



**ADVISORY VISIT TO RIVER WITHAM AT
HOUGHAM MANOR, HOUGHAM,
LINCOLNSHIRE
UNDERTAKEN BY VAUGHAN LEWIS,
WINDRUSH AEC.
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1.0 Introduction

This report forms the output of a site visit undertaken on 7 September 2005 to Hougham Manor, Lincolnshire on behalf of the owner Mr Michael Bell. Information for the report was gathered during the site visit. Throughout the report, normal convention is followed, with banks identified as RB (right bank) and LB (left bank) when facing downstream.

Hougham Manor lies some 8km downstream of Grantham. The fishery runs for approximately 500m upstream and downstream of the manor house. Within the estate boundaries, the River Witham holds important populations of the nationally rare white-clawed crayfish *Austropotomobius pallipes* and water vole *Arvicola terrestris*. Both species are subject to varied degrees of statutory protection under the Wildlife and Countryside Act 1981 (as amended) and the Countryside and Rights of Way Act, 2000.

2.0 Habitat assessment

The river had been heavily dredged in the past. A large flood bund on the RB was testament to this ecologically damaging activity. The resultant channel was moderately incised, over-deep and over-wide in places, with limited amounts of gravel dominated riffles suitable for brown trout spawning, remaining.

A large impounding weir was located near to the downstream limit of the fishery. Head loss over the weir was approximately 1.5m. An abstraction (believed not now in use) for agriculture was located immediately upstream of the weir. The presence of the weir and its backwater effect had a profound impact on the upstream habitat. For a distance upstream of some 150m, the river was significantly impounded, with deposition of fine sediment actively occurring.



Impounding weir near to the downstream limit of the fishery

Further upstream, a shallow gravel dominated riffle had been constructed, in 2003. Another 2 riffles and a set of paired stone deflectors had been constructed elsewhere on the fishery. The gradient of the riffles and their appearance was excellent. However, the size of the gravel used was rather larger than optimum for spawning brown trout *Salmo trutta*.



Constructed riffle

The efficacy of the paired groynes was less apparent. They were not of sufficient dimension to create a big enough increase in water velocity to displace sediment and scour the substrate locally.

Land use on both sides of the river was improved grassland. The emergent vegetation present was dominated by branched bur-reed *Sparganium erectum*, with lesser amounts of reed canary grass *Phalaris arundinacea*. Small low-level berms had been excavated at a number of locations at the same time as the riffles were constructed. Strong stands of vegetation were present on these berms.

Much of the river was relatively open, with few riparian trees present on the RB. In order to redress this deficiency, a large number of trees had been planted along the LB. In addition, a meander had been fenced off near to the upstream limit of the fishery. The profile of this area had been flattened by an excavator and a number of trees planted. The resulting area provided significant riparian cover, and was a potential resting area for Otter *Lutra lutra*.



Trees planted on the LB of the fishery

Fish stocks in the fishery include moderate numbers of wild brown trout and mixed coarse fish species including chub *Leuciscus cephalus* and perch *Perca fluviatilis*.

3.0 Recommendations

The principle of constructing riffles in the river is sound. It provides additional and much needed sections of gravel bedded, flow dependent habitat utilised by brown trout for spawning. Fast flowing riffles are also of great importance to white clawed crayfish.

It is recommended that two additional riffles are constructed, one towards the upper end of the fishery in the reach below the section of concrete revetment on the LB. The second riffle could usefully be installed in the river length leading into the next right hand bend downstream. In addition to these two riffles, additional stone and gravel should be added to the existing paired groynes to upgrade them into a full riffle.

In general, it is recommended that riffles should be constructed to be a minimum of 15m in length. Each riffle would increase the retained head, probably by between 15cm-30cm, with the extent of this backwater effect being assessed as part of the detailed design process. Riffle construction should commence at the downstream end of the fishery to allow for the impact of this backwater effect. Optimum conservation benefit is obtained if the depth of gravel in each riffle exceeds 50cm, with a range of macroinvertebrate species requiring a hyporheic zone of this depth to reproduce

successfully. In order to optimise spawning conditions for brown trout, water velocity should be between 25cm/sec – 75cm/sec, with a water depth varied between 25cm and 60cm. Gravel and stone will need to be imported onto the site from the nearest quarry. A variety of infill material can be used, with best value being obtained from larger unsorted stones. It is important however that a layer (minimum 30cm depth, ideally 60cm) of mixed gravel between 20mm–50mm diameter is placed over the infill to complete the riffle. The price of materials is likely to be in the region of £10-15/tonne delivered. The tonnage of material can be calculated by multiplying the estimated volume required by a figure of 1.8. A large hydraulic excavator will be required to place the stone in the river, at a cost of around £250/day for a machine and driver.

In order to optimise spawning success on the existing riffles an additional layer (10cm-20cm thick) of 20mm-50mm diameter gravel should be added.

Past dredging activity has significantly raised sections of both banks of the reach. This has reduced the length of low level flood berms present, with an adverse impact on a range of wetland plant and animal species. Typically, present bank levels could be reduced to no more than 10-20cm above mean summer water over selected lengths of at least 15m, *provided that this does not compromise the structural integrity of the existing flood bund*. If these berms were sited alongside sections of constructed riffle, they would provide an element of flood compensation, provided that the excavated material is transported out of the flood plain.

Once riffle construction is complete, a deep substrate incubation box could be utilised in order to produce initial stockings of semi-natural brown trout. In essence, deep substrate incubators are gravel filled boxes, approximately 0.6m in each dimension that are filled with suitably sized gravel and seeded with 10,000 - 20,000 trout eggs. A water feed at the bottom of the box allows the eggs to incubate and hatch. Once they reach the swim-up fry stage, they leave the box via the overspill pipes, stocking themselves into the river. Alternatively the fish can be caught in a small catch box and distributed on suitable shallow habitat throughout the fishery. In effect, they produce naturally reared fish without the unhelpful behavioural modifications associated with hatcheries. Such a system could be established using the impoundment at the downstream limit of the fishery. More details on incubation boxes can be found on the Wild Trout Trust web site www.wildtrout.org or in Volume 2 of the Trust's magazine, *Salmo trutta*.



A deep substrate incubation box being loaded with eyed brown trout ova

Note that all works to bed or banks of the river or within 8m of its banks requires the written consent from the Environment Agency under the Land Drainage legislation. The introduction of any fish or eggs into any inland water requires the consent of the EA under the Salmon and Freshwater Fisheries Act, 1975. It is imperative that all relevant consents are obtained by the club.

It is also important that all suitable care must be taken to protect white-clawed crayfish and water voles during construction. As a minimum, a survey should be commissioned for both species prior to the commencement of any work. In the event that either species is identified within the footprint of the proposed enhancements, advice on suitable mitigation strategies should be obtained from English Nature or the Environment Agency.

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