



**Advisory Visit**

**River Isla**

**October 2014**



## 1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the River Isla on 3<sup>rd</sup> October, 2014. Comments in this report are based on observations on the day of the site visit and discussions with Richie Miller of the Deveron, Bogie and Isla Rivers Trust (DBIT [www.deveron.org](http://www.deveron.org)) and Marcus Walters of the Moray Firth Trout Initiative (MFTI [www.morayfirhtrout.org](http://www.morayfirhtrout.org)).

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 River Isla is a tributary of the River Deveron, which flows northwards into the Moray Firth at Banff on the north coast of Aberdeenshire. The River Isla rises at Drummuir and flows north through the town of Keith, then west to its confluence with the Deveron close to Milltown of Rothiemay. The DBIT website [www.deveron.org](http://www.deveron.org) contains detailed information on the wider Deveron catchment, including a comprehensive fisheries management plan.

Approximately 8km of the upper Isla was inspected during this walkover survey, between the junction of the Towie Burn (National Grid Reference (NGR) NJ3942045530) and Keith (NGR NJ4284750855), plus a short section at Drummuir station (NGR NJ3784244230). Land use in this area was predominantly mixed livestock and arable farming, with forestry on higher ground. Keith is home to a number of distilleries which abstract water from the Isla for cooling purposes; a number of weir structures which represent obstructions to free fish migration are associated with these abstraction points.

Angling on the Isla appears to be minimal. The DBIT fisheries action plan states *angling occurs on the middle to lower section of the Isla but effort is minimal as migratory fish do not enter the system in larger numbers until the autumn. The river Isla is historically fished on a no fee basis by local residents.*

From 2003 to 2013 the DBIT operated a hatchery from which fed fry of salmon and sea trout (from Isla broodstock) were stocked into sections of the Isla catchment upstream of the major obstructions to adult salmonid migration (the distillery weirs). The Wild Trout Trust has reservations over the use of hatcheries given the lack of evidence of their success, the potential to damage genetically discrete components of salmonid stocks and the evidence for lower fitness of fish in the absence of free mate choice (e.g. [http://www.academia.edu/351192/MHC-mediated\\_mate\\_choice\\_increases\\_parasite\\_resistance\\_in\\_salmon](http://www.academia.edu/351192/MHC-mediated_mate_choice_increases_parasite_resistance_in_salmon)). DBIT are well aware of these issues, carry out genetic analysis and operate the hatchery according to Fisheries Research Scotland best practice guidelines.

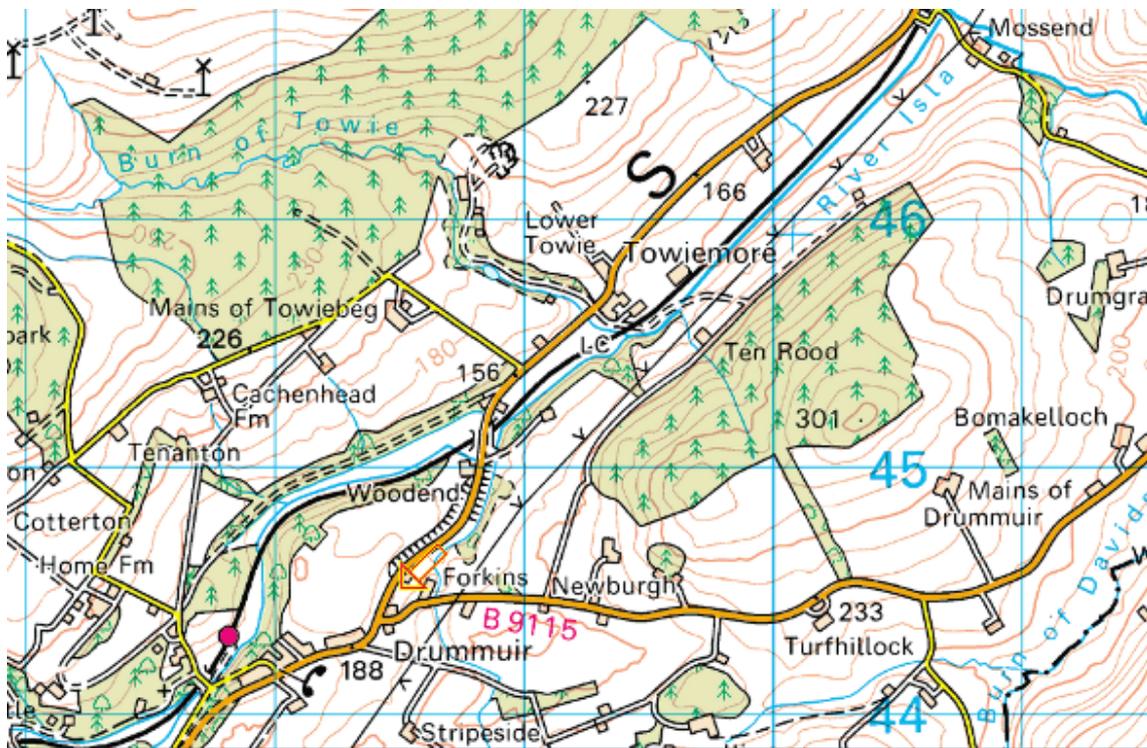


Figure 1 Upstream section of walkover survey, showing Drummuir station (bottom left) and the confluence of the Burn of Towie and the River Isla (centre). (River flowing towards the north east).

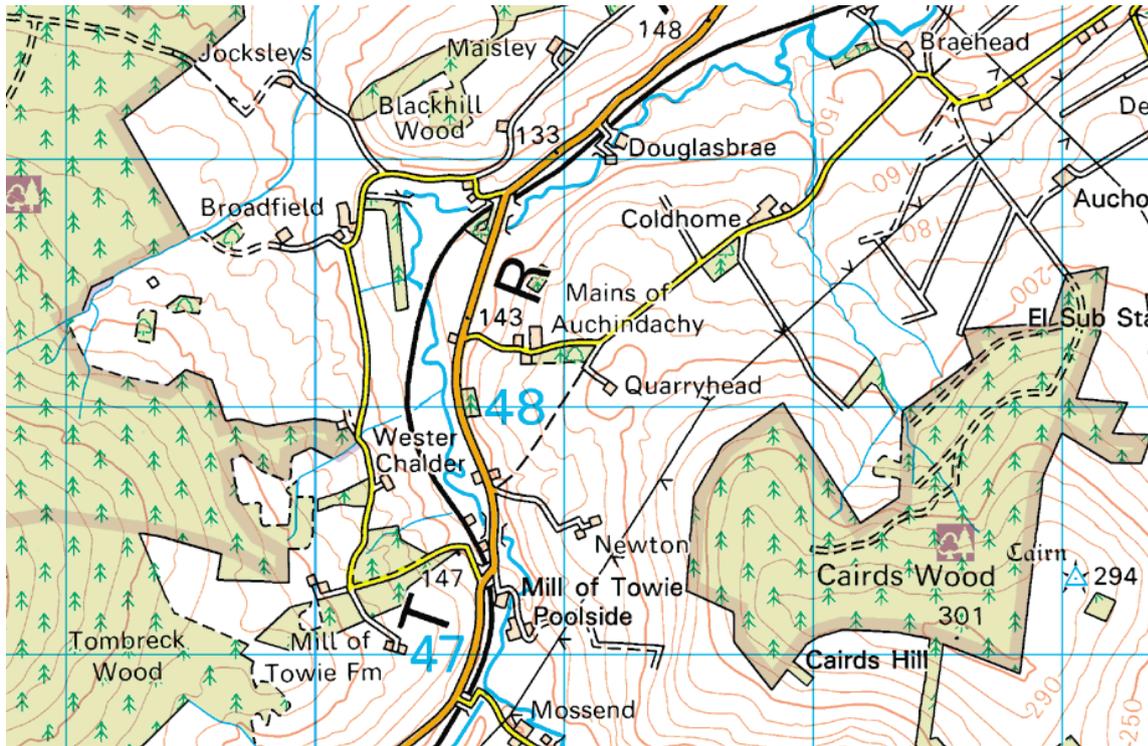


Figure 2 Middle section of walkover survey

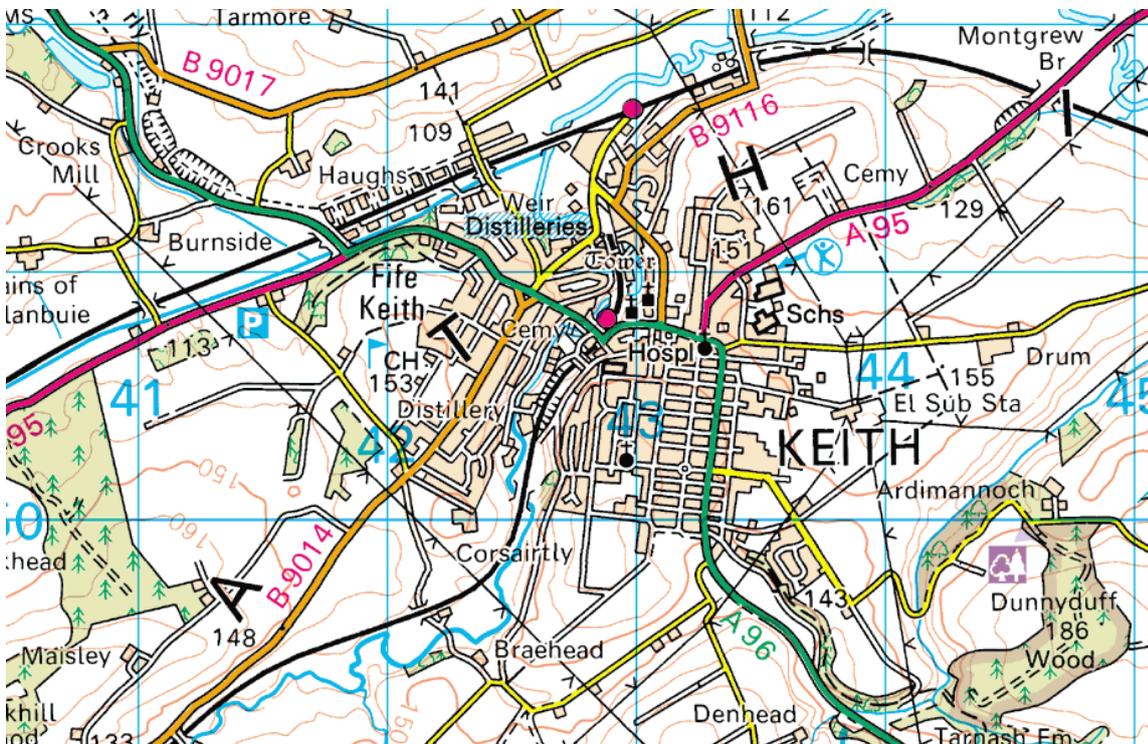


Figure 3 Downstream section of walkover survey

### **3.0 Habitat Assessment**

#### Drummuir station

The river channel here has been straightened at some point in the past, possibly when the railway line was constructed (Figure 1). The river has a uniform width and depth profile and is predominantly shallow (Photo 1). There is no pool-and-riffle sequence, the in-stream habitat being largely shallow glide with an un-sorted riverbed substrate (Photo 2). The banks are stable, with mature trees present along both banks.

Small salmonids were observed rising here, but the impoverished habitat as a result of channel modification is likely to restrict their density and size range. Introducing features to promote bed scour and sorting of the substrate would be likely to increase the number of fish this reach would hold. Such features could include woody debris tree kickers in the pattern of alternate D-shaped groynes. Features such as cross channel logs and log flow deflectors may be possible in sections where the gradient is greater (see recommendations section).

#### Towie Burn confluence to Davidson Burn confluence

The section of the Isla downstream of the Towie Burn has obviously been straightened, possibly when the adjacent railway line was constructed (Figure 1) along the left bank. The river here has a moderate gradient (apparently steeper than the upstream Drummuir section) and tree-lined banks which promote bank stability; these factors have combined to produce reasonably good in-stream habitat despite the very straight channel (Photos 3, 4).

The river bed comprises a gravel and cobble substrate and there is a riffle-glide sequence which repeats every 20 – 30m. The roots of the riparian trees (native deciduous, largely alder and ash) provide good cover. As would be expected in a straightened channel, there is a relative lack of deeper pool habitat because there are no meander bends where lateral scour pools develop (Photo 5). Most of the glide areas are around 0.5m deep, but there are occasional deeper (1m+) areas where large tree root masses coincide on opposite banks, pinching the channel and promoting bed scour (Photos 7, 8). Noting the channel dimensions at such points gives a useful pointer for the size and scale required of introduced structures to have similar effects.

Both banks of the river are fenced preventing livestock access and allowing tree growth and succession (Photo 11). This provides a healthy riparian zone alongside the river with good bank stability and shade to prevent excessive water temperatures. It has also promoted the occurrence of large woody debris (LWD) features at regular intervals which are invariably enriching the in-stream habitat. Because of the good bank stability along this reach, the presence of LWD is promoting bed scour, much-needed depth variation and the sorting of river bed gravels (improving spawning conditions). Some examples are shown in Photos 6, 9 and 10.

Downstream of a burn/field drain confluence on the LHB (approximate NGR NJ4018546255) the river channel widens, probably as a result of active erosion of the right bank (Photo 12). There is a small conifer plantation on the RHB here, the moderate size of the trees suggesting it was planted relatively recently (10 – 20 years ago?) compared with the more mature deciduous trees present. Loss of bank stability when this area was cleared and planted probably lead to increased rates of bank erosion, widening the channel; coarse sediment has been deposited in the wider channel in the form of a gravel shoal, in turn promoting more bank erosion. The overall effect is by no means detrimental *per se*, as it has re-introduced some natural sinuosity and depth variation to the channel, but it indicates how the artificially straight river reacts when the bank stability provided by the mature riparian trees is removed.

In the field downstream of the conifer plantation, the character of the river changes again, this time as a result of riparian land use (NGR NJ4041246479). The fenced buffer strip on the right bank ceases at this point and grazing has reduced the quality of the riparian habitat considerably (Photo 13). Closely grazed grass is present right up to the water's edge and bank poaching is evident in places (Photo 14); whilst grass is currently present it appears this may be part of a crop rotation with the field being a ploughed arable field previously. Tree succession and under-storey vegetation is absent, limiting the input of terrestrial invertebrates to the aquatic food web. In-channel habitat is generally shallow riffle with fewer pools than upstream.

The next field downstream (NGR NJ4053746626) is fenced off but the fence is in poor repair, allowing livestock access. There are mature trees present on the bank here, but "scalloping" of the bank is occurring between them as

a result of livestock trampling. This could easily be rectified by mending the fence.

There is a low-lying boggy strip of land alongside the river here on the RHB (Photo 15) and the railway line is further away from the river on the LHB; there is also a flat meadow on the RHB downstream to the road bridge alongside the Davidson Burn confluence (Photo 16). This could provide an opportunity for introducing some sinuosity to the river channel, by re-meandering it across the wider corridor available here. Professional advice from a fluvial geomorphologist would be required. The invert of the minor road bridge at the downstream end of this reach would be a fixed level, to which a channel of appropriate gradient, length and bank-full discharge could be designed.

Small numbers of the invasive, non-native plant Himalayan balsam were observed along this reach, particularly within the fenced sections where it is not grazed off. DBIT are actively engaged in controlling invasive non-native species ([www.deveron.org/wb/pages/biosecurity/the-biosecurity-project.php](http://www.deveron.org/wb/pages/biosecurity/the-biosecurity-project.php)).



**Photo 1 Straight, uniform channel of the River Isla, Drummuir station**



**Photo 2 Poorly sorted river bed sediments, River Isla, Drummuir station**



**Photo 3** Immediately downstream of the Towie Burn confluence – evidence of active bed load transport



**Photo 4** Typical character of the reach downstream of Towie Burn – riffle and glide habitat in-stream, with excellent riparian habitat.



**Photo 5 The straightened nature of the channel means deep pool habitat is scarce, with shallow glides such as this present instead.**



**Photo 6 Woody debris in the channel provides excellent habitat diversity via increased cover, scour and depth variation**



**Photo 7 Pinch points like this one created by trees on opposite banks create scour and deeper pools**



**Photo 8 As above – resilient tree roots causing flow deflection, scour and deep pool habitat**



**Photo 9 Large woody debris creating scour and cover**



**Photo 10 As above**



**Photo 11** The fenced buffer on the right bank has allowed good riparian habitat to develop



**Photo 12** More dynamic erosion and deposition at the conifer plantation on the RHB



**Photo 13 Unfenced field downstream of the conifer plantation**



**Photo 14 Poached banks in the above field which will ultimately lead to loss of valuable trees and increased bank erosion**



**Photo 15 Low-lying area on the RHB where channel re-meandering may be possible**



**Photo 16 Field looking downstream to the road at Davidson Burn confluence**

Davidson Burn confluence (NJ4068546855) to B9014 Bridge of Maisley (NJ4074048740)

The Burn of Davidson joins the Isla on the RHB immediately downstream of the minor road bridge. Downstream of the confluence there is a long slow pool/glide impounded above a weir (Photos 17 – 19). The purpose of the weir is to divert water into a leat on the LHB which runs down to the Mill of Towie (NJ4073147242) and beyond, re-joining the Isla downstream of the Bridge of Auchindachy (NJ4068447503). There did not appear to be much flow down the leat on the day of the visit and it is not known if there is still extant water power at the mill. However, the weir structure comprised relatively modern gabion baskets suggesting recent repair or modification.

The flow over the weir was concentrated into a flume on the left side. The flow in the flume was very fast and laminar. Overall head loss across the structure was approximately 1 metre, although there is a step down at the downstream side (possibly a deliberate pre-barrage to aid fish passage). The structure is probably passable by adult salmon, sea trout and larger brown trout; however this is unlikely to be the case for juvenile and smaller adult trout. Opportunities to improve fish passage should be explored, the ideal solution being removal of the weir if the water supply to the mill is no longer required.

Downstream of the weir the plan-form of the river is more sinuous than the upstream section, although still has signs of past channel straightening in places. Bank erosion is more evident here, especially where mature trees are absent from the banks, for example between the weir and Mill of Towie (Photo 20). Where livestock are excluded from the banks, the riparian zone habitat is much better (Photo 21). Stone rip-rap has been used to reinforce the LHB just upstream of the Bridge of Auchindachy (Photos 22, 23), but this has failed; a more effective way to reduce erosion and improve habitat would be brushwood revetment (see recommendations) combined with setting back the fence line to allow trees to colonise the banks. A fenced buffer on the RHB here would also be of benefit.

Downstream of the Bridge of Auchindachy the increased sinuosity of the river creates some deep lateral scour pools on the outside of meanders (Photo 24) which are good habitat for adult fish. It is important to note that the presence of trees and associated bank stability play an important part in

this process. Where trees are present and the bank is stable (as in Photo 24) the scour produces a deep holding pool. Where trees are absent, the less stable bank is prone to accelerated rates of erosion, producing poor habitat and inputs of sediment into the river (Photo 25). Areas like the latter are candidates for brushwood revetment and fencing/tree planting to stabilise the banks.

A good example of riparian land management can be seen in Photo 27 where it appears that land alongside the river has been set aside from agriculture and either planted or allowed to colonise with native trees. As these mature, they will stabilise the river banks and reduce the rate of erosion, producing a healthy riparian habitat, shade and inputs of woody debris. In contrast, Photos 25 and 26 show a straightened section of river with little depth variation and a section with few riparian trees and increased rates of erosion.

At the railway bridge NGR NJ4044648457, livestock access is creating a fine sediment input to the river (Photo 28). The river reach downstream of the bridge is relatively open and treeless and has numerous areas of accelerated bank erosion. Livestock appear to have unfettered access to the upstream section of this reach, with electric fencing appearing with progress towards the next bridge. Brushwood revetment, fenced buffer strips and tree planting would benefit the river here. At the downstream end of this reach towards the Bridge of Maisley, finer gravel is evident on the river bed (probably sourced from the active bank erosion just upstream). Rooted, submerged plants such as water crowfoot (*Ranunculus* sp.) and starwort (*Callitriche* sp.) are present in these areas.



**Photo 17 Weir and impounded reach near Davidson Burn confluence**



**Photo 18 As above, downstream view with leat on LHB**



**Photo 19 Wider upstream view of the weir**



**Photo 20 Upstream of Mill of Towie. LHB erosion in the absence of trees.**



**Photo 21** An un-grazed section of river just downstream of Mill of Towie with good riparian habitat



**Photo 22** Failed stone rip-rap bank reinforcement along the LHB



**Photo 23** Upstream view of the reach shown in Photos 21 and 22. Brushwood revetment and setting back the fence on the true LHB (right of picture) would arrest the erosion and improve riparian habitat here. The opposite bank would also benefit from a fenced buffer strip.



**Photo 24** A deep lateral scour pool.



**Photo 25 Accelerated rates of bank erosion**



**Photo 26 Straightened section of river (NGR NJ4055447910)**



**Photo 27 Developing woodland produces a healthy riparian habitat**



**Photo 28 Open, treeless banks are prone to accelerated rates of erosion**



**Photo 29** Railway bridge at NGR NJ4044648457. Livestock access is creating a fine sediment input here.



**Photo 30** View downstream from the above railway bridge. Absence of trees and accelerated rates of erosion occur in this reach.



**Photo 31 An area that would benefit from brushwood revetment and fencing**



**Photo 32 Livestock access creating fine sediment and faecal input to the river**



**Photo 33** Finer gravel and rooted, submerged plants such as *Callitriche* sp. and *Ranunculus* sp. are present around the Bridge of Maisley area NGR NJ4064348812.

### Bridge of Maisley to Keith

Downstream of the Bridge of Maisley, land use alongside the river appears to be predominantly grassland, with the occasional arable field. The river has a meandering plan form and the banks have moderate tree cover, with some lengths fenced off from livestock (Photos 35, 37). No areas of severely accelerated bank erosion were observed, although there are some areas suitable for brushwood revetment and fencing, such as Photo 34 (these would be a lower priority than on the section upstream of Bridge of Maisley). In-stream habitat is good, with a pool-riffle sequence, although low and submerged cover is lacking in some areas (Photo 36).

The section of river from Braehead (NJ422495) downstream into Keith was not inspected. In Keith itself, barriers to migration such as the one in Photo 37 are a problem for fish migration. Upstream movements of adult salmonids accessing spawning habitat and downstream movements of juveniles (smolt migration) are the most commonly considered fish migrations, but movements of “non-migratory” trout of all sizes, along with other non-salmonid species, needs to be considered ([www.wildtrout.org/content/about-trout-challenges#weirs](http://www.wildtrout.org/content/about-trout-challenges#weirs)). DBIT have installed an easement on the weir in Photo 37 consisting of wooden baulks to concentrate the flow in one area; this will assist adult salmon and sea trout moving upstream, but the barrier remains a problem for smaller adult trout and delayed downstream movements of smolts. The latter has been implicated as a significant cause of smolt mortality on the River Tweed, depending upon water levels at the time of migration (Gauld *et al.*, 2013).



**Photo 34 Minor bank erosion could be tackled with brushwood revetment and fencing**



**Photo 35 View downstream from Douglasbrae (NJ4116249059)**



**Photo 36 Good in-stream habitat although low bankside cover is lacking in places**



**Photo 37 View of the Isla valley looking east from approximately NJ4260249792.**



**Photo 38 Weir in Keith at a distillery abstraction point. DBIT have made an easement here, but obstruction to free fish passage is still a significant issue at such structures.**

## 4.0 Recommendations

In general, the upper Isla has good in-stream habitat despite some extensively straightened reaches alongside the railway line in the Drummuir / Towiemore area. Riparian land use has a big influence on habitat quality, especially the absence of trees (and hence reduced bank stability and accelerated erosion); this is a particular problem on the middle section (Figure 2) down to Bridge of Maisley. Barriers to fish migration in Keith are a significant problem and it would be ideal if improvements could be made here to increase rates of natural spawning in the upper Isla, taking advantage of the increased survival rates of wild over hatchery fish.

The following measures are recommended for the upper Isla:

- Reduce accelerated rates of erosion by the use of a combination of brushwood revetment and creation of a fenced buffer strip planted with native, deciduous trees (Photos 39, 40). The buffer strip should be as wide as possible (a minimum of 5 m, preferably 10 m). Brushwood revetment is a much quicker technique than willow spiling, allowing longer lengths of bank to be treated. The use of live willow is possible with this technique, but consideration should be given to future maintenance requirements. Low growing sallow species are recommended over crack or white willow. Dead brushwood will trap silt, vegetate and consolidate the bank very effectively as long as livestock are excluded.
- Consider the use of in-stream structures on the Drummuir station section to increase habitat variation. The gradient here appears quite low and a longer length than covered on this visit should be inspected (e.g. to check there are no downstream impoundments). If the area seen reflects the natural gradient, then structures like log flow deflectors and K-dams are not appropriate and the approach should be to introduce sinuosity within the existing channel with D-shaped groynes on alternate banks (Figure 4). The simplest way to do this would be to use tree kickers or hinged trees on alternate banks (Photos 41, 42).



**Photo 39 Woody bank revetment (in this case with root wads), fencing and tree planting provide good habitat and a long-term solution to accelerated bank erosion.**



**Photo 40 An example of brushwood revetment, prior to livestock exclusion.**

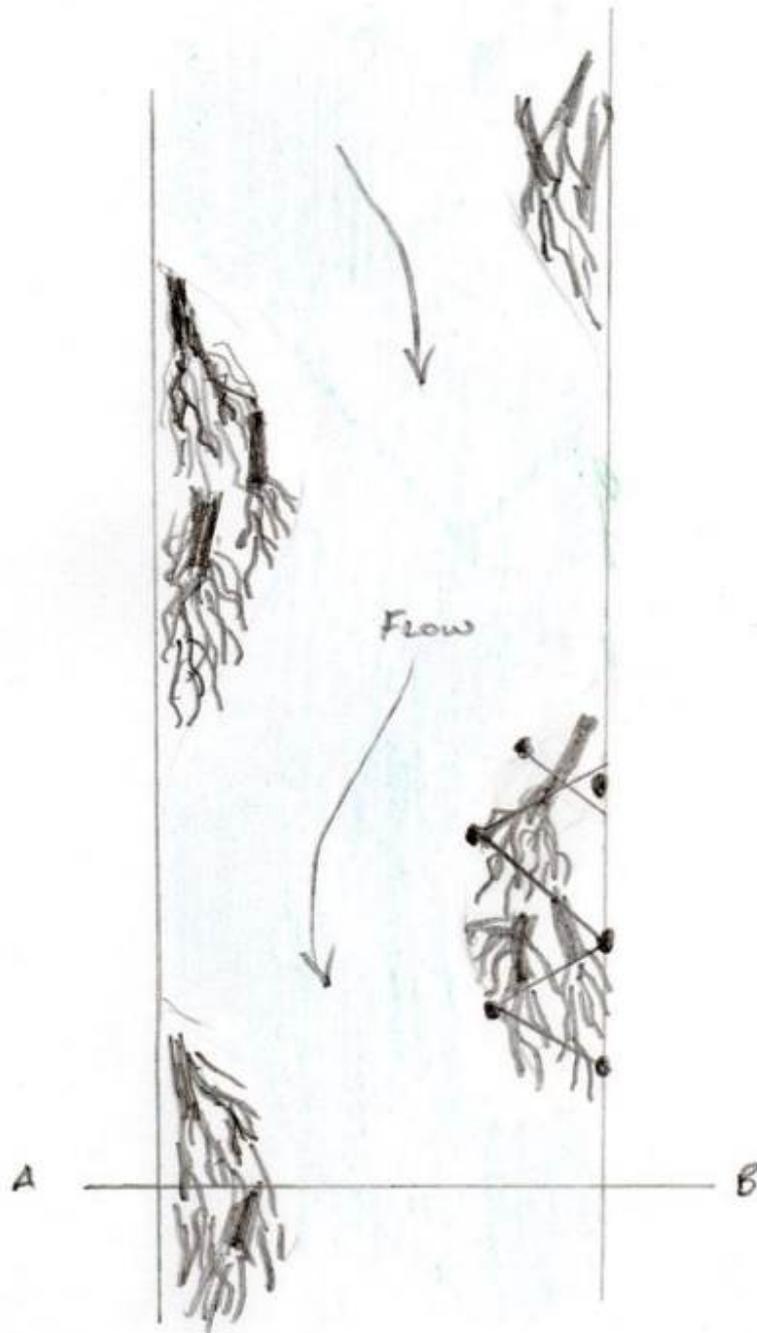


Figure 4 Schematic of structures on alternate banks



**Photo 41** A “tree kicker” installed in the River Petteril, Cumbria, securely cabled to a tree stump. This provides cover and changes the depth profile by promoting deposition (shallowing, yellow arrow) amongst the branches and scour (deepening, red arrow) of the open channel



**Photo 42** Partially cut and laid tree. Young trees such as alder, willow and hawthorn up to about 15cm trunk diameter are most suitable

- In addition to brushwood structures providing erosion control, they have also been shown to dramatically increase the numbers of juvenile salmonids in areas where cover was previously lacking. The Wye & Usk Foundation (WUF) in Wales have demonstrated this effect and have carried out large scale brushwood projects, along with the laying of coppice re-growth into the river margins. Straightened, shallow sections of the Isla would benefit from something similar.
- Consideration should be given to re-meandering the section of the Isla upstream of the Bridge of Howdoup (Davidson Burn confluence), making use of the low-lying area on the RHB. Professional fluvial geomorphology advice would be required. Further advice on this topic can be provided by Wild Trout Trust (contacts Tim Jacklin, Gareth Pedley) and The Tweed Forum may be able to help given their experience with the Eddleston Water project [www.tweedforum.org/projects/current-projects/eddeleston](http://www.tweedforum.org/projects/current-projects/eddeleston) .



**Photo 43** Large scale brushwood project at a site which subsequently showed a large increase in salmonid fry and parr numbers (courtesy of Wye & Usk Foundation).



**Photo 44 Coppice re-growth laid into the margins creates excellent cover very quickly**

- Investigate the possibility of removing the weir downstream of the Davidson Burn confluence, or providing improved fish passage at this site.
- Retain large woody debris within the river channel. LWD is promoting good habitat in the Towiemore section of the Isla in a section which has been extensively straightened; the stable, tree-lined banks there mean the LWD creates scour of the river bed and depth variation. In sections of river with fewer trees and less stable banks, LWD may be more prone to causing bank erosion; in these cases, each structure should be assessed on its habitat merits weighed against effort to stabilise the banks by brushwood revetment, fencing and tree planting.

## 5.0 Making it Happen

Further assistance from the Wild Trout Trust may be available via a practical visit to demonstrate some of the techniques recommended above.

We have produced a 70 minute DVD called 'Rivers: Working for Wild Trout' which graphically illustrates the challenges of managing river habitat for wild trout, with examples of good and poor habitat and practical demonstrations of habitat improvement. Additional sections of film cover key topics in greater depth, such as woody debris, enhancing fish stocks and managing invasive species.

The DVD is available to buy for £10.00 from our website shop <http://www.wildtrout.org/product/rivers-working-wild-trout-dvd-0> or by calling the WTT office on 02392 570985.

The WTT website library has a wide range of materials in video and PDF format on habitat management and improvement:  
<http://www.wildtrout.org/content/index>

## 6.0 Reference

**N.R. Gauld, R.N.B. Campbell, M.C. Lucas** Reduced flow impacts salmonid smolt emigration in a river with low-head weirs. *Science of The Total Environment*, Volumes 458–460, 1 August 2013, pp435–443.  
<http://dx.doi.org/10.1016/j.scitotenv.2013.04.063>

## 7.0 Disclaimer

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