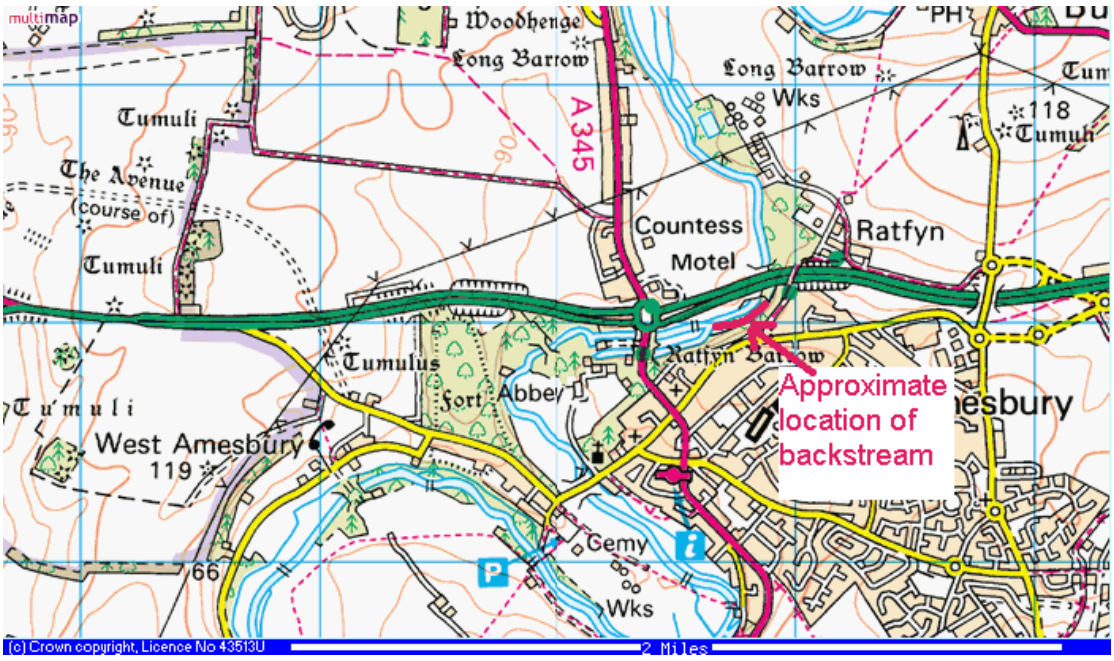

# HABITAT ADVISORY VISIT TO A BACKSTREAM OF THE RIVER AVON AT AMESBURY, UNDERTAKEN BY VAUGHAN LEWIS, WINDRUSH AEC LTD ON BEHALF OF THE LIVING RIVERS PROJECT AND THE ENVIRONMENT AGENCY

## MARCH 2008

**Introduction**
This report is the output of a site visit undertaken by Vaughan Lewis, Windrush AEC Ltd to a backstream of the River Avon at Amesbury on March 26th 2008. The visit was undertaken on behalf of the Wild Trout Trust. Information contained within the report was obtained from observations on the day of the site visits and discussion with Allan Frake, Environment Agency and Martin de Retuerto, Living Rivers Project.

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

**1.0 Habitat assessment**
The channel that was visited during this advisory visit is a small backstream of the River Avon upstream of Amesbury. The channel lies immediately downstream of the A303 and is fed by surface water drainage, ground water flow and two informal breaches from the adjacent main River Avon.




The two breaches in the LB of the main River Avon provided a flow of water into the backstream some 50m downstream of the A303 bridge. On the day of the site visit, the upper breach was still running, whilst the lower breach was dry. River levels were relatively high for the time of year.

**Upstream bank breach showing flow still entering the backstream**

There was an additional flow into the backstream via an underground bank breach (there may be an old pipe present that has been exposed by recent erosion?). A very substantial volume of water was passing through this breach, and was upwelling in the margins of the backstream, replicating a deep spring input.

The backstream was moderately/heavily shaded by a mixture of riparian trees including hawthorn *Crataegus monogyna*, ash *Fraxinus excelsior*, sycamore *Acer pseudoplatanus* and hazel *Corylus avellana*. This was limiting the growth of valuable instream and marginal vegetation, limiting cover and creating an over-wide channel. Where this had occurred, there was a substantial covering of fine sediment over much of the channel's width.

There were some sections of Large Woody Debris present in the channel. These provide excellent cover for juvenile trout and coarse fish, particularly during the winter period.

**Upwelling flow visible by right boot**

**Typical length of channel with LWD visible.**

The downstream limit of the backstream was marked by its passage into a culvert, and hence under the main River Avon via a siphon. The channel then rejoined a second arm of the Avon at a lower level some 300m downstream. This area of the river is a well-used spawning area for both brown trout, and Atlantic salmon *Salmo salar*. On the day of the advisory visit, the screen across the upstream face of the culvert was blocked with debris. Removal of this lowered the upstream water level by around 150mm-200mm with a noticeable and beneficial impact on habitat quality.

**Screened culvert. Note dark mark on wall showing level of water before unblocking culvert.**

**2.0 Fish stocks**

No formal fish stock assessment had been undertaken on the backstream. However, during the course of the visit, moderate numbers of (probably) 1+ brown trout *Salmo trutta* were noted in the channel. It is also likely that bullhead *Cottus gobio,* and Brook lampre*y Lampetra planeri* were also present. These are species of conservation concern recognised by their designation under the EU Habitats Directive and the Wildlife and Countryside Act respectively.

**3.0 Recommendations:**

A pre-requisite for successful enhancement of the backstream, is the provision of guaranteed minimum flow. In addition to their clear beneficial impact on flows within the backstream, they may potentially offer a route for fish in and out of the stream during periods of high flow. Trout have obviously gained access to the channel, either via the breaches or by running upstream through the siphon under the main Avon.

In order to increase the security of water supply into the backstream, it is recommended that the two existing natural breaches in the LB of the main Avon should be allowed to remain. Their edges should be carefully graded to create a shallow, safe gradient. It will be necessary to provide a simple crossing of these in order to allow access along the footpath at the breach locations. It should be a relatively simple matter to provide a sleeper (or similar) bridge, provided that adequate provision is made for Health and Safety of people using the crossing. The

cost implications should be small; if the breaches are not formalised in this way, there would be a requirement to repair them, an operation that would carry broadly similar costs.

In addition, no attempt should be made to reduce the underground flow provided to the backstream from main Avon. There was no evidence of bank erosion issues connected to this water source, and hence no obvious reason why it should not be permitted to continue to supply water to the backstream.

The contribution to flows of these three sources should be monitored during the forthcoming summer.

· Access for fish into the channel is currently limited by the screen across the culvert. The relatively narrow bar spacing leads to the screen blocking with debris, limiting fish migration, and raising the upstream water level, adversely affecting habitat quality. In order to reduce the incidence and impact of this, it is recommended that a new screen be fitted. This should slope backwards at an angle of around $45^{o}$, thus building in a degree of 'self-cleaning'; accumulated debris will tend to be driven up the screen by flow, reducing blockage of the culvert. Bar spacing of the screen should be considered, with the widest spacing deemed acceptable for Health and Safety purposes adopted. Finally, it would be desirable if the screen could be cleaned at least once a week, either by a paid employee or by volunteers.

· In places, riparian trees formed a dense canopy, overshading the channel and reducing the abundance of valuable fringing vegetation. It would be beneficial to decrease the incidence of shading in these locations through coppicing/pollarding of selected trees. No more than 20% of the available cover should be cut in any year, with the aim being to create a mix of shade/open water in the rough ration of 60/40. Any further opening up of the channel risks increasing the summer water temperature of the stream to above optimum for trout. By adoption of a cutting cycle of between 7-20 years, the optimum ratio of shade/open water can be maintained, whilst protecting the ecological and landscape value of the riparian trees.

It may be that suitable trees for coppicing/pollarding could be identified by staff engaged on the STREAM project, for cutting at a later date by contractors or volunteers.

· The large amount of LWD present was of great benefit to the stream. It provided excellent cover for a range of species, including fish. It concentrated flow, thus helping to shape the river's morphology, by scouring and sorting the substrate, and causing differential deposition of sediment. The stable LWD dams also act to detain leaf litter that is the basic foodstuff of many 'shredding' species of macroinvertebrates. There should thus be a general policy of retaining LWD in the channel, except where it poses an unacceptable flood risk or prevents access along the channel for migrating fish. LWD should be stabilised within the channel by the use of stakes and wire if necessary.

· Trimming of branches and local realignment of LWD can be usefully undertaken, in order to optimise its beneficial impact on river processes. This can include scouring out of new pools or maintaining the depth of existing pools. LWD can also

be of great benefit in cleaning silt from, and sorting sediment sizes in gravel dominated riffles, used by spawning trout and rheophilic coarse fish species. Upstream facing LWD groynes can be used to direct flow into the centre of the channel, encouraging scouring here and deposition of fine sediment in marginal areas. Upstream facing groynes staggered along opposing banks can be used to create a longer section of fast, scouring flow along the central part of the channel. Further details are shown in the 'Wild Trout Survival Guide'.

Suitable locations for the retention or introduction of LWD could be marked on site by staff during the STREAM project planned for the main River Avon at Amesbury.

· In locations where the channel was clearly overwide, large amounts of sediment had been deposited across the channel width. In order to narrow the channel, faggot bundles constructed from the brushwood arisings from coppicing could be installed in marginal areas and secured using driven wooden stakes. This is a job that could easily be performed by volunteer labour, with each section of faggot narrowing undertaken as a separate and short project.

**Faggot narrowing**

· There was a limited amount of gravel present within the stream. This is likely to be limiting both spawning and subsequent survival of brown trout. In order to address this limiting factor, it would be beneficial to construct a series of shallow, gravel dominated spawning riffles. These could be simply constructed by importing gravel to the site and introducing it to the backstream.

Ideally, larger 'reject gravel' (mixed materials generally >75mm in diameter) should be use to construct a stable base to the riffle. This should be covered with a layer of finer gravel (ideally 10-40mm diameter) preferably greater than 30cm deep, in order to create a final water depth of between 15cm-50cm. Water velocity over the gravel should be in excess of 25cm $sec^{-1}$, with deeper areas left intermittently along the margins in order to provide cover for spawning trout. Sections of LWD should be introduced and secured onto the riffle in order to scour fine sediment and create a more diverse depth profile.

Each riffle should be at least 10m in length, with construction of riffles started at the downstream end of the fishery, progressing upstream, in order to avoid drowning out of each riffle by the construction of additional ones. Typically, a 10m riffle would require around 20 tonnes of stone to construct, at a price of £18/tonne (+ VAT) delivered to site. It is likely that the gravel could be ordered and delivered at the same

time as that for the main STREAM project, with final introduction to the river affected by volunteers.

· It might be possible to introduce water crowfoot *Ranunculus* Spp to the backstream following the introduction of gravel. Simply translocating large fronds and 'heeling' them into the gravel with protection from grazing wildfowl may be adequate. Additional holdfasts can be provided by the use of wooden 'snowshoes'. These are simple structures constructed from pliable fine twigs (often willow) that are then secured onto the bed where they collect strands of submerged vegetation encouraging it to root.

**Constructed snowshoe prior to installation.**

· The gravel already present in channel appeared to be moderately imbedded (compacted). In order to increase trout spawning success, it is important that the consolidated gravel 'pan' is broken up. This can be achieved by the use of LWD groynes (see above). Additional benefit can be obtained by utilising gravel washing using water pumps with a modified outlet. Starting at the upstream limit of the gravel riffles, the pressurised water jet is played over the gravel, loosening it and removing much of the silt trapped within it. This would make an ideal training exercise for students, perhaps as part of the WTT Practical Visit (see below) or in conjunction with the Environment Agency.

**Gravel cleaning**

· In order to inform management decisions and to monitor any changes resulting from habitat enhancements undertaken to the backstream, a quantitative assessment of fish stocks would ideally be undertaken prior to the commencement of any programme of enhancement. This should comprise a catch depletion electrofishing survey undertaken within a length of river isolated by stop nets, coupled with a semi-quantitative assessment of the remainder of the length of the fishery. It may be that the Environment Agency might offer some assistance, or that the WTT could undertake a survey as part of a Practical Visit (see below).

· Much of the recommended work could be undertaken using suitably supervised volunteer labour. However, some of the large elements, including haulage of gravel to site and the construction of a redesigned culvert screen, are likely to require the assistance of larger organisations. It may be possible to include one or more of these items in the STREAM project planned for the adjoining River Avon. It is strongly recommended that early contact be made with the Project Manager, Jenny Wheldon. She will be able to provide a view as to the practicability of such linkage between the two projects./

· Funding for some of the work recommended might be forthcoming from the Wild Trout Trust who hold small 'pump priming' pots of money for projects of this nature. The Trust also operates a 'Practical Visit' scheme whereby a river restoration specialist undertakes up to 2 or more days work at the site in order to demonstrate techniques that are suitable to address the issues raised in this report. Contact the Tim Jacklin (Projects Officer) at the Trust projects@wildtrout.org for further details. Other

potential funding sources include the Environment Agency or the Sharegift charity. This is a charity that collects unwanted share allocations and donates the profits to smaller groups undertaking a variety of work. Contact them at http://www.sharegift.org/

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· Note that any works to bed or banks of the river or within 8m of its banks may require the written consent from the Environment Agency under the Land Drainage legislation. The introduction of any fish or eggs into any inland water requires the consent of the EA under the Salmon and Freshwater Fisheries Act, 1975. It is imperative that all relevant consents are obtained prior to the commencement of any works.