Plumpton Mill Stream. Plumpton College

Advisory Visit April 2017

Key Findings

- **Access for free fish migration is an issue that needs to be resolved. Local fish migration is being hampered by poorly positioned concrete culvert tubes.**
- **Enhanced protection from agricultural diffuse and point source pollution is urgently required.**
- **This section of the Plumpton Mill Stream has the potential to be a first class trout spawning and nursery zone.**
- **The stream is comparatively gravel rich and provides some good spawning opportunities for wild brown trout and other gravel spawning fish species.**
- **In-channel cover associated with slightly deeper pool habitat and low-level cover is currently limited.**
- **The stream should be providing a superb educational resource.**

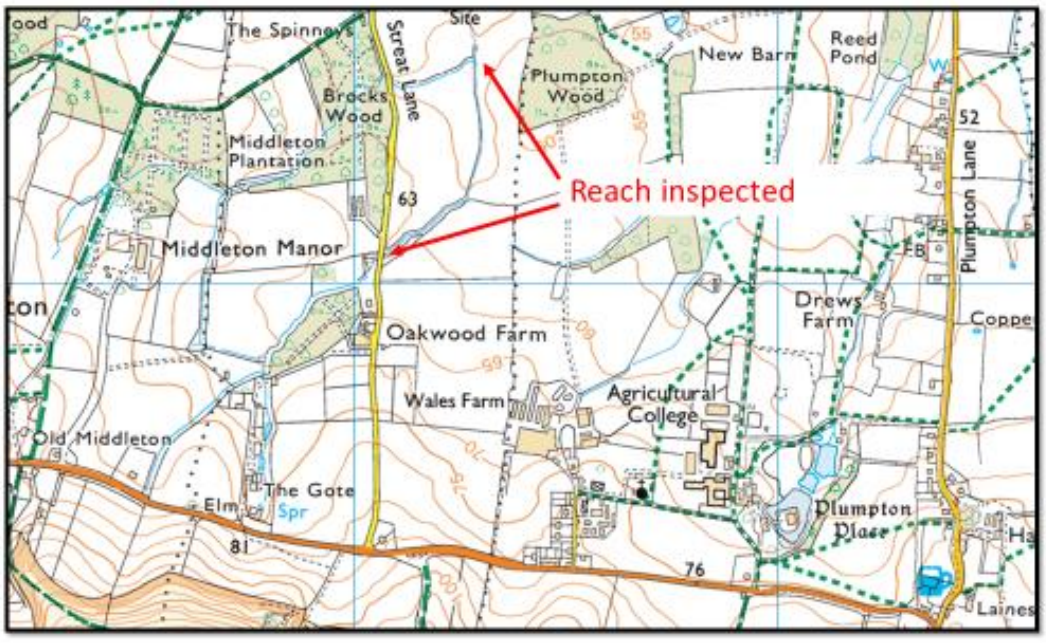
1.0 Introduction

This report is the output of a site visit to a 1.0km stretch of the Plumpton Mill Stream, which is a third order spawning and nursery tributary of the Bevern Stream, an important Sussex Ouse tributary. The reach inspected runs from national grid reference (NGR) TQ 35068 14056 down to TQ 35285 14525. The request for the visit came from Mr. Andrew McCall, who is the Curriculum Manager for the Countryside and Environment Dept. at Plumpton College.

The College is currently in the process of producing a new Conservation Management Plan for the entire site. Unfortunately, the stream has suffered from poor water quality as a direct result of some of the College's own agricultural activities and it is hoped that a new plan will help to identify all of the issues and potential opportunities that might exist to ensure that the ecology of the stream is protected and hopefully improved in the future.

The Plumpton Mill Stream is classified under the Water Framework Directive and is included by the Environment Agency as part of the Bevern Stream. Waterbody ID No. GB106040013360.

Comments in this report are based on observations made during the site visit and discussions on the day with Mr. Peter King, project Officer for the Ouse and Adur Rivers Trust. Normal convention is applied with respect to bank identification, i.e. left bank (LB) or right bank (RB) whilst looking downstream. Upstream and downstream references are often abbreviated to u/s and d/s, respectively, for convenience. The Ordnance Survey National Grid Reference system is used for identifying locations.



Map1. Plumpton Mill Stream © streetmap

	Plumpton Mill Stream
River	Sussex Ouse
Waterbody Name	Bevern Stream
Waterbody ID	GB 107041012570
Management Catchment	Adur and Ouse
River Basin District	South East
Current Ecological Quality	Poor Status
U/S Grid Ref inspected	TQ TQ35068 14056
D/S Grid Ref inspected	TQ TQ35285 14525
Length of river inspected	1.0km

Table 1. Overview of the waterbody. Information sourced from http://environment.data.gov.uk/catchment-planning/WaterBody/GB1060400013360

2. Catchment Overview

The Plumpton Mill Stream is one of several key tributaries of the Sussex Ouse. Rising from springs on the cusp of the South Downs and the Sussex Weald, the Plumpton Mill Stream flows east to join the Bevern stream before flowing on to enter the Ouse at Barcombe.

The Sussex Ouse is a very important local fishery and wildlife resource and supports a number of potentially threatened and nationally protected species. The Ouse is particularly valued for its sea trout (*Salmo trutta*) populations and the Environment Agency and local stakeholders represented by the Ouse and Adur Rivers Trust are keen to protect and improve the stock, along with other species such as eel (*Anguilla anguilla*), Bullhead (*Cottus gobio*) and brook lamprey (*Lampetra planeri*).

A particular issue impacting many rivers in Southern region is one of free access for migration. Reports have indicated that sea trout often gather at key locations downstream of known obstructions, where they are vulnerable to poaching and predation pressures and where there are sometimes only limited opportunities for successful spawning. It is understood that a particular structure located a

short distance downstream of the College land holdings poses a major obstruction to upstream fish migration. It may well be possible for occasional sea trout to ascend this structure during exceptionally high flow conditions. However, access to the potentially good spawning habitat located within the college land holdings is likely to be extremely difficult under low, or average flow conditions.

3. Habitat Assessment.

At the upstream boundary the stream flows through a culvert under Streat Lane (cover photo). No assessment of the quality or extent of any fish habitat was made upstream of this road culvert. It is possible that large trout might be able to migrate up and through this culvert under a certain flow conditions. Access under low flow conditions would be problematic, as would any access during high flows, when water velocities emanating from the culvert would be too fast to facilitate free passage. The structure should therefore be classified as an obstruction to free fish migration and dispersal.

A simple easement to improve fish passage opportunities at this site could be implemented. The cost versus benefit of improving fish passage at this location will depend on the extent of habitat availability found upstream of Streat Lane and resolving migration issues downstream.

Downstream of the bridge the stream flows in a generally straight channel, which looks to be have been re-aligned, possibly to act as a field boundary or to resolve land management issues. Habitat quality within the channel itself was generally considered to be reasonable, with evidence of occasional shallow pool, riffles and glides, flowing over a comparatively gravel-rich bed. (photo 1).

The channel is sandwiched between arable fields but receives some protection via a narrow buffer zone comprised of mature trees (photo 2), as well as a belt of scrub. The banks are steep and the channel is deeply incised, which is a natural characteristic of many Sussex streams. Overall, this section of channel should provide good spawning and nursey opportunities for trout; however, the reach could be improved through the development of additional deeper pool habitat, capable of holding adult fish.

Some efforts have been made during college tutorials to introduce stub flow deflectors (photo 1) in the hope of creating a more diverse shape to the river bed. For the flow deflectors to be effective, they need to be larger and combined with efforts to loosen the crust of the stream bed, which in many places is heavily armoured with compacted cobbles.

Photo 1. Long sections of the bed and toe of the bank are gravel rich. Note the stub deflector designed to promote bed scour. These need to be considerably larger to be effective.

Photo 2. The channel is lined with mature trees and a narrow buffer zone. Note the riffle/glide sequence and dappled light v shade regime.

Small spawning streams like the Plumpton Mill Stream are vulnerable to low flows. At the time of the visit in April, the stream was experiencing very low flow following a long dry spell. Ensuring that there is plenty of tree shading to keep the stream cool is of critical importance. Much of the reach inspected was comparatively shady, with the odd shaft of sunlight hitting the stream bed. On Sussex streams where low flows can be expected following any prolonged dry spell a high percentage of channel shading is considered to be beneficial.

It was apparent that although there was plenty of high-level shade, there was little low-level or trailing in-channel cover from fallen woody material (photo 3). Whether or not the stream has been subjected to a tidy-up or fallen material has been flushed out is not known. The primary food and cover for invertebrates from fallen woody material is critically important, as is the cover provided for small fish. Introducing more woody material either as cover logs, or brushwood shelves would help to reduce predation pressures and ensure that fish take up residence, rather than migrating downstream in search of cover.

Photo 3. The introduction of brushwood via tree hinging would create much improved opportunities for invertebrates and fish.

At two separate locations downstream the stream is forced through culverts Photo 5 and 6 to facilitate access for farm machinery. These stream crossings are considered to be of poor design and condition. Although not clear from the photos, the culvert tubes were perched and represent a huge problem for fish migration. Culverts like this are also problematic for eel migration and difficult for mammals such as water vole. Standard best practice for culverts is that they should be designed to be one third over-capacity, with that third sunken below the bed of the watercourse. This allows a natural bed to form within the culvert, improving habitat, assisting fish and sediment movement through the structure and preventing the structure from becoming perched over time. In addition to the environmental problems associated with the structures themselves, the

location of the crossings provide a direct pathway for nutrient-rich sediments to run-off the adjacent sloping arable field and bypass any protection given by the narrow field margins (photo 7). This is considered to be poor practice and a major issue for the health of the watercourse.

Photo 4. Culverts tubes create huge problems for wildlife.

Photo 5 shows the downstream side of the culvert. The culvert was not sunk into the bed when installed and has now perched above the downstream water levels creating a block for any fish migration.

Photo 6. The culvert runs beneath the track which acts as direct pathway for diffuse pollutants running off the field during heavy rainfall events.

4. Conclusions

Running through the College land holdings, the Plumton Mill Stream should be a first class ecological resource contributing valuable fish stocks to the wider Bevern Stream and Sussex Ouse catchment. The stream has at some stage been heavily modified and could be restored to provide improved adult trout holding habitat. Reasonable quality spawning and nursey habitat is available but the stream cannot reach its full potential without also address local water quality and connectivity issues.

The two key issues to address are:

- Improved access for fish migration, both on the college grounds and immediately downstream, where a solution to a chronic fish passage issue would enable more fish to access the high quality spawning habitat available on sections located within the college grounds. A dialogue with the local Ouse Adur Rivers Trust, as well as the Environment Agency is required to see if pooled resources can be targeted at finding an appropriate solution. The field culvert crossings located on the college grounds are also blocking local migrations and should be replaced with clear–span bridges, wide enough to include sections of natural bank or, at the very least, over-capacity sunken culverts.

- Problems associated with diffuse pollution from arable fields are a major concern. Unless water quality can be protected from the impacts of

agricultural pollution this stream will not reach its full potential. Wider field margins are required and sediment pathways must be intercepted to increase ground infiltration, rather than surface water run-off. This will require space and possibly more tree planting on slopes and contours, as well as diversion of over-land flow pathways using bunds and soakaways.

Increasingly, invertebrate surveys are being delivered by voluntary groups as part of a Citizen Science initiative. As the presence of certain aquatic invertebrates is strongly linked to water quality, community groups are using surveys to keep a watching brief on the quality of their local rivers and streams. Training and data collation to a national database is being coordinated by the Riverfly Partnership. For more information go to www.riverflies.org It is understood that the college already undertakes some biological monitoring.

Maintenance regimes on the stream should be very light and concentrate primarily on the removal of man-made rubbish. Naturally fallen woody material is extremely valuable and should only be removed if absolutely necessary to avoid damage to local infrastructure, or reduce the risk of local flooding immediately adjacent to any blockages. The role that fallen woody material plays in helping to protect property located further downstream is now well documented. Natural Flood Management (NFM) where headwater streams are deliberately seeded with woody material can help to flatten out peak flood events and also helps to store water for slow release during prolonged dry spells.

Tree management on these small streams is important, especially given the threats currently posed to native ash and alder trees through disease. Shading is vital in helping to moderate summer water temperatures and helps to ensure that dissolved oxygen concentrations remain high. Shafts of sunlight that reach the river bed are also valuable in helping to promote primary production. The solution is to aim for a dappled light and shade regime. Should there be any long gaps along the bank line where trees are absent, or in danger of failing, then it is recommended to consider successional tree planting with locally native, deciduous species. This is also a valuable technique in helping to defend a bank that could be in danger of excessive erosion in the future. Currently the reach in question supports a good balance of light and shade.

Some improvements to channel shape and cover is recommended thought he creation of occasional pool habitat, where water depth is greater than 300mm, as this is required to provide safe refuges for adult trout. Ideally these pools should also incorporate some low-level over-head and trailing cover. Larger undershot flow defectors, coupled with a loosening of the bed material will also help pools to develop, as will the scour that is created through the development of small natural logjams. Hinging small trees that currently grow on the top of the bank and folding them into the margins will also create important low-level cover.

5. Recommendations

- Explore options for helping to resolve fish passage issues both on college land holdings and on neighbouring land to ensure that all habitat is adequately connected and that, in future, the stream can support a vibrant and healthy native fish community.

- Identify and address problems associated with diffuse pollution and surface water pathways capable of carrying nutrient rich sediments directly into the stream. A combination of wider buffer zones, contour tree planting and strategic bund creation to intercept flow into soak-away areas would represent best practise.

- Move but do not remove fallen woody material that is deemed to be causing a local issue; elsewhere, leave it to establish naturally.

- Consider the creation of a modest number of improved pool habitats for adult trout and pre and post spawning migratory fish.

6. Making it Happen

The WTT can provide further assistance to help implement the above recommendations. This includes help in preparing a project proposal with more detailed information on design, costs and information required for obtaining consents to carry out the works. If required, a practical visit can be arranged to demonstrate habitat improvement techniques. Demand for these services is currently high but WTT is able to provide further advice and information as required. Further advice on fund-raising can be found at www.wildtrout.org/content/project-funding

We have produced a 70 minute DVD called 'Rivers: Working for Wild Trout' which graphically illustrates the challenges of managing river habitat for wild trout, with examples of good and poor habitat and practical demonstrations of habitat improvement. Additional sections of film cover key topics in greater depth, such as woody debris, enhancing fish stocks and managing invasive species.

The DVD is available to buy for £10.00 from our website shop www.wildtrout.org/product/rivers-working-wild-trout-dvd-0 or by calling the WTT office on 02392 570985.

The WTT website library has a wide range of materials in video and PDF format on habitat management and improvement.

7. Acknowledgement

The Wild Trout Trust would like to thank the Environment Agency for their continued support of the advisory visit service.

8. Disclaimer

This report is produced for guidance; 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 guidance made in this report.