



# RIVER WENSUM: HABITAT RESTORATION AT DRAYTON

SCOPING STUDY  
UNDERTAKEN BY VAUGHAN LEWIS,  
WINDRUSH AEC ON BEHALF OF NORFOLK  
ANGLERS' CONSERVATION ASSOCIATION

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## 1.0 INTRODUCTION

Following the production of the River Rehabilitation Feasibility Study of the River Wensum' and the successful completion of habitat restoration projects by the Environment Agency at Lyng, Billingford and Fakenham, Norfolk Anglers' Conservation Association (NACA) has engaged Windrush AEC to undertake a scoping study of riverine restoration opportunities on the Wensum at Drayton, Norfolk.

Information for this scoping study was obtained during a site visit undertaken with Martin Page, Chris Turnbull (NACA) and Simon Johnson (Environment Agency) on 9<sup>th</sup> July 2001. Further data were obtained from the River Rehabilitation Feasibility Study'. Throughout the report, normal convention is followed with respect to bank identification i.e. banks are designated Left hand Bank (LHB) or Right Hand Bank (RHB) whilst looking downstream.

## 2.0 BACKGROUND

The River Wensum between its source and Costessey was designated as a Site of Special Scientific Interest in 1993, in recognition of its status as probably the best example of an enriched lowland river in England. Particular features of note include the presence of over 100 species of aquatic plant and a rich invertebrate fauna, contained within a relatively natural corridor. More recently, the section of the river downstream of Hellesdon Mill has been submitted to the European Community (EC) as a candidate Special Area of Conservation (cSAC).

Fish stocks in the River Wensum include bullhead *Cottus gobio* and brook lamprey *Lampetra planeri*, both of which are designated under Annex 11. of the EC Habitats Directive, and barbel *Barbus barbus* and grayling *Thymallus thymallus*, cited in Annex v of the same directive. In addition, the river contains large numbers of eel *Anguilla anguilla*, a species of international conservation concern and brown trout *Salmo trutta*, a Biodiversity Action Plan species. Other key species of conservation importance include water vole *Arvicola terrestris*, white-clawed crayfish *Austropotomobius pallipes* and otter *Lutra lutra*.

Recent studies' have highlighted a number of key issues affecting the diversity and abundance of fish stocks in the river. These include a significant increase in licensed abstraction, a decline in water quality, particularly increased phosphate and ammonia levels, increased siltation, direct loss of spawning gravels, and a reduction in the availability of off-channel nursery and adult fish habitat such as old meander loops, backwaters, cattle drinks and ditch systems. Further reduction in the availability of marginal cover is predicted due to the on-going loss of riparian alder *Alnus glutinosa* trees as a result of *Phytophthora* infection noted during the site visit.

Addressing the water resource and water quality issues at source is beyond the scope of this study. It does however aim to highlight opportunities to restore in-channel and riparian habitat important to a range of species within the study area at Drayton (TG

### 3.0 PROPOSED ENHANCEMENTS

It should be emphasised that the enhancements outlined above are indicative only. They represent aspirations for the enhancement of what is a severely geomorphologically damaged section of the River Wensum. Given the river's designated status, it is acknowledged that detailed discussions will need to be held with EN regarding the final design of these proposals. Similarly, although a number of compensation measures have been included with respect to flood issues, there may be some aspects of the scheme that require further discussion with the EA.

The upstream boundary of the NACA fishery is located at the confluence of the Old Costessey Mill stream (TG 177130) known locally as "The Point". A short gravel riffle is present on the RHB. This was traditionally an important spawning and recruitment area for barbel, chub *Leuciscus cephalus* bullhead, dace *Leuciscus leuciscus* and gudgeon *Gobio gobio*; the presence of a number of juvenile dace and barbel on the day of the site visit is testament to its continued importance. However, due to reduced summer flows, increased deposition of fine sediment and dense benthic algal growth, the value of this recruitment area has declined. In addition, the adjacent cattle drink has infilled with sediment, removing much of its benefit as a feeding area and high water refuge for coarse fish fry.

It is proposed to concentrate existing flow over the riffle by narrowing the channel on the LHB using faggot bundles obtained by local coppicing/pollarding of riparian willows. It is envisaged that a marginal shelf area would be created over a length of some 30m, with the new bank line extending some 3-4m further into the channel than the existing line. The top level of the shelf will be set at approximately 10-15cm above mean summer water level. The area behind the new bank line will be infilled with willow thinnings to create a low energy environment, that will rapidly accumulate sediment, allowing colonisation with marginal plants such as water forget-me-not *Myosotis scorpiodes*, brooklime *Veronica beccabunga* and reed sweet flag *Glyceria maxima*. Experience on other rivers (e.g. River Allen) has shown that this type of marginal enhancement provides excellent refuge habitat for white-clawed crayfish and feeding opportunities for water voles

In addition, the old cattle drink on the RHB will be excavated to create a new, larger fenced drink. This will be approximately 10m x 5m, with an average depth of 0.5m and will provide a valuable area of low velocity fry refuge. Spoil generated by the excavation will either be incorporated as backfill within the proposed LHB narrowing or disposed of outside the indicative floodplain.

Downstream of the small extant riffle, the availability of suitable gravel spawning areas is strictly limited. This is largely as a result of historic dredging undertaken for land drainage and/or flood defence reasons. The extensive mounds of gravel dominated spoil on the RHB are testament to the volumes of bed material excavated. Removal of this material has not only reduced spawning opportunities for lithophilous fish, but has also damaged the hydrological connectivity with the adjacent riparian meadows, reducing their floristic value. The inclusion of the RHB meadow system in the Broads Environmentally Sensitive Area (ESA) scheme is clear evidence of the landowners aspirations for these fields.

As a result of the lack of spawning gravel and the imperative to improve the ecological interest of the ESA land, it is recommended that two riffle areas be constructed. The first of these would be located at TG 176132, some 50m downstream of the power lines crossing the river. It would be approximately 30m in length and would be created by introducing stone and gravel into the river in order to reduce the mean depth to 0.6m. In order to increase heterogeneity of flow patterns, 2 or 3 mid-channel islands will be constructed using woven faggot bundles. These islands will be approximately 5m x 3m and will create a valuable habitat in their own right. Summer water levels would be slightly raised (10-15cm), introducing the possibility of increase floristic interest in riparian meadows and the land being entered into a higher ESA payment tier. The riffle would be fenced to prevent access of stock into and across the river.

In order to compensate for any loss of channel capacity, the RHB will be excavated to create a low level (10-15cm above mean summer water level) marginal shelf along the length of the riffle. Additionally, the possibility of utilising previously excavated material for the riffle construction will be investigated. If sufficient gravel is present in the RHB mounds, then it will prove economic to hire a commercial stone screen to clean and grade material on site. If this option were pursued, it would have the added benefit of allowing floodwater to enter the RHB ESA field at a lower discharge than at present, thus increasing flood storage and providing an increased degree of attenuation.

It is also recommended that the mouth of the old river channel on the LHB downstream of the proposed riffle should be enlarged in order to provide an increased area of low flow fry refuge.

The second riffle will be located immediately downstream of the major drain and pond system on the LHB at TG 178133. It will be of similar construction to the upstream riffle, with a length of approximately 30m. It is estimated that the upstream summer water level would rise by 10-15 cm. Compensation for loss of capacity would again be provided by the excavation of a substantial 2-stage marginal shelf along the length of the riffle. Gravel for the riffle will be obtained by screening dredgings tipped on the RHB or alternatively will be imported to site. Fencing of the riffle will be undertaken to prevent stock access. The possibility for the creation of a mid-channel island will also be investigated.

The mouth of the drainage channel on the LHB will be excavated to create a low velocity fry refuge. Discussions will also take place with EN and the EA in order to consider further modifications to the ditch and pond system aimed at optimising their ecological value.

Below the railway bridge, the NACA fishery starts again at the confluence of the large ditch on the LHB at TG 179133. This channel has great potential for a coarse fish spawning area and high water fry refuge. Currently, however, the mouth of the channel is partially occluded by emergent reed growth, limiting access in and out of it for fish at low water. This could potentially lead to stranding and death of fish that have entered during high water and are then unable to return to the main river. In order to reduce this risk and to increase the fishery value of the drain, it is recommended that the channel mouth be opened up substantially. Excavated spoil

could be removed from the flood plain area or thin spread on the wide LHB marginal fringe.

A third riffle is planned for the 30m section immediately below the drain confluence. Construction will be as for the previously described riffles, with the necessary stone coming either from screening of previously excavated material on the RHB or by importation of gravel to the site. If screened material were used, the RHB would take additional flood water at a lower discharge than at present, offering a valuable degree of flood attenuation. The excavation of a 2-stage channel on the RHB will provide compensation for any loss of capacity resulting from imported gravel. The riffle will be fenced to prevent general access of the cattle to the river. However, if required, the fencing and the riffle could be adapted to create a designated stock watering area for both RHB and LHB fields.



Potential location of constructed riffle downstream of railway bridge

Prior to the commencement of any agreed works, it is vital that a suite of monitoring is undertaken in order to gauge the success of the scheme. Some data are already available. Notwithstanding this, as a minimum, the following surveys should be undertaken:

- River Corridor Survey and/or River Habitat Survey
- Quantitative electrofishing survey

- Invertebrate (including white-clawed crayfish) survey to standard EA Biological Monitoring Working Party (BMWP) format  
Water vole survey
- Fixed point photography at key locations

#### 4.0 ESTIMATED BILL OF QUANTITIES, INDICATIVE COSTS AND POTENTIAL FUNDING STREAMS

The following table provides an indication of potential requirements for materials and associated costs. These figures are indicative and should not be used for final costing purposes.

ITEM	UNIT	QUANTITY	ESTIMATED COST
Flint reject gravel	Tonnes	1850	£18,500*
Faggot bundles	N (2m x 0.5m each)	400	£ 2,400
Stakes for faggots	N (1.5m long)	600	£ 600
Plant	360 slew plus Hydreema 10 tonne dumper	2 week hire	£,6,000 (including delivery)
Fencing	m	210	£ 500
<b>TOTAL</b>			<b>£28,000</b>

\* If imported. Cost reduced to <£5,000 if on-site material screened

Potential funding streams include the following:

Environmentally Sensitive Area payments. New arrangements for funding of ESA grants have recently been announced. In essence, these mean that elements of capital projects such as this undertaken on land in ESA may attract grant aiding of up to 80% of the total cost. In addition, fencing of riverside areas attracts a grant of 80p/metre for barbed wire and post fencing.

Land-fill tax credits. Land-fill tax credits are vested in so-called Entrusts for distribution to projects with a strong environmental theme. This project would meet qualifying criteria for funding.

English Nature. English Nature has already part funded this initial scoping report. They may have additional funds for enhancement projects within designated SSSI/cSAC sites.

Environment Agency. The EA may be able to provide funding for elements of this project. In addition, they may be able to help by facilitating the establishment

of a partnership funded project. Careful planning of such a scheme may release funding streams from organisations not able to be the sole financial sponsor.

- d• Wild Trout Trust. The WTT has already part funded this initial scoping report. They may be able to offer an element of matched funding for the implementation of an agreed scheme.

## 5.0 LEGAL CONSIDERATIONS

There are a number of statutory consenting procedures that must be addressed during the planning of this project, namely:

Consent will be required from EN for work on a SSSI/cSAC site. An appropriate assessment will be required to satisfy the conditions of the latter designation.

A Land Drainage consent will be required from the EA. This will focus on the impact of the proposals on flooding and conservation interests in the floodplain.

- An exemption under the Waste Regulations may be required from the EA for the disposal of spoil arising from this work.
- Mitigation measures to protect water voles and white-clawed crayfish (and any other specially protected species found at the site) will need to be agreed with EN prior to the commencement of any works.

## 6.0 REFERENCES

- 1 River Rehabilitation Feasibility study of the River Wensum (Norfolk) Report to EA, Anglian region by Econ, 1998

