Advisory Visit

River Erewash, Stanton Gate

19th August 2008

1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin and Paul Gaskell of the Wild Trout Trust on the River Erewash (Derbyshire / Nottinghamshire), on 19th August 2008. Comments in this report are based on observations on the day of the site visit and discussions with Mick Martin and Dennis Manley of the River Erewash Restoration Project (http://rivererewashrestorationproject.blogspot.com), and Joel Rawlinson, Environment Agency Fisheries Technical Officer.

The section visited was in the lower-middle reaches of the catchment between Stanton Gate road bridge (SK 48425 38308) near where the M1 motorway crosses the river, upstream to the footbridge upstream of Hallam Fields sewage treatment works (SK 48163 39718), a river length of approximately 1.8 Km. A short section of the Nut Brook was also inspected between the railway line and the Erewash confluence.

Volunteers from the River Erewash Restoration Project have carried out a tremendous amount of work on the river clearing litter, rubbish and debris from the channel (Photo 1). This has greatly enhanced the appearance of the river and raised its profile locally as an asset to the area.

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 Fishery Overview

The River Erewash is located on the boundary between Derbyshire and Nottinghamshire and flows south through a heavily populated catchment (approximately 30% urban, the rest arable and grazing) containing the towns of Heanor, Eastwood, Ilkeston, Stapleford, Sandiacre and Long Eaton. It is a low to moderate relief catchment draining Carboniferous Coal Measures with Permian and Triassic rocks on eastern and southern boundaries.

Prior to its confluence with the River Trent the River Erewash flows into former gravel pits which are now the Attenborough Nature Reserve Site of Special Scientific Interest (SSSI). As part of further gravel extraction,

Photo 1 Example of the problems that have been tackled by the Erewash Restoration Group

Photo 2 Combined Sewer Overflow (CSO) discharge point on the River Erewash

improvements are planned at the SSSI to partially divert the Erewash away from existing water bodies which support the designated features of interest of the SSSI. The diversion of the river is intended to reduce the input of nutrients to the SSSI from the Erewash which contains a high proportion of treated sewage effluent.

The River Erewash has a history of poor water quality. Industrial pollution, not least from mining, and a high population density in the catchment meant the river was grossly polluted for most of the 20th Century. More recently water quality has greatly improved because of the decline of heavy industry, and in the last decade investment by Severn Trent Water Ltd in the sewage treatment works (STW) discharging to the river.

There are eight major STWs which discharge to the Erewash, which is a relatively small river (Table 1), with a limited amount of water available for dilution; this is exacerbated by abstraction, for example to supply the Erewash canal.

Table 1 - Flow data (1965 – 2006) from the Environment Agency gauging station at Sandiacre (NGR SK 482 364). Flows in cubic metres per second (m^3s^{-1}).

Ref: http://www.nerc-wallingford.ac.uk/ih/nrfa/station_summaries/028/027.html

Mean flow	1.89
Q95 (flow exceeded 95% of the time, i.e. a low flow)	0.463
Q10 (flow exceeded 10% of the time, i.e. a high flow)	3.867

Effluent is treated to a high standard before it is discharged to the river, and this maintains water quality at a standard which is suitable to sustain aquatic life. However, the urbanised nature of the catchment with its flashy runoff regime means the Erewash is vulnerable to poor water quality events, particularly during storms.

Most sewerage systems incorporate combined surface water/sewage overflows (CSOs), which act as safety valves when there is heavy rainfall which generates a volume of effluent the STW is unable to cope with (Photo 2). In these cases the effluent is discharged untreated directly to the river,

the concept being there will be sufficient water in the swollen river to provide adequate dilution.

If there is localised heavy rainfall, particularly over urban areas which run-off very rapidly, CSOs can discharge when there is insufficient water in the river to dilute the effluent, causing water quality problems. Most CSO systems incorporate storage tanks to buffer these effects, so runoff can be stored and subsequently treated, but sometimes these are not of sufficient capacity. There is also the issue of adequate maintenance, for example sewers becoming blocked (such as with congealed fat) and diverting raw sewage into storm overflows in dry weather conditions.

The vulnerability of the Erewash to this type of event was illustrated in October 2007 when a pollution incident from Newthorpe STW killed a large number of fish. More recently a CSO below Hallam Fields STW was spotted discharging during dry weather and reported by Mick Martin and Helen Perkins of Derbyshire Wildlife Trust.

Environment Agency electric fishing survey data between 1995 and 2004 show the fish community in the Erewash comprises coarse fish, particularly in the lower reaches where large numbers of roach were recorded. Other species present include chub, dace, gudgeon, perch, pike, ruffe, minnow, bullhead, stone loach and 3-spined stickleback. Brown trout were recorded on one survey in July 2004 at Stoneyford (north of Langley Mill – around 12 km upstream of Stanton Gate) when two fish of 302 mm and 192 mm were caught.

Barbel are also present as a result of previous Environment Agency introductions of one and two-year old fish. Individuals of 3 kg or more are now appearing in anglers' catches.

3.0 Habitat Assessment

The visit began at Stanton Gate where there was good instream habitat in the form of riffles supporting good growths of water crowfoot (*Ranunculus* sp.), deep pools and glides (Photo 3). Bankside trees and bushes were present at intervals, providing excellent low cover over the water. A flood bank was present on the left bank of the river, but it was set well back from the river and a large area of wet grassland was present, probably to act as a storage area for flood flows (Photo 4).

Photo 3 Good instream habitat: watercrowfoot, low overhanging cover, and a variety of depth and flow

Photo 4 Flood storage area on left bank downstream of the M1. The river is behind the camera, and the set-back flood bank is visible bordering the field on the left of the picture.

Photo 5 Straightened, concrete-lined channel under the M1 motorway.

A short distance upstream the M1 motorway crosses the river and beneath the bridge the river channel has been straightened and lined with concrete blocks for approximately 200 m (Photo 5). Road drainage enters the river downstream of the bridge via an outfall with a flap valve.

Upstream of the motorway a number of hawthorns were situated on the outside of a meander, overhanging the river (Photo 6). These provide valuable low cover over the river, which is ideal habitat for adult fish of many species including barbel, chub and trout. At similar sites on the river the Restoration Project volunteers have cut back the overhanging branches to give clearance beneath, and prevent the accumulation of litter and sewage storm overflow debris. The dilemma here is how to manage the litter problem without removing valuable fish habitat. It may be possible to use floating rope booms at selected locations to intercept the debris where it can be easily removed before it reaches overhanging trees and bushes.

A number of large trees are present on the bankside which may be black poplar (*Populus nigra*) or one of its hybrids. The true black poplar is rare and it is recommended that these trees are properly identified, and if they are black poplar, protected.

Large woody debris (LWD) is present in two or three locations where the boughs of larger willow trees have cracked and leaned into the water, providing excellent habitat (Photo 7). LWD has been shown to be extremely important in several respects:

- It increases variety in flow patterns, depth and velocity
- It promotes the development of in-channel physical habitat diversity
- It can have significant benefits to the control of run-off at the catchment scale. Woody Debris helps regulate the energy of running water by decreasing the velocity, thus the travel time of water across the catchment is increased.

Large Woody Debris (LWD) is a general term referring to all wood naturally occurring in streams including branches, stumps and logs. Almost all LWD in streams is derived from trees located within the riparian corridor. Streams with adequate LWD tend to have greater habitat diversity, a natural meandering shape and greater resistance to high water events. LWD is an essential component of a healthy stream's ecology and helps maintain a diversity of biological communities and physical habitat.

Photo 6 Overhanging branches - traps for debris but vital fish habitat

Photo 7 Large Woody Debris (LWD) - excellent habitat

Photo 8 Fennel pondweed (*Potamogeton pectinatus*) replaced water crowfoot in the proximity of the STW outfall; a sign of nutrient enrichment.

Photo 9 Hallam Fields STW outfall

Traditionally many land managers and riparian owners have treated LWD in streams as a nuisance and have removed it, often with uncertain consequences. This is often unnecessary and harmful to stream habitat. Removal of LWD reduces the amount of organic material supporting the aquatic food web, removes vital instream habitats that fish will utilise for shelter and spawning and reduces the level of erosion resistance provided against high flows. In addition LWD improves the stream structure by enhancing the substrate (scouring and sorting gravel) and diverts the stream current in such a way that pools and riffles are likely to develop.

The favoured areas for catching barbel on this section of the Erewash are all in close proximity to LWD or low overhanging cover, illustrating the importance of these features as adult fish habitat.

Although much of the bankside was grazed by cattle, there was good marginal vegetation growth of long grasses, nettles and wild flowers. Himalayan balsam was present in low numbers in some areas. Himalayan balsam *Impatiens glandulifera* was introduced to the UK in 1839, and is now naturalised, especially on riverbanks and waste ground and has become a problematical weed. It is a tall, robust, annual producing clusters of purplish pink (or rarely white) helmet-shaped flowers. These are followed by seed pods that open explosively when ripe, shooting their seeds up to 7m (22ft) away. Each plant can produce up to 800 seeds.

It tolerates low light levels and, in turn, tends to shade out other vegetation, impoverishing habitats. Being an annual plant it dies back in winter leaving large areas of bare bank vulnerable to erosion. Its presence along riverbanks is therefore undesirable.

The Nut Brook joins the Erewash at National Grid Reference (NGR) SK 4829 3892. Above the confluence it was noticeable that there were fewer instream features such as riffles and pools in the Erewash; most of the river was a steady glide. The predominant submerged aquatic weed also changed from water crowfoot (*Ranunculus* sp.) to fennel pondweed (*Potamogeton pectinatus,* Photo 8), a sign of nutrient enrichment, probably because of the discharge Hallam Fields STW outfall a short distance upstream (Photo 9).

The river channel in this area was incised (water level is well below the level of the surrounding land – Photo 10), and the shape of the channel in cross-section is trapezoidal. This suggests the river has been the subject of

Photo 10 Showing the incised channel, with steep banks even on the inside of meanders

Photo 11 An example of 1970s river engineering works creating an incised channel with a trapezoidal cross-section and the loss of pool and riffle habitat structure (River Sow, Staffordshire).

engineering works in the past for land drainage or flood defence (Photo 11). The banks and bed of the river appeared to comprise hard clay, and there was little gravel on the river bed. Where gravel was present, areas of scour showed it was a thin layer overlying the clay.

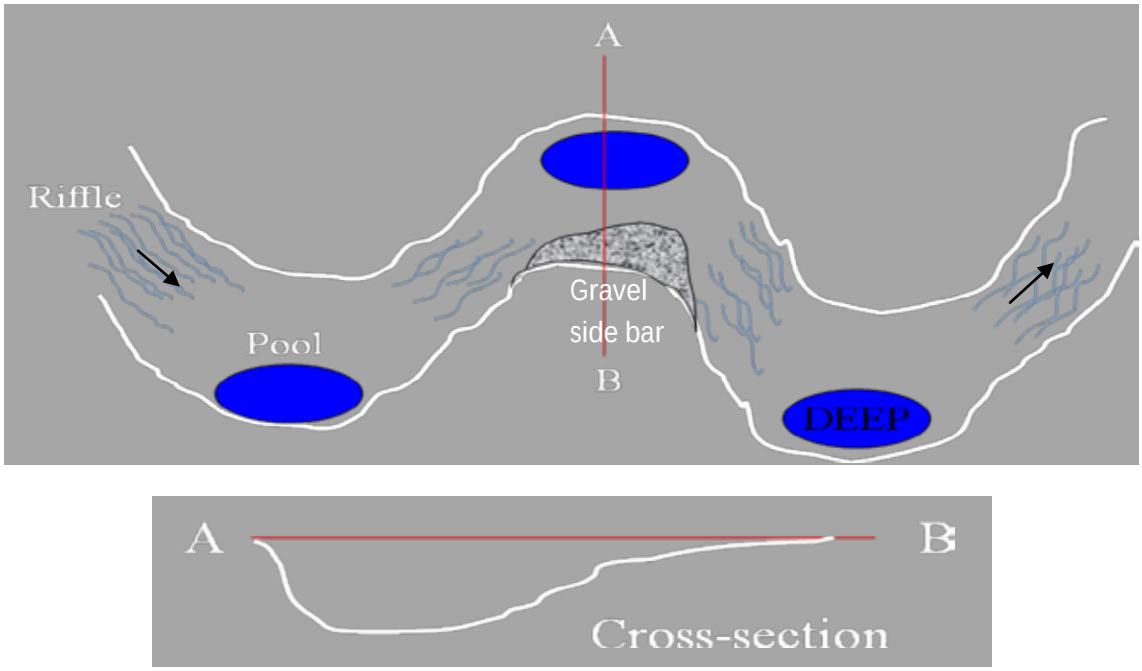

Figure 1 A schematic representation of pool and riffle sequence, and the associated channel cross-section. Pools tend to form of the outside of bends where there is scour, and deposit the gravels in riffles downstream.

Ideally the banks of the river should be reprofiled to recreate a more natural cross-section with a shallow profile on the inside of bends (as illustrated in Figure 1). This would encourage the deposition of gravel on the inside of bends. Works of this nature would require the movement of substantial quantities of earth and be expensive.

Upstream of Hallam Fields STW, the gradient of the river steepened and there were some areas of riffle habitat. However, this levelled out again with progress upstream and the final section visited was mainly a slow glide (downstream of the footbridge at SK 4816 3972).

The Nut Brook was inspected between the railway crossing and the Erewash confluence. Water crowfoot (*Ranunculus* sp.) was prolific, and there was

good bankside cover in the form of overhanging grasses, nettles, etc. and low bushes and trees (Photo 12). There were some areas of flow variation where debris had lodged across the channel. Himalayan balsam was more prolific here than alongside the Erewash.

Photo 12 The Nut Brook

4.0 Conclusion

This section of the River Erewash has habitat which is capable of supporting adult trout. Their absence is probably because of the following factors:

- intermittent water quality problems (as described in section 2.0)
- limited trout spawning habitat in the form of suitable gravel riffles because of the low gradient of the river, past river engineering works, and the flashy runoff regime

If trout populations could be found within the wider catchment and actions targeted at improving and extending these populations, then it may be possible to return wild trout to this section of the Erewash.

5.0 Recommendations

- Take up the Environment Agency's offer to carry out electric fishing surveys on the Nut Brook, other tributaries, and the Erewash upstream of Stanton Gate, to establish the presence or absence of trout, and their distribution. A plan can then be drawn up identifying the factors limiting the distribution of trout within the catchment, (e.g. weirs, water quality, habitat availability) and how these can be overcome. A catchment-wide approach to restoring the trout population is required, and improving habitats in areas distant from this stretch (for example spawning areas in tributaries and headwaters) may be necessary to re-establish trout in the Stanton Gate reach.

  From this brief assessment, it appears the Nut Brook has more favourable habitat for trout recruitment than the main river. Introduction of gravel riffles may be feasible here, but it is first necessary to know the distribution of trout and where such actions would be best targeted.

- Introducing gravel to create spawning areas in the main river is desirable, but this is likely to be impractical because of the incised channel and high peak flows which are likely to mobilise the gravel and wash it away. Reprofiling of the channel cross-section would probably be necessary to reduce the power of peak flows in areas where gravel was introduced.

  It is recommended that the group talk to the Environment Agency about the possibility of a bank reprofiling project. Andrew Crawford (Biodiversity Technical Specialist) has experience of this subject. The M1 widening project may provide the opportunity for some mitigation work to improve local biodiversity. The removal of the spoil from the floodplain is often the key issue in such projects, and the M1 widening may also provide an opportunity in that respect.

  It may be possible to introduce gravel to the smaller channel of the Nut Brook, as mentioned above. LWD could be used to create localised scour of existing gravels to improve spawning conditions (Photo 13). This should be positioned pointing upstream to avoid bank erosion.

Photo 13 Example of log installed to create localised scour and improve gravels

- Control Himalayan balsam. This can be achieved by physical or chemical means:

  Physical Control

  The main method of control, and usually the most appropriate, is pulling or cutting plants before they flower and set seed. Grazing access appears to be controlling balsam on some sections of the river. In areas inaccessible to livestock, physical or chemical control is recommended.

  Chemical Control

  Before using weedkillers alongside waterways it is necessary to contact the Environment Agency and obtain their written consent via form WQM1 (www.environment-agency.gov.uk/subjects/conservation/840870/840941/) . It can also advise on suitably qualified contractors.

  Himalayan balsam can be controlled with a weedkiller based on glyphosate, such as Roundup. Glyphosate is a non-selective, systemic weedkiller that is applied to the foliage. It is inactivated on contact with the soil, so there is no risk of damage to the roots of nearby plants, but care must be taken that the spray doesn't drift onto their foliage. Glyphosate is most effective when weed growth is vigorous. This usually occurs at flowering stage but before die-back begins; with most weeds, this is not earlier than mid-summer.

It may take a couple of seasons to obtain good control due to the germination of more weed seedlings.

Photo 14 Himalayan balsam in flower

- The club should adopt a policy of retaining LWD in the river channel wherever possible. The West Country Rivers Trust provides a useful guide to the management of natural LWD:

  1. Is the debris fixed, if yes then continue to 2, if not continue to 5.
  2. Is the debris causing excess erosion by redirecting the current into a vulnerable bank? If yes then go to 5 if not then go to 3.
  3. Would fish be able to migrate past it (take into account high river flows). If yes got to 4, if no go to 5.
  4. **Retain the woody debris in the river**.
  5. **Extract the debris.**

  Note: If the debris dam needs to be removed but there is still a significant amount of the root system attached to the bank then it is

recommended that the stump be retained for its wildlife habitat value and its stabilising effect on the bank.

- Leave the low branches on overhanging trees and bushes and try using rubbish booms to intercept debris upstream of these locations. Locate the booms in areas where they can be easily accessed for debris removal. Angling the booms across the river may help funnel material towards one bank for collection.

- Find out the current status of water quality in the Erewash and what plans there are for improvements under European directives such as the Water Framework Directive. Neil Ratcliffe is the Environment Officer at the EA covering the Erewash catchment and will be able to provide an overview of this subject.

- Take part in the anglers' invertebrate monitoring initiative instigated by the Riverfly Partnership. Details of sampling strategies and training days can be obtained from the Riverfly website at www.riverflies.org . Contact Bridget Peacock riverflies@salmon-trout.org for further details. Suitable nets for sampling macroinvertebrates can be obtained from Alana Ecology www.alanaecology.com Tel: 01588 630173

- Carry out gravel cleaning by raking or jetting on suitable riffles as discussed during the advisory visit.

- Publicise the work of the restoration project, and make it possible for more people to get involved. Consider constituting a more formal group which would make it possible to apply for grant funding and to take forward and manage projects resulting from these recommendations. See the UK Rivers Network website http://www.ukrivers.net/adopt-a-river.html for further information. For example a "friends of.." group, such as www.friendsoftheriveryarrow.co.uk , or the Wandle Trust (www.wandletrust.org). This would also provide a focus for community involvement and raise the profile of some of the larger issues affecting the river (such as water quality improvements). The River Glaven Conservation Group's website http://www.riverglaven.org.uk/home.html contains a useful example of the development and implementation of a river improvement project by a local group.

It is a legal requirement that all the works to the river require written Environment Agency (EA) consent prior to undertaking any works, either in-channel or within 8 metres of the bank.

6.0 Making it Happen

6.1 Wild Trout Trust assistance

The WTT can provide further assistance in the following ways:

- Advice and support in formulating a worked-up project proposal for larger improvements such as bank reprofiling and gravel introduction
- Assistance with the preparation of Environment Agency Land Drainage consent applications
- The provision of 'seed corn' funding (typically £1000 - £2000) to kick start the fund raising effort for project works
- Works could also be kick-started with the assistance of a WTT 'Practical Visit' (PV). The WTT will fund the cost of labour (two-man team) and materials. Recipient organisations will be expected to cover travel and accommodation expenses of the advisers. The use of specialist plant will be by separate negotiation.

Wet-work advisers can demonstrate one or more of the following techniques that are appropriate to the site.

- Tree Planting
- Fencing (Installation & Repair)
- Flow Deflectors
- Introduction of spawning substrate
- Gravel Jetting
- Introduction / Management of Woody Debris

Note: Recipients of the programme must have received a WTT AV and have obtained the appropriate consents from the Environment Agency, Natural England,etc, prior to arrangements being made to undertake the PV.

Applications for all the above should be made via projects@wildtrout.org

7.0 Disclaimer

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