Habitat Advisory visit to the Willow Brook, Fortheringhay, Northamptonshire, undertaken on behalf of Willow Brook Flyfishers by Vaughan Lewis, Windrush AEC Ltd December 2004

1.0 Introduction

This report forms the output of a site visit to the Willow Brook on 7 December 2004 on behalf of the Willow Brook Flyfishers. Information in the report is based on observations on the day of the visit, additional comments provided by members of the club and EA fisheries surveys undertaken on the fishery.

Throughout the report, normal convention is followed, with right bank (RB) and left bank (LB) of the river identified when looking downstream.

2.0 Fishery Description

The Willow Brook rises near to Corby, and flows in a generally south easterly direction before entering the River Nene at Elton. The upper reaches of the river were periodically polluted until the steel works closed in the 1980's, and its discharge of cooling water discontinued.

Upstream of the Wood Newton road bridge, the river had clearly been dredged in the past, with an associated reduction in the quality and variation of the instream habitat. Large Wood Debris (LWD) was limited in abundance, reducing valuable scouring and sorting of the substrate. There were a number of large gardens on the LB. Extensive bank modification had taken place at a number of these properties.

Below Wood Newton Bridge, there was significant poaching of the LB by agricultural stock. During discussion with club members, it became apparent that significant habitat damage had resulted in this reach, including the loss of water crowfoot *Ranunculus spp.* due to sediment accumulation. There had been a noticeably detrimental impact on fish stocks.

Downstream of this single field, the instream habitat was generally excellent, with a meandering planform and a well developed pool and riffle sequence. There was ample gravel dominated, shallow habitat suitable for spawning and juvenile trout. Stands of submerged water forget-me-not *Myosotis scorpioides* were present. The marginal growth of emergent vegetation was good on the semi-consolidated silt berms, with species including reed canary grass *Phalaris arundinacea,* hard rush *Juncus inflexus* and sedge *Carex* spp. present. These marginal berms narrowed the channel, creating a good variation in flow and form in the river.

Typical habitat downstream of Wood Newton Bridge

The river channel bifurcated at the site of an old mill, with the high level channel on the RB. A small weir impounded water on the LB channel by some 300mm.

Dappled shading was provided by riparian tree growth, although the incidence of *Phytopthora* amongst the alder *Alnus glutinosa* trees may result in reduced shade in the future.

A sewage treatment works discharged into this reach. A grey discolouration of the water was very apparent downstream of the discharge.

Towards the downstream end of this reach, a farm access bridge had been installed. The construction had utilised 5 round culvert sections in order to pass flow along the channel. This has created a drop of some 1m between the upstream and downstream bed levels, with the upstream level perhaps indicative of the original level prior to dredging. The pipes formed a considerable barrier to upstream migrating fish, physically separating upstream and downstream reaches, and causing fragmenting of the fish population. The backwater effect resulting from the impoundment had caused a significant length (400m+) of depositing channel upstream, with associated growth of, predominantly, reed sweet grass *Glyceria maxima*, and a silt dominated substrate. This section of the fishery has the most significant mayfly hatch but was largely un-fishable beyond mid-summer due to the growth of reeds.

Culvert bridge showing head drop over the structure and its impassable nature

The reach upstream of the Packhorse Bridge (Martin's Farm) had been heavily modified by dredging activity in the past. The channel was heavily incised (2m), with raised banks of spoil on the RB and LB evidence of the extent of this drainage work. The incised nature of the channel rendered access for fishing difficult.

The line of the channel had been moved across the floodplain and straightened. The contemporaneous channel had a good pool and riffle sequence with extensive gravel substrate present.

Straightened line of the dredged channel upstream of the Packhorse Bridge

Strong stands of water crowfoot *Ranunculus spp.* and horned pond weed *Zannichellia palustris* were present in the channel where the flow rate was fast over a gravel substrate.

Non-cultivated buffer strips were present on both sides of the river. There was a total lack of any riparian trees with a consequent paucity of shade and Large Woody Debris (LWD).

The reach downstream of the Packhorse Bridge, had a good gradient, meandering planform and significant lengths of shallow gravel dominated riffles suitable for spawning and juvenile brown trout.

Typical length of lower fishery, showing well developed pool-riffle regime and meandering planform.

The substrate of the riffles was moderately imbedded and poorly sorted. Numbers of recently cut trout redds were clearly visible in places. There was a well developed pool and riffle regime in this reach, with abundant deeper water suitable for adult trout habitat.

Clean gravel marking the site of a recently cut trout redd

Strong stands of submerged vegetation, including water crowfoot, horned pond weed and milfoil *Myriophyllum* spp. were present. Dense emergent vegetation growth was present on the well consolidated marginal shelves along this reach.

There was very little LWD present in the channel, with much of it having been removed by club working parties and the Environment Agency.

Land use was arable agriculture on both banks, with stewardship buffer strips alongside the whole length of the reach.

3.0 Fish stocks and invertebrate fauna

An electrofishing survey undertaken by the Environment Agency during 1998 showed high densities of chub and low densities of brown trout in the club's fishery. Key findings of the report of relevance to Willowbrook Flyfishers include:

- Densities of (mainly coarse) fish are some of the highest recorded in the Welland and Nene Catchments from this type of river. Large numbers of chub are present in the fishery
- The number of brown caught on the club's fishery was low, with most fish between 27cm and 35cm in length
- There is a requirement to identify brown trout spawning sites on the club's fishery in order to assess the potential recruitment to the fishery

The club has a membership of 30, and stocks the Willow Brook annually with a total of 1,000 12" fish, with half of these fish being rainbow trout and half brown trout.

Fish are released in batches throughout the year, with some 20% reported as being captured by members. Some catch and release is practiced by members, although significant numbers of fish caught are killed.

The Brook's invertebrate community has been regularly monitored by the Environment Agency. The Biological Monitoring Working Party (BMWP) score (a measure of diversity and sensitivity to pollution of the invertebrates in the Brook) varied between 98 and 122 during the period January 2001 – December 2004. This represents a moderate score, with many of the high scoring, pollution sensitive species absent from the recorded invertebrate fauna. Anglers have recorded adult blue winged olive *Serratella ignata* (noted on day of site visit), iron blue dun *Baetis niger*, black and brown silverhorn sedge*(Mystacides azurea* and *Anthripsodes cinereus)*, and mayfly *Ephemera vulgata* at the fishery.

4.0 Recommendations

- The quality of the sections of suitable spawning gravel could be improved by establishing 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. The EA have offered to undertake this work on behalf of the club. If their offer is not taken up, it is imported that they 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. In order to monitor the success of any gravel washing, it is further recommended that an annual count of spawning redds is undertaken by the club. Key spawning areas should be walked during November- January and observed redds logged and counted.

- The club presently stocks with 1,000 takeable trout, with a recorded exploitation rate of only 20%. These figures suggest a reduced number of trout could be stocked to the river, at a considerable saving to the club.

Careful use of deep substrate incubation boxes could help to boost semi-natural recruitment. Basically, these 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 or, probably more usefully, caught in a fine meshed box and distributed around the fishery. In effect, this system produces naturally reared fish without the unhelpful behavioural modifications associated with hatcheries. 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.* One or more could be sited in the fishery, at the mill at the fishery's upper limit or at the site of the 'Culvert Bridge', using either the head loss over the bridge or the old ram pump to drive the box.

- In common with most other fisheries, the over-wintering success recorded for the trout stocked to the Willow Brook is poor. Careful feeding with floating trout pellets during the winter months may help to increase over-wintering, both by providing

valuable energy for the fish and also by behaviourally reinforcing fidelity to the river reach they were stocked into.

- There is very little point in undertaking the removal of coarse fish from the fishery. This would prove difficult, would have no long term impact on coarse fish numbers (see EA fisheries report) and would affect the biodiversity of this reach and those downstream adversely. It would be more productive for the club to accept the fact that the Willow Brook is a mixed fishery, and undertake management to improve it for all species of fish.

- There was little Large Woody Debris (LWD) in the channel, much of it having been removed by the club and the Environment Agency. LWD is of great importance to the fishery, both in terms of the cover it provided and, in particular its ability to cause scour of the river bed and sorting of substrate. 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.

The report also provides recommendations for the management of LWD, the most important of which is "although there are certain situations that may require wood removal to eliminate stream blockage, the wisest management is no management". Building on this simple truism, it is recommended that before any future work to remove LWD from river channels is undertaken, the wider implications of the proposal on the whole river system are considered, rather than just the potential (in many cases unproven) benefits to salmonid populations. In addition, the impact of planned riparian tree work on the supply of LWD to the river should be considered. In some circumstances, it may be beneficial to allow trees to fall into the channel, provided the risk of increased flooding is acceptable.

In order to manage LWD effectively in the Willow Brook it is important that a balance is struck between the benefits of retention of timber within the river channel, and access for angling. It is also important that the Environment Agency is made aware of an adopted policy to retain LWD in the channel, in order to prevent its removal during routine management operations undertaken by the Agency.

- In order to increase LWD in the longer term, it would be prudent to embark on a riparian tree planting programme. Species native to the catchment should be planted, with the exception of alder, which should be omitted due to the incidence of *Phytopthora* disease.

- Upstream of the Packhorse Bridge, wooden or stone groynes could be constructed in order to create increased variation in the bed morphology of the river, and to help sort substrate. A similar effect could be achieved by the construction of mid-channel islands constructed from faggot bundles supported by chestnut stakes, and infilled with woody brash.

- The growth of the emergent weed is very extensive during the summer months, largely as result of the previous heavy dredging undertaken, that has resulted in an over-deepened channel and an associated reduction in water velocity. Removal of all of the weed is not practical or desirable. However, it is possible to manage the weed in order to maintain sections of open water. This can be achieved by either manual cutting (chain scythes), mechanical cutting (hydraulic powered cutter mounted on 360 excavator) or by the use of herbicide. Of these options, the best in terms of its cost, lack of environmental disturbance and practicality is probably the 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.

- The presence of the 'Culvert Bridge' is without doubt a serious impediment to migrating fish. It is also responsible for significant detrimental impact on instream habitat upstream of the structure. To replace the bridge would be a major undertaking, probably beyond the means of the club. However, the Environment Agency may be able to offer assistance with this issue, either directly or via a collaborative project with other stakeholders.

- A watching brief should be maintained on the discharge from the sewage treatment works. The BMWP results from the EA monitoring indicate moderate/good water quality. As a minimum this standard must be maintained. Discharges from sewage treatment works each have a statutory discharge consent standard agreed with the EA. Compliance with these standards is regularly monitored by the EA. Results are published on a public register, available for inspection at the EA's office or by post. Compliance with statutory consent standard should be checked by the club on a regular (annual?) basis. Failure to comply with the standards allows the club to mount a prosecution or to claim civil damages via the Angler's Conservation Association. The EA should enforce this legislation, but have from time to time, some regions have not been as rigorous in this matter as would be expected.

- Note that all works to bed or banks of the river or within 8m of its banks require 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.