Little Ouse at Knettishall

A Project Proposal by the Wild Trout Trust - April 2015

1. Introduction

This report is the output of a site visit to the River Little Ouse on the Suffolk – Norfolk borders at Knettishall. The visit was requested by Penny Hemphill, who is the Water for Wildlife Advisor for the Suffolk Wildlife Trust (SWT).

The SWT have been working in partnership with the Environment Agency (EA) to create improved in-channel and riparian habitat to a substantial reach of the Little Ouse and have already completed a phase of improvement works designed and supervised by the late Dr Nigel Holmes. Dr Holmes had already designed a scheme aimed at improving a 0.5 km section of river running upstream from Knettishall Heath road bridge, at National Grid Reference TL 956 807, up to TL 960 809. The project partners are very keen to see the phase of work completed and are looking for support from the Wild Trout Trust to help with the project delivery. The aim of the site meeting and this subsequent report is to review the original project objectives and to agree an implementation plan for delivery later this year.

Comments in this report are based on observations on the day of the site visit, references to Dr Nigel Holmes's original project plans and discussions with Penny Hemphill and Julia Massey, ecologist working for the Environment Agency.

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.

Map 1 Little Ouse Knettishall Heath ©streetmap.

2. Catchment overview

The Little Ouse rises to the east of Thelnetham and flows broadly west to join the Great Ouse near Littleport in Cambridgeshire. For much of its length the Little Ouse forms the county boundary between Norfolk and Suffolk and is a natural link between the Brecklands and the Broads.

The river channel itself is not particularly noted for supporting high quality in-channel habitats or fisheries, however the Little Ouse catchment supports important riparian fenland habitat.

The river channel has been heavily modified for both navigation and drainage purposes and is designated under the Water Framework Directive (Water body ID no. GB105033043100) as a "Heavily Modified Waterbody" with moderate ecological potential.

3. Habitat assessment

Habitat quality within the target reach running upstream from Knettishall Heath Bridge can best be categorized as straight, uniform glide habitat flowing over a soft, sediment-laden river bed. The RB margins are ill-defined, without a conventional river bank and in places are dominated by emergent reeds, mainly *Phragmites australis* (photo 1 and cover). The LB is more clearly defined and has been raised, in all probability as a direct result of many years of maintenance dredging, or weed clearance work.

Dense beds of emergent watercress Rorrippa sp, were also present in the margins and were comparatively dormant at the time of the site visit in early April. In a few locations, beds of emergent burr read *Sparganium sp*, have established, sometimes in central channel locations (photo 2), as well as isolated clumps of yellow flag iris *Iris pseudacorus* in shallower marginal areas.

Overall, the channel is excessively wide for the average flow discharge, with in-channel habitat heavily influenced by the impounding effects of a weir, located a short distance downstream of Knettishall Heath Bridge. The result of the over-wide channel and impounding effects of the weir have been to restrict any natural geomorphological features from forming. The lack of any channel sinuosity, or variations in flow patterns or water depth, seriously compromises and opportunities for a diverse river ecology.

There are few opportunities for flow-loving, gravel spawning fish species in this particular reach, with habitat favouring weed and root spawning species such as roach *Rutilus rutilus*, common bream *Abramis brama*, perch *Perca fluviatilis* and pike *Esox lucius.* Opportunities for gravel spawning/flow loving species such as chub *Leuciscus cephalus*, dace *Leuciscus leuciscus*, barbel *Barbus barbus*, trout *Salmo trutta*, gudgeon *Gobio gobio*, bullhead *Cottus gobio* and even minnow *Phoxinus phoxinus* were extremely limited. The European eel *Anguilla anguilla* as a migrant, adapts well to slow flowing, silt laden river beds.

Photo 1. No defined river bank on the RB and dominated by Norfolk reed

Photo 2. Branched bur reed, encroaching into central channel locations.

4. Habitat improvement options

In Nigel's original project plan he recommends a combination of "Cutting and Filling" from the LB to try and create a sinuous thalweg within the confines of the existing wetted channel. The effect was to be created by using a tracked 360 excavator to win and redistribute bank materials and reed-sods.

Dr Holmes recognised in his project proposal that any restoration of natural river features was going to be very difficult at this particular location due to the lack of any significant bed gradient.

A significant issue with this particular prescription could be the presence of water vole burrows. It is recommended to carry out an early inspection of the bank to either rule in, or rule out the cutting down and pushing in of the existing LB to form low marginal shelves, or berms. Even if vole burrows are absent, the soft, friable nature of the bank materials are not ideal for berm creation, unless used in combination with some kind of revetment and then immediately planted to tie in erodible soils.

One option to create support on the outer edge of low, wet berms is to relocate sedge sods, which are currently growing in low-lying damps areas of the adjacent LB meadow (photo 3) and use them to create a new, low bank line. Potentially these plants and associated root mass can be dug up whole and used to form the revetment. Hopefully the material will be "sticky" enough to have sufficient integrity so that it can be swung into position and pushed in place with the bucket of the machine. Some in-channel redistribution of existing river bed sediment deposits may also be required to ensure the outer edge of the revetment is sufficiently shallow enough to support the new revetment.

If this work were to be sanctioned, it would create additional new habitat in the meadows through the action of winning the sedge sods and creating wet scrape habitat. Temporary standing water, particularly in the winter and early spring might encourage a more diverse range of species to colonise, or temporarily visit the area, including wading birds. An early conversation with the land owner is recommended to explore whether or not there is potential to win the necessary materials and create a new habitat in the meadows, as well as in the river.

If it is not possible to excavate the sedge, then the revetments could be constructed from imported brushwood faggot bundles, secured to the river bed with untreated timber (ideally chestnut) stakes. A jute/coir soil-saver envelope is recommended when using this technique to limit the escape of fine back-fill materials being washed out. Although effective, this technique is both labour intensive and comparatively expensive compared with simply relocating flood plain materials using a large excavator.

Creating the berms adjacent to the LB with a combination of sedge-sod revetment and cut & fill would provide both improved in-channel habitat as well as creating a more diverse and potentially more biologically valuable LB margin. Promoting the sought-after in-channel flow sinuosity will necessitate the removal of reed mass from the RB in several locations and re-locating them to the left bank, to help promote the sinuous flow patterns described in Nigel's report.

Building out and consolidation of the RB margin in several locations might also be required to force some flow back towards the LB. This could potentially be achieved by installing a few large woody debris groynes. These could be pegged down into the existing reed bed and positioned at right-angles to the flow. They will need to be positioned to encroach into the channel to help kick back any flow coming off of the LB berms. Currently the flow trickling through the wide RB reed bed will be limiting the amount of water being forced back into the open channel. Harnessing as much flow power as possible will be the secret to creating the desirable meandering flow patterns described by Nigel in his report.

Photo 3. Sedge could be won to form scrapes in the LB meadow.

In Nigel's report he rightly identifies the dense reed bed adjacent to the RB as being extremely valuable, potentially compensating for the "dead" river section. In reducing the diffuse flow through the reed-bed by introducing LWD groynes, the reed bed itself will not be damaged, requiring only standing water to maintain the reed in healthy condition. A line of what appear to be mature poplars trees have been planted on the field boundary at the back edge of the reed bed. It is a possibility that several could be dropped onto the reed bed and pulled into position by the excavator and secured with driven posts and wired down.

It is understood that a Flood Defence Consent has been issued by the EA to undertake the works set out in Nigel's report. A variation to the original consent may well be required if material dug from the flood plain is to be used for revetment and woody debris dropped to encourage any meandering flow patterns.

Acknowledgement

The WTT would like to thank the Environment Agency for supporting the advisory and practical visit programme.

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