Water Framework Directive Habitat Survey

Upper River Yare and Blackwater, Norfolk

February 2012

1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the upper River Yare and Blackwater, near Reymerston, Norfolk on 1st and 2nd February, 2012. Comments in this report are based on observations on the day of the site visit and discussions with Jez Wood, Biodiversity Officer with the Environment Agency, Anglian Region.

Normal convention is applied throughout the report with respect to bank identification, i.e. the banks are designated left hand bank (LHB) or right hand bank (RHB) whilst looking downstream.

2.0 Catchment Overview

The waterbodies which are the subject of this visit are the upper River Yare (GB105034051270), from National Grid Reference TF9709008130 to TG0472006100, and its tributary the River Blackwater (GB105034051260) from TF9319006470 to TG0469006030. Water Framework Directive (WFD) details regarding the waterbodies and their status are shown in the table below.

Waterbody ID	GB105034051270	GB105034051260
Waterbody Name	Yare	River Blackwater
Management Catchment	Broadland Rivers	Broadland Rivers
River Basin District	Anglian	Anglian
Typology Description	Low, Small, Calcareous	Low, Small, Calcareous
Hydromorphological Status	Not Designated A/HMWB	Not Designated A/HMWB
Current Ecological Quality	Moderate Status	Moderate Status
Current Chemical Quality	Does Not Require Assessment	Does Not Require Assessment
2015 Predicted Ecological Quality	Moderate Status	Moderate Status

2015 Predicted Chemical Quality	Does Not Require Assessment	Does Not Require Assessment
Overall Risk	Probably At Risk	At Risk
Protected Area	Yes	Yes
Number of Measures Listed (waterbody level only)	-	-

Information supplied by the local Environment Agency states that *The WFD Fish Status is less than good in these tributaries due to the absence or lower than expected densities of brown trout, which is suggestive of poor habitat. It is considered likely that past dredging, straightening, and other management are in part responsible for the over-wide channels and resultant slower flows that are unable to transport fine sediments away. It is considered likely that the introduction of flow deflectors, gravel riffles, addition of woody debris and tree planting to add shade, etc. would be of benefit to the brown trout and consequently the WFD fish (and invertebrate) status. Both of these waterbodies are 'moderate single element failures'*, which makes them priority water bodies for the introduction of measures.*

* For the both Yare and Blackwater, fish are *moderate status – quite certain* with the reason for failure to meet good status listed as unknown.

The waterbodies fall within the East Anglian Plain Natural Area (Mid-Norfolk Character Area). The geology is chalk overlain by thick (up to tens of metres) of boulder clay from the last Anglian glaciation (400,000 years ago). Fragments of chalk in the clay give a more or less calcicolous feel to the vegetation across the whole area. Pre-glacial river gravels exist under the clay, with evidence of old river channels which were interrupted by the last glaciation. As the climate warmed and the ice melted, fast-flowing streams carried sands and gravels, depositing them in valleys where they can be found today.
(www.naturalareas.naturalengland.org.uk/Science/natural/NA_search.asp).

There is one designated conservation site along the watercourses: Potters Carr SSSI, Cranworth, an area of alder carr and wet pastureland. A large proportion of land in the catchments is under environmental stewardship schemes, ranging from Entry Level Stewardship to Countryside Stewardship Scheme. Land use in the catchments is predominantly arable agriculture.

3.0 Habitat Assessment

3.1 Blackwater

The source of the Blackwater is close to Saham Grove (TF933065), west of Shipdham; the river here is very small (Photo 1) and flows east under a minor road (Photo 2) then the A1075 towards Shipdham before turning south-east. The river is essentially a field drain here, being straightened and lowered. It is unlikely that trout would be found in these very upper reaches because of the small channel size and low volume of water present.

A track crosses the river at TF 962056; the river here is larger and of a size where trout would be expected to be present. The channel is straightened and lacks a natural pool-riffle sequence, but channel vegetation management appears to be relatively light providing some cover within the channel and a gravel bed is present. A wide field margin is present on the left bank downstream of the track. The bridge culvert does not form an obstacle to fish movement (Photos 3-5).

The river is of similar character near Cranworth at TF976045. More bankside trees are present here (hawthorn) and wide field margins are present downstream of the track on the RHB. The bridge culvert does not form an obstacle to fish passage (Photos 6, 7).

Photo 1 Blackwater near the source at Saham Grove (TF933065)

Photo 2 Blackwater at road bridge at TF946066

Photo 3 Upstream view, track crossing at TF962056

Photo 4 Downstream view, track crossing at TF962056

Photo 5 Bridge culvert, track crossing at TF962056

Photo 6 Near Cranworth, TF976045, upstream view

Photo 7 Near Cranworth, TF976045 downstream view

The road bridge south of Cranworth (TF987039) comprises an arched brick culvert which takes all the river flow at normal levels, plus three higher level pipes for higher flows (Photos 8, 9). Fish passage is possible through the existing arrangement (via the brick arch), but low, rounded baffles on the base of this culvert would improve the situation. In-stream habitat is better in the vicinity of the bridge, with a less straight planform and the presence of more varied riparian vegetation including trees (Photo 10).

At White Bridge near Southburgh the riparian habitat is better than upstream sections, with mature trees present and relatively low, scrubby banks (Photos 11, 12). The in-stream habitat however lacks variety; there is an absence of a pool-riffle sequence and the depth is uniform and shallow. Further downstream towards Calveley Hall the river is split into two channels around a series of disused, concrete trout rearing tanks (Photo 14). Just downstream of this point there is a short section of river with excellent in-stream habitat; large woody debris is present and the river has scoured deeper pools and cleaned and sorted gravel (Photo 15).

Immediately downstream, the river enters a series of on-line lakes. Although Ordnance Survey maps show the river bypassing the lakes to the north, no evidence of a river bypass channel was found on site at the upstream end of the lakes. However, further downstream at Bridge Farm (Photo 16), the outflow from the most downstream lake does join a channel on the north side; this may emanate from other lake overspills or springs. It was not possible to gain access along the whole length of the lakes to verify the existing situation, but it does appear that there is no direct route for fish passage around the lake complex. Further investigation is required with a view to creating a bypass channel around the lakes and providing continuous river habitat.

At Blackwater Bridge (TG022049) riparian habitat was good, but in-stream again lacked variation in depth, being mostly shallow glide (Photos 17, 18). Conversation with a local farmer revealed that his son did fish in this area and had observed trout.

Photo 8 Road bridge culvert, Blackwater TF987039

Photo 9 Road bridge culvert, Blackwater TF987039

Photo 10 Downstream view from road bridge, Blackwater TF987039

Photo 11 Upstream view from White Bridge near Southburgh, Blackwater TF997044

Photo 12 Downstream view from White Bridge near Southburgh, Blackwater TF997044

Photo 13 Upstream view, Blackwater TG012047

Photo 14 Upstream view showing disused trout rearing tanks, Blackwater TG013047

Photo 15 Blackwater immediately downstream of Photo 14 – some excellent in-stream habitat with large woody debris, scour pools, a good depth variety and well-sorted gravel substrate

Photo 16 Outflow from the lake (background and left) and upstream view of river channel (centre), Bridge Farm, Blackwater, TG021049. Arrow indicates flow direction.

Photo 17 Upstream view from Blackwater Bridge, TG022049

Photo 18 Downstream view from Blackwater Bridge, TG022049

Photo 19 Upstream view from Dereham Road bridge (TG028055). River impounded above structure shown in Photo 20.

Photo 20 Dereham Road bridge culvert, near Reymerston. A major obstacle to free passage of fish. Blackwater TG028055

Photo 21 A smaller obstacle to fish passage a short distance downstream of Photo 20

Photo 22 Very good in-stream habitat downstream of the road bridge at TG028055 for about 500 metres, alongside a nature reserve on the RHB.

Photo 23 Part of the section of the Blackwater that was the subject of a river restoration carried out approximately 10 years ago By Prof. Richard Hey following gravel quarrying, Blackwater TG035057

At Dereham Road bridge near Reymerston, the bridge culvert poses a significant obstruction to upstream fish passage, having an approximately 1-metre head difference across a vertical sheet-pile weir (Photo 20). Improving fish passage here would be most cost-effectively achieved by the construction of a rock ramp, or series of pre-barages downstream of the weir. Upstream of the bridge the river is impounded, straight and shallow, with a bed dominated by fine sediment; there is space on the LHB here for river channel re-routing (adjacent to the golf course, Photo 19). A short distance downstream are two much smaller structures that are likely to be passable by fish (Photo 21) and could easily be improved by notching. Downstream of this point for approximately 500m, the river habitat is excellent. A pool-riffle sequence is present with many natural features including gravel shoals and point bars, woody debris and deep pools bordered by tree roots. The left bank here is a land-filled gravel pit which appears to have been over-filled creating very steep banks down to the river; the right bank is much lower and is signed as a wildlife area. Both banks are wooded, mainly with young alder trees of a similar size/age (about 20-cm trunk diameter).

With progress downstream the channel becomes wider and shallower with fewer in-stream features. The next point inspected was adjacent to Hardingham Church alongside the lakes (former gravel pits). A section of river here was the subject of a river restoration project (following gravel extraction) supervised by Professor Richard Hey (pers. comm.). The project involved the re-creation of a river channel with a meandering planform, pool-riffle sequence and functioning floodplain, between the approximate grid references TG036058 and TG039057 (Photo 23).

<u>Summary of Identified Pressures affecting trout populations – Blackwater</u>

1. Extensive channel modification for drainage (straightening, bed lowering), for the majority of the river length inspected resulting in impoverished habitat for fish.

2. Two significant obstructions to the free movement of fish, one at Dereham Road bridge (TG028055) and another at the on-line lakes near Calveley Hall (TG015048).

3.2 Upper Yare

The source of the Upper Yare is north-east of Shipdham at TF972083. The river is culverted for approximately 1 km under Shipdham airfield and inspection at Park Farm (south of Whinburgh, TG003084) showed the river is very small at this point (Photo 24).

Downstream of the B1135 road bridge north of Garvestone (TG013085), the river has been recently dredged (Photo 25) for a length of approximately 400 m. The left bank has been battered back to a 30-degree angle and the river bed lowered by about 20 cm. The bed lowering has left only fine bed substrate and appears to have effectively increased the height of the weir immediately below the road bridge, and hence the obstacle to fish movement (Photo 26). It is thought that the works are not consented by the Environment Agency and it is obvious that no consideration has been given to habitat for fish or other wildlife. No meaningful in-stream habitat remains along this length. Ironically, this length of river appears to border land on the LHB in a Countryside Stewardship agreement.

Upstream of Garvestone village the river is straight, wide and shallow; it flows alongside residential properties coming into the village and some low, presumably ornamental, weirs are present (Photos 27, 28). There is a ford in the village consisting of pipes under the road for low flows and a lowered road surface for higher flows; this is potentially an obstacle to fish movement, especially if the pipes block (Photo 29).

Between Garvestone and Thuxton, the river has more natural features although at the time of the visit flows appeared to be very low. Rainfall has been exceptionally low in recent months, but it would be worth investigating abstractions in this catchment to assess their potential impact. Some parts of this section were heavily shaded by marginal hedges (hawthorn) and would benefit from sensitive riparian tree management (Photo 30).

In Thuxton, a brook joins the river from the west, via a bridge culvert under the railway line (Photo 32); fish access could be improved here by installing baffles on the culvert base. The brook itself was overwide and shallow within the village (Photo 31).

Photo 24

Photo 25

Photo 26

Photo 27

Photo 28

Photo 29

Photo 30

Photo 31

Photo 32

Photo 33

Downstream of Thuxton, the river has a meandering planform but becomes straightened alongside the railway line before circumventing a stillwater trout fishery. The river channel here is incised, straight and slow-flowing (Photo 33). A short distance downstream is the confluence of the Yare and Blackwater.

Summary of Identified Pressures affecting trout populations – Upper Yare

1. Extensive channel modification for drainage (straightening, bed lowering), for the majority of the river length inspected resulting in impoverished habitat for fish.
2. Obstruction to the free movement of fish at B1135 road bridge (TG013085) and other lesser obstructions (railway bridge culvert in Thuxton TG032071, ford and ornamental weirs at Garvestone TG024080).

4.0 Conclusions and Recommendations

The reason this waterbody is failing to reach good potential for fish is because of poor in-stream habitat resulting from extensive channel engineering works and subsequent maintenance. The re-grading and realignment of the river has disrupted the natural morphology of the channel, leading to an absence of habitat features necessary to support healthy fish populations. This process is ongoing, as evidenced by the recent dredging described above.

To improve the status of this waterbody for fish, the in-stream habitat needs to be improved. To do this sustainably, the physical processes controlling channel shape and dimensions need to be considered in detail (via a geomorphological survey) and restoration design options considered. Options may be constrained by the availability of space, finance and the need to retain specific river functions (e.g. land drainage, flood alleviation) (Hey, 2000).

The ideal restoration scenario is one with none of the above constraints, resulting in restoration of the original river morphology (or a naturalised channel appropriate for current climate and catchment conditions) and reconnection to the floodplain. Realistically there will be constraints

(probably in this case to retain a land drainage function) meaning the options are likely to be:

- Creating a new, lower level floodplain and a meandering channel at the existing bed level within this. The width of the lowered floodplain depends on required flood capacity, but should extend beyond the belt width of the new meandering channel as a minimum.
- Use of structures (deflectors, riffles, vanes, woody debris) introduced to the existing channel to create localised scour and hence variation in depth and substrate composition.

The former option is more expensive (around £50K - £250K depending upon extent) and requires more land, but is a more sustainable, long-term solution which works with the rivers' natural processes; the latter option is less expensive (around £10K to £50K depending upon extent) but the improvements may be less effective or long-lasting.

For any form of river restoration to be successful, it is vital that landowners and land managers are fully engaged with the process. There is a long tradition of watercourse management purely for land drainage and agriculture in this area (much of it carried out by Environment Agency predecessor organisations), so a process of engagement, explanation and consultation is necessary to communicate the aims and objectives of the Water Framework Directive and attaining Good Ecological Status.

5.0 Making it Happen

The following steps could be undertaken in order to progress a restoration project:

- Undertake a consultation with local interested parties, including landowners and the wider community, to explain the goals and objectives and to identify constraints. Use existing areas of good/restored river habitat (Blackwater, downstream of Dereham Road, Reymerston) as example areas.
- Identify suitable areas and local landowners willing to participate in river restoration and obtain agreement. Potential areas for

improvement identified during the current visit include the White Bridge (TF997044) to Dereham Road bridge (TG028057) section of the Blackwater; the aims of a project here should include in-stream habitat restoration, restoring connectivity around the lake complex and improving fish passage over the barrier at Dereham Road.

- Undertake a geomorphological survey of the reach and appraisal of options for restoration, including indicative costs.
- Identify the preferred option, draw up detailed design, obtain necessary consents and funding and carry out works.

6.0 Acknowledgement

The Wild Trout Trust would like to thank the Environment Agency for the support which made this visit possible.

7.0 Disclaimer

This report is produced for guidance only and should not be used as a substitute for full professional advice. Accordingly, no liability or responsibility for any loss or damage can be accepted by the Wild Trout Trust as a result of any other person, company or organisation acting, or refraining from acting, upon comments made in this report.

References

Hey, R.D. (2000) *River habitat restoration in canalised watercourses: possibilities and constraints*. Paper presented at CONNECT Workshop, 6-8 November, Lillehammer, Norway.