HABITAT ADVISORY VISIT TO THE BLACKWATER RIVER, REEPHAM, NORFOLK.

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1.0 Introduction

This report is the output of a site visit undertaken by Vaughan Lewis, Windrush AEC Ltd to the Blackwater, Norfolk on 12th November 2005. The visit was sponsored by English Nature, as part of the 'Cinderella chalkstreams' initiative.

Comments in the report are based on observations on the day of the site visit, and discussion with Terry Lawton. Throughout the report, normal convention is followed with respect to bank identification i.e. banks are designated Left Bank (LB) or Right Bank (RB) whilst looking downstream.

2.0 Habitat Assessment

The Blackwater is a small tributary of the River Wensum, joining with the main river near Lenwade. The designation of the River Wensum as a Special Area of Conservation under the EU Habitats Directive highlights the importance of the whole of the river's catchment with respect to its ecology.

Upstream of Blackwater Farm

Upstream of Blackwater Farm, the gradient of the river was relatively steep, with heavy shade cast over much of the channel from RB trees, including field maple *Acer campestre* and alder *Alnus glutinosa*. There were sections of coarser gravel suitable for spawning and juvenile trout. However, the substrate was relatively undifferentiated, with a heavy burden of fine sediment. There was a raised flood bank along the LB of the river, formed from deposited material resulting from previous dredging of the channel. Where grazing stock had removed the surface soil, large amounts of coarse gravel were visible in this bank.

Location of raised flood bank on LB

Further upstream the channel became more occluded by emergent vegetation, with little open water visible in some locations.

Towards the upper end of the reach, there were some sections of gravel-dominated riffle. The channel was some 4m in width and 25cm deep at these locations, providing a model of the cross-sectional area kept clear by the discharge along the river. The gravel was relatively undifferentiated, with the introduction of Large Woody Debris likely to prove beneficial at these locations.

Upstream of the old Railway line, land use comprised of wood on the RB, with significant consequent shading of the channel, with the channel totally tunnelled in places. The LB was dominated by grazing meadows. The bed of the river was incised, with largely soft sediment and sand, and a paucity of gravel due to past dredging. The RB was noticeably higher than the LB, suggesting that excavated material was deposited on this side of the river.

Towards the upper limit of the reach, the gradient of the stream increased, with some sections of gravel dominated riffle present. Stands of Water crowfoot *Ranunculus* spp were apparent in the river here. Once again, these were relatively unsorted, and would benefit from the introduction of LWD to constrict flow, increasing local velocity, and removing much of the fine sediment.

Downstream of Blackwater Farm

Downstream of Blackwater Farm, the river had been historically straightened, leaving an incised channel, with a wetted width of some 3m-4m. Instream habitat was a mix of uniform shallow glide, with some short sections of gravel bedded riffle where the gradient was steeper. Riffle substrate was relatively unsorted, with significant volumes of sand and fine sediment entrained within the gravel bed. The shallow glides were dominated by sand and silt, overlain by leaf litter. Land use was dominated by an equestrian enterprise and sheep grazing. The channel was lightly shaded by mature poplars.

Gravel riffle at the site of a water jump for horses

The river was incorporated into design of an equestrian course, with water jumps located at the site of hard-bedded riffles. Stands of submerged weed were present, including water crowfoot *Ranunculus* spp, curled pondweed *Potomogeton crispus* and lesser water-parsnip *Berula erecta*. There were a few riparian trees in this reach casting limited shade over the channel.

There were sections of bank where over-grazing by sheep and horses had reduced cover from fringing vegetation, to the detriment of juvenile trout. The resulting channel was over-wide with a consequently reduced sorting of the substrate.

Further downstream the river had been rerouted some 150 years ago. The gradient of the river was lower in this reach, with an associated increase in the depth of fine sediment. The river then flowed through an area of wetter land dominated by common reed *Phragmites australis*. The channel of the river was partially occluded by branched bur-reed *Sparganium erectum*, with habitat more typical of drain than. There was very little habitat suitable for brown trout in this section of the river.

3.0 Fish stocks

The Blackwater had stocks of wild brown trout, with no supplementary stocking having taken place in the recent past. There were also significant stocks of mixed coarse fish including chub *Leuciscus cephalus* and dace *Leuciscus leuciscus*. Given the close proximity of River Wensum, it is likely that the Blackwater is an important nursery stream, both for coarse fish and brown trout.

Large numbers of signal crayfish *Pacifasticus leniusculus* were noted during the site visit.

5.0 Recommendations

- Coppicing or 'singling' of riparian trees in sections of heavily shaded channel can be of great benefit. Coppicing and pollarding of trees are traditional and potentially valuable methods of managing trees. Wildlife associated with coppiced trees depends on maintaining a diversity of light and shade, so blocks of trees should be cut in rotation. Fringing marginal vegetation resulting from coppicing is of great importance to the survival of juvenile salmonids. However, some caution should be exercised in the cutting of trees as to much light falling on the channel may encourage the development of excessive emergent vegetation, particularly where the gradient is shallow. Ideally, coppicing should be restricted to those sections of the river where water velocity exceeds $20cmsec^{-1}$, effectively limiting the growth of emergent plants.

The length of the coppicing cycle can vary between six and fifteen years, with a short cycle preventing development of mature trees, encouraging vigorous root growth and the dappled shade required by some specialist flora and fauna. This regime may well be suited to reaches of river where fly fishing is practised, allowing maximum room for casting. Species that can be successfully coppiced include hazel *(Corylus avellana)*, alder, and *(Fraxinus excelsior).*

An alternative strategy for previously coppiced trees is 'singling'. This involves selecting the most upright stem for retention and cutting out the remaining stems close to the stool. This is a less risky option where there are concerns over regeneration due to grazing stock.

The ratio of shaded to open bank receives attention in the literature. The *Forests and Water Guidelines* (Forestry Commission 1991) recommends maintaining about half the length of the stream open to sunlight, with the remainder under dappled shade to create desirable conditions for a diverse aquatic ecosystem. The *Guidelines* further state that it is particularly important to maintain open ground to the south of the stream to allow more light to penetrate and to increase the water temperature for better aquatic plant and invertebrate growth. Hunter (1991) recommends 40-60% tree shade to maintain cool water for trout. Another suggestion is provided in Mason et al (1988). Trees on the south side of the river should be managed to give gaps of approximately 20 m in length at 70 m intervals to permit macrophyte growth. .

- It is recommended that Large Woody Debris (LWD) should be introduced and stabilised in the channel in order to promote controlled bed scouring. The benefits for retaining LWD are clearly laid out in the recent EA R&D document, "Large Woody Debris in British Headwater Rivers". Key conclusions of the report include:

  - An increase in both mean flow depth and velocity and variability of both parameters.
  - The development of high physical habitat diversity both in-channel and in the floodplain. Removal of LWD reduces both habitat quality and availability for juvenile and adult brown trout.

- Although active LWD dams may impair upstream migration of fish at low flows, they rarely do so at high flows.
- LWD have significant benefits to the control of run-off at the catchment scale.
- River and riparian management has important effects on the distribution and character of dead wood accumulation within the river system.

Practical management options to increase LWD include making use of fallen timber in order to create simple flow deflectors by wiring/staking these to the bank. These can be used to scour relatively homogeneous riffle areas in order to create deeper pools used by adult fish, and offer an effective and natural alternative to constructed gabion groynes. The resultant small pools can provide shelter areas adjacent to riffles during spawning periods, increasing the numbers of spawning fish.

It is important that the Environment Agency is made aware of any adopted policy to retain LWD in the channel, in order to prevent its removal during routine management operations undertaken by the Agency.

- A series of valuable gravel riffles could be constructed in the reach upstream of Blackwater Farm, by screening of the previously deposited dredgings on the LB of the river above Small trial pits should be dug into the raised gravel berm on the LB to ascertain the percentage of gravel present. If adequate amounts of gravel were found, then it would be worth screening the gravel on site and using it in the riffle construction. The advantages of this approach in comparison to the use of imported gravel to construct riffles include reduced cost, fewer lorry movements, and the net neutral impact on flood plain storage. In addition, carefully planned excavation could result in the creation of a wide marginal berm at or just above summer water level, with associated benefits to a range of wildlife

The cross- sectional area of any modified river should be referenced to the areas of clean riffle, characterised by a wetted width of around 4m and a mean water depth of 25cm.

- Establish a regime of cleaning spawning gravels each September. This can be achieved by either manual raking, or by the use of high-pressure water jets. Care must be taken to clean riffles rotationally, with only short sections being treated annually. It must also be recognised that this option may well favour increased spawning success of the earlier breeding native brown trout to the detriment of the later breeding, introduced rainbow trout. It is important that the EA are contacted prior to any cleaning of gravel, due to the possible discoloration of water in the river resulting from the operation. The same concerns dictate that downstream neighbours should also be forewarned of the operation.

- Some sections of the river were so overgrown with emergent vegetation to be of very limited use either as trout habitat or for fishing purposes. Other sections had a less intensive growth of emergent vegetation that still however limited habitat quality for trout and angling opportunity. Vegetation growth in these sections could be controlled by the judicious use of herbicide.

The only appropriate herbicide cleared for use near to and in water is glyphosate (sold as ‘Roundup’, Roundup Pro Biactiv etc). It is a selective, translocated herbicide that

is used to treat the actively growing plant once its leaves have emerged from the water. Glyphosate offers a cheap and environmentally sensitive option (it is inactivated on contact with water and sediment) for the treatment of emergent vegetation.

Glyphosate can be used to selectively remove small stands of emergent vegetation, creating runs and sections of clear water where required. It can be also be used carefully in order to shift sediment from strategic locations by training the river's flow to scour these areas.

Detailed advice on the use of herbicides can be obtained from the Centre for Aquatic Plant Management capm.org.uk. The written consent of the Environment Agency is required for the use of glyphosate.

- There were short sections of bank that had been slightly over-grazed by sheep and cattle. Whilst there was not extensive damage to the banks, the marginal vegetation had been largely removed, with the result that the channel was over-wide and lacking in valuable fringing cover. It is recommended that consideration should be given to the utilisation of temporary electric fencing in order to reduce stock grazing of the banks in these reaches.

- The presence of signal crayfish within the river is likely to have a significant impact on both the structure of the banks, and the invertebrate fauna of the river. In the absence of advice to the contrary, it is recommended that a concerted and continued programme of trapping should be undertaken in order to reduce the numbers of crayfish. Note that a licence for trapping is required from the Environment Agency.

- Some of the land adjacent to the upstream reach of the river appeared to be in an existing Environmentally Sensitive Area scheme. It may be that there is adequate time left for this scheme to run to allow the submission of a habitat enhancement scheme for the river under a modified conservation plan for the site. It is recommended that DEFRA and the owner of the land to discuss possible options.

- Note that all works to the bed or banks of the river or within 8m of its banks may require the written consent from the Environment Agency under the Land Drainage legislation. It is imperative that all relevant consents are obtained by the club prior to the commencement of any works.

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