Advisory Visit

Longhope Brook

April 2010

1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the Longhope Brook, on 1st April, 2010. Comments in this report are based on observations on the day of the site visit and discussions with Jim Sharrock, the landowner.

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 Longhope Brook is a small stream between Gloucester and Ross-on-Wye, which drains south into the Severn estuary near Westbury-on-Severn. The section visited was just downstream of the village of Longhope, Gloucestershire (Figure 1).

A short section of the brook (approximately two fields) is owned by Jim Sharrock, but sections owned by neighbours (upstream) and Severn Trent Water (downstream, alongside a public footpath) were also inspected giving a total length visited of approximately 1 km. No organised angling takes place on the brook here, but a friend of Mr. Sharrock has caught brown trout by fly fishing occasionally.

The catchment of the brook is set amongst the hills of the edge of the Forest of Dean, with mixed land use of woodland, pasture and arable. Formerly many of the fields were used for fruit orchards, although many have been changed to other uses now.

There are no sites with conservation designations (such as Site of Special Scientific Interest) alongside the brook here.

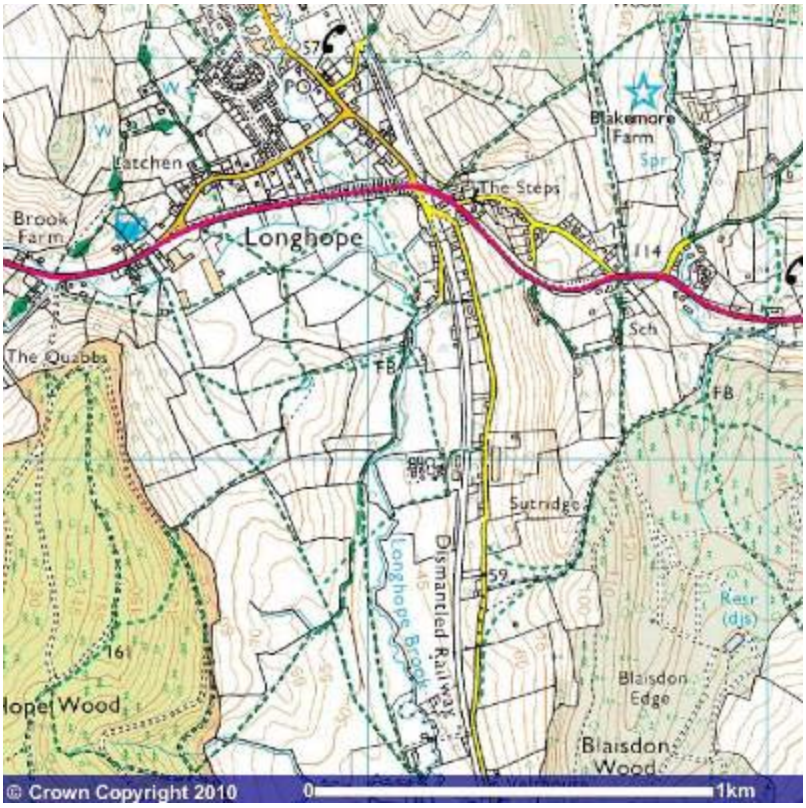

Figure 1

Photo 1 Weir at the upstream extent of the reach

3.0 Habitat Assessment

At the upstream end of the stretch visited, there is a large weir (Photo 1) which formerly diverted water to a mill, although no millstream or leat is now evident. The weir will prevent upstream migration of fish, and causes habitat to be fragmented; this means species like trout, eels, lampreys, etc., could be separated from areas they would use for spawning, feeding or refuge at different times of their life cycle. The cumulative effect of barriers such as this can greatly reduce fish numbers and impact the natural shape and function of watercourses. The presumption should be to remove redundant structures such as this, or facilitate fish passage over them.

Downstream of the weir the brook has a relatively natural course with some excellent in-stream habitat. There is a pool-and-riffle sequence with alternating areas of shallow, fast-flowing water over a gravel / cobble substrate and deep pools, often on the outside of bends and bounded by tree roots. The deep pools, especially where submerged tree roots are present, are ideal habitat for adult trout (Photo 2) because they provide cover and refuge from predators.

The shallow riffle areas with gravel substrates are the habitat used by trout for spawning. The adult fish will select areas of clean gravel, often at the tail of a pool where the water is breaking into a riffle, to excavate a nest known as a redd. This is done in late autumn or winter and the eggs remain within the gravel for several weeks whilst they incubate, with the trout fry emerging the following spring. Because of the length of time the eggs spend buried, it is vital that water can flow freely through the spaces between gravel to deliver oxygen and remove metabolic products. The accumulation of fine sediments (< 2mm diameter) are detrimental to egg survival because they block the spaces between the gravel.

Various aspects of modern life including agriculture, roads, land drainage and higher peak flows deliver large amounts of fine sediment to watercourses. The gravels within the Longhope Brook contain levels of fine sediment that are probably detrimental to trout egg survival and targeted gravel cleaning is recommended.

Photo 2 Great adult trout habitat – a deep pool on the outside of a bend with plenty of submerged tree roots

Photo 3 Typical juvenile trout habitat – shallower, faster runs with overhanging marginal cover

The juvenile stages of trout tend to occupy shallow riffles and runs, away from adult fish which may predate upon them (Photo 3); they require plenty of cover for refuge in the form of larger rocks or vegetation in the stream or overhanging the margins. The availability of this cover can be critical in determining how many juvenile trout survive to adulthood. Such cover can be introduced using brushwood bundles, or logs pinned alongside the bank.

A limited amount of bank erosion was taking place in the upper field where the banks were grazed right to the river's edge (Photo 4). This is undesirable because it leads to widening and shallowing of the river channel and loss of habitat diversity. Just downstream of this point, alongside a residential property on the left bank, some bank protection works have been carried out using brushwood staked against the bank, and planting of willows behind this (Photo 5). This has been done extremely well and not only provides erosion protection, but excellent cover for juvenile trout. This contrasts with the gabion baskets and hard concrete banks evident alongside the next property downstream on the right bank; the brook here is wide and shallow and of limited habitat value (Photo 6).

Photo 4 Grazed banks erode easily leading to over-wide, shallow channels with limited in-stream habitat value.

Photo 5 Bank revetment work using local brushwood – good erosion control and valuable habitat

Photo 6 Hard banks and a wide, shallow channel – poor trout habitat

Mature trees are present along much of this section of the brook. The trees along the banks provide a number of important functions for the fishery including:

- Stabilising the river banks with their root masses and providing a high degree of natural resistance to erosion.
- Shading the river channel and keeping water temperatures down during periods of hot weather. Recent research has shown water temperature in unshaded channels in southern England can exceed the upper lethal limit for trout at certain times (Broadmeadow, *et al.*, 2010). This has implications for the distribution and abundance of trout within river systems, particularly with respect to climate change.
- Input of invertebrates to the river channel providing food for trout and other species.
- Providing a source of large woody debris (LWD) in the river channel – a vital component for a healthy river ecology and fishery.

The presence of LWD has been shown to be extremely important in several respects, including development of high in-channel physical habitat diversity and control of run-off at a catchment scale. Woody Debris helps regulate the energy of running water by decreasing the velocity, which assists in retaining sediments including gravel of a suitable size for trout spawning.

This section of the Longhope Brook has some good examples of LWD which are shaping the channel and providing excellent instream habitat for juvenile and adult brown trout (Photo 7). There should be a policy of retaining LWD within the channel wherever possible.

Woody debris in rivers provides habitat for a variety of animals. Brown trout numbers increase significantly with the presence of woody debris along the banks and in the river as they provide refuge and cover. LWD may offer lies for otters or perches for kingfishers. Woody debris in the river also creates pools and riffles in sections of the river that would otherwise have a dearth of aquatic habitats. LWD provides a range of surfaces including splits and hollows in which algae, microbes and invertebrates can colonise. These tiny organisms are crucial as they make up the base of the aquatic food chain and provide food – directly and indirectly – for all creatures associated with

the watercourse including mayflies, stoneflies, caddis, crayfish, trout, dippers and otters.

At one point there is a barrier across the river to prevent cattle wading up the river out of Mr. Sharrock's field. This barrier has been a source of contention in terms of the perceived flood risk posed by debris accumulating against it. There are numerous designs of swinging gates which could be used in this situation to restrict cattle movement and remove all doubt with respect to flood risk (see recommendations section).

Himalayan balsam is present along the banks of the brook, and numerous seedlings were observed during the visit (Photo 8). Himalayan balsam *Impatiens glandulifera* was introduced to the UK in 1839, and is now naturalised, especially on riverbanks and waste ground and has become a problematical weed. It is a tall, robust, annual producing clusters of purplish pink (or rarely white) helmet-shaped flowers. These are followed by seed pods that open explosively when ripe, shooting their seeds up to 7m (22ft) away. Each plant can produce up to 800 seeds. It tolerates low light levels and, in turn, tends to shade out other vegetation, impoverishing habitats. Being an annual plant it dies back in winter leaving large areas of bare bank vulnerable to erosion. Its presence along riverbanks is therefore undesirable.

The downstream section of the reach is bordered on the left bank by a sewage treatment plant, and on the right bank by arable farmland. The latter is in Entry Level Stewardship (Appendix 1) and has a generous field margin alongside the river (Photo 9). Some trees have been coppiced along the right bank presumably to reduce shading of the arable field. Limited coppicing or singling (Photo 10) is not a problem as long as enough shade is retained to keep water temperatures down in summer; a 60:40 ratio of shade to light is about right (dappled shade). Rotational coppicing on a cycle of anything from 5 to 30 years is better than removing lots of trees in one go; the rotational approach promotes lots of different stages of re-growth which is good for biodiversity. See page 35 onwards of the Wild Trout Survival Guide for more information.

Photo 7 A good example of large woody debris influencing channel shape and habitat diversity for the better

Photo 8 Himalayan balsam seedlings sprouting on accumulated fine sediment

Photo 9 Alder trees which have been "singled"

Photo 10 A wide field margin alongside the watercourse – good agricultural practice

4.0 Recommendations

Overall the Longhope Brook has good instream habitat for wild brown trout, and requires minimal intervention. The following actions are recommended to protect and enhance their population.

- Selected areas of gravel should be cleaned in early autumn (September) prior to trout spawning. This can be done by forking over gravel by hand or using a water pump and lance, or a leaf blower. More details are in Appendix 2.
- Large woody debris (LWD) should be retained within the river channel wherever possible, as should submerged and low cover over the water, for example tree roots (Photo 11).

Photo 11 Submerged tree roots and a deep scour – fantastic trout habitat.

- Cover for juvenile trout could be increased on some of the shallow runs and glides by installing logs parallel to the bank. The logs can be scalloped underneath to provide bolt holes, and brushwood can be nailed to the logs to overhang the water. Brushwood bundles can be created and simply attached to stakes (Figure 2).

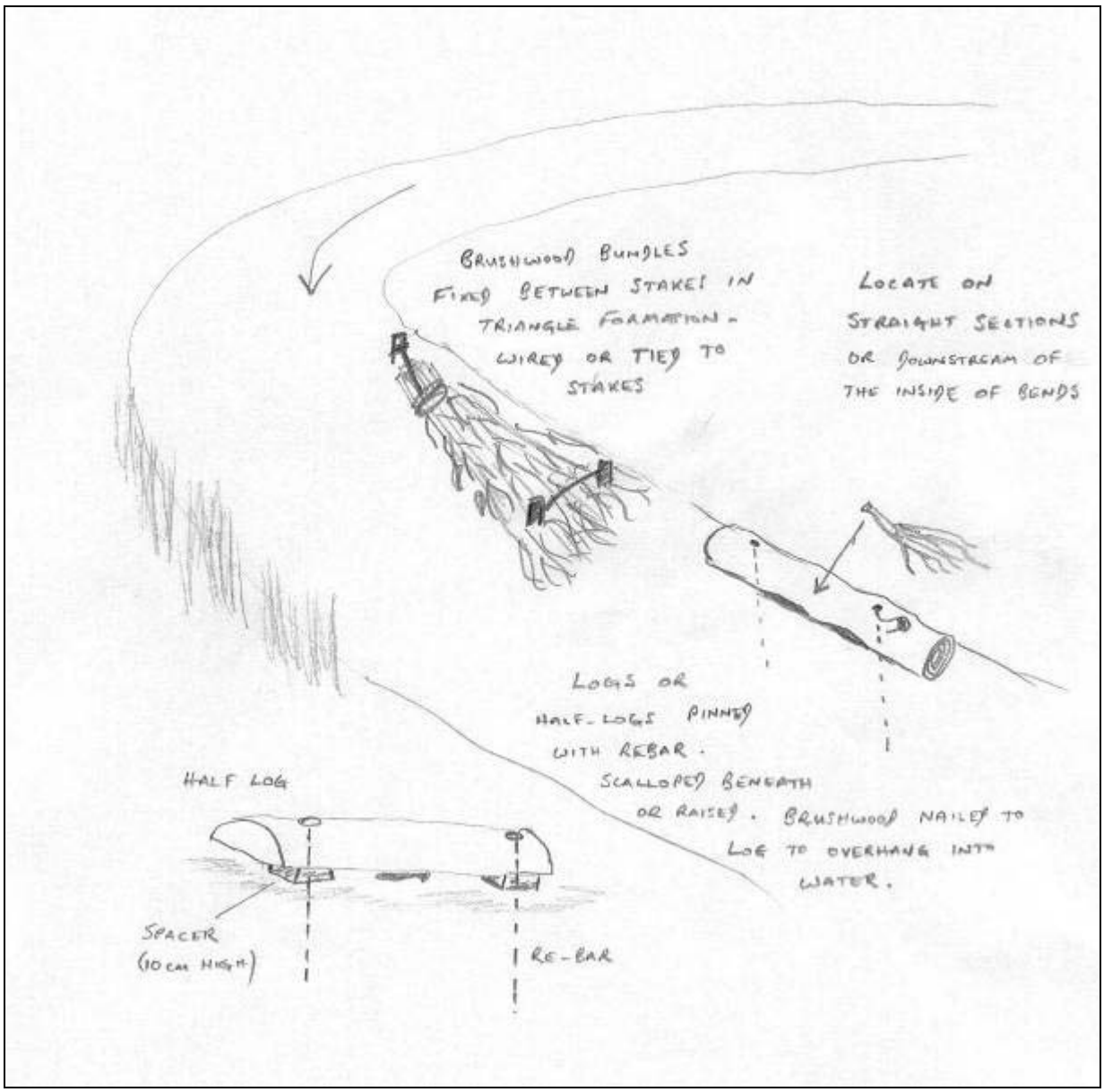

Figure 2

- Tree management should be undertaken with a light touch, with consideration given to retaining trees for their shading and cooling effect on water temperature, and their role in stabilising banks and creating adult trout habitat on the outside of bends (Photo 2). Consideration should be given to tree succession, and the limiting effects of grazing has upon this. Having an wide ungrazed margin allows trees to develop to replace those that are eventually lost to the natural erosion within the river channel.

- In some areas where trees have been lost and rates of bank erosion have accelerated (Photo 12), it is possible to pack these areas with brushwood wired in place to stakes driven into the banks (Photo 13). This will slow the rate of erosion and can promote the accumulation of sediments which will vegetate and consolidate. This should be combined with longer term measures like fencing out grazers and encouraging tree growth behind these areas.

Photo 12 Area where a tree has been lost and the bank has become scalloped. Building waste has been tipped here to slow erosion but is unlikely to be effective.

Photo 13 Example of brushwood packed into a scalloped bank and wired in place, then fenced out. The bank here has since accumulated sediment and consolidated (River Ecclesbourne, Derbyshire).

- Himalayan balsam should be controlled to protect river banks by encouraging a diversity of plants rather than a monoculture of this invasive species. Methods of control include hand-pulling before the plants flower, herbicide treatment (requires prior written consent from the Environment Agency), or controlled grazing. The latter may be the best option although it must be balanced with protecting the river banks from trampling and overgrazing which also causes undesirable widening of the channel. For more advice see http://www.environment-agency.gov.uk/static/documents/Leisure/GEHO0307BLZO-e-e(1).pdf

- Water quality monitoring using invertebrate sampling should be considered. The Riverfly Partnership run training courses for the Anglers' Monitoring Initiative (AMI) which uses a simple technique to check water quality and provide an early warning of pollution problems. For more details see their website www.riverflies.org or call Bridget Peacock on 0207 929 6966.

- Consideration should be given to installing a water gate in place of the gate currently across the river. Guidance on this can be found in the Wild Trout Trust's recently published Upland Rivers Habitat Manual which is available on our website. See http://www.wildtrout.org/index.php?option=com_content&task=view&id=384&Itemid=327 and click on Section 5 – Physical Enhancements (Page 15 of 24).

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. Check with the Development Control department of your local EA office for more information.

5.0 Making it Happen

The Wild Trout Trust can provide additional help and advice to implement the above recommendations, including assistance with the preparation of Land Drainage consent applications, technical advice and practical demonstrations of habitat improvement techniques. Please contact Tim Jacklin for further details.

6.0 Acknowledgement

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

References

Broadmeadow, S., Jones, J.G., Langford, T.E.L., Shaw, P.J. and Nisbet, T. (In Press - due 2010). The influence of riparian shade on lowland stream water temperatures in southern lowland England and their viability for brown trout. River Research and Applications In Press.

Appendix 1

Agri-Environment Schemes in England

The Common Agricultural Policy (CAP) has spawned a range of agri-environment schemes, with the aim of ameliorating the impacts of farming on nature conservation interests. Over time, the percentage of the CAP that is given to these schemes has increased, under the policy of 'modulation'. Delivery of these agri-environment schemes varies between EU members states. In England the chief mechanisms are as follows:

- Countryside Stewardship (CS) and Environmentally Sensitive Area (ESA) payments. These are old schemes, superseded by the Entry Level Scheme and Higher Level Schemes (see below). However, a number of pre-existing CS and ESA have a few years left to run and can thus still deliver environmental benefit. This type of habitat is of great value for birds and insects, whilst also helping to detain sediment and attenuate surface water run-off.

- Entry Level Stewardship (ELS): This pays a flat rate of £30/ha/year (with the exception of parcels of land >15ha within the moorland line for which a payment of £8/ha/year is made) on achievement of adequate 'points' for the retention and development of environmentally favourable land use over the whole farm. The scheme is open to all farmers and is non-competitive (i.e. all those who reach the target level of points will receive the payment). Agreement is generally for 5 years. Features that qualify for points include the planting of wild bird cover and nectar rich seed mixes, creation and maintenance of buffer strips, and the development of beetle banks. An Organic Entry Level Stewardship (OELS) scheme is also available.

  www.naturalengland.org.uk/ourwork/farming/funding/es/els/default.aspx

- Higher Level Stewardship (HLS): Higher Level Stewardship (HLS) aims to deliver significant environmental benefits in high priority situations and areas. It involves more complex environmental management, so land managers will need advice and support. HLS is usually combined with ELS or OELS options, but unlike these, entry into the scheme is discretionary. A wide range of management options are offered, which are targeted to support key features of the different areas of the

English countryside. HLS agreements are for ten years and can include payments for capital items such as hedgerow restoration.

Natural England has produced a set of targeting maps to increase the environmental benefits delivered through HLS. The targeting maps are the first systematic joining together of information on biodiversity, landscape, natural resource protection, public access and historic interests. Natural England is actively seeking applications in target areas, and for key interest features outside these areas.

www.naturalengland.org.uk/ourwork/farming/funding/es/hls/default.aspx

Catchment Sensitive Farming (England Catchment Sensitive Farming Delivery Initiative)

The Catchment Sensitive Farming (CSF) programme aims to develop measures to tackle diffuse water pollution from agriculture (DWPA) to meet Water Framework Directive requirements. CSF promotes land management that keeps diffuse emissions of pollutants to levels that are consistent with the ecological sensitivity and uses of rivers, groundwaters and other aquatic habitats, both in the immediate catchment and further downstream. Farmers are encouraged to adopt best practice over a range of issues, including the use of fertilisers, manures and pesticides; to promote good soil structure to maximise infiltration of rainfall and minimise run-off and erosion; to protect watercourses from faecal contamination (e.g. with fencing and livestock crossings), and from sedimentation and pesticides (e.g. with buffer strips) and to reduce stocking density or grazing intensity.

The CSF programme takes forward the Government's strategic review of DWPA in England, by promoting voluntary action by farmers in 50 priority catchments to tackle the problem of DWPA. A list of these catchments can be found at http://www.defra.gov.uk. CSF officers have been appointed for each catchment. They are imbedded with DEFRA, the Environment Agency or Natural England, and can be contacted for advice at the relevant local office.

The recently launched Campaign for the Farmed Environment is a voluntary agreement with the aim of replacing ecologically valuable land that was lost as a result of the abolition of set-aside. Farmers are encouraged to farm parcels of land so as to optimize their ecological value. Management options include the creation of wide buffer strips, game cover, and over-wintered stubbles. If this voluntary approach proves not to be successful, legislation to enforce these changes is expected in 2012.

Appendix 2

Gravel cleaning

Leaf-blower method

The WTT have recently purchased a leaf blower for gravel cleaning. It is a Stihl BR600 backpack 2-stroke.

I have used the blower several times and it's big advantage is portability. It is not as precise or controlled as the water pump/lance method, and this would be my first choice, but if access is a problem then the leaf blower is a good substitute. On compacted gravels you need to break them up a bit with a crowbar before using the blower. A full face mask and trawlerman's oilskin is very useful as well!

Water pump and lance method

A suggested equipment specification, including approximate costs is listed below:

Pump - Honda WH20X water pump - **£475**

15m length 1" clear braided hose (outlet) - **£45**

2m length 22" green PVC suction hose (inlet) - **£25**

1.5m length 25mm steel pipe (attached to outlet and flattened at end to increase pressure) - **£10**

Adaptors 2" BSP swivel x 1" BSP male (to attach pump to outlet) - **£45**

Hose fitting 1" BSP female swivel x 1" tail (to attach outlet to pump) - **£15**

Jetting riffles

To reduce impacts of silts moving downstream ‘Sedimats’ can be used. These are pinned to the riverbed downstream of the cleaning and collect the silt blown up by the pumps. Being made of hessian they can then be removed from the river planted up and used for any bank work. They cost approximately £42 each.

Points to note:

1) Spawning gravels are also important habitat for invertebrates and plants and operators should avoid the temptation to clean 100% of the available spawning resource. WTT recommend a 4-year rotation doing no more than 25% in any one year; this gives invertebrates the chance to re-colonise and is a good compromise between improving spawning success and minimising invertebrate damage. The invertebrates do re-colonise very quickly, and often in greater numbers and diversity than pre-cleaning, so any declines are short-lived.

2) Spend the winter preceding any jetting operations to identify areas were trout redds occur. This will enable you to target your time more efficiently.

3).Gravels need to be cleaned in September / October, prior to spawning (Dec-Jan) to an approximate depth of 20-30cm; on no account do it later than this or you may be causing more damage than you are trying to rectify. Concreted gravels need to be broken up, by bashing away at them with the steel lance (or a crow bar), they do break up to leave loose gravel, it's just hard work! Work in a downstream direction to avoid mobilising silt into areas already cleaned.

4) Evaluate your efforts - are there any redds in evidence in the winter after your efforts? How many and where?

5) Health & Safety - Work in pairs and use goggles/ safety glasses to protect your eyes. Undertake a risk assessment.

6) Let your local 'River Authority' know what you intend to do - you may need special permission.

7) Jetting does not solve the problems of excessive siltation. It merely mitigates against the effects. To tackle this issue effectively you must look at land use and address problems at the catchment level.