



Habitat Advisory visit to the River
Maine.

Undertaken on behalf of Gracehill,
Galgorm and District Angling Club,
Antrim, Northern Ireland,
by Vaughan Lewis, Windrush AEC
Ltd

April 2009

1.0 Introduction

This report forms the output of a site visit to the River Maine, near Ballymena Antrim, Northern Ireland, on 17th April 2009 on behalf of Gracehill, Galgorm and District Angling Club. Information in the report is based on observations on the day of the visit and additional comments provided by club members.

The club was formed in 1960, and has approximately 350 senior and 50 junior members. They control a large section of the River Maine, a key tributary of Lough Neagh.

Throughout the report, normal convention is followed, with right bank (RB) and left bank (LB) of the river identified when looking downstream.

2.0 Habitat Assessment

A major flood defence scheme was undertaken during the 1980's, apparently largely to protect the Gallagher's tobacco factory on the RB of the river. This scheme had a major impact on the river, straightening its planform, over-deepening it, and removing much of the hard bed. The erection of earth bunds and concrete flood walls in various sections also significantly reduced out of banks flow, and hence hydrological connectivity with the river's floodplain. The requirements to prevent flooding of the factory and surrounding properties remains a constraint on future instream habitat enhancements.

The top beat of the reach walked was immediately upstream of Bridgend. A high level mill channel was present on the RB of river. This was fed from the main river upstream of a major weir and provided water to the Gallaghers factory. Habitat quality in it was poor for trout, with a significant growth of diatomaceous algae.

A major enhancement project had been undertaken over a section of 150m of the River Maine, funded by the EU. This comprised the provision of rubble mats, stone deflectors and large, individual boulders. The work had increased instream habitat diversity for all lifestages of brown trout *Salmo trutta* and Atlantic salmon *Salmo salar* and had been possible as this length of channel was upstream of the footprint of flood defence scheme.

The enhancement linked into a short section of relatively poor habitat, with limited instream variation and cover. However, the bed had excellent potential for salmonids, being dominated by uniform and compacted mixed gravel. This length of river remained rather open, with limited amounts of bankside cover, overhanging tree shade and Large Woody Debris (LWD). Upstream of this to the site of the weir, there was excellent natural habitat.

There were some small stands of water crowfoot *Ranunculus* Spp. present in the channel. Club members noted that this weed was far more prevalent in the past, with much of the weed possibly having been torn out by a flood in autumn 2008, apparently the highest flow experienced in the catchment for over 30 years.



Enhanced length of channel showing LB deflector

There were short sections of erosion along the RB of the river. This appeared to be as result of slippage caused by angler usage.

Downstream of Bridgend, the channel had been heavily dredged and flood banks constructed along both sides of the river as part of the major flood defence scheme. The lack of trees was apparent, with all bankside vegetation having been removed as part of the scheme. Subsequent to completion of the flood scheme, the club had installed a number of blockstone deflectors/weirs, in an effort to scour the bed and increase habitat diversity. There were approximately 8-10 of these structures along a length of several hundred metres, each with a head loss of approximately 300mm to 500mm. Erosion of some of the groyne was visible where they met the existing bankline.

Some of the pools created downstream had proved to be very successful for holding adult salmon and dollaghan. However, there was restricted availability of gravel riffle habitat downstream of each structure, probably limiting biodiversity interests as well as reducing habitat for spawning and juvenile salmonids. The club had an aspiration to undertake more work to the river, to improve instream habitat further, in particular increasing the amount of gravel present.



Dredged section of river downstream of Bridgend, with flood banks visible on LB and RB. Note the blockstone weir subsequently installed by anglers



Detail of blockstone weir

At the downstream limit of the flood scheme, the channel was diverted from within the Gallagher's site, and excavated along a new line, constrained by a concrete wall along its LB. A significant movement of gravel had apparently taken place downstream through this section after completion of the scheme, with the material accumulating in the more natural channel section downstream. The club and Gallagher's had introduced large boulders into the denuded reach as compensation for the work undertaken.

Downstream of Gracehill Bridge, the river was dredged during the 1980's, removing much of the original hard bed, leaving a clay and sand dominated substrate. Compensation for this work was undertaken by the club, with the installation of a number of blockstone weirs and boulders, in a similar manner to the Gallagher's reach. Head difference over these structures was approximately 500mm. Despite this work, there remained a dearth of good quality gravel within the channel.

Club members had planted a number of willow trees along the LB of the river. These were now semi-mature.



LB willow trees planted by the club. Note also blockstone weir

The club had driven three stakes into the river bed near to the willow trees some five years ago. These had remained in place despite the very high flows of August 2008, scouring the bed and creating valuable instream cover for fish.

A series of rubble mats utilising 200 tonnes of introduced gravel, and large boulders had been constructed by the club. They had planted the mats with water crowfoot, with willow moss *Fontinalis antipyretica* and Hemlock water dropwort *Oenanthe crocata*

having colonised the gravel naturally. This work had formed an excellent section of spawning gravel and juvenile habitat for salmon and trout. Pre and post electrofishing surveys showed that trout fry numbers had quadrupled, with a similar increase noted in the numbers of parr present.



Gravel spawning area created by the angling club

Immediately downstream of the rubble mats, a series of 'D' shaped bankside deflectors constructed of stone, had been installed under the EU funded salmon enhancement plan for the River Maine, approximately 2 years ago. They had begun to colonise with reed canary grass *Phalaris arundinacea*, along with other emergent vegetation, and had created significant sections of bed scour.



‘D’ shaped stone deflectors

3.0 Fish stocks

The River Maine holds good stocks of brown trout, Atlantic salmon and dollaghan. Dollaghan are brown trout that migrate downstream as juveniles from tributary streams to Lough Neagh. Utilising the rich waters of the lough, the dollaghan grow rapidly, attaining a weight up to and beyond 5kg. During the late summer through to winter, the adults migrate upstream to their natal rivers, where they spawn. In essence, the dollaghan behave in a similar way to sea trout, with Lough Neagh replacing the ocean in their entirely freshwater existence. Due to a decline in runs, and catches of dollaghan in the 1980’s and early 1990’s, a programme of hatchery rearing and restocking was instigated. Subsequently, numbers of dollaghan have partially recovered, with good catches now made by anglers. A similar rearing programme is in place for the system’s salmon fishery.

Brown trout numbers appear to have reduced in the Maine. Despite a general acceptance of ‘catch and release’ by anglers, the average size of fish has declined, although anglers do still catch reasonable numbers of fish between 100g and 200g. The club has an aspiration to try and increase the number of larger fish present throughout the river. There is some poaching of the river, but the club does operate a robust bailiffing system, with offenders taken to court.

There is some spawning of salmonid species within the River Maine. However, a large percentage takes place in a tributary stream, the River Clough, which was not walked during this visit.

Stocks of eel are also present in the River Maine. Worldwide concern regarding the status of eel has culminated recently in the development of a European eel strategy. In order to meet the requirements of EU Council Regulation EC No 1100/2007 relating to controlling exploitation of eels, the Department of Food and Rural Affairs (DEFRA) has recently published eel management plans for the UK. Details can be found at <http://www.defra.gov.uk/marine/pdf/fisheries/emp/neagh.pdf>.

The plans for Lough Neagh suggest that escapement of eels from the fisheries on Lough Neagh equates to around 360 tonnes annually. This figure is in excess of the 160 tonnes to 240 tonnes estimated escapement required to sustain the fishery. As such, and given the socio-economic interest of the Lough Neagh eel fishery, no reduction in fishing effort or catch is currently recommended.

4.0 Water Quality

The catchment has been subject to in excess of 100 pollution incidents since 2004. Some of these have been serious, with numbers of fish believed to have been killed. Despite a number of warning letters, only 3 prosecutions have taken place, leading the club recently to take their grievances regarding water quality to Ballymena Borough Council (Source: Gracehill, Galgorm and District Angling Club website). The volume and frequency of these pollution events must have an impact on the overall water quality and ecology of Maine. No chemical or macroinvertebrate data was provided to allow an assessment of the level of this impact. Throughout the day, numbers of adult upwing (Ephemeroptera) flies were noted on the river's surface, suggesting reasonable water quality.

5.0 Management recommendations

- There are clear benefits to stock abundance and size arising from 'catch and release' of rod caught fish. The present policy of returning the majority of fish caught should continue. If a return was made to 'catch and kill', it is likely that the pressure on the fishing from the relatively large number of anglers fishing the river would result in a reduction in fish numbers.
- The continuation of the currently high level of pollution incidents is clearly unacceptable. Lobbying of the local authority and the Department of Culture and Leisure (DECAL) should therefore continue. In addition, it would be of great value to obtain more baseline data on chemical and biological assessment of water quality. To this end, the club should request that the relevant authority (DECAL or the Rivers Authority?) should take regular (monthly) water quality samples from key locations on the river.
- In addition, standardised samples of the river's macroinvertebrate fauna should be taken and analysed. Ideally, this should be undertaken by the statutory authority. However, the club should also consider undertaking some basic monitoring of macroinvertebrate populations in the river. This involves taking a series of three minute 'kick-samples' of the riverbed. A fine meshed net is placed on the bed of the river, which is then disturbed using the sampler's feet for a total of three minutes, sampling all habitat types in proportion to their abundance in the channel. The samples are then placed in a

labelled container (they can be preserved with alcohol if required for future sorting).

- Samples are subsequently sorted into invertebrate families. Each family is assigned a score under a system known as the Biological Monitoring Working Party (BMWP) with the highest scores reserved for the most pollution sensitive families. Scores for all families are then added together, to give a total for each sample taken. This score can then be compared to a predicted score based on elevation, geographic location, gradient, and general habitat of the site. Deviation of the sample from the predicted score would be indicative of a water quality or perhaps flow, perturbation. Further details of 'DIY' sampling strategies can be obtained from the Riverfly website at <http://www.riverflies.org/> Suitable nets and trays for sampling and sorting macroinvertebrates can be obtained from Alana Ecology www.alanaecology.com Tel: 01588 630173.
- Despite the excellent work above Bridgend, a short section remained within this reach that would benefit from enhancement. Angling generally took place from the high RB. It would be possible to install a series of elongated 'D' shaped deflectors along this bank, constructed from large boulderstone and backfilled with cobbles and coarse gravel, with their top level set at around 150mm above summer water level. A covering of coir fibre geotextile, planted through with live willow slips and well grown, bare-rooted emergent vegetation would increase stability of the structure. The deflectors would not only increase variation to flow patterns, but would also provide improved access for anglers. The introduction of individual boulders and groups of boulders would help to also scour the bed, sorting the gravel and improving both spawning opportunity and juvenile habitat for salmonid fish. Subject to consultation with the Rivers agency, it may be necessary to undertake modelling of the likely flood risks of undertaking this work.
- In order to help re-establish water crowfoot in the channel, it may be helpful to utilise willow snowshoes. These are simply thin willow stems twisted and woven in order to make the rough shape of a snowshoe or tennis racket. Once complete, they are anchored to the river bed using wooden or metal pins. Weed passing down the river lodges on the snowshoes, allowing it to root into the bed. A similar effect can be obtained by driving small wooden stakes into the river bed. Further details on snowshoes and other uses of willow are provided in the WTT Chalkstream Habitat Manual. This is available as a series of downloadable PDF's from the Trust's website www.wildtrout.org Construction should be undertaken in April or early May to maximise growth of introduced plant material prior to high winter flows.



Snowshow ..



....and after installation showing collected weed

- It would be also valuable to plant a number of deciduous trees, particularly along the LB. Species to consider include ash and willow, with individual trees protected from agricultural stock and rabbits. Additional instream habitat could also be created by partially cutting through the trunks of large individual bankside trees, near to their base, and ‘hinging’ them into the water. They could then be fixed in place roughly parallel to the bank, using 25mm reinforcing bar driven into the riverbed through holes drilled in the trunks. At least 3 sections of bar should be used, with each one driven at least 600mm into the riverbed. Additional fixing should be provided by wrapping galvanised cable laid steel wire around the trunk or passing it through a drilled hole at its butt, with the wire then attached firmly to the stump remaining on the bank. This provides a solid failsafe fixing in the event of the tree working loose from the rebar. Where erosion has resulted from angler access along the bank in the upper reach of the fishery, it would be prudent to densely plant willow slips (preferably osier *Salix viminalis* or goat willow *Salix caprea*) approximately 1m-2m back from the bank top to create a protective root

system as they grow. Anglers should be asked to avoid these areas during the establishment of the willows.

- An alternative method of establishing water crowfoot is to transplant the weed from areas where it remains abundant. One simple way of doing this is to make a hole in the bed of a diameter of around 5cm-10cm using a crowbar or similar metal spike. Fold a good sized tress of water crowfoot in half and tuck the folded section of weed into the hole. Then push in the sides of the hole using boots, and place a small pile of stones over the base of the weed to prevent it pulling out in strong flows. If swans prove to be a nuisance, it may be necessary to put a metal cage over the newly planted weed until it is well established.



Tree suitable for 'cutting and hinging' into the river



Freshly planted water crowfoot protected by mesh cage

- The blockstone weirs constructed downstream of Bridgend have created a series of hydraulic checks within the channel. These act to control water level and influence the flood regime of the river. Where erosion of the bank is occurring adjacent to the weirs, repairs should be effected. Without this remedial work, the weirs will fail, resulting in a loss of benefit and the potential for significant bank slippage.
- It should be possible for the club to install a series of additional enhancements to the river along this reach, for instance introducing large individual boulders and sections of spawning gravel, without any significantly increased flood risk, provided that the enhancements do not ‘drown out’ the hydraulic checks (blockstone weirs). Undertaking this type of enhancement scheme has the potential to improve the fishery quality of this reach of the river dramatically. However, it is of fundamental importance to obtain the consent of the Rivers Agency for any such work. This will require the quantification of any changes to flooding that might occur as a result. In order to do this, it may be necessary to create a flood model to assess the risks. The WTT has a professional link to the River Restoration Centre (RRC) who have the capability to provide this service and, in conjunction with the WTT, help in the detailed design of any future enhancements. RRC can be contacted directly at <http://www.therrc.co.uk/>. Similar work could be undertaken downstream of Gracehill Bridge, where there is a similar deficit of spawning gravel.

- The grass and riparian vegetation along this reach has been very heavily maintained. Subject to agreement with the Rivers Agency, it would be prudent to reduce both the frequency and extent of the cutting, so as to leave a wide (3m+) margin of uncut vegetation adjacent to the river. The root system that would develop as a result of these changes would help reduce erosion. In addition, mixed deciduous trees could be planted on the top of both banks adjacent to Gallagher's factory. Suitable species include mixed native willows, hawthorn, blackthorn, alder and ash. As the trees grow, careful coppicing and pollarding can be used to regulate cover, shade and the amount of LWD in the channel.
- Selected willows (one in three initially) downstream of Gracehill Bridge could be 'cut and hinged' as described above. By carefully aligning the hinged limbs parallel to the bank, and fixing them in this position, valuable instream cover would be created without a significant increase in flood risk. The hinged limbs will also help protect the bank from erosion, with growth into the bank from the limbs offering further protection. The longevity (>5 years) of the group of three stakes driven into the river bed by the club shows that firm fixings can be obtained in the bed of the river at this location.
- Additional funding for some of the work recommended might be forthcoming from the Wild Trout Trust who hold small 'pump priming' pots of money for projects of this nature. The Trust also operates a 'Practical Visit' scheme whereby a river restoration specialist undertakes up to 2 days work at the site in order to demonstrate techniques that are suitable to address the issues raised in this report. Contact Tim Jacklin of the WTT at projects@wildtrout.org at for further details. Other potential funding sources include the Environment Agency or the Sharegift charity. This is a charity that collects unwanted share allocations and donates the profits to smaller groups undertaking a variety of work. Contact them at <http://www.sharegift.org/>
- The club should also consider entering the WTT conservation awards for the work that they have undertaken to date. These are annual awards open to all clubs in Great Britain, Northern Ireland and the Republic of Ireland, with cash prizes for the top three amateur and professional projects. Tim Jacklin can provide details of how to enter.
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