



**Advisory Visit**

**Bradwell Brook (River Noe), Derbyshire**

**11<sup>th</sup> February, 2009**



## 1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the Bradwell Brook, Derbyshire on 11<sup>th</sup> February, 2009. Comments in this report are based on observations on the day of the site visit and discussions with Colin Jones (club secretary), John Gibson (riverkeeper) and Tim O'Connor (long-standing member) of Peak Forest Angling Club.

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

Peak Forest AC was established in 1861 and controls the fishing on approximately 11 miles of river in north Derbyshire on the River Noe and its tributary, the Bradwell Brook. The Bradwell Brook emerges from springs in the village of Bradwell, and is a limestone stream draining the White Peak Natural Area ([www.naturalareas.naturalengland.org.uk](http://www.naturalareas.naturalengland.org.uk)). The confluence of the Bradwell Brook and the Noe marks the approximate boundary between the White Peak and the Dark Peak, and there is a marked contrast in character between the two rivers. The Bradwell Brook has the characteristic clear water and flora influenced by the Carboniferous limestone, whereas the Noe has peat-tinged waters running off the shales and sandstones of the Dark Peak.

The River Noe contains good stocks of grayling *Thymallus thymallus*, wild brown trout *Salmo trutta* and a self-sustaining population of rainbow trout *Oncorhynchus mykiss*, a non-native species. The latter appear to predominate in the Bradwell Brook, possibly because of the more stable flows, temperatures and the water chemistry of this stream (a self-sustaining population of rainbows also occurs in the Derbyshire Wye, another limestone river). In addition to the wild fish populations, the club introduce about 500 10-12" farmed brown trout annually to certain beats on the Noe.

### 3.0 Habitat Assessment

#### Bradwell Village

The Bradwell Brook emerges from springs (Photo 1) above the village of Bradwell (National Grid Reference SK 17410 80984). It flows through a walled channel and under several bridges and culverts within the village, and the channel has a uniform width and is shallow, with little depth variation (Photo 2). The bed of the brook is gravel, but this is unsorted and hence not well-suited to successful trout spawning. Generally this would be considered poor habitat for trout, but two factors mitigate against this:

- the abundance of submerged vegetation (water crowfoot *Ranunculus* sp.) provides good cover for juvenile fish and their invertebrate prey. Larger adult fish are known to be present in the few deeper areas with overhead cover (bridges and culverts).
- Being spring-fed, the brook has a high base flow with relatively little variation.

These factors mean that although spawning success may be limited in this section, survival of the fish that do hatch is probably high.

#### Soft Water Lane – Weir at old pond (NGR SK 17484 81268 SK 17597 81749)

Downstream of the village centre the brook flows through fields (RHB) and the fringes of Bradwell and some houses and factories back onto the brook. The channel is more natural, with a meandering plan-form and a pool and riffle sequence; this promotes greater variation in depths and better habitat for the various life stages of trout. The lateral scour pools on the outside of bends have deeper water suitable for adult fish, whereas the gravel deposited below these areas form shallow riffles suitable for spawning and juvenile habitat (Photo 3).

The habitat is generally good in this section, with water crowfoot and gravel present. There is however a lack of low cover over the water which is essential for creating lies favoured by trout; the field on the right bank is grazed but unfenced, leaving the river margin bare and exposed (Photo 4). The left bank has a better margin in places (Photo 5), although grazing animals may be able to wade the river to access this bank, limiting the development of a healthy riparian margin.



Photo 1 The spring source of the Bradwell Brook



Photo 2 The brook in Bradwell village: wide and shallow with hard banks, but full of water crowfoot.



Photo 3 Below Soft Water Lane – deep pool on the outside of a meander



Photo 4 Lack of low marginal cover



Photo 5 Good marginal cover provided by tussocky vegetation



Photo 6 Trout redd cut into gravel where the current is pinched by water crowfoot beds

Protecting the bank from grazing, encouraging the tussocky, over-hanging fringe (as shown in Photo 5), and maybe planting some low-growing bushy trees (such as willows: *Salix caprea*, *S. cinerea*) would benefit this section, and may also improve the habitat for water voles.

There was generally a lack of large woody debris (LWD) in the river channel in this section. The importance of LWD is discussed further in the section below, but a careful programme of LWD introduction and retention would benefit this section by promoting localised bed scour and gravel sorting, improving trout spawning conditions and egg to fry survival rates. One or two trout redds were observed in this section (Photo 6), but not as many as would be expected, probably because of the unsorted nature of the gravels. The relatively modest range of flows experienced by the Bradwell Brook does not promote gravel sorting, so LWD is important in this context.

#### Old pond area (SK 176 817)

There is an old pond alongside the brook on the right bank. A weir (Photo 7) impounds the brook and the pond was formerly supplied by water diverted from the impoundment. These arrangements are dilapidated and the former pond is now a wet woodland and fen, dominated by reeds, sedges, grasses and willows (Photo 8). The Conservation Service of the Peak District National Park Authority (PDNPA) are working with the club to conserve the wildlife importance of this site which includes the above habitats and the associated plants, invertebrates, birds (warblers, wren, blackcap, bullfinch, kingfisher, dipper and wagtails), mammals (water voles, harvest mice) and fish (bullhead, brook lamprey, brown trout).

In addition to the weir at the former pond, there are additional weirs just downstream. One appears to be a gauging weir (Photo 9), and the other was not inspected but is a more substantial structure associated with Stretfield Mill. All the weirs present barriers to fish movement and fragment populations, limiting access to spawning, feeding and resting habitats. Ideally actions should be taken to improve access for fish over these barriers by either their removal or the construction of a fish pass or easement. It should be noted that the wetland habitat area previously described depends upon the water level behind the associated weir.

The river channel in the section between the weirs is uniformly wide and shallow, and between stone walls in some parts (Photos 9 and 10). The

habitat is not particularly good for trout, although the abundant water crowfoot affords cover for juvenile fish.



Photo 7 Weir alongside old pond



Photo 8 Wetland area on the site of the old pond



Photo 9 Gauging weir and walled, wide, shallow channel



Photo 10 View downstream towards Stretfield Mill

## Stretfield Mill – Sewage Works

The lower section of the brook has some very good habitat for wild trout. There is a meandering plan-form, a pool and riffle sequence and variation in channel form (widths and depths) (Photo 11). The river margins are largely wooded with some more open areas, and there does not appear to be any grazing of the banks; there are some excellent wet margins with tussocky vegetation ideal for water voles (Photo 12). Water crowfoot is present but in lesser quantities than upstream because of the increased shading of this section. The river bed is predominantly gravel of an ideal size for trout spawning, although there were relatively few areas of really well-sorted gravel that encourage fish spawning and good egg survival (Photo 13).

This section of the brook has recently been cleared by the club to facilitate access for angling. During this work, large amounts of naturally occurring woody debris, and also man-made litter and detritus, have been removed from the river channel (Photo 14). On a river like the Bradwell Brook which is fished, there is a balance to be struck between creating access for angling and retaining areas of large woody debris (LWD) essential for healthy fish stocks and stream ecology. In this case the emphasis has been placed on improving access and the river and fishery would benefit from the balance being tipped back in favour of retention of more LWD.

LWD refers to all wood naturally occurring in streams, including branches, stumps and logs; derived from trees within the riparian corridor. Streams with adequate LWD have greater habitat diversity, a natural meandering shape and greater resistance to high water events. Therefore LWD is an essential component of a healthy stream's ecology and maintains the diversity of biological communities and physical habitat (Photo 15).

Traditionally many river managers have treated LWD in streams as a nuisance and removed it, often with uncertain consequences. This is often unnecessary and harmful: stream clearance reduces the amount of organic material necessary to support the aquatic food web, and removes vital in-stream habitats that fish utilise for shelter and spawning. In addition LWD improves the stream structure by enhancing the substrate and diverting the stream current in such a way that pools and spawning riffles are likely to develop (Photo 16). A stream with a heterogeneous substrate and pools and riffles is ideal for benthic (bottom dwelling) organisms as well as for fish species like wild trout.



Photo 11 The lower section of the brook has a good pool and riffle sequence



Photo 12 Excellent tussocky, overhanging marginal vegetation



Photo 13 Good spawning gravel, but it would benefit from scouring and sorting by LWD structures



Photo 14 Considerable amounts of LWD have been cleared from the brook



Photo 15 An example of LWD on the River Dane, Cheshire. The fallen willow is providing superb low cover and creating lies for adult trout



Photo 16 LWD actively creating trout habitat: deep scour (adult holding water), cleaned and sorted gravel (spawning), and in-stream vegetation (juvenile cover). Picture courtesy of Dominic Martyn (EA).

This section of the brook would benefit from a more relaxed approach to the management of LWD, and an acceptance that having some areas of the stream which are not fishable will increase the overall quality of the fishery. This applies equally to the River Noe, because nurturing the potentially high quality spawning habitat in the Bradwell Brook will provide more fish to seed downstream. It would also benefit this section of river in the short to medium term to re-introduce some LWD into selected locations.

In terms of the River Noe, it would also be highly desirable to improve fish passage across the weir at Brough Corn Mill (and any barriers on the lower brook, which was not inspected). This would facilitate access for adult fish from the Noe to make use of the good quality spawning and nursery habitat in the Bradwell Brook.

#### **4.0 Conclusions**

Overall the Bradwell Brook has some excellent habitat for trout and provides a valuable spawning and nursery area which benefits the wider Peak Forest AC fishery. The habitat could be improved by carefully managed retention and introduction of LWD, cleaning of gravel spawning areas, and improved access for fish over existing barriers (weirs).

#### **5.0 Recommendations**

· Adopt a policy of retaining some LWD in the river channel. 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 (taking 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 or reposition 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.

- Introduce LWD for habitat structure in suitable locations (Photo 17). This can be done in several ways for different reasons:

1. To create deep scour pools and cover for adult habitat (mimicking natural LWD dams).
2. In riffle areas to create gravel scour and low cover to improve spawning conditions, e.g. using upstream facing flow deflectors and hinging trees/boughs into the river rather than removing.
3. In the straightened shallow sections (e.g. Photo 18) to improve flow diversity and cover. Hinging of trees, pinning trunks and root balls to the river bed, and midstream deflectors.

- Start a dialogue with the Environment Agency regarding the improvement of fish passage at the weirs on the Noe and Bradwell Brook. James Finnegan is the Fisheries Technical Specialist at the Nottingham Office, and further information on fish passage can be found in the EA Fish Pass Manual.

- Introduce LWD and coarse woody debris (brushwood bundles) to provide refuge for fish from predators such as goosander and mink, and to backfill some areas of bank damage (e.g. Photo 19). Brushwood bundles or 'mattresses' can be easily constructed and installed on working parties, and provide valuable cover for most life stages of fish, increasing their survival rate (Photo 20).

- Protect the left bank from grazing livestock on the section between Soft Water Lane and the Old Pond to allow a tussocky margin to develop, along with some low-growing native shrubs (e.g. willows). There may be grants available to fund fencing and livestock watering points, particularly if this would benefit other species such as water vole.

- When creating access for angling, concentrate on creating access and egress points to fishable sections with wading between, and trim only a narrow path well back from the brook. This will protect the valuable fringe of marginal vegetation and increase the fish carrying capacity of the stream



Photo 17 Installing LWD



Photo 18 Straightened section suitable for installation of LWD flow deflectors



Photo 19 Example of a brushwood mattress



Photo 20 Area suitable for backfilling with brushwood



Photo 21 Gravel cleaning with a portable leaf blower

- Continue existing mink control by trapping using the Game and Wildlife Conservancy Trust raft method in partnership with Derbyshire Wildlife Trust.
- Carry out targeted gravel cleaning by raking or jetting. This should be carried out in September or early October prior to the trout spawning season. About 25% of riffle areas should be done annually on a rotational basis. Observation of the river for redds in the winter to see which areas are used by spawning trout can be used as a guide for where to clean gravels in the subsequent year.

Raking is carried out using garden forks to turn over gravel to a depth of 20 – 30 cm. Jetting uses a high pressure water jet or leaf blower to wash fine sediment out of the gravel (Photo 21). Both techniques should be carried out working in a downstream direction.

- The club should continue to refrain from stocking farmed trout into the Bradwell Brook to avoid competitive and predatory interactions and interbreeding between stocked and wild fish. The Environment Agency's National Trout and Grayling Strategy has recently introduced a policy that will make it compulsory to use triploid (non-breeding) brown trout when stocking rivers ([www.environment-agency.gov.uk/subjects/fish/165773/1791055/1800027/](http://www.environment-agency.gov.uk/subjects/fish/165773/1791055/1800027/)). This policy will be phased in, becoming mandatory in 2015, and is to protect wild populations from the damaging effects of interbreeding with farmed, domesticated strains of brown trout. The club should consider an early switch to triploid brown trout on the currently stocked beats of the Noe to protect wild stocks.
- Take part in the anglers' invertebrate monitoring initiative instigated by the Riverfly Partnership. Regular invertebrate samples provide a quick water quality "health check" and can provide an early warning of pollution problems. Details of sampling strategies and training days can be obtained from the Riverfly website at [www.riverflies.org](http://www.riverflies.org) . Contact Bridget Peacock [riverflies@salmon-trout.org](mailto:riverflies@salmon-trout.org) for further details. Suitable nets for sampling macroinvertebrates can be obtained from Alana Ecology [www.alanaecology.com](http://www.alanaecology.com) Tel: 01588 630173

**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**

### Wild Trout Trust assistance

The WTT can provide further assistance in the following ways:

- Advice and support in formulating a worked-up project proposal and assistance with the preparation of Environment Agency Land Drainage consent applications.
- Works could 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 advisors. The use of specialist plant will be by separate negotiation.

Advisors can demonstrate techniques that are appropriate to the site including

- Flow Deflectors
- 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](mailto:projects@wildtrout.org)

## **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.

## **8.0 Acknowledgment**

The WTT are grateful to the Environment Agency for providing the support to make this advisory visit possible.