



**Advisory Visit**

**River Witham, Easton Estate, Lincolnshire**

**20<sup>th</sup> October 2009**



## 1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the River Witham, Easton Estate near Grantham, Lincolnshire, on 20<sup>th</sup> October, 2009. Comments in this report are based on observations on the day of the site visit and discussions with Sir Fred Cholmeley.

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 Fishery Overview

The Easton Estate section of the upper Witham is approximately 3 km long and flows north from the upstream boundary where it passes beneath the A1 Great North Road (National Grid Reference SK928254), to the downstream boundary at the bridge on Easton Lane (SK929274).

The landscape through which the river flows is a mixture of grassland (currently being lightly grazed by sheep), and plantations of mature deciduous trees. The majority of the grazed land is in a Higher Level Stewardship scheme. The area is located on the Kesteven plateau, within the Lincolnshire and Rutland Limestone Natural Area ([www.naturalareas.naturalengland.org.uk/Science/natural/profiles%5CnaProfile38.pdf](http://www.naturalareas.naturalengland.org.uk/Science/natural/profiles%5CnaProfile38.pdf)).

The river levels were very low at the time of the visit following prolonged dry weather. The water clarity was good and the river bed visible throughout the length.

A pollution incident, thought to be farm slurry, affected the river in 2008 killing over 100 trout on this section of river. About a dozen live adult trout were observed during the visit, the majority of these in the section of river between the walled garden and the northern edge of Wellspring Plantation (track crossing).

## 3.0 Habitat Assessment

### 3.1 Lower section (Easton Lane – Forge Cottage)

This section of river has three blocks of woodland on the banks: Broadlands plantation, Post Office plantation and Mill Hill plantation. The extent of shading

provided by the trees influences the growth of submerged, emergent and riparian vegetation, and in turn the width and depth of the river channel. Where shading is present the river tends to be wide and shallow, whereas in the open field areas the channel is narrow and often choked with emergent vegetation.

A tributary stream enters on the LHB in Broadlands Plantation, but it flows over a drop of approximately 1 metre just above the confluence, making it impossible for trout to access this tributary for spawning (Photo 1). This may indicate that the main river channel has previously had its bed lowered for land drainage purposes, and the tributary level represents the former river bed level. In the river at the confluence the channel has been encroached by snowberry bushes (*Symphocarpus albus*), and there is an accumulation of debris and aquatic vegetation; this has impounded water upstream to the new footbridge and created a very slow-flowing section where fine sediment is settling out and duckweed (*Lemna* sp.) has colonised (Photo 2).

Immediately downstream of the new footbridge there are the remains of an old weir structure: a submerged concrete base and bankside slots to accommodate boards. Although submerged, this has an impounding effect upstream and has trapped fine sediment resulting in a wide, shallow channel choked with Fool's water cress (*Apium nodiflorum*).

Alongside Post Office plantation the river is heavily shaded and the channel is wide, shallow and has a bed dominated by fine sediment (Photo 3). Submerged aquatic weed present is dominated by slow-flowing species including *Myriophyllum* sp. and pondweed *Elodea* sp.

In contrast, upstream of the plantation channel has an open aspect and is dominated by emergent vegetation such as burr-reed (*Sparganium erectum*); this has grown across the channel in some areas pooling up the water and creating pond-like conditions. The channel here is quite incised, possibly as a result of previous land drainage works (Photo 4).

Upstream of the old footbridge, the LHB is steep and wooded (Mill Hill plantation), and the RHB is sheep-grazed grassland. The balance of light and shade is better on this part of the river, and there is a balance of open water and aquatic vegetation (Photo 5). There is however little variation in depth (predominantly shallow – ankle depth), and the bed substrate is poorly sorted fine gravel and sand. The LHB is unfenced and livestock have access to the river; this has resulted in some light poaching of the banks in some areas.



**Photo 1 Outfall of tributary stream into the river – impassable for fish**



**Photo 2 Impounded section upstream of Broadlands plantation**



**Photo 3 Wide, shallow channel alongside Post Office plantation**



**Photo 4 Incised and weed-choked channel upstream of Post Office plantation**



**Photo 5 A more open channel alongside Mill Hill plantation, resulting from a combination of shading on the RHB and stock access on the LHB**

### 3.2 Middle section – Twin arch bridge (North Lodge track crossing) – Track bridge near Wellspring plantation

Upstream of the twin-arch bridge the river is fenced on the RHB and grazed by sheep on the LHB. The channel is dominated by emergent vegetation (*Sparganium erectum*, *Phalaris* sp. and reedmace *Typha latifolia*), and is generally shallow, although there is some deep water suitable for adult trout on the outside of a bend.

The RHB alongside the garden of Forge Cottage is dominated by a dense stand of dogwood, and stock fencing begins here on the LHB. The fencing crosses the river here and has accumulated debris against it which is likely to damage the fencing in future high water events. Further upstream towards the walled garden the LHB is heavily grazed despite the fencing – possibly by rabbits?

The river has been straightened for a 400-m section above, below and through the formal walled gardens. Within the gardens, the banks are walled with a ha-ha on the RHB to conceal the river from the hall. The channel width between the walls is very wide and emergent vegetation (reedmace) has colonised it extensively. There is a deeper pool at the upstream end of the garden below a constriction in the channel, and an adult trout was observed here.

Upstream of the gardens, the channel remains artificially straight. There is some reasonably good gravel substrate, and three or four high spots in the channel comprising blocks of stone (livestock fords, or possibly the remains of old weirs). With progress upstream, the channel is less straight but remains largely shallow and wide.

The channel returns to a meandering planform alongside North Road plantation. There are some excellent natural channel features in this area which provide some good trout habitat. There is a variable depth profile with some deep (1 metre) pools, shallow areas with well-sorted gravel substrate, gravel shoals and side bars, and good cover from submerged tree roots. Not surprisingly, the majority of trout observed during the visit were seen in this area.



**Photo 6 Upstream of the twin-arch bridge**



**Photo 7 Forge Cottage – encroaching dogwood and debris accumulated on fence**



**Photo 8 Within the walled gardens**





**Photo 9** Wide, shallow channel typical of the section upstream of the gardens



**Photo 10** Good habitat alongside North Road plantation – lateral scour pools, gravel shoals and side bars.

### 3.3 Upper section - track bridge near Wellspring plantation to A1 culvert

The pool under the track bridge (EA bridge no. G127) contained about half a dozen adult trout including one large individual (approximately 40 cm length).

Upstream of this point, the river runs through Wellspring plantation, and so is heavily shaded; further upstream the shade is from the RHB only and the LHB a grass field. A small tributary (spring) entered on the LHB near an old pump house (SK927260), and further upstream near the A1 there is a wet flush from a spring in the field, and the remains of a ram pump.

Just upstream of the pump house tributary there are the remains of a brick weir or sluice structure within the river channel (Photo 11). Despite the dilapidated state of the structure, there is still a head difference of around 1 metre across it. This presents an impassable barrier to fish wishing to move upstream, and is a bottleneck in terms of fish reaching good spawning habitat and post-pollution re-colonisation. No fish were observed in the reach upstream of this structure, despite adult fish being observed a short distance downstream near the track bridge.

Upstream of the brick structure, the river is impounded and sediment has accumulated creating a wide, shallow channel (Photo 12). Upstream, beyond the impounding effect the habitat is good for spawning and the juvenile stages of trout; there is a good gravel substrate although the river does not meander to the same extent as below the plantation hence there it tends to be shallow, with fewer of the deeper pools that tend to occur on the outside of bends (Photo 13).



**Photo 11 Brick weir / sluice structure – a significant barrier to fish movement and an obstacle to re-colonisation of the river following the 2008 pollution.**



**Photo 12** Accumulated sediment upstream of the structure creates a wide, shallow channel



**Photo 13** Relatively good spawning and juvenile habitat in the section below the A1

## 4.0 Recommendations

The main issues affecting the quality of wild trout habitat in this section of the Witham are:

- Connectivity – the brick structure (photo 11) is a major obstacle preventing fish reaching good spawning habitat upstream, and hindering the re-colonisation following the 2008 pollution. It is recommended that the structure is removed, and the river bed upstream is allowed to regrade (i.e. erode to produce a more pronounced longitudinal slope).

Because of the accumulated bed materials upstream of the weir, its removal will create a 'nick point' which will migrate upstream as the bed regrades to a new level. During this process the increased energy of the river may cause banks to slump, and the loss of some bankside trees. This rate of change could be managed by the strategic placement and fixing of tree trunks within the channel to check the rate of sediment movement. A bed level survey and modelling of the predicted extent of the regrading is recommended prior to removal works.

There are a number of examples of weir removal on the Witham and other neighbouring streams which could be visited; some are very close by on the waters of Grantham Angling Association which can be contacted via the website <http://gaaffs.org/index.html>.

- Dearth of pool habitat – generally there was a lack depth variation throughout the river, with most of it being predominantly shallow. The small numbers of trout observed were concentrated in the few deeper pool areas. The lack of pools is probably because of past modifications to the channel (straightening, widening, deepening and impounding for ornamental or land drainage purposes).

These factors have probably also contributed to the encroachment of emergent vegetation into the channel in many places where an overwide channel has been created, then accumulated silt.

Depth variation can be re-created by narrowing the channel and promoting scour. There are a variety of ways of doing this, which are detailed in the Wild Trout Trust's chalkstream habitat manual (Available online at [www.wildtrout.org/index.php?option=com\\_content&task=view&id=324&Itemid=315](http://www.wildtrout.org/index.php?option=com_content&task=view&id=324&Itemid=315) and on CD via the WTT online shop). Appropriate techniques for this section of the

Witham include “cut and fill” (Figure 1) to create a two-stage channel in areas such as that shown in Photo 9, the placement of flow deflectors to create scour, and the use of Large Woody Debris (LWD) (Photo 14; Figure 2). Raising the river bed level with introduced gravel is also possible, and would benefit trout by providing a good spawning substrate, and contribute to re-wetting adjoining land – something that is beneficial for conservation and may be desirable under the Higher Level Stewardship scheme.

- Poorly sorted bed substrate – although there are some areas of gravel of a suitable size for trout spawning, particularly towards the upstream end of the reach, much of the river bed substrate is poorly sorted and contains high levels of fine (<2mm diameter) sediment. The promotion of scour with LWD and groynes would assist in sorting bed material and providing better quality spawning areas (Photo 14; Figure 2).
- Extremes of shading – land use alongside the river tends to be either open grazed fields with an absence of trees or bushes, or mature woodland plantations providing dense shade over the channel. In the former case, the channel tends to be choked with vegetation and in the latter, over-wide and shallow.

A better balance of light and shade should be sought by encouraging the growth of trees and bushes on the banks of very open sections of river. The tree species should be native (and of local provenance if possible) and include willow (*Salix cinerea*, *S. caprea*), hawthorn (*Crataegus monogyna*), blackthorn (*Prunus spinosa*), hazel (*Corylus avellana*), and ash (*Fraxinus sp.*).

Areas where the channel is densely shaded should have trees alongside the river coppiced or pollarded to reduce shading and encourage the growth of low, marginal fringing vegetation. As a rough guide, there should be approximately 60% shade to 40% light reaching the water. It is important not to be too drastic in reducing shade, as it helps to keep water temperatures down in the summer – vital for coldwater species like trout.

The arisings from tree work should be retained (logs and brushwood, and whole small trees) so they can be used to create the LWD and flow deflectors described above.

The upper Witham is a nationally important site for the threatened native white-clawed crayfish (*Austropotamobius pallipes*). Further information on crayfish in the Witham can be found on the Lincolnshire Biodiversity Partnership website ([www.lincsbiodiversity.org.uk](http://www.lincsbiodiversity.org.uk)), specifically at [www.lincsbiodiversity.org.uk/docs/BAP/Themes/Rivers\\_and\\_Wetlands/White-clawed%20Crayfish%20\(2006\).pdf](http://www.lincsbiodiversity.org.uk/docs/BAP/Themes/Rivers_and_Wetlands/White-clawed%20Crayfish%20(2006).pdf).

It is important that the protection and enhancement of white-clawed crayfish populations are at the forefront of any habitat improvement projects. Many of the suggestions above (weir removal, LWD introduction) will benefit crayfish and promote their re-colonisation following the 2008 pollution. One of the targets for crayfish within the Lincolnshire Biodiversity Action Plan is to carry out 10 habitat enhancement projects on the upper Witham by 2015; this may provide an opportunity for collaboration and funding for the suggested improvements on the Easton Estate.

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.

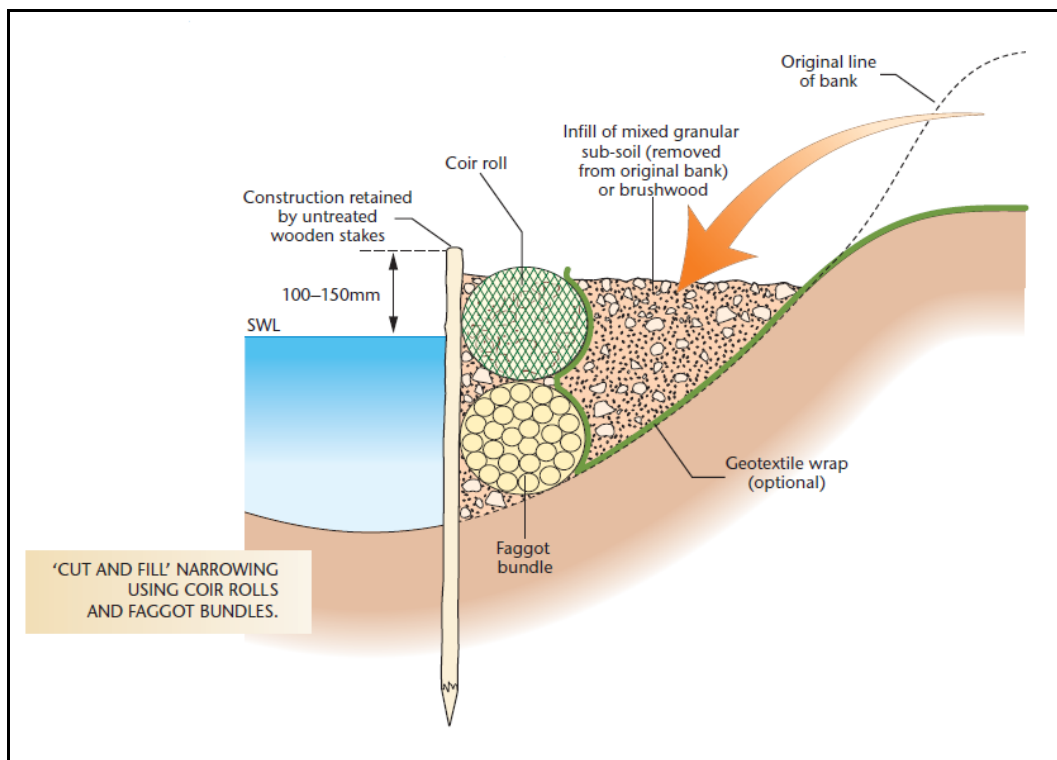


Figure 1 Cut and fill narrowing



**Photo 14 Beneficial effects of LWD – note the depth heterogeneity and the clean, well-sorted gravel.**



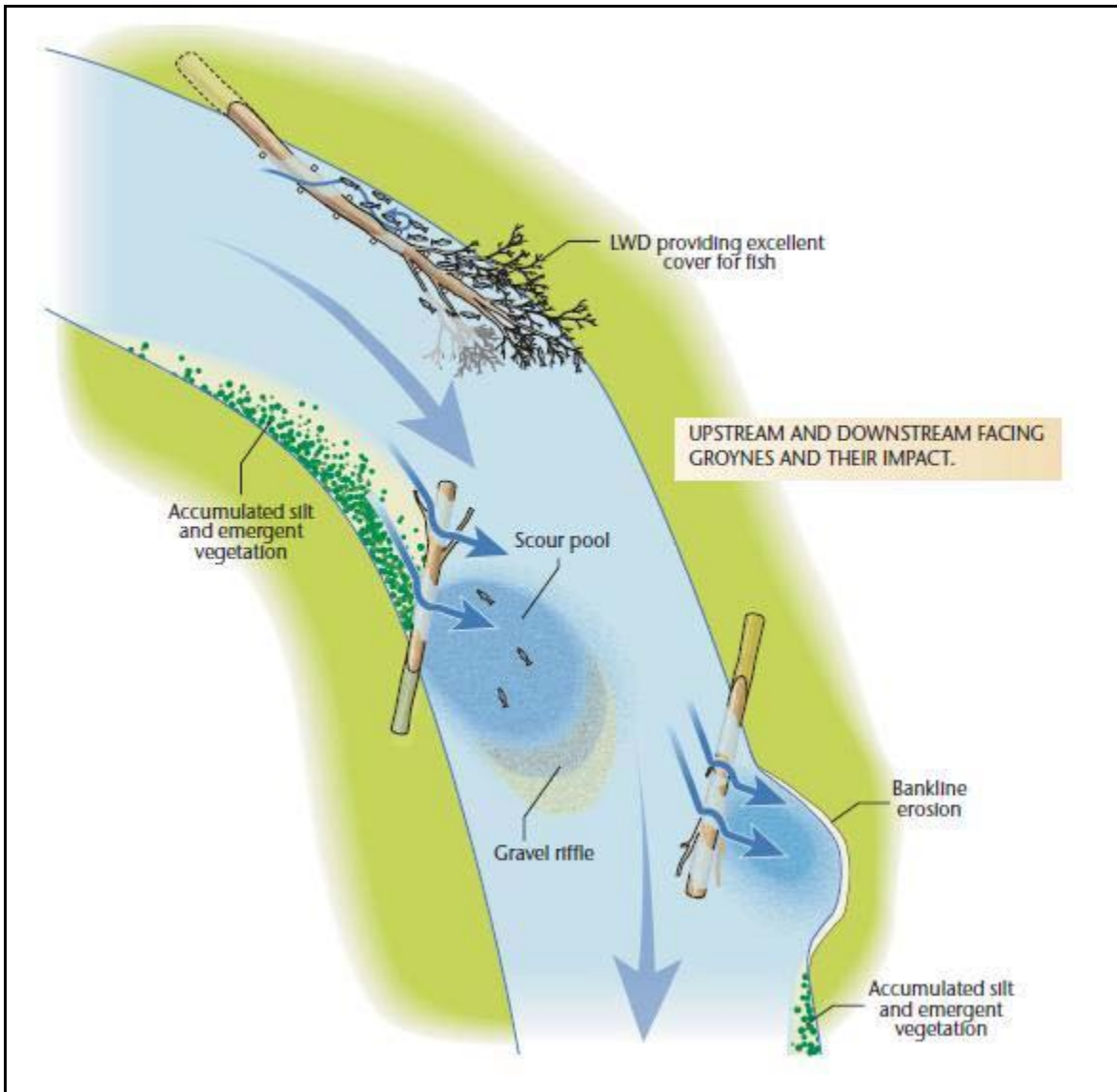


Figure 2 Large Woody debris and its effects

## 5.0 Making it Happen

The WTT can provide further assistance in the following ways:

- Advice and support in formulating a worked-up project proposal and assistance with the preparation of Environment Agency Land Drainage consent applications.

- Seed corn funding of £500 to £1500 to kick start projects. These bursaries are intended to be used as matched funding to assist in raising money from other funders towards project works.
- Works could be kick-started with the assistance of a WTT 'Practical Visit' (PV). The WTT will fund the cost of labour (two-man team) and materials. Recipients will be expected to cover travel and accommodation expenses of the advisors. The use of specialist plant will be by separate negotiation.

*Note: Recipients of the programme must have received a WTT AV and have obtained the appropriate consents from the Environment Agency, landowners, etc., prior to arrangements being made to undertake the PV.*

Applications for all the above should be made via [projects@wildtrout.org](mailto:projects@wildtrout.org)

## **6.0 Acknowledgement**

The Wild Trout Trust would like to thank the Environment Agency for the support that made this advisory visit possible.

## **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.