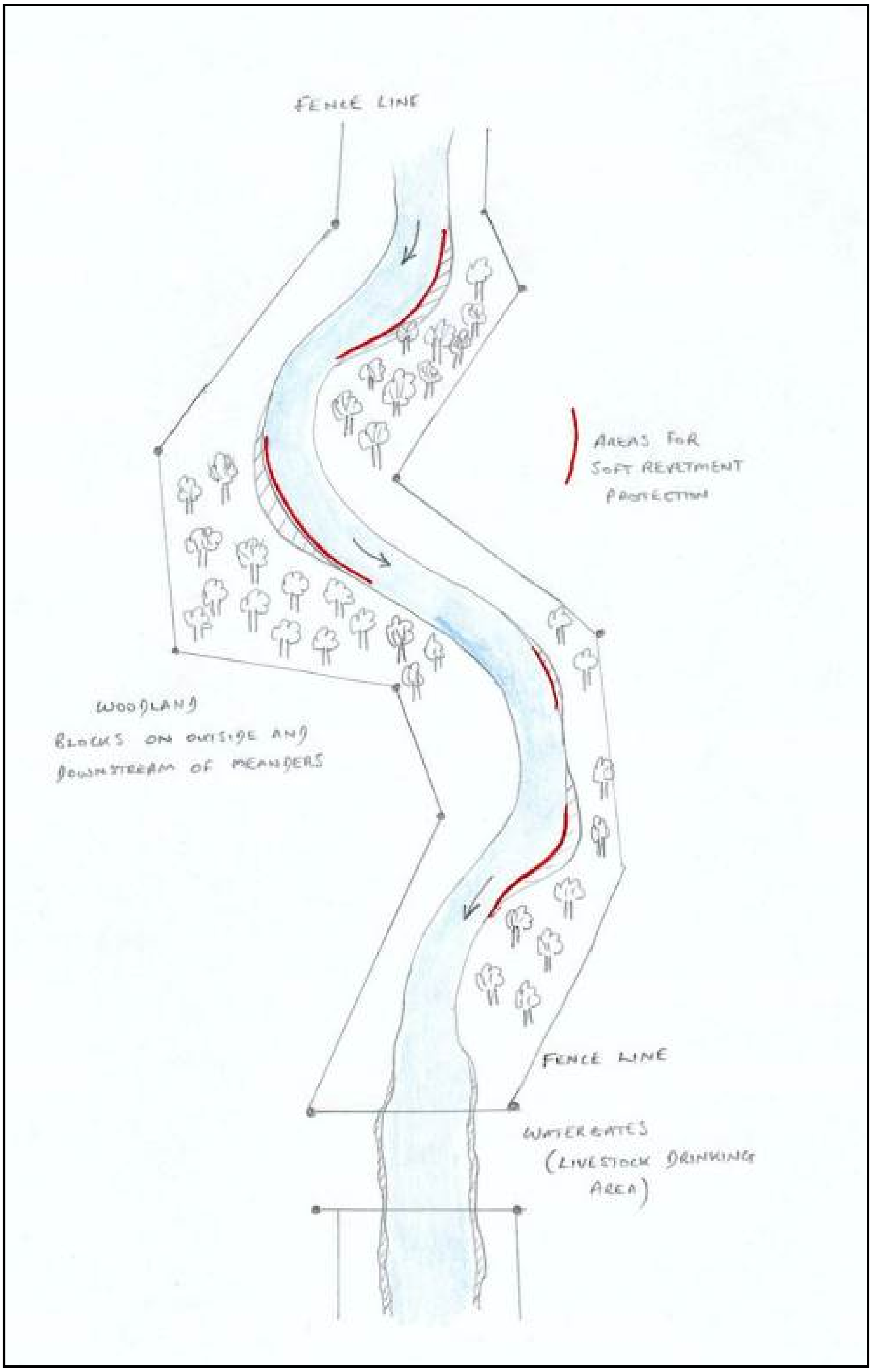


Figure 3 Stylised diagram of fencing and tree planting to increase the resistance of banks to erosion in the areas on the outside of and downstream of meanders. Soft revetment to allow time for trees to establish. NB Water-gates would not be practical on a river the size of the Teme.

Photo 17 Afon Dulas (before)

Photo 18 Afon Dulas (after). A Wye & Usk Foundation project, www.wyeuskfoundation.org (Photos courtesy of Simon Evans).

Photo 19 Conifer top revetment against an eroding bank on the River Manifold, Staffs. Note wide fenced adjacent margin which has also been planted with willow slips and is a vital part of the treatment.

Further recommendations:

- Retain large woody material in the river channel wherever possible. Use the decision tree given above (page 11).
- Where suitable trees are available, hinge and lay these into the margins of the river to provide low cover for fish (see appendix for examples).
- Fill in with hinged hawthorn bushes the scallops in the bank in areas such as Photo 14 to reduce erosion rates; combine with riparian fencing.
- Discuss with Natural England the regulations regarding cutting of the buffer strip upstream of Burrington Bridge to improve foot access for anglers during the summer.
- Consider taking part in the Anglers' Riverfly Monitoring Initiative to monitor for gross changes in water quality (see the Riverfly Partnership's website www.riverflies.org for more details).

- Review the club's trout stocking policy. The annual catch of trout seems low compared to the number of fish stocked, so it may well be possible to reduce the numbers stocked without adversely affecting catches. Catch returns are essential in order to monitor and manage the fishery. Further information on stocking is available on the WTT website here, along with case studies from clubs which have reduced stocking http://www.wildtrout.org/content/trout-stocking .

Please note that because of the SSSI status of the River Teme, it is a legal requirement that Natural England are consulted and written permission obtained prior to any works affecting the river.

It is also a legal requirement that all works to the river require written Environment Agency (EA) consent prior to undertaking any works. The EA will consult Natural England as part of the consenting process, but it is far easier to have discussed and agreed proposals with both organisations in advance of a formal consent application.

5.0 Making it Happen

The WTT can provide further assistance to help implement the above recommendations. This includes help in preparing a project proposal with more detailed information on design, costs and information required for obtaining consents to carry out the works. If required, a practical visit can be arranged to demonstrate habitat improvement techniques. Demand for these services is currently high but WTT is able to provide further advice and information as required. Further advice on fund-raising can be found at http://www.wildtrout.org/content/project-funding.

We have 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.

The WTT website library has a wide range of materials in video and PDF format on habitat management and improvement: http://www.wildtrout.org/content/index

6.0 Acknowledgement

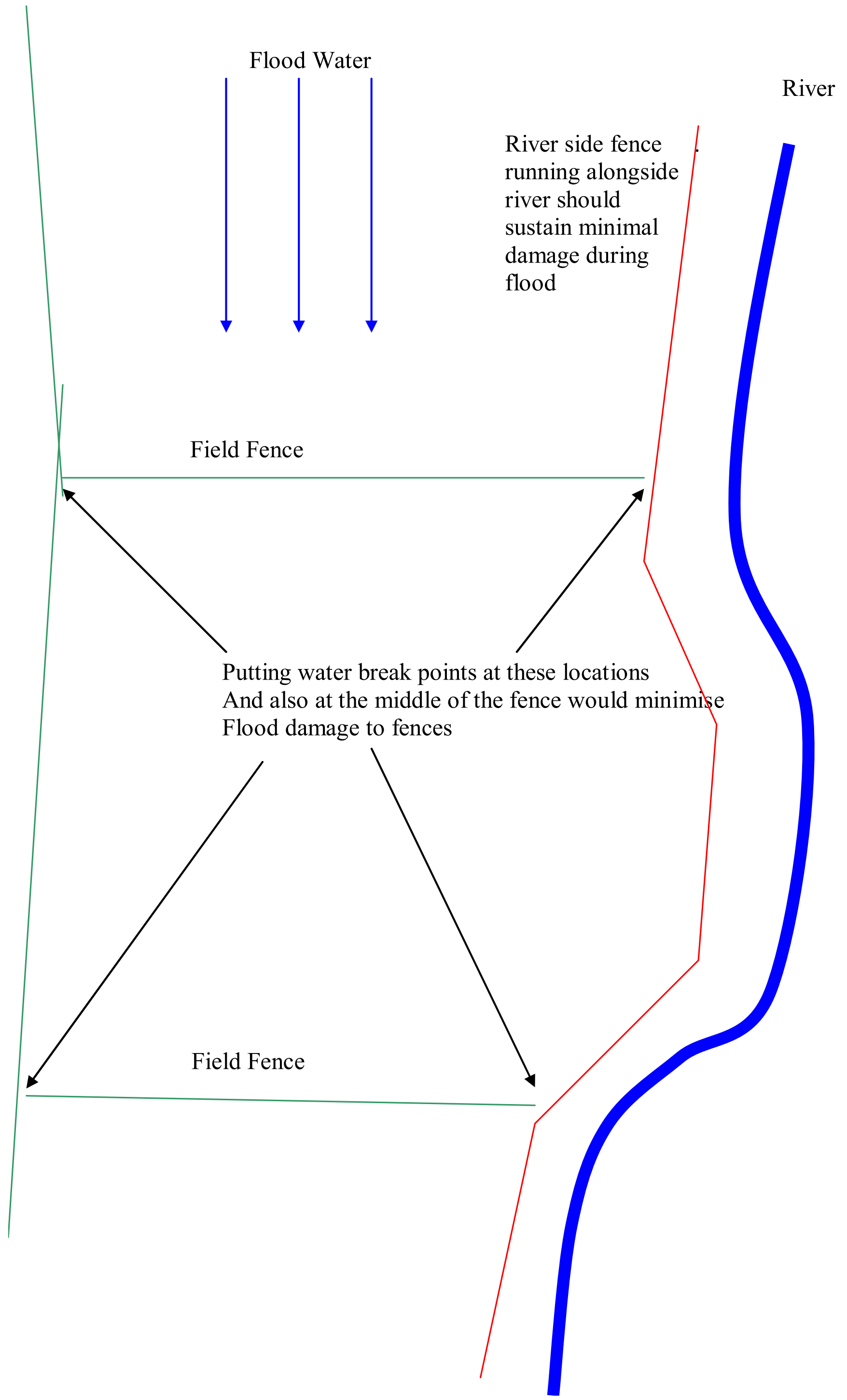
The Wild trout Trust would like to thank the Environment Agency for their continued support of the advisory visit service

7.0 Disclaimer

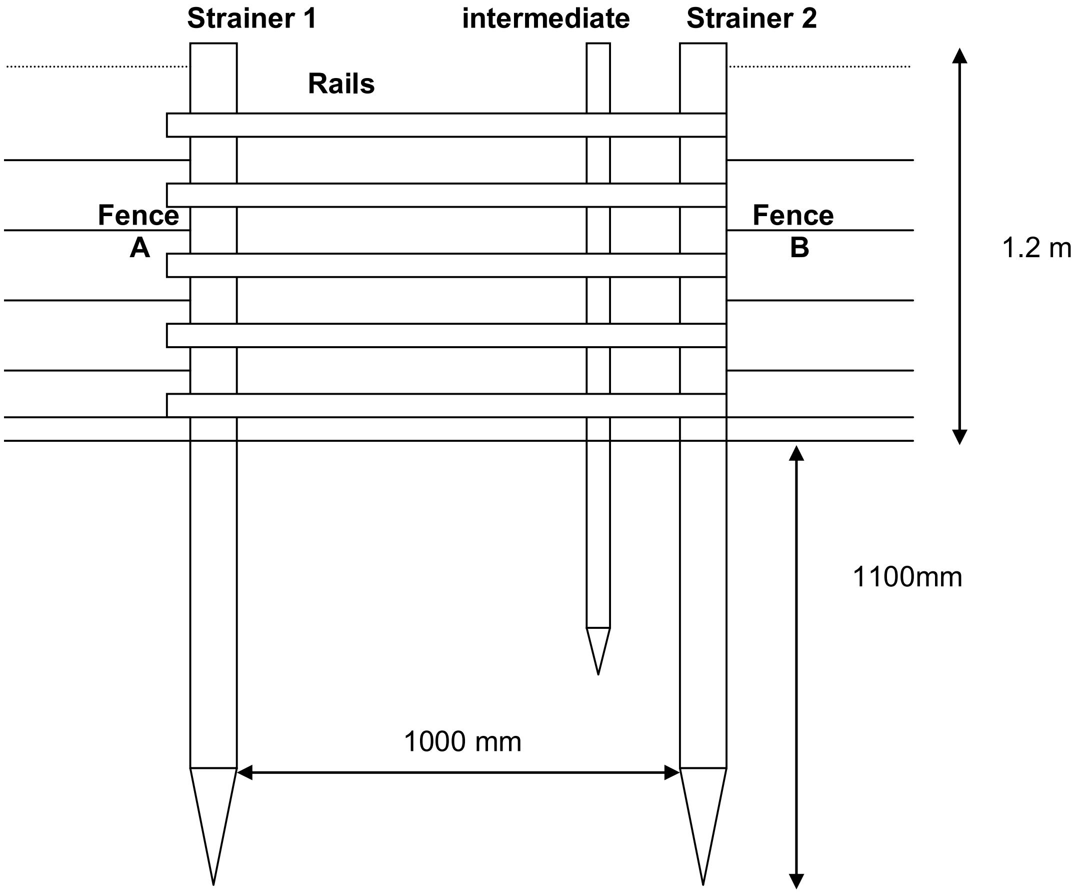
This report is produced for guidance and not for specific advice; no liability or responsibility for any loss or damage can be accepted by the Wild Trout Trust as a result of any other person, company or organisation acting, or refraining from acting, upon guidance made in this report. Accordingly, no 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.

Appendix 1

River-side fencing – guidance (courtesy of Will Cleasby, Eden Rivers Trust). See also WTT Upland Rivers Habitat Manual (www.wildtrout.org Publications)



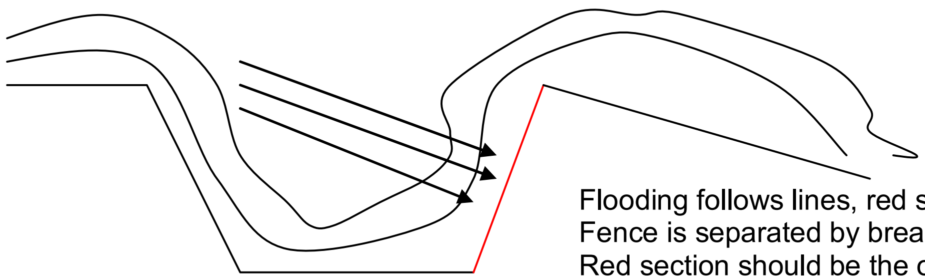
Details for setting up water break points to separate one fence into two



Water Break Point:

- Straining posts 1 and 2 set at approx 1m apart
- Intermediate post set 200mm of strainer 2
- Rails are nailed to strainer 1 and intermediate post
- Rails sit flush to strainer 2 but not attached to it

Example:



Flooding follows lines, red section of
Fence is separated by break points.
Red section should be the only one
To replace after flooding

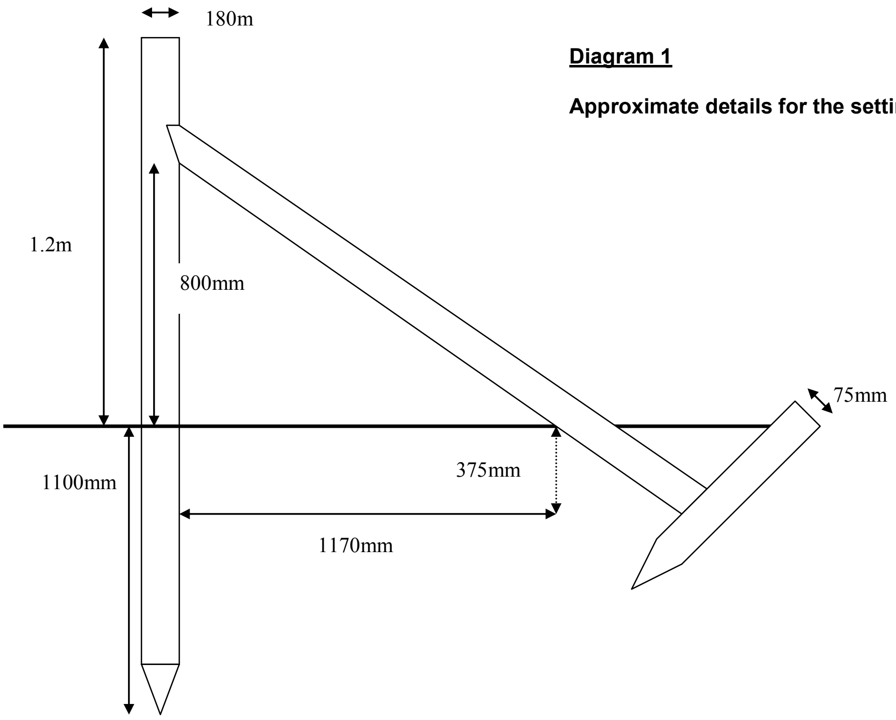


Diagram 1

Approximate details for the setting up of the strainer

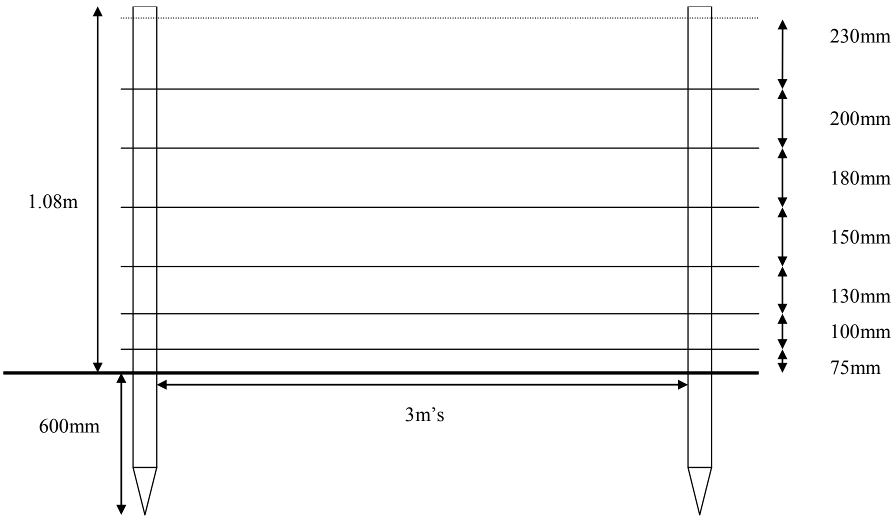


Diagram 1

HIGH TENSILE.

6 STRAND HIGH TENSILE
1 STRAND BARBED WIRE

High tensile wire (diagram 1)

- Shall not be less than 1.06m high from ground to top wire.
- Wire shall be galvanised (BS4102), 3.15 mm diameter.
- Straining Posts shall be 180mm minimum top diameter x 2.4m's to be driven into the ground.
- Strainers to be set at centres not exceeding 50m's.
- Turning posts shall be 155mm top diameter x 2.1m's. May be pointed and driven to 900mm into the ground.
- Struts shall be 120mm dia x 2.1m long and notched into the straining post at an angle no greater than 45 degrees. Allow two struts for strainer/turner where angle is less than 135 or one bisecting the angle where the internal angle is greater than 135.
- Intermediate post shall be 75 - 100mm dia x 1700mm to be driven to 450mm. To be set at no more than 3 m intervals.
- Galvanised steel radisseurs to be used to tighten strands.

Examples of habitat improvement techniques mentioned in the report.

- Examples of fencing projects – before and after

River Eden, Crackenthorpe, November 1998

River Eden, Crackenthorpe, July 2002

River Eden, Barrowmoor, October 1999

River Eden, Barrowmoor, August 2000

Pictures courtesy of Eden Rivers Trust

- Introducing low cover by laying smaller trees (up to 20cm diameter)

Partial cutting and laying of trees (like hedge laying) is a quick way of creating low cover which is firmly fixed to the bank.