River Ottery, Werrington, Cornwall

An Advisory Visit by the Wild Trout Trust, April 2014

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Introduction

This report is the output of a Wild Trout Trust visit undertaken to the River Ottery at Werrington near Launceston, Cornwall (National Grid Reference: SX 34634 86911 to SX 34634 86911) in April 2014. The visit was requested by the Mr Mark Claridge of Duchy College, Cornwall and primarily focussed on assessing the river and identifying options to improve habitat for wild trout (*Salmo trutta*).

Comments in this report are based on observations on the day of the site visit, and discussions with Mr. Claridge and Dave Chapman of the Westcountry Rivers Trust.

Throughout the report, normal convention is followed with respect to bank identification i.e. banks are designated Left Bank or Right Bank whilst looking downstream.

Figure 1: A map showing the section of the River Ottery visited

Catchment and Fishery Overview

The River Ottery is 33km in length and drains a catchment of about 125km^2. Rising near Otterham, it flows first north and then southeast through Canworthy Water, the outskirts of Tremain and North Petherwin, through Yeolmbridge and confluences with the Tamar near Werrington. The Ottery collects flow from a series of small spring-fed tributary streams, most notably the Exe Water and Caudworthy Water.

The underlying geology is mostly shale, overlain by heavy clay deposits. The relatively impermeable geology combined with the relatively step gradient of the catchment predispose the river to spate flows during periods of wet weather. Land-use in the catchment is dominated by large dairy farms (particularly in the upper reaches) with some intensive arable agriculture.

As with many Cornish rivers, fast and turbulent flows during spate conditions drive an active river morphology. The bed and bank profile naturally fluctuates, helping to create a physically diverse habitat. However, spate flows also make it difficult for aquatic and marginal plants to establish.

The Ottery reportedly supports strong resident trout populations, bolstered by a good head of sea trout (known locally as 'Peal') running up from the English Channel through the Tamar-Tavy Estuary to spawn in the Upper Tamar and its tributaries.

The Lower River Ottery (Waterbody ID: GB108047007980) is presently designated as being in 'good' ecological status under the Water Framework Directive and is meeting its targets for fish, invertebrates and water quality.

Table 1: WFD Information for the Upper Dun

Lower River Ottery	
Waterbody ID	GB108047007980
Waterbody Name	Lower River Ottery
Management Catchment	Tamar
River Basin District	South West
Typology Description	Low, Medium, Siliceous
Hydromorphological Status	Not Designated A/HMWB
Current Ecological Quality	Good Status
Current Chemical Quality	Does Not Require Assessment
2015 Predicted Ecological Quality	Good Status
2015 Predicted Chemical Quality	Does Not Require Assessment
Overall Risk	Probably At Risk
Protected Area	Yes

Habitat Assessment

For the purposes of this report, the section of the river visited is described from the upstream extent, working downstream to a point where the river is confluenced by a small stream flowing from nearby Ham Mill.

At the upstream extent of the reach, a large tree had fallen into the river and been carried a short distance downstream. Highly-energised flows during spate conditions have scoured deep runs around the tree (Figure 2) and created a deep pool beneath. Material scoured from the bed has been deposited a short distance downstream to form a riffle and coarse point bar (Figure 3). The resultant diversification of depth and flow conditions around the fallen tree, as well as the roots and branches of the tree itself has created a dense cluster of complex habitat features favoured by flow-loving fish. Overhead cover and pockets of slackened flow provide ideal opportunities for fish to conserve energy whilst darting in and out of faster flows to snap up passing food items. A good diversity of habitat features allows territorial fish such as wild trout to each hold up in a small micro-territory where they are less threatened by their neighbours. Dense brushwood in the form of roots and branches also provide excellent refuge from predators such as piscivorous birds.

Figure 2: Deep, fast-flowing runs have been scoured around the edges of the fallen tree

Material scoured out from the bed by flows deflected around and under the fallen tree will also be naturally 'sorted' by the flow. Fine sediment will be washed downstream and the bed material naturally graded by size as smaller (lighter) stones are carried further and larger (heavier) cobbles drop back to the bed sooner.

Figure 3: Material scoured out from the pool below the tree has formed a riffle and point bar downstream

This sorting of bed material is important in maintaining good quality spawning habitat for gravel spawning fish such as salmonids, grayling (*Thymallus thymallus*), chub (*Leuciscus cephalus*) and dace (*Leuciscus leuciscus*).

Physical diversity is central to supporting a healthy and diverse river ecosystem and subsequently a healthy habitat for wild salmonids. Diversity is also key in ensuring that the correct habitat is available for the different *life stages* of salmonids. Clean, well graded gravel with a good throughput of well-oxygenated water is vital for successful spawning; shaggy marginal cover and shallow, stoney riffles then provide important habitat for trout and salmon parr respectively; and subsequently, deep pools, overhead cover and in-channel structure (such as fallen trees) form important territories for adult fish.

Fallen woody material is also a vital component of the river ecosystem. A broad community of freshwater invertebrates feed directly on dead wood or graze on the algae that quickly colonises it. However, fallen trees can also pose a flood risk and this has contributed towards the widespread removal of woody material from rivers across the developed world. In heavily spate-prone rivers such as the Ottery, finding methods of retaining (or introducing) woody habitat without causing a flood risk to nearby properties and infrastructure can be challenging. Established techniques for achieving this goal are discussed further in the *Recommendations* section.

Fallen trees not only help to re-shape the riverbed, introducing greater diversity of depth conditions, they can also lead to increased bank erosion. This can be either beneficial or detrimental to a healthy fishery depending on the rate of erosion and the management of the adjacent land (a factor that will greatly influence the extent of erosion). Bank erosion is a natural process by which the channel adapts to annual flows. Erosion often introduces additional gravel into the river which can benefit gravel-spawning fish as well as a providing habitat for a range of invertebrate species. Material eroded from one bank is often deposited a short distance downstream on the inside of the next meander. This can introduce low-gradient boggy habitat where a succession of marginal plants can establish – boosting local biodiversity.

However, where the adjacent land is managed for intensive agriculture, banks are often weakened by reduced vegetation coverage. Fence lines too close to the bank result in too narrow a buffer between heavily grazed or cultivated land and the reduced root structure associated with such land uses places riverbanks at a greater risk of erosion.

Alien invasive plants such as Japanese knotweed (*Fallopia japonica*) or Himalayan balsam (*Impatiens glandulifera*) also weaken bank stability as they quickly out-compete and overshade native species during summer months but die back to leave bare, exposed soil during the winter. Unfortunately, examples of both poor bankside fencing and invasive plants were observed (Figures 4 and 5).

Figure 4: A stand of Japanese knotweed is weakening the bank. This will need to be addressed.

Figure 5: Livestock-poached banks also weaken the bank and contribute towards excessive inputs of fine sediment.

Bank erosion on the reach of the Ottery visited appeared to be disproportionately high and this could be to the detriment of the habitat, reducing bankside biodiversity and introducing excess volumes of fine sediment, also likely contributing towards elevated nutrient levels within the river.

Approximately 50 metres downstream of Ham Mill Bridge, a point bar has formed at the head of a tight left hand bend in the river. The pinched channels either side of the point bar cause flows to accelerate into fast-flowing runs that are likely to be favoured feeding areas for trout. The pinched flow appears to have also accelerated the formation of a pool against the RB downstream. This, in combination with an ineffective buffer fence positioned too close to the bank edge may be causing excessive erosion (Figure 6).

Figure 6: Flow pinched around the point bar in combination with a fence line positioned too close to the RB appear to be contributing to a potentially excessive rate of erosion

After the left-hand bend, both banks exhibit good examples of low-lying tree cover (Figures 7 and 8). Trailing branches and complex root systems in the margins of the channel will provide an important refuge for resident fish during spates. Sheltered pockets of slack water will provide somewhere for fish to hold up and wait out periods of turbulent flow.

Figure 7: Trailing bankside branches and roots provide excellent cover habitat

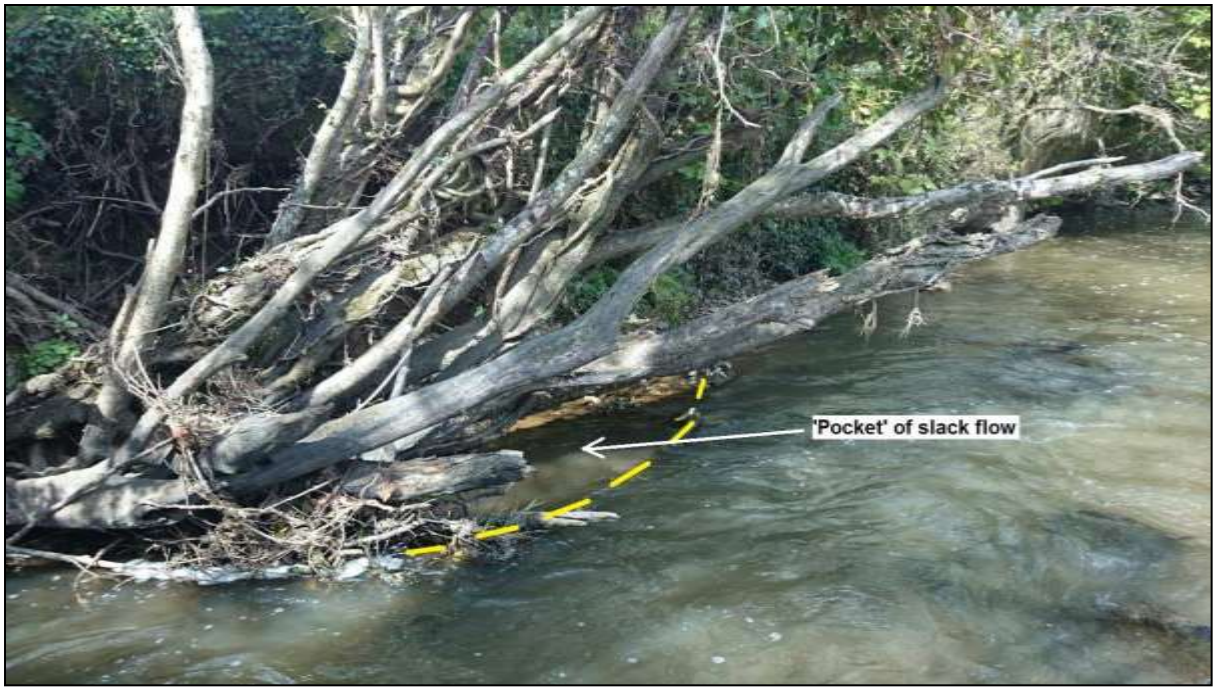

Figure 8: A 'pocket' of slack flow can be observed in the lee of a semi-submerged branch

There are also opportunities to introduce additional cover and refuge habitat in this reach. These are discussed in the *Recommendations* section.

At the downstream extent of the reach visited a small stream joins the river. The 1884 map of this location (http://www.old-maps.co.uk/index.html) suggests the stream once carried flow from Ham Mill when there was a functioning mill at the site. This small stream has good potential as a spawning area for brown/sea trout, providing lower peak flows and a gravel substrate within the appropriate size range (10-50mm) for trout spawning. However, the stream is presently choked with fine sediment and heavily poached by livestock in places. Fencing the steam off from grazing livestock and occasional log deflectors to keep gravel scoured clean, could greatly improve the quality of the habitat. Unfortunately, due to technical issues, photographs of this reach were not available to include in the report. The reach is highlighted in the Google Earth image shown in Figure 9.

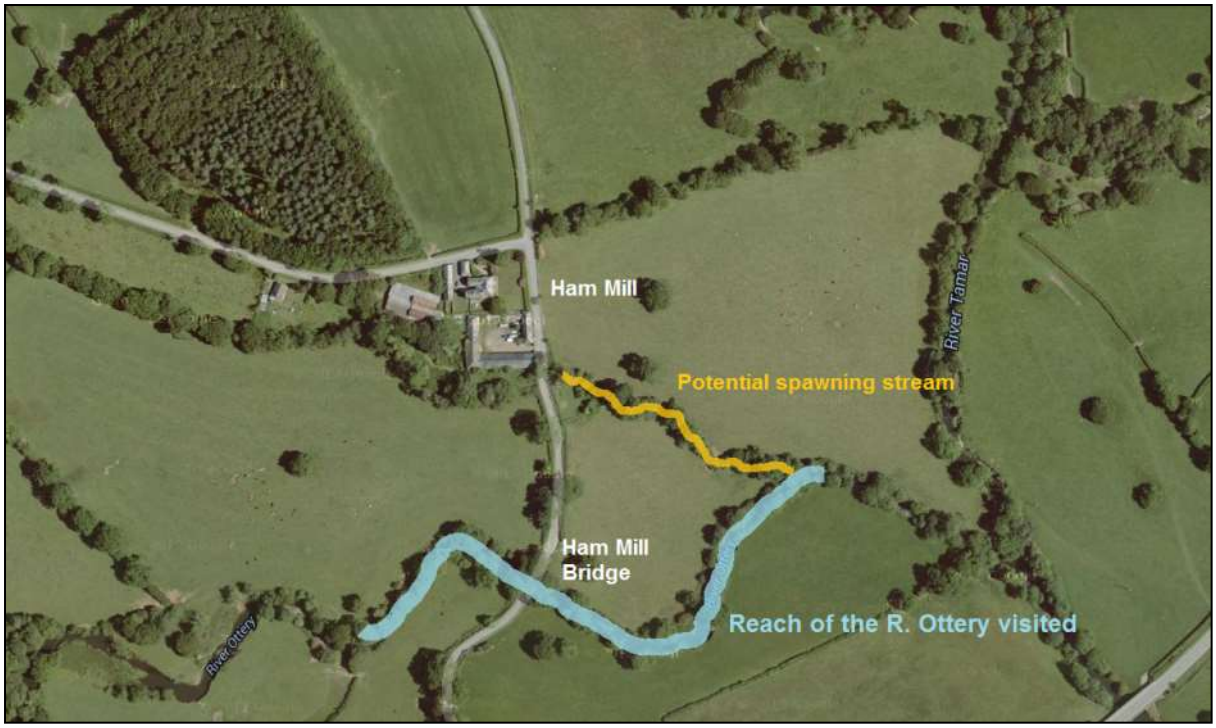

Figure 9: A Google Earth image showing the reach of the River Ottery visited and the location of the potential spawning stream

Recommendations

In order for the River Ottery at Werrington to achieve its full potential as a good quality habitat for resident brown trout and sea trout, the following actions are recommended:

1. The stand of Japanese knotweed (JK) at SX 34323 86837 should be treated as a matter of priority. The best way to eradicate JK is by injecting the stem or spraying the underside of the leaves with the broad-spectrum systemic herbicide glyphosate. Glyphosate is relatively hydrolytic and therefore relatively safe to use near water. However, this should only be undertaken by a trained operative with an NTCP PA6 (W) qualification. Consent is also required from the Environment Agency to undertake any herbicide spraying within 1 metre of the river bank top.

   Treatment of a JK stand will take a minimum of 3-5 years, with subsequent monitoring to ensure the plant has been completely eradicated. It is also imperative that you do not attempt to strim JK as even small pieces of the plant can take root and propagate into new plants.

2. Engage with riparian land owners/tenant farmers and Westcountry Rivers Trust explore options to improve fencing along the reach, ensuring that an adequate buffer margin of at least 3 metres is maintained between the top of bank and the fence line.
   (https://www.youtube.com/watch?v=00tcTY_UEk4)

3. Capitalise on opportunities to increase the abundance of trailing and submerged branches by 'hinging' accessible branches down into the water pointing downstream (see Figures 10, 11 and 12).

Figure 10: An example of a stand of hazel (*Corylus avellana*) hinged downstream to create marginal refuge habitat

Figure 11: An example of an opportunity on the R. Ottery to introduce further woody habitat

Figure 12: Another example on the Ottery where small limbs could be hinged into the river

4. Another option for introducing additional woody habitat into the river is to create occasional 'kickers' (Figure 13). This technique involves cabling felled limbs or small trees back to their stumps so they can move slightly with the flow (http://www.wildtrout.org/content/how-videos#tree kicker).

A kicker will provide valuable cover for fish and food/habitat for freshwater invertebrates without increasing flood risk. During high flows the kicker will be swept against the bank and out of the strongest current. The cable also allows the wood to rise and fall with changing water levels.

5. The small stream flowing from Ham Mill should be fenced off from livestock and allowed a sufficient marginal buffer of rough vegetation to limit the volume of fine sediment entering the watercourse. The stream should then be monitored to see how conditions improve and potentially explore options to improve gravel quality. (http://www.wildtrout.org/content/how-videos#gravel)

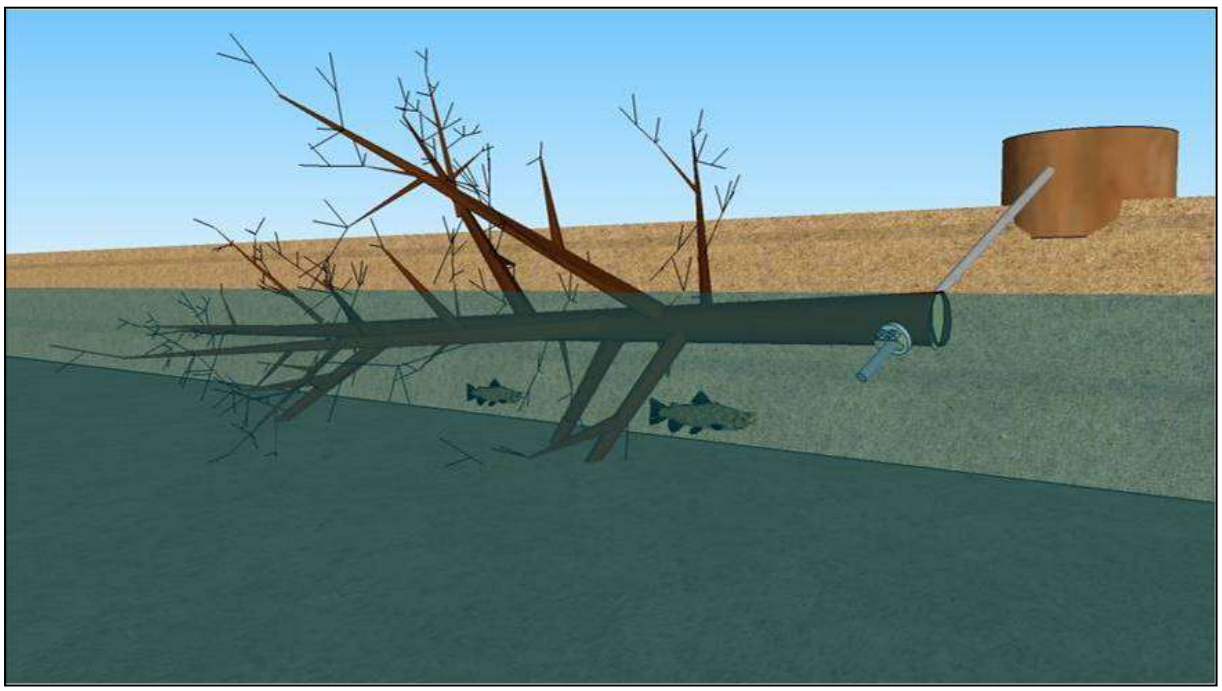

Figure 13: An illustration of a marginal kicker cabled to an existing tree stump

Figure 14: An example of a marginal kicker during high flows

6. In areas where excessive erosion is deemed to be a problem, brushwood won from on-site tree works could be used in combination with live willow to stabilise the bank (see example Figures 19 and 20). Densely-packed brushwood is very effective at absorbing energy from the flow and locally slowing water velocity. Live willow 'whips' (thin, straight sections) and live willow stakes driven into the bank will, if successfully planted, continue to grow and strengthen with time. Willow whips and stakes can probably be won from existing bankside willows.

Figure 15: A brushwood bank protection revetment being installed on a spate-prone river

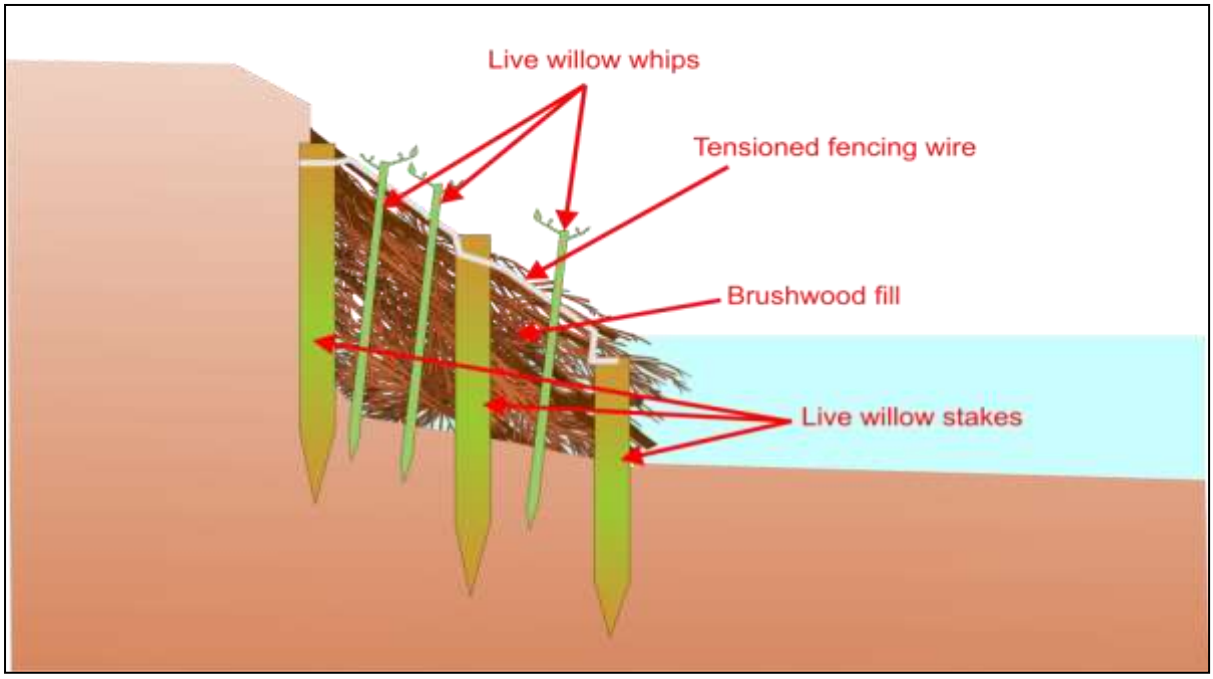

Figure 16: A cross section illustration of a brushwood erosion protection installation with live willow

Willow can be cut and planted at any time of year but the technique is most successful if undertaken in winter or early spring when the willow is still dormant.

(http://www.wildtrout.org/blog/bank-erosion-matter-balance)

Making it Happen

The creation of any structures within the river or with 8m either side will require formal Flood Defence Consent (FDC) from the EA. An FDC application will have to be submitted to the EA, usually along with a methodology and drawings detailing the proposed works. This enables the EA to assess possible flood risk, and also any possible ecological impacts. Contacting the EA early and informally discussing any proposed works is recommended as a means of efficiently processing an FDC application.

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

http://www.wildtrout.org/content/index

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 http://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 Practical Visit (PV). PV's typically comprise a 1-3 day 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 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 organisations and landowners through guidance and linking them up with others that have had experience in improving river habitat.

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.