Advisory Visit

River Enler, Newtownards

Northern Ireland

5th April 2016

1.0 Introduction

This report is the output of a site visit to the River Enler near Comber, Newtownards, Ireland. The visit was undertaken at the request of Tony Waugh of the Inler Angling Club to assess riverine habitats and make recommendations for improvements that would help the club to develop the wild fish stocks of the river.

Normal convention is applied throughout this report with respect to bank identification, i.e. the banks are designated left bank (LB) or right bank (RB) whilst looking downstream. The Ordnance Survey National Grid Reference system is used for identifying specific locations and upstream and downstream references are often abbreviated to u/s and d/s, respectively, for convenience.

2.0 Catchment and fishery overview

> "*The Inler (or Enler), originates in the Holywood & Castlereagh Hills. From there it flows through Dundonald and on to Comber, before finally entering Strangford Lough at Island Hill on Comber Estuary.*
>
> *In recent years the Club has worked tirelessly to improve habitat, and with help from ADSEA, who supplied sea trout fry in an effort to encourage an increase in migratory fish to the Inler system, we're aiming to become one the finest game fisheries in the country.*"
>
> Inler anglers also recently introduced a new vision for the club "*to become a true wild trout fishery. Annual stocking of fish has ceased and through the advice of the Wild Trout Trust charity we will let the resident fish stocks recover. To do this we've introduced a compulsory **catch & release** on all fish being landed.*" (www.inleranglers.com)

The bedrock geology of the northern and eastern catchment (Enler Catchment) primarily comprises sedimentary rock formations of sandstone, siltstone and mudstone, with older sandstone and subordinate limestones underlying the central main river valley. The western catchment (Gransha River catchment) comprises predominantly whacke, an even older, hard dark sandstone. Superficial deposits in the upper Enler catchment comprise predominantly glacial deposits of sand and clay, with the central valley comprising predominantly alluvium (clay, and and silt) and eastern and western areas of the catchment comprising mainly till. This geology is likely to produce a neutral to acidic upper catchment, becoming more neutral in pH through the main river valley.

3.0 Habitat Assessment

The river was inspected from the d/s end, working u/s, so the report will cover the Lower, Middle then Upper section. Flows on the day of the visit were elevated following recent heavy rain which affect the water clarity and ability to fully view in-channel obstructions and the river substrate.

3.1 Lower Section (downstream from Munn's Bridge, Newtownards Road to and including, Island Hill)

The farthest d/s section of the river is tidal and this greatly affects the scope of the habitat there, owing to the great fluctuation in depths throughout the tidal cycle. This somewhat limits the improvements that can be achieved there but means that cover and in-channel structure are important to maintain flow diversity from both a habitat and fishing perspective. Overhanging and trailing branches provide valuable refuge in which fish can rest and evade predators (they're far easier for fish to swim through than for cormorants), while also pinching areas of the channel to maintain discrete areas of scour and deposition (Fig. 1). In this section, being d/s of the town, in-channel structure could be seen as creating a minor increase to flood risk but the wide floodplain in this area and tidal nature means that retaining and, in areas, increasing this structure is unlikely to have a significant negative impact u/s.

Figure 1. Bankside trees and vegetation provide important cover and flow diversity in the ever changing tidal reach. The wide floodplain of this reach limits the likely impact of such structure on river levels u/s.

Several rock/boulder weirs are present within the tidal section, although only some were visible owing to high tide and high river flows. As with all weirs, it is important to remove them wherever possible as, contrary to prior fishery management beliefs, contrary to past river management consensus, the negative impacts of weirs far outweigh the benefits and promoting a more natural channel structure and dimensions is always the optimal course of action. Each weir creates its own negative impact both upon habitat quality (through impoundment of flows), sediment transport and fish passage and these impacts are cumulative – the greater the number of structures, the greater the negative impact upon the river and its ecology.

In estuary areas, weirs can also inhibit the running in and out of a river by migratory fish which often explore up into rivers before dropping back d/s. Fish of many species are often recorded doing this throughout the season, on their inward and outward migrations, where they spend extended periods within the estuary area, moving in and out with the tide. Weirs can therefore be an issue even if they are only behavioural barriers e.g. passable but shallow water or high flow that discourage fish from passing.

There is also the cumulative effect of barriers as, even when "most" fish can pass a barrier, it can still pose considerable problems for the overall fish population. This is because a group of fish trying to migrate will potentially lose members of that group at each barrier, through stress, predation, exhaustion, missing the passable flow/tide/river height or simply failing to find a passable point on the weir/barrier.

For example, consider six barriers that are each passable by 75% of the fish attempting to ascend them; this may seem a small issue for the overall population. However, this would mean that out of a group of 50 fish below the <u>first</u> barrier, only 10 would make it to the spawning grounds above the <u>sixth</u> barrier, a big reduction in the total number of potential mating pairs and offspring that could be produced.

Simply seeing 'some' fish get over a structure and knowing fish are present above it gives no real idea of the number of fish that **should** be passing it, with the smaller fish (including precocious mature parr) that often struggle the most comprising an important component of the overall spawning stock. It is therefore vital to ensure that manmade obstructions are removed wherever possible and where they absolutely cannot be removed, they are made as passable as possible.

At lower flows, the impounded reaches u/s of a weir also create an easy hunting ground for predators and poachers, undoubtedly increasing losses to the fish population, particularly of juvenile fish (including smolts) on their d/s migrations. These sections act as an ideal spot where fish-eating birds could easily corral fish.

Figure 2. Even seemingly surmountable weirs and barriers can have an impact upon fish stocks and limit the overall success of a population. The weir in this picture is drowned out by the high tide but how many fish become stuck above or below it on lower flows and lower tides?

It is often assumed that the areas around weirs are good fishing areas and therefore good habitat, which can occasionally be the case, particularly on heavily degraded channels with little other habitat; however, it is important to consider whether the reason that fish are accumulating around those features is more likely to be due to the barrier it poses to fish movement (physical or behavioural) that traps them in that area.

U/s of the weir, the wide, uniform channel appears relatively featureless, barring the occasional tree and overhanging bush, likely subjected to past dredging activity. Increasing the amount of cover and, ideally, trailing/in-channel structure would be beneficial to retain resident fish and providing improved holding water for migratory fish (Fig. 3).

Figure 3. There is a general lack of cover in many areas of the Lower Section.

At the u/s end of Comber Park (NW 58205 23603), what is thought to be the u/s limit of Japanese knotweed (*Fallopia japonica*) was observed (Fig. 4). This is a highly invasive and destructive non-native invasive species that out-competes and over-shades native plant species, leaving poorly vegetated banks that are susceptible to erosion. It is important that such potentially damaging infestations are treated before they can take over.

U/s of the knotweed, further signs of past channel maintenance and realignment are evident by the significantly straightened and uniform channel. In most areas, the bankside cover is too high above the water level to provide significant fish-holding potential (Fig. 5).

Figure 4. The suspected source of Japanese knotweed (brown canes in foreground) on the river.

Figure 5. Cover and in-channel structure provides some enhancement of the artificial channel but much of the cover is above the optimal height above water level.

In addition to the straightening, much of the riverbank through Comber has been artificially revetted, often with sheet piling but also with rock armouring. This appears in part to be to keep the river within its artificial alignment but also to increase flood protection for the surrounding infrastructure. The sheet piling creates a barren edge to the river with little cover or sanctuary for fish and another submerged weir poses a barrier and potentially delays fish within this sub-optimal habitat where they are susceptible to predation, stress and poaching, particularly at low flows (fig. 6).

Figure 6. Sheet piled river margins provide no cover or refuge and another rock weir poses another potential obstacle that could delay fish within the sub-optimal habitat.

Owing to the lack of cover within the town area, it is therefore important to retain and encourage small shrubs and vegetation anywhere they can grow without adversely affecting flood risk (Fig. 7). In many places that such shrubs have established, it appears that the low branches have been removed. This may be to reduce perceived flood risk but it is more likely that it was simply to ease angler access. The temptation to prune low trees and branches for access should always be resisted as the action will simply remove the feature that held the fish anyway leaving no cover and no fish.

At Newtownards Road Bridge, the overwide channel has caused sediment deposition, partially blocking one arch (Fig. 8). Removing the sediment here will only facilitate further deposition as it is the loss of energy within the over-wide channel that is causing the material to be deposited.

Figure 7. Where shrubs become established and pose no flood risk they should be retained at all cost as they will help to provide some of the vital cover that is lacking. Pruning the low branches will only improve angler access to areas that fish used to inhabit!

Figure 9. Deposition around the Newtownards Bridge. Removing this will simply reinstate the over-wide channel and result in more deposition. This work may be undertaken by the council to maintain capacity but would be of no real benefit to angling as it may even remove spawning gravels.

3.2 **Middle Section** (downstream from Kennel Bridge to Munn's Bridge)

The channel u/s of the road bridge remains a uniform width and is of low sinuosity. This will greatly limit the natural variability of substrate sizes that should occur within the channel as areas of wider channel (as under the bridge) are required to facilitate deposition of finer gravels, although the exact extent of this was difficult to ascertain on the day, owing to the coloured water (Fig. 10). In addition to the obvious impacts upon reduction of potential fish spawning, the lack of substrate diversity and sorting degrades its habitat quality for many beneficial native invertebrates. The lack of low/trailing cover and in-channel structure also reduces fish holding features within the channel and limits the number and size of fish that it can support.

Figure 10. U/s of Newtownards Bridge the channel remains uniform and lacking cover/in-channel structure.

Some areas of low/trailing cover are present, and should definitely be retained (Fig. 11). These are the obvious locations that resident fish will chose to hold and form likely lies from which to catch resting migratory fish. However, there is again a general lack of this type of cover through the Middle Section. Planting the occasional small, shrub willow species (*Salix* spp.), particularly goat willow (*S. caprea*) that do not grow too large or rapidly and provide valuable low, bushy cover will greatly increase the fish-holding potential of the section (Fig. 12).

Figure 11. Owing to the general lack of overhanging and trailing vegetation, it is vital to retain whatever cover is available.

Figure 12. A typical goat willow with small, dense canopy which could provide valuable fish cover if located on a riverbank. Note the more oval-shaped leaves than many willow species and the pale underside (inset). This tree c.100m d/s of the gauging weir (NW 5788724062) would make a useful donor for cuttings.

Throughout the Middle Section numerous weirs are present, fragmenting habitat within the river, interrupting fish and sediment movement and impounding flows (Fig. 13 & 14). Although once thought to create good habitat and fishing pools, it is now recognised that weirs form little more than sediment traps on a river and the associated deposition leads to shallowing of the pools over time. For this, and the reasons mentioned previously, weirs should be removed from rivers wherever possible. Where habitat features are required, bankside and trailing trees perform many of the same beneficial functions without the negative implications.

On heavily altered/man-made channels, particularly where there are flood risks and rough trees and vegetation are not appropriate, it may be desirable to retain some of the weir structure as a flow deflector, but never right across the channel. A free-gap of at least ¼-⅓ of the channel width should always be maintained clear down to bed level. This will allow active fish passage and sediment transport. The flow focussing within the free-gap will then drive scour into the river bed, creating pool depth that will be maintained by the flow it receives, rather than infilling as occurs u/s of a full-width weir. Even so, complete removal of weirs and replacement with more natural woody features that will develop the channel and assist its natural recovery of natural in-channel substrate features is almost always the preferred option.

Figure 13. A potential barrier to fish movement which impounds the river u/s and interrupts sediment transport through the river.

Figure 14. Another of the numerous rock weirs throughout the Middle Section that pose issues to fish and substrate movement.

The largest weir with potentially the poorest passability observed on the river is the flat-V flow-gauging weir (NW 5790424165, Figs. 15 & 16). This undoubtedly forms some barrier to all fish, although it is likely that larger fish will ascend it more easily than smaller ones, particularly in higher flows as it drowns out more and increased turbidity provides some cover.

While at the site, and as if on cue, a small trout (c.200mm) attempted to ascend the weir and failed. This highlights not only the issue with fish passage but that fish passage is required throughout the year, not just in the period immediately preceding spawning, and for all fish sizes. All trout, including 'resident' fish and juveniles require the ability to move freely, both u/s and d/s, to make optimal use of available habitats. Consider that the best habitats for one life stage may be quite different from another and that those habitats could be u/s or d/s of their current residence. Again, the behavioural barriers that discourage fish movement due to water depth, temperature or exposure can be as detrimental as physically impassable ones and a combination of all factors amplifies the impact. This is a major reason that the potential impact of barriers is so often underestimated.

Figure 16 provides a better perspective of the fast shallow flows that fish will find so difficult to ascend. As the water depth increases to that which would be more passable, so will the velocities, exchanging one issue for another.

Figure 15. Looking u/s at the flat-V flow gauging weir – a notable barier to fish passage.

Figure 16. Side view of the flat-V gauging weir, where shallow, high velocity flows provide a physical and behavioural barrier to fish passage. Increased flow and depth that would ordinarily make an area more passable are likely to significantly inhibit fish passage through greatly increased flow velocities. The small trout was observed failing to ascend the weir in the area highlighted in red – it is probable that this was the only area with low enough velocities for the fish to even attempt the ascent.

The gauging weir impoundment extends for c.60m u/s through what is reasonable habitat (good tree and bankside cover) but severely degraded by the uniformity of flows. The final stretch of the Middle Section, up to the bridge, is again straight, shallow and lacking low and in-channel cover (Fig. 17). Planting trees along the bankline could greatly improve this habitat by providing cover and diversifying flows to increase bed scour and deposition. The weirs in this section also further prevent flow diversification as each weir effectively resets the flows by spreading the water and energy across the full channel width. Removal of the weirs or at least creating offset notches to encourage a more meandering flow path (one side of the channel to the other) would be greatly beneficial.

Figure 17. Straight, shallow, uniform section that would benefit from increased in-channel cover.

1.1 **Upper Section** (upstream from Kennel Bridge)

The banks are less revetted in the Upper Section but the channel remains heavily modified, being notably straightened and of uniform. The close proximity of access tracks and worked land to the river is also leading to additional sediment inputs where gutters are cut through the banks to drain the track, as do the field drains (Figs. 18 & 19). Areas of trees, shrubs and rank vegetation provide some cover and shelter within the channel but a lack of in-channel cover and structure remains - this limits the fish carrying capacity and of the area and leaves them susceptible to predation.

Figure 18. Looking u/s of Kennel Bridge, the channel is significantly straightened and uniform offering little refuge from predators. Drainage points from low-lying areas of track and puddles drain silt laden water directly to the river (red circle).

Figure 19. Field drains provide additional detrimental fine sediment input to the river.

Low-level weirs again de-energise the river flow, interrupt sediment transport and inhibit the natural development of a more natural channel morphology in many areas (Fig. 20). The impoundment created also inhibits the natural scouring and sorting at pool tail u/s where such action is required to maintain high quality invertebrate and spawning habitat free from fine sediment.

Figure 20. One of many low-level weirs in the Upper Section that impound the river and inhibit the development of a more natural channel.

Outside the influence of the weirs, or where they have degraded and become outflanked by river flows, the channel is beginning to recover some more natural sinuosity and bed structure, with evidence of bank slumping through beneficial erosion leading to the formation of berms and flow diversification (Fig. 21). Adjacent areas of cover and greater bank stability provided by trees further enhance these features. It is understood that overhanging and trailing vegetation has historically been cut back to maintain flow conveyance. Gaining agreement that such work will be kept to an absolute minimum or ideally ceased will be the best way to ensure continued natural channel recovery and habitat quality.

Areas of bank slumping and regrading have allowed beneficial widening of the channel, with a corresponding increase in the availability of finer gravel substrate providing valuable potential invertebrate and salmonid spawning and juvenile habitat (Fig. 22). Willow planting will help to consolidate the regraded bank and provide a valuable increase in lacking cover.

Figure 21. Gravel bar (right of shot) that is forming a vegetated berm and greatly diversifying the channel structure. This effect has occurred in several areas where weirs have become outflanked but will also occur as more in-channel structure (trailing trees) becomes established and diverts flows within the channel. Such gravel formations are greatly inhibited by weirs interrupting gravel supply.

Figure 22. Bank slumping (providing width variation) and natural regrading assisted through stabilisation by bankside vegetation improves this section; however, more cover is required.

The u/s end of this section becomes wooded on the LB and with the additional trees, benefits from inputs of woody material that also provide cover and flow diversity, greatly enhancing the section (Fig. 23). However, the channel is still very uniform in width and with the bank revetments on the RB and naturally stable, tree-lined banks on the other side, along with a lack of in-channel structure, it has little ability to change to a more natural, meandering shape.

Figure 23. Higher quality habitat provided by adjacent trees and vegetation which, through the additional bank protection, offers an opportunity to drive bed scour and create deeper holding water along those banks.

The high, natural stability of the LB through tree roots and vegetation offers an ideal opportunity to develop the channel structure. Flows can be directed along the LB side of the channel where, unable to erode outwards into the stable bank, they will scour downwards to develop deeper, self-maintaining pool areas and sort bed materials. Removing (initially) a small section of the weirs at the side where bed scour is required will be the first step (Fig. 24). This can be further assisted through the installation of additional, strategically placed large woody material to create pinch points but also areas of slower flow to increase deposition and substrate retention. Once the channel is naturally recovering it may then be beneficial to remove the remaining weir material, if it is not simply consumed within the new channel shape.

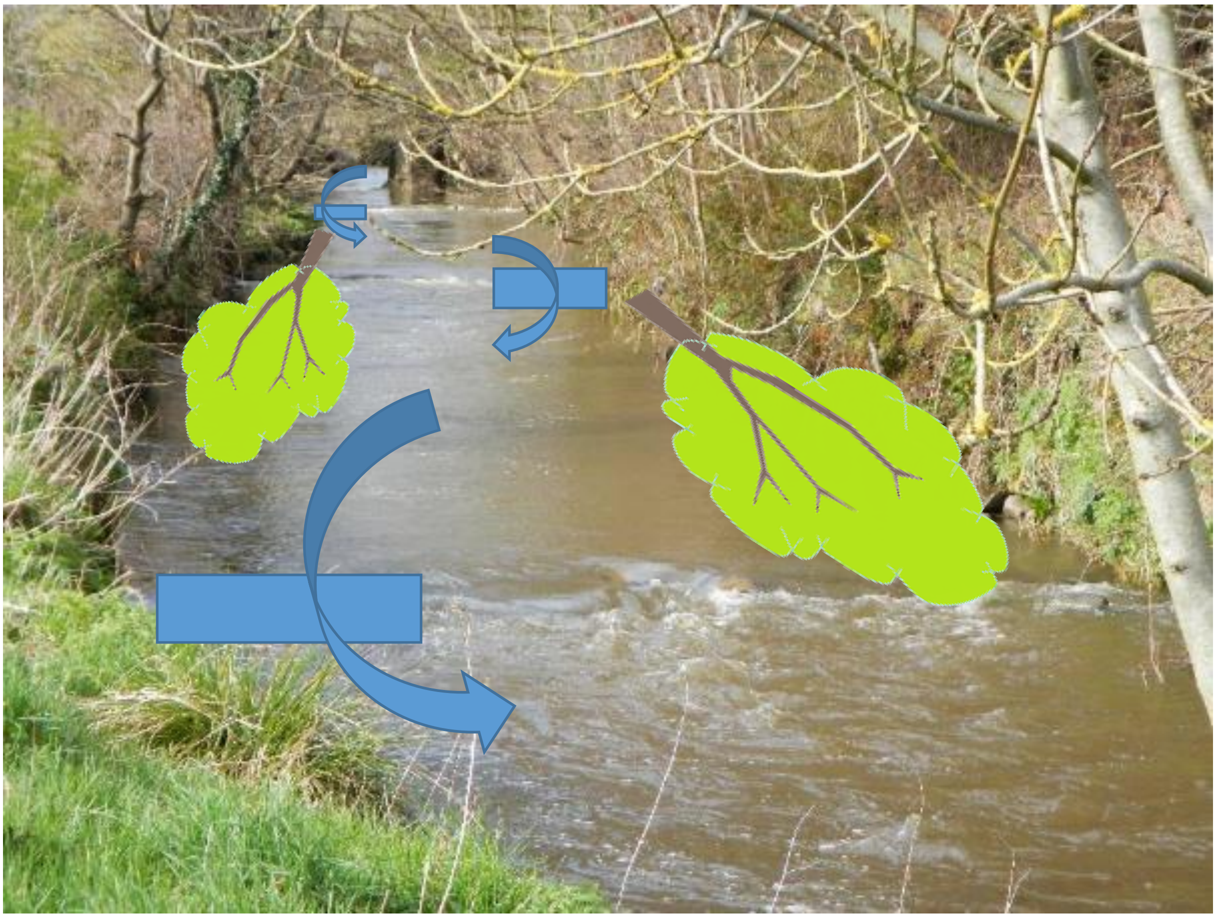

Figure 24. Strategically removing small sections of the weirs (indicated by blue blocks and arrows) could start to reinstate a more diverse flow regime. In addition, diffuse woody material (tree canopies) pinned u/s of the weirs and around the areas of deposition would further focus flows through the gaps while facilitating deposition along the opposite bank areas.

2.0 Headwaters

The upper Enler and some main tributaries were given brief inspection during the visit although most, owing to their location within the town and valley, were heavily modified (dredged and straightened), although they did appear to provide some potential salmonid spawning, juvenile and invertebrate habitat (Fig. 25). The potential flood risk they pose also limits the opportunities for initiating improvements such as increasing in-channel structure, tree planting and so on; however, such options should be investigated further to ascertain their feasibility.

The upper Enler was spot checked, where it flows past the Billy Neil Soccer School of Excellence, and it appears similarly degraded by straightening and hard engineering as the lower sections (Fig. 26) but again, is likely to provide some spawning and juvenile habitat. The potentially lower flood risk and larger riverside buffer strips in this area may allow more extensive in-channel improvements to be undertaken. Bankside willows could be thinned to allow greater light penetration to the channel, with some limbs laid into the channel to provide low cover and develop the channel morphology.

Figure 25. One of the tributaries which joins in the town. Some habitat potential but a notably degraded channel course and dimensions.

Figure 26. The upper Enler, near the Billy Neil Soccer School. Heavy armouring constrains the channel but there is potential to let more light in and increase the low/trailing cover. Again, completely removing at least a portion of the weir would be beneficial.

An upper section of the main tributary, referred to as the Gransha River, was also inspected via a spot check looking u/s and d/s of the Glen Road Bridge (Figs. 27 & 28). The channel here is far more natural, with a good diversity of bankside cover and river substrate. The conditions appeared to provide high quality spawning and juvenile salmonid habitat.

Figure 27. A more natural, if possibly straightened, section u/s of the Glen Road Bridge.

Figure 28. More natural channel dimensions and bankside vegetation d/s of the Glen Road Bridge.

3.0 Recommendations

3.1 Channel restoration

The Enler is heavily modified in most sections, either through dredging and realignment, weirs, or both. The ideal situation would be to fully restore the river to a more natural state and thereby allow the development of higher quality channel structure and habitat. However, this option is always high cost and is majorly complicated through urban areas with adjacent infrastructure and flood risk issues. In more rural areas, the issues centre around land loss and reduced workability of the land, but they still represent a significant challenge. With these considerations in mind, the recommendations of this report will focus on smaller-scale actions that can improve habitat for the benefit of the native fauna in the short-term, with the hope that larger-scale initiatives can be undertaken in the future.

3.1.1 Barriers

Removal of weirs and other obstructing structures within the channel should be a primary goal for improvement works for the river. Removing the rock weirs within the Middle and Lower town sections could not only improve habitat, and fish and substrate movement within those sections, but it could also potentially lower flood risk. The reduced flood risk could also increase the potential for allowing a more diverse tree and vegetation structure to develop within those areas.

A great initial step would be to investigate the potential to notch the weirs and remove at least a portion of them down to bed level. The location of the notch should be dictated by where deepening and the main river flow would be beneficial and with the hard engineering of the banks in many places it may even be possible to encourage some variation in the flow path (as described for the upper section) within the town. Where this is seen as too high a risk to the riverbanks or adjacent infrastructure, notches could simply be restricted to the centre of the channel.

Easing fish and substrate passage through these structures represents one of the single biggest and simple improvements that could be initiated on the river, the other being increasing the availability of low-level and trailing structure over and within the channel.

3.2 Tree work

3.2.1 Planting

It is recommended that planting with locally native deciduous tree species is undertaken wherever cover is lacking along the river. They can also be planted in anticipation of natural channel movement to control that erosion or to provide features when the river reaches those points. Likewise, planting at a low level on the bank, or on bars/depositional features can help to consolidate them and the increased structure in those areas will assist in developing them further by dissipating the energy of high flows and encouraging further deposition in those areas.

It is important to recognise that, particularly in the Upper Section, although the erosion may not be as desirable to the adjacent land users, the natural erosion and deposition that is beginning to take effect is part of the river naturally recovering and reinstating beneficial habitat features. Not all erosion is bad and there is certainly no reason for the angling club trying to prevent it entirely, as most large-scale sediment input from the erosion will occur when the river is already high and can transport the material, rather than depositing it. At some point, if the river reinstates a more natural channel dimensions, it may then be beneficial to limit those areas of erosion and the associated sediment inputs. Currently, the field drains and other continual sediment inputs (particularly at medium and lower flows) are likely to be at least as damaging, if not more damaging in terms of siltation, with no ecological benefit.

The above factors should be considered in choosing the location of any tree planting as there is little benefit in undertaking planting that will help to constrain the channel in its current, unnatural course, as should the potential requirement for future maintenance of any willows planted.

With willow the quickest and easiest way of planting is by pushing short sections of fresh willow whip into the ground. This can be undertaken at any time of the year, but will have the greatest success during the dormant season, shortly before spring growth begins (ideally late Jan-March). Whips should be planted into soft, wet ground so that there is a greater length within the ground than out of it, to minimise the distance that water has to be transported up the stem; 30-40cm of whip protruding from the ground is sufficient (providing this protrudes past the surrounding vegetation to allow access to light). Whips of 5mm-25mm in diameter tend to take best, but even large branches can be used.

Small bundles (faggots) of freshly cut willow can also be employed to rapidly increase marginal cover. If they are staked into sections of softer river bank along the waterline they have a good chance of rooting and becoming valuable, dense cover.

3.2.2 Laying

Where trees (particularly willows) are already established, habitat improvements can be quickly and easily achieved by laying the trunks, or branches of occasional selected trees down into the watercourse to increase low cover and in-channel structure. The method is usually limited to pliable species like willow, elm, hazel, hawthorn and small alder, but some others can be laid carefully. Where willow is laid into the river, it is highly likely to root back into any sediment deposition that occurs around it, creating a more stable and permanent improvement to the channel structure.

The process of laying a tree or branch is simple: it involves cutting part way through the stem/trunk, a little at a time (while it is under light tension) until it can be forced over into the river (Figs. 29 & 30). The depth of the cut should be limited to only that which is required to bend the limb over, as this will retain maximum strength in the hinge and maintain the health of the tree/shrub. On smaller shrubs, simply cutting the stem/trunk at a very shallow angle and then putting an axe blade into the cut and hitting it with a hammer can also help the laying while retaining a good strong hinge.

This is a great method to rapidly increase low cover but should be employed sparingly so as not to detract from other valuable tree habitats. The method is best employed specifically where the additional cover is likely to directly benefit fish holding capacity of an area. Fast growing trees like willow can even be strategically planted in anticipation of employing this technique once they are established.

Figure 29. Hinged willow.

Figure 30. Hinged hazel.

3.2.3 Coppicing

Particularly where there is a predominance of one age class of tree and / or the canopy is of a uniform height, low coppicing can be a great way to increase habitat diversity and light penetration by rejuvenating low-level regrowth. This method also works well where past tree maintenance (by anglers or for flood defence) has removed the low-lying branches. This technique should always be undertaken sparingly, only on the occasional tree, to ensure that one type of habitat is not gained at the expense of another.

Coppicing should be undertaken during the dormant season as this is when the process will create the lowest impact upon the tree and it will have the greatest chance of survival. When used properly, this technique causes minimal stress to the tree or impact on its long-term viability. Coppicing can often extend the life of a tree, particularly if the work reduces weight out of the tree's crown and allows it to remain in place longer.

3.2.4 Kickers

Tree kickers can be a great way of manipulating flows and erosion/deposition, particularly within a heavily impacted channel. The technique involves cutting a tree/shrub and then cabling it to its own or an adjacent stump, to keep it in place. The increased woody material in the river then focusses flows into the rest of the channel while creating a baffling effect and diffusion of flow energy around the kicker to encourage substrate deposition and natural channel narrowing (Fig. 31). See how the kicker in Figure 31 has caused sediment to be accumulated at the d/s side, focussing flows along the far bank of the previously over-wide channel.

This technique would work well alongside notching weirs in the Upper section at alternating sides (see Fig. 24). Sediment can then be allowed to accumulate, consolidate and form new, vegetated in-channel bars or even encouraged by planting with willow whips. A further step could be to employ living willow tree kickers that then also have the potential to take root into any fine sediment that accumulates around their canopy in exactly the same way that laid willows will often strike root from their branches and start to grow back into the ground.

Figure 31. A perfect example of how a tree kicker can be employed to create deposition in the river margin that will focus flows down the far side of the channel.

Tree kickers can be easily anchored in place with a simple steel cable setup (Fig. 32) or by winching the trunk of a tree between the vee of two closely adjacent trees or branches, as can other large logs (Fig. 33).

Figure 32. A basic tree kicker cable setup using 4000kg braking strain cable and two sets of cable clamps. The webbing strap in the background is used to pull the kicker close to the stump but is removed once the cable is fully fixed in place.

Figure 33. An alternative way of anchoring a tree kicker or log/woody material without manmade fixings. This technique simply relies on winching the butt end of the wood between two adjacent trees/branches and allowing friction to hold the material in place. Best for low flood risk areas but still a very secure method of fixing.

4.0 Making it Happen

WTT may be able to offer further assistance such as:

- WTT Project Proposal
    - Further to this report, the WTT can devise a more detailed project proposal report. This would usually detail the next steps to take and highlighting specific areas for work, and more detailed explanation of the how it can be undertaken, with the report forming part of any required consent applications.
- WTT Practical Visit
    - Where clubs are in need of assistance to carry out the kind of improvements highlighted in an advisory visit report, there is the possibility of WTT staff conducting a practical visit. This would consist of 1-3 days' work, with a WTT Conservation Officer(s) teaming up with interested parties to demonstrate the habitat enhancement methods described above. The recipient would be asked to contribute to the time, and reasonable travel and subsistence costs of the WTT Officer. This service is in high demand and so may not always be possible.

In addition, the WTT website library has a wide range of free materials in video and PDF format on habitat management and improvement:

www.wildtrout.org/content/index

We have also 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.

5.0 Disclaimer

This report is produced for guidance; 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.