Wild Trout Trust Advisory Visit

The Weardale Environment Trust

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The Weardale Environment Trust (TWET)

Introduction

The Weardale Environment Trust (TWET) was formed in 2001 for the conservation and restoration of the River Wear and its tributaries. Membership is varied but includes considerable support from the various angling associations of the middle and upper river. Membership of the Trust is free to anyone who has an interest and this has lead to good levels of support when volunteers have been needed.
TWET have already successfully completed a number of improvement projects using voluntary labour, they have recently taken a lease on a reach of the main River Wear between Stanhope and Frosterley, for a peppercorn rent from the riparian owner. The objective for this site is to create a river nature reserve for demonstration of good environmental practice for organised groups and in particular schools. The main objective for this visit was to provide some advice on river improvements for the nature reserve and a site visit was carried out with Peter Stephenson, Jim Tague and Tony Hardwick.
Members have already expressed opinions on improvements needed for the beat to tackle erosion and improve holding capacity for trout. Tony Hardwick is a professional engineer specialising in river works, and has provided technical drawings and flow models of the site and made some suggestions on possible remedial work. The section of river that makes up the nature reserve, was for many years typified by a number of gabion basket weirs. These deteriorated over time and were eventually washed away in the 1996 floods. Since this time, the beat has shown signs of excessive erosion and the holding habitats for adult trout that existed with the weirs have disappeared leading to concerns from both the landowner and the angling community.
It is likely that considerable funding may be available to carry out river improvement work through the Mineral Valleys Project which is led by English Nature and supported financially by the Heritage Lottery Fund.

Nature Reserve site

The nature reserve site includes just over 800 metres of single riverbank used by a local angling association, including a boundary access route through the adjoining land. The site will be referred to as the right riverbank in following discussions.
The character of the water throughout the beat is extremely conducive to migratory salmonids, both in terms of juvenile habitat and returning adult fish. Redds were not visible on the day of the visit as water was higher than normal and slightly coloured, but sea trout had been seen spawning within the beat recently.

Lower Section *(boundary to start of major erosion)*

At the bottom of the beat the property boundary consists of a new double fence in order to maintain health of a registered flock. This boundary is extremely suitable for creating a traditional hedgerow as already recognised by the group. This, and other improvements to the environmental management of the property boundary, will perhaps lead to some funding opportunities for improvements through the

DEFRA Countryside Stewardship Scheme as will be discussed later. Members have already recognised the need to control the apparently large rabbit population which appear to be doing as good a job at removing bank-side vegetation as any agricultural stock, leaving the river bank vulnerable to erosion in high flows, particularly under the trees. A good pest controller will fill rabbit holes as they are cleared which will not only help monitor the population but will reduce the chance of visitors to the reserve injuring themselves.

Stone revetment in the lower section.

The river at this point consists of a good pool – riffle sequence of medium size substrate favoured by spawning salmon and sea trout. The instream habitat appeared to be characteristic of a northern spate river. A wide gravel bank on the right bank provides little opportunity for habitat improvements. Habitat availability for adult trout is limited to whatever instream features are present around rocks and boulders.

Further upstream, the river is secured against the opposite bank by short sections of stone revetment which historically protected a pumping station for water transfer, and a steep natural bank which appears to be extremely stable. These features provide a deep run into the pool sequence and are good habitat for both migrating salmon and trout and adult non-migratory trout. Again, there is little opportunity for habitat improvements here and there is already good cover provided by overhanging trees. The right bank will remain completely fenced and this will maximise vegetation on this side of the river. It has been suggested that breaks in the fence should be used to allow drinking points for agricultural stock. This is not recommended for this site. Wherever a fence is turned at right angles to the river, it is vulnerable to flood damage. This is a particular risk for this section of the Wear. Other Trusts are now

using a variety of alternative techniques to provide drinking water for agriculture and some contacts are provided in the appendix of this report. Providing mains water is often a favourable option with a farming landowner due to the reduced risk of disease, however, this must be offset by the increased cost of the farm water bill. Natural water can be brought to a trough by a number of means:

- Use a spring or feeder stream to gravity feed a central trough which can then be used to feed other troughs in adjoining fields.
- Use a siphon pump to take water out of the main river and feed an individual or central trough.
- Use a hydraulic ram to supply a central trough from which others are supplied.
- Pasture pumps, which are operated by stock themselves are another option, in this case they would not be suitable as sheep do not have the strength to operate them with such a large head of water. They will be suitable for cattle in other areas that TWET may work in.

Stand of Japanese Knotweed on opposite bank.

At the top of the lower section, a stream enters the river from property controlled by Northumbrian Water. It is unknown whether this stream is subject to treated water from the sewage treatment works, and there are additional inflows further upstream. Extremely apparent at the confluence of this small stream with the river is a medium size stand of Japanese Knotweed. According to members, this could be the source of Japanese Knotweed on the Wear making it an ideal environmental problem for members to tackle. This would tie in with the land use on the opposing land with high movement of vehicles and construction work. There is a small stand

of Japanese Knotweed appearing on the right bank opposite the larger stand. It is feasible that the plant has been transported over the river, but it is also feasible that there are further stands upstream. The Wildlife & Countryside Act makes it an offence to cause or allow Japanese Knotweed to grow and steps should be taken to work with Northumbrian Water to remove both stands. As the plant is transported by water, the Trust should also take the opportunity to try and identify any occurrences of this plant upstream and tackle those also. Japanese Knotweed is an extremely invasive plant that is disastrous for riverbanks. It out-competes native vegetation, but dies back in winter to leave a bare bank vulnerable to erosion which a spate river like the Wear will immediately take advantage of. As the plant is transported by water, to eliminate it from the river, groups must start at the top of the catchment at the source of the problem and work their way downstream. Members should also be vigilant for Himalayan Balsam which was not apparent on-site but has caused similar problems elsewhere, and Giant Hogweed which can be a danger to visitors to the reserve, particularly children.

In the first instance, the small and medium stands of Japanese Knotweed are probably best treated simply with a translocated herbicide such as glyphosate (trade name RoundUp) in Spring and Autumn when growth rates are highest. This kind of treatment will still take at least three years and if it does not work specialist advice may need to be sought. Both stands are in close proximity to water and treatment of the plants must be carried out by someone holding the necessary training certificate for use of a herbicide near water, and also with a licence from the Environment Agency. This licence will not be hard to get as the problem is a recognised issue for all rivers in the UK.

Coppicing of multi-stem trees throughout the upper part of this section will help secure vegetation on the riverbank and prevent future erosion. It should be noted that with the direction of the sunlight on this part of the river, that it will be difficult to get the vegetation growth needed to really secure the bank, the tree roots that are already in place are probably doing the best job possible. Careful coppicing will not kill the trees but will promote further root growth.

Small stand of Japanese Knotweed appearing on the right bank.

Middle section *(eroding field)*

The middle section of the reserve is typified by a dynamic pool – riffle sequence. This is causing some concern where it is eroding into the area planned for the nature reserve. Understandably, this is also of considerable concern to the landowner losing grazing land.

The erosion was caused by the build up of a large gravel bar on the opposite bank in the 1996 floods. This has shifted the force of the river flow onto the right bank where erosion has taken place.

TWET have consulted with various individuals and an engineering solution to this problem is being considered. This would involve removing some of the gravel bar that has formed opposite the erosion, and using stone revetment to re-create the old riverbank toe, approximately in the middle of the current stream.

Accelerated erosion on right bank.

There are problems for TWET with adopting this strategy. Rivers are dynamic features of the environment, and the processes which cause erosion and allow it to move around the flood plain over time are critical to the life cycle of salmon and trout. TWET must balance the need for the river to act naturally for the fishery and their environmental remit with the wishes of the landowner and anglers.
The erosion occurring throughout this stretch appears to be related to high flow events, hence the shape of the resulting bank. There is no question that the gravel bar opposite and the direction of flow from upstream is willing the river to move in the direction it is. If allowed to continue naturally, it will create a meander of maximum bend before starting to move back in the opposite direction (pers. comm. Professor Stuart Lane). If the engineering option is taken forward, this will have to include gravel removal and possibly engineering upstream, otherwise the erosion will continue in exactly the same way, in high flows, above the level of the stone revetment. This has occurred in other rivers where revetment has been used. It should be remembered that this stretch was constrained by the gabion weirs for a number of years and this has exacerbated the problem now that they have been washed out. The river is in the process of reverting back to juvenile habitat for migratory salmonids, and indications on the Wear are that this is favouring sea trout.
From a river trust perspective, the engineering solution to this problem is probably not the best way to progress. Firstly, it is very unlikely that the statutory authorities will back the engineering work and consent will be difficult if not impossible to get. Secondly, trying to fight the natural processes of the river goes against the grain of the environmental approach that TWET are taking, and past river engineering has exacerbated the river erosion in the Wear. Thirdly, the engineering will not solve the problem forever, and may not even solve the short-term problem if high flow

erosion continues at this site and either side of it. If erosion gets behind the revetment, it may not last very long at all and the problem will simply be passed on downstream either by changes in flow or following changes in sediment movement. Finally, the Wear is reverting back to a sequence of habitats that will eventually favour wild trout, attempts to create this artificially are not going to be cost effective and will slow this process down.
TWET should accept that the river will erode where it has an opportunity, and that this is an important process of the river. This is in fact an ideal opportunity to use the education remit of the site to address this issue and to demonstrate possible ways to slow excessive erosion back down to an acceptable rate.
It is recommended that TWET explore the use of soft engineering techniques throughout this stretch both as a demonstration opportunity and to find out which techniques suit the river and TWET volunteers. It is not recommended to use live willow spilling. If the river gets behind willow spilling in a high flow location, it has a tendency to pull out in one long section and cause massive damage. It is recommended to try the following techniques, with advice and assistance from Tony Hardwick, and using the potential labour offered to TWET from BTCV:

- Regrade the bank with machinery to an ideal slope.
- Fence off in a straight line, almost continually to the stand of Japanese Knotweed on the right bank, after coppicing the lower section.
- Secure turf to bare areas (seeding may not get the desired effect between periods of flood).
- Where the toe needs protecting, try log and brushwood technique (see appendices).
- Plant single stem willow throughout the length (these have a reduced tendency to cause damage if a single stem is lost, as opposed to woven willow). This leaves the option of pleaching in the future (laying of waterside willow similar to a traditional hedgerow). Remember to coppice after first year of willow growth to increase root growth rate in the following season.

Advice on techniques for carrying out soft engineering / bioengineering can be found in the following sources:

- The New Rivers & Wildlife Handbook, RSPB, NRA & RSNC. ISBN 0 903138 70 0
- Waterway Bank Protection: a guide to erosion assessment & management. Environment Agency. ISBN 0 11 310160 0
- Waterways & Wetlands – a practical conservation handbook. British Trust for Conservation Volunteers.

It has been suggested that BTCV may use hybrid willow from a biofuel grower. This is not to be recommended, these hybrids are bred for very fast growth for the biofuel industry and do not belong wild on the riverbank! Details of a supplier of native willow is included in the appendices. Any bioengineering should be protected from grazing animals by a fence with a wide margin, this will not affect any land payments to the farmer. It should be noted that EA consent will still be required for soft engineering, but that there is an EA officer who has been examining potential for soft engineering based at the Newcastle office.

Upper section *(erosion point to upper limit)*

The upper section of the beat is typified by quite heavy tree cover. This has left very little bankside vegetation to bind the soil structure. This does not appear to be a problem in most flow situations, and erosion is only occurring in high flows. Any location where the weight of the tree is hanging over the river should be coppiced in order to maintain root structure without the risk of the tree collapsing.

Trees hanging over the river should be coppiced as a matter of urgency.

Use of instream structures such as deflectors has been raised as a way of re-establishing deep water habitats for trout. This will be of greater value during low flow situations. It will be difficult to create these structures in the places that they are needed, especially while the river is changing so significantly. Very large boulder placement in some of the shallow pools may be an alternative option, especially if these have been lost in the past due to river engineering and if they are a characteristic of other parts of the river. These will create low flow features which will vary depth and flow direction to the favour of fish.
Where the river joins directly to the bank in normal flows, some soft engineering may be beneficial to slow erosion down. Unless all trees are removed from the river corridor over this stretch, it is always going to be low in bankside vegetation due to its orientation to the sun. Log and brush type reinforcements, or live willow will also help to create under-bank habitat for adult trout.

Log and brush type habitat improvements may benefit the lower section here, but further upstream, there is very little on which to secure instream deflectors etc. An increase in light through coppicing will hopefully promote bankside vegetation.

Nearing the top of the wooded section, there is a large tree that has become wedged in the bank. The eddy behind this is causing some erosion to the bank. Where this can be tolerated, it will increase both the availability of adult trout habitat in the beat and the amount of potential food. Woody debris and leaves take a very long time to decay in water, but is fed on by high numbers of invertebrates. Woody debris needs to occur to trap fallen leaves and detritus in order to store it for long enough that it is a benefit to fish. Woody debris extending into the stream creates variety in depth and flow that will be favoured by trout. In some places, it is now being reintroduced into streams to create habitat. In this instance, the erosion should be monitored and if it becomes intolerable, the tree can be removed and, or the erosion repaired with brushwood left over from the coppicing activities. Any trees that fall in or become lodged in this stretch in the future may well be a benefit, so monitor before taking any action.

Fallen trees lodged in the riverbank can provide essential habitats and foodstuff, particularly in rivers lacking other natural features. Erosion is accelerated behind this and may be slowed using brushwood left over from coppicing.

At the very top of the upper section there is further erosion associated with deposits and the change in flow following the 1996 floods. Herein lies the problem with investing large amounts of funding in hard engineering. The river is mobile along its length and very much in a state of flux at the moment. This can be seen by the river at two different heights either side of the gravel bar. The river is going to continue to move towards the right bank, right from the very top of the beat and possibly beyond. This will compromise the work downstream as they become increasingly in the wrong place for the river. The flow is forced against the riverbank at this point, even in lower flows, and it will continue to move the river in this direction.

All the overhanging trees which are putting strain on the riverbank here need to be coppiced and the landslip type erosion needs to be addressed. Agricultural stock is not a major contributory factor unlike downstream, however, a fence with a wide margin should be included to protect visitors from the unstable bank. The potential to regrade this section back is limited based on the topography and proximity to road and railway line. In summer low flows, it may be possible to reinstate a toe using either live willow, or log and post type techniques, and back fill to recreate the slope upstream. An example of a similar project is included in the appendices.

Summary

The following actions are recommended:

1. Undertake pest control on rabbit population and ensure holes are filled prior to encouraging visitors.
2. Explore options for provision of alternative drinking water for sheep.
3. Undertake local control of Japanese Knotweed, engage Northumbrian Water over stand opposite and explore other sources in the catchment.
4. Begin rotational coppicing and coppice all overhanging trees as a matter of urgency.
5. Consider regrading and bioengineering solutions for slowing high flow erosion in the middle section. Reinstate fence with wide margin.
6. Monitor impact of fallen trees and raise awareness of their biological importance. Consider whether log / brush type bankside features may be increased along the first part of the upper section to slow erosion and provide fish habitat and food.
7. Consider some introduction of boulders if these are a characteristic of the Wear.
8. Consider bioengineering solutions for the landslip in the upper section.

TWET is hopeful that funding will be available through the Mineral Valleys Project. Bearing in mind the possibility of hedge-laying as an additional project activity, it may be possible for the landowner or TWET to apply for some additional funds through the Countryside Stewardship or Rural Enterprise Schemes provided by DEFRA. To

explore this possibility TWET would need to get in touch with their local Rural Development Service office.

TWET has a wide education remit. There is a considerable amount of school visit information available free of charge on the Eden Rivers Trust website www.edenriverstrust.org.uk TWET may wish to explore grant streams such as Awards for All and Your Heritage as a way of developing education opportunities on this site. For more information about these grant streams go to www.hlf.org.uk

Appendices

Case examples of soft engineering for erosion control

Eden Rivers Trust Project 1

Severe erosion on mainstem of River Eden 1999.

Following three years of installation of fence with very wide margin 2002.

Eden Rivers Trust Project 2

1999 severe erosion and land loss mostly due to agricultural stock access.

Turf harvested from the flood plain field (which was reseeded where the turf was lifted) secured to the bare patches in order to accelerate recovery.

The end result one year later.

The Tweed Foundation log & Christmas tree technique

Larch poles are secured to the riverbank toe using long metal pins. Christmas trees are then nailed to the poles in a downstream facing direction. This method can be replicated using any wood and brush combination, including live willow.

Eden Rivers Trust Project 3

The original eroding bank.

Bioengineering of the toe.

Regrading of the riverbank.

One year later. Note collapse would have serious consequences.

Further assistance

The Association of Rivers Trusts (ART) was formed in 2002 to provide support and assistance for young and emerging river based charities and improvement associations in England and Wales.
Funding and advice may be available to TWET for specific areas of the organisations development. It is recommended that TWET makes contact with ART and makes use of their resources.

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Fax: 01566 784404

www.associationofriverstrusts.org.uk

Willow suppliers

The following bioengineering firm may be a starting point, but best option is to try and identify your own source somewhere locally.

Envirocon
Danville Lake Gardens
Bowness on Windermere
Cumbria

Tel 015394 44095

Alternative water supplies

Manufacturers of Papa hydraulic ram and siphon pumps

PAPA Pump Ltd
14a Kingshill Industrial Estate
Bude
Cornwall
EX23 8QN

Philip Selwyn

Telephone 01288 354454
Fax 01288 356657
E-mail ppumpltd@aol.com

Pasture pumps (available through most agricultural suppliers)