River Cale, Wincanton

An Advisory Visit by the Wild Trout Trust February 2013

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Introduction

This report is the output of a Wild Trout Trust visit undertaken on the River Cale national grid reference (NGR) ST 71103 28896 to ST 71206 27756 on the 9th of February 2013. The visit was requested by Mr Garry Hunt and Matt Bishop, local residents who have set up a community group to clear litter from the river and restore it to a good quality habitat and focal point for the town of Wincanton. The visit was primarily focussed on identifying community-centred options to improve the river habitat for local wildlife including wild brown trout *(Salmo trutta)*.

Comments in this report are based on observations on the day of the site visit and discussions with Mr Hunt and Mr Bishop.

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.

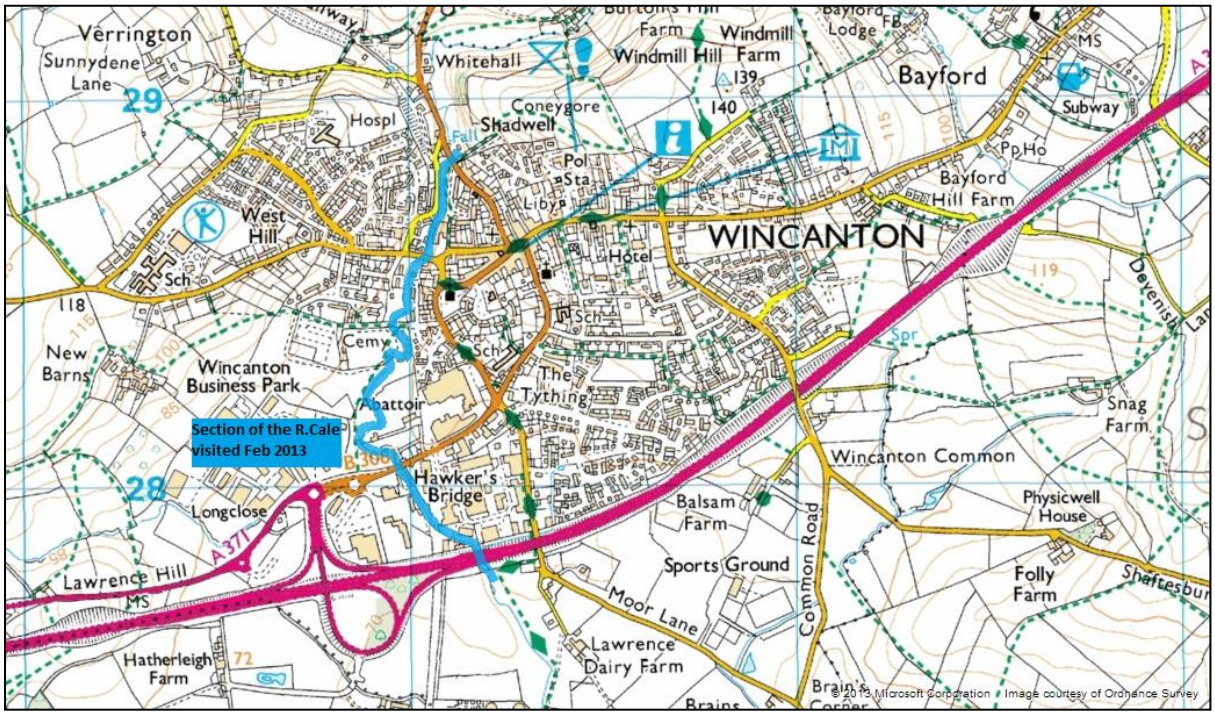

Figure 1: Map showing the section of the River Cale visited

This section of the River Cale is identified in the Environment Agency's River Basin District plan as water body ID no. GB108043015850 and is classified as being in Good Ecological Condition under the Water Framework Directive (WFD).

Table 1: Water Framework Directive (WFD) information for the Upper Cale

CALE (Upper)	
Waterbody ID	GB108043015850
Waterbody Name	CALE (Upper)
Management Catchment	Dorset
River Basin District	South West
Typology Description	Low, Small, Calcareous
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	At Risk
Protected Area	Yes
Number of Measures Listed (waterbody level only)	-

Catchment and Fishery Overview

The River Cale rises in Coneygore Wood to the north east of Charlton Musgrove, joining four tributary streams as it flows south west towards the town of Wincanton. South of the town, the river collects water from a number of other tributaries before joining the Dorset Stour near Marnhull.

Although there are some pockets of limestone geology within the catchment, the Upper Cale drains an area that mostly overlies mudstone bedrock with a

superficial geology of head and alluvial deposits (clay, silt sand and gravel). The relatively low permeability of the surrounding land causes the river to be flashy in terms of water level, responding quickly to rainfall.

Under the Water Framework Directive, the Upper Cale (from the headwaters to the confluence of the Bow Brook) is designated as being in 'good ecological condition'. However, this classification has been made in the absence of fish survey data and may not accurately depict the true condition of the habitat. The Cale has many of the characteristics associated with gravel-spawning, flow-loving fish and trout have been sighted in the river. However, the size of the resident trot population is unknown.

The Lower Cale (from the confluence of Bow Brook near Templecombe, downstream to the River Stour) is designated as being in 'moderate condition' and is failing its targets for fish.

Much of the river through Wincanton has been modified to the extent that habitat quality has been reduced and fish passage impaired. In addition, a number of pollution events have occurred on the Cale in recent years, most recently near Hawkers Bridge in Wincanton when contaminated water entered the river as emergency services extinguished a large factory fire.

Habitat Assessment

The river was walked from Hawkers Bridge downstream to the bridge on the A303, then upstream to the waterfall at Shadwell. For the purpose of this report, the habitat of the reach visited will be described moving downstream from the upstream extent.

At ST 71103 28896, a large weir, known locally as *The Waterfall*, is a complete barrier to fish passage and fragments the river habitat. Fish populations above the structure are completely isolated and vulnerable to pollution events, being unable to naturally recover by means of recruitment from fish downstream. In order for the River Cale to function as a fully connected habitat, the weir should be removed. Such an action however, may be unfeasible in the short to medium term. The Waterfall is a prominent feature and a significant landmark in the town. It is highly likely that local residents would resist plans to remove or significantly alter the structure. In addition, the size of the impoundment means

that removal of the weir would require significant re-profiling of the river for a considerable distance upstream.

In the short-medium term, actions to improve the Cale should remain focussed on the river downstream.

Figure 2: The 'waterfall' is a straight-drop, wide crested weir that completely fragments the river habitat and cuts the headwaters of the river off from the river downstream.

Downstream of the weir the river flows alongside a green public space known locally as *The Beach*. The right bank and sections of the left bank are densely wooded and in mid-summer this section of the river is likely to be over-shaded. Shade is important for regulating river temperature and concerns over the future effects of climate change have led to the development of the Environment Agency's Keeping Rivers Cool guidance.

http://www.wildtrout.org/sites/default/files/news/Keeping%20Rivers%20Cool_Guidance%20Manual_v1%20%2023%2008%2012.pdf

However, too much shade can limit the growth of river plants and can deprive the river ecosystem of its main primary production, significantly impacting the food web of the river. A roughly 50:50 ratio of direct sunlight to dappled shade is recommended in order to ensure that rivers are kept cool whilst also allowing aquatic and emergent plants to establish.

Figure 3: Some sections may be slightly over-shaded in mid-summer when bankside trees are fully in leaf.

The recreational importance of this stretch of the river may make it a good candidate for a habitat project. Tree works to punch occasional 'skylights' in the tree canopy or thin out some of the smaller trees amongst the bigger ones could benefit river plants and the wood arising from such works could be used to create some simple woody debris habitat features in the channel.

It may also be beneficial to introduce greater variation in the heights and densities of the crowns of the trees so that the variation in light conditions is more easily maintained.

If properly publicised and explained (perhaps with interpretation signs), a habitat project in a publicly well-used space may help to galvanise support for further works and encourage local residents to take more interest in the health of the river.

Immediately downstream of this section of the Cale, the river suddenly becomes much less accessible and is straightened and canalised between a wall and a steep bank. The channel is wide and as a result the water level is relatively shallow. The modified channel has created a uniform habitat lacking in features for flow-loving fish.

Habitat improvement works could be undertaken relatively easily and cost-effectively. The bed is littered with large cobbles and blocks which could be very easily repositioned to introduce greater physical diversity. Flows could be deflected to create pockets of increased bed scour and greater variation in velocity. In addition, more light could be let into the channel by trimming some of the overhanging hazel on the left bank (right of Figure 4 below). This could be done by hand with pruning saws.

Works could be undertaken by volunteers at little or no cost potentially making this site a quick-win option for kick starting a wider scheme of habitat works. However, care should be taken to ensure that enough of the habitat currently provided by the large stones for bullhead *(Cottus gobio),* is preserved so as to not harm the resident population. The bullhead is a small fish, sometimes called 'Millers Thumb' because of its unusual shape, which can spend almost its entire life under one stone. They are a protected species, enjoying high-level conservation status and present in the Cale.

Figure 4: The straightened, canalised section of the river could be cost-effectively improved by repositioning existing bed load

After the straightened section, the river passes under a double-arched bridge and bends around to the right. In the lee of the central abutment of the bridge deposition of fine sediment has caused a bar to form. This highlights the naturally active morphology of the river and suggests that before it was

constrained by human modifications, the Cale would have been a constantly shifting and changing river and a dynamic habitat.

Figure 5: A depositional bar has developed in the lee of the central abutment of the double-arched bridge.

Downstream from the bridge the river has been artificially straightened but is no longer constrained by block stone walls. The river here closely follows alongside the historic course of the Somerset and Dorset Joint Railway and was probably straightened to accommodate its construction. The bed substrate is relatively course but with a greater abundance of gravel than upstream.

Pollarded willows *(Salix* sp.*)* are evenly spaced along the left bank. Willow is often planted for bank erosion protection. Provided it is properly maintained to prevent the trees becoming too large and toppling over, the dense root systems help to hold banks together, creating a natural revetment that gets stronger over time.

Straight branches of willows can be cut into live willow stakes and driven into the bank to help control erosion. Particularly if undertaken during months when the willow is dormant and the sap is not rising, the stakes should take root in spring and grow into new trees.

Willow can also be used to create living woody debris habitat features. Such features can be good at withstanding heavy spates but will require annual maintenance to prevent them becoming unmanageable.

Figure 6: Live willows providing bank erosion protection.

This straightened section could be enhanced by some small, low-lying live willow flow deflectors positioned to kick flows against the right bank where the willows will prevent erosion becoming an issue.

It is worth noting that regular pollarding has caused the willows to grow to a uniform height. The diversity of light conditions in the river would be improved if pollarding were to be undertaken on a rotational basis, allowing a more diverse range of canopy size/shape to develop.

At the downstream end of this straightened reach, a pool known locally as *Dead Man's Pool* (supposedly named after a railway accident), could be a good holding pool for adult wild trout. Downstream of the pool the river flows under a bridge with a wide and shallow sill and through a heavily engineered section of channel before flowing under another, older bridge.

The short section of channel between the bridges is very easily accessible to the public but quite industrial in appearance. A project to soften the appearance of the channel and 'green-up' the bank edge could help to create an attractive

public space where people of all ages can safely access the river. It is important that the river through Wincanton be appreciated as an aesthetically pleasing feature of the town if the amount of litter entering the river is to be reduced. Similar urban projects have benefitted from adopting the philosophy that the more attractive the river looks, the less likely it will be used as a rubbish dump.

Figure 7: An area with formal access could become a key feature on the river. At present however, the location is quite industrial in appearance and may benefit from being softened with marginal plants.

The local authority should be engaged to discuss options for improving the aesthetics of this section of channel.

Flows through this engineered section of channel are impounded by a small weir immediately downstream. The impounding effect slows down flow velocity which causes fine sediment to drop out of suspension and uniformly smother the bed, reducing physical diversity the range of habitat available for plants, fish and invertebrates.

Although the impoundment is undesirable in terms of its effect on habitat, the weir acts as a 'pre-barrage' that raises water level over the sills of the bridges and ensures they are passable to fish. Considering the impounding effect is drowned out a relatively short distance upstream and that the weir itself is passable to fish, it may be best to leave the weir in place for the short term. The weir is passable to fish because of a notch in the crest that allows a solid plume

of water to flow through and guide fish up through the obstacle. Passability could be improved further by rearranging the large boulders downstream of the notch to minimise turbulence and reduce the amount of entrained air (white water) which can create hostile conditions for fish.

At Reavensbury Park on the River Wandle in London, The Wandle Trust recently replaced a similar sized weir with a retained gravel riffle which has improved fish passage and also introduced potential spawning habitat. A similar project could be a good medium term goal for this weir.

Figure 8: A small weir impounds the river but is passable for fish and acts as a pre-barrage to the sills of the bridges upstream

After the weir, the Cale is pushed in a weeping bend to the right by a 'rip-rap' revetment on the left bank. This revetment may have been installed to protect the railway from the river. The gaps in the rocky revetment actually provide some good habitat niches in which invertebrates and small fish can shelter. Additionally, sedges (*Carex* sp.) have colonised some of the gaps in the revetment. Additional planting of sedges in the revetment could introduce more marginal cover for fish and provide an important interface between the terrestrial and aquatic habitats. Many freshwater invertebrates have life stages both in and out of the water and marginal plants are important for fly life such as damselflies and mayflies which use marginal vegetation to rest on whilst they prepare for flight.

Figure 9: Although not ideal, the rocky rip-rap revetment on the left bank does provide some habitat for invertebrates and plants

As the river flows alongside the playing fields it begins to resume a more natural course and becomes noticeably more sinuous. Low-lying shrubby bankside plants provide some good overhead cover for fish and the roots of bankside trees help to introduce diversity by deflecting flows and also provide coarse woody debris which can be an important refuge for juvenile fish. Large pieces of rubble introduce further flow variation and create pockets of localised bed scour.

Scour on the bed in shallow, faster-flowing sections of the river is particularly important for the River Cale. As the headwaters are cut-off from the river downstream, the naturally shallowest sections of river with the steepest gradient are not accessible to trout or other gravel spawning species such as dace *(Leuciscus leuciscus)*. As a result, spawning opportunities are limited to sections of fast flowing river in which rubble or large woody debris (LWD) cause scouring of the bed which in turn lifts and naturally sorts the gravel substrate. Trout in particular need un-compacted, well oxygenated, clean gravel in which to cut their nests known as 'redds' and lay their eggs. The eggs must remain well-oxygenated in order to survive.

In a sinuous and fast-flowing river, higher velocities around the outside of a meander (bend), will scour out a pool. The material scoured from the pool is deposited downstream before the apex of the next meander where another pool

is scoured. This is one of the key ways in which the classic pool-riffle river sequence is formed. Pools are important holding water for fish and can be vital refuges during drought conditions. Riffles are important for gravel spawning fish and can be a refuge for smaller fish from larger aquatic predators.

Figure 10: Habitat quality is improved as the river becomes more sinuous and faster-flowing

Downstream of the playing fields as the river bisects the green space between Wincanton Business Park and The Tythings Commercial Centre, is a short section of richly diverse habitat. Shallow, fast-flowing riffles and deep scour pools with overhead cover from tree roots provide good quality habitat for flow loving fish. A sandy berm has developed into a marginal shelf which has become colonised by marginal plants. This section of river could become a model for creating good quality spawning and nursery habitat for trout and with some tweaks could become a template for future works.

On the day of the visit, an old see-saw was spotted in the river. The stand appeared to be in useable condition and removing it from the river and returning it to working condition in the nearby park could be an opportunity for good publicity.

Figure 11: The fast-flowing and diverse habitat downstream of the playing fields

Unfortunately, habitat diversity reduces only a short distance downstream as the impounding effect of a weir below Hawkers Bridge (ST 70981 28023) artificially deepens the river. The river continues to follow a naturally meandering course but it becomes sluggish and flows become uniformly laminar.

Figure 12: The habitat diversity of the meandering channel is significantly reduced as the flows are impounded by the Hawkers Bridge weir which slows flows and significantly reduces in-stream morphology

The weir appears to have been installed to hold up a head of water, probably to abstract for use in a large dairy products factory. The factory was central to the economy of Wincanton for nearly a century and the exploitation of the river would have been key to its operation. The structure is a significant barrier to fish passage, likely only to be passable during high flows.

The structure now appears to be redundant and removing it or lowering a significant proportion of it to bed level could dramatically improve the habitat upstream and improve habitat connectivity, allowing more fish up into the recreational areas of the town. Removal of the impoundment could also reduce flood risk.

Figure 13: The weir below Hawkers Bridge

Within the weir, two sluices are probably remnants of a control structure. Removing these sluices could be a stopgap to weir removal. However, this should only be undertaken with the permission of the owner of the weir and with the consent of the Environment Agency. A trial may be required to gauge the response of the river. If the water flowing through the sluices is too turbulent, the weir may not be rendered any more passable to fish than it is at present.

If weir removal or lowering is deemed infeasible, it may be worth considering the option of installing a pre-barrage onto the weir apron downstream to reduce the head loss over the weir and potentially reduce the turbulence of the water flowing through the sluices. A notch could also be cut into the crest of the weir to help ease fish passage.

Downstream of Hawkers Bridge, the river flows alongside Bennets Field Trading Estate. The river here is heavily incised and the banks are very steep. This has reduced the width of the true marginal zone before the river bank becomes a terrestrial habitat. However, a community of sedges has established along the water's edge and the inaccessibility of the river has ensured that the river is relatively undisturbed. The bed is strewn with rubble which could be relatively easily repositioned to focus scour into deeper pools and introduce greater flow diversity. Some simple log flow deflectors could also be fixed to the bed.

With some relatively simple tweaks, habitat diversity could be increased alongside the industrial estate and downstream to the A303 bridge. However, a major factor through this reach is the volume of litter both in the channel and along the banks. Poor fencing of the top of bank means that industrial debris can easily disperse and roll into the river.

Within the industrial estate are a number of car garages and diffuse petrochemical pollution from rainwater run-off could be impacting water quality.

A campaign to raise awareness and improve fencing and waste management through the industrial estate would help to reduce the volume of litter in the river and could help to improve water quality.

Figure 14: The river downstream of Bennets Field Industrial Estate could be cost-effectively improved by the installation of some simple flow deflectors and the repositioning of existing bed load.

Fish passage under the A303 bridge could be problematic during low flows. An Environment Agency flow gauging telemetry point under the bridge uses the regular trapezoidal shape of the channel to gauge flows. Options to improve fish passage through this section may impact on the calibration of this gauge and so any alteration of the channel under the bridge will have to be discussed with the Environment Agency.

Throughout the visit, the invasive plant Japanese Knotweed *(Fallopia japonica)* was observed in several locations. Japanese Knotweed rapidly out-competes native bankside plants summer months but dies back in the winter leaving banks exposed to erosion. Controlling invasive plants such as Japanese Knotweed and Himalayan balsam *(Impatiens glandulifera)* will be important actions in protecting the river from habitat degradation. In many urban river groups around the country, hand pulling of Himalayan Balsam is used as an easy and relatively safe vehicle for engagement of the local community with their river (e.g. http://www.sheffieldsprite.com/).

Conclusions

The River Cale through Wincanton has been significantly altered by local industry and infrastructure. As a result, natural morphology has been repressed causing a subsequent reduction in habitat diversity. Low habitat diversity and barriers to upstream migration have limited the natural recovery of fish populations after a series of unfortunate pollution events. The limited abundance of good quality spawning habitat may also be a significant population bottleneck.

The river does not appear to have made a full transition from its historical function as a commodity of local industry to a cherished natural habitat and landscape feature within the town. As a result it has collected a large quantity of windblown and dumped litter.

Fortunately, the newly kindled, keen interest of the local community has already made a difference in terms of litter clearance and has laid the foundation for community-focused habitat enhancement projects that can help restore the habitat towards its full potential.

The river could benefit from the introduction of some simple woody debris habitat features. Woody debris is a vital component of the river ecosystem providing shelter for fish, food for shredding invertebrates and naturally helping to control sediment. Large Woody Debris (LWD) in particular plays an important role in naturally diversifying flow patterns and helping to scour pools in the bed.

Recommendations

In order for the River Cale through Wincanton to progress towards its full potential as a rich and diverse ecosystem, the following actions are recommended:

1. The removal of rubbish from the river should continue. What is removed from where and by who should be publicised to raise awareness and encourage volunteers to continue to look after the river. Photographs of rubbish collected into one pile or skip can be a powerful image that will help to highlight both the plight of the river and the effort in keeping it clean

2. A small project to further enhance the fast-flowing and diverse section of river downstream of the playing fields (Fig 11) by the installation of some simple habitat features could be a good platform from which to launch further projects. Creating a small section of ideal habitat where the public can clearly observe the stark contrast of the impounded reach downstream could help to galvanise local support for the restoration of the river. Making relatively small habitat tweaks around the existing natural processes occurring at this location will also aid the understanding of volunteers and help to guide the development of other habitat enhancements.

3. The straightened section of river downstream of The Beach (Fig 4) could be a good location for another phase of work. Although this section of river is obscured from public view, the habitat could be significantly improved by the labour of volunteers simply repositioning some of the existing large stones into alternating 'D-shaped' berms or simple flow deflectors. This will help to create a more natural flow path through the reach and introduce greater variation of depth and flow velocity.

4. Once volunteers have built their confidence, a well-publicised project at The Beach could help to significantly raise awareness of the river. Tree works to allow a little more light into the river would also provide material that could be fixed to the bed to create LWD habitat features and flow deflectors. Tree works may have an associated cost and a project here may be more likely to attract local funding if other projects have been already installed nearby to demonstrate the benefits.

5. Japanese knotweed and Himalayan balsam should be strategically controlled throughout the town. Japanese knotweed is best controlled chemically with a glyphosate-based herbicide, administered by a recognised and licensed authority. Repeat visits throughout the growing season may be required to fully eradicate it from an area. Knotweed should not be cut or strimmed as new plants can grow from the nodes of even small cuttings of the stem. New plants can also grow from cuttings of the rhizome (roots) as small as a one pence piece.

Himalayan balsam, having very shallow roots, can be simply pulled and composted. However, this must be undertaken before the flowers turn to seed and ideally should be undertaken before the plants flower. Seed pods explode on touch and can propel seeds several metres. HB seeds also float and an infestation can rapidly spread downstream.

Balsam can also be treated by strimming or cutting below the bottom node (however, this may prove difficult on steep banks), or by spraying with glyphosate. Normally, providing there is no input of seed from upstream, the seed bank is only viable for around 18 months, so an infestation can be eliminated with 2 years of intensive treatment.

The issue of infestations upstream spreading seeds downstream should not prevent a programme of treatment being implemented. The longer the problem is left untreated, the greater the cost of treatment will become and the greater the risk to the river. Additionally, a recent publication has highlighted the value of localised invasive species control as vital to increasing overall biodiversity (http://www.sciencemag.org/content/339/6117/316.abstract).

6. The weir below Hawkers Bridge should be removed or lowered to bed level. This may have a significant associated cost and may require specialist contractors. The option of opening the sluices in the weir as a stopgap measure should be discussed with the owner of the weir and the Environment Agency.
   If the sluices are to be raised, it is strongly recommended that an initial trial be undertaken with the greatest care to ensure that the sluice can be lowered again.

7. The heavily engineered section of channel at the northern edge of the playing fields (Fig 7) could provide an opportunity to create a community access area where local people can safely appreciate the river. There are a variety of companies that specialise in 'greening up' hard engineering and the cost of improving this reach should be assessed against the potential value of an attractive and safe access point for local people and schools.

Works to green-up this area could be made more cost effective and valuable if undertaken in combination with works to replace the nearby weir (Fig 8) with a retained gravel riffle.

Figure 15: A long gravel installed to replace a weir in Ravensbury Park on the River Wandle. Image courtesy of Cain Bio-Engineering Ltd.

8. Sinuosity could be introduced into the straightened reach upstream of Dead Man's Pool (Fig. 6) by installing some simple flow deflectors or low-level marginal shelves. These can be constructed from brushwood and fixed in place with chestnut stakes. Low-level brushwood shelves can improve habitat whilst having a minimal impact on flood conveyance. They can introduce sinuosity to the channel during low flows whilst being easily over-topped during high flows. They also help to trap fine sediment and can become colonised by marginal plants. If positioned near spawning gravels, brushwood structures can provide important refuge for newly emerged fry.
   More information on the importance of both LWD and brushwood in rivers can be found here:
   http://www.wildtrout.org/sites/default/files/library/Woody_Debris_Apr2012_WEB.pdf

9. The river should remain at the heart of local community environmental action. In order for the river to remain healthy for future generations it should be monitored for potential threats such as pollution and opportunities for further enhancement work. Invertebrate sampling is an effective way of keeping an eye on water quality and it is recommended that samples are regularly taken and the findings recorded.
   http://www.riverflies.org/rp-riverfly-monitoring-initiative

10. The WTT 'Trout in the Town' programme helps to link urban river habitat groups into a wider network of projects so that they can benefit from peer support - especially from long established groups such as the Wandle Trust. The WTT hosts an "Urban River Champions' Conclave" every couple of years which helps urban river groups to meet up and swap ideas and share experience.
    The WTT also runs a 'Mayfly in the Classroom' scheme for local schools. Mayfly are reared in the classroom and returned to the river, helping to connect the local community with the river and teach children about river conservation.
    Guidance on group organisation as well as monitoring options on the following couple of links:
    http://www.wildtrout.org/sites/default/files/tint/prioritising_finalwebversion.pdf
    http://www.wildtrout.org/sites/default/files/tint/monitoring%20in%20tintt%20general_v1.pdf

Making it Happen

WTT Urban River Restoration Guidelines are available to buy as a hard copy or for free lo-res download:

http://www.wildtrout.org/content/wtt-publications#urban

There is the possibility that the WTT could help to start a project via a Practical Visit (PV). PV's typically comprise a 1-3 day visit where approved WTT 'Wet-Work' experts will complete a demonstration plot on the site to be restored.

This will enable project leaders and teams 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 PV leader.

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 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.