River Rother – Stedham Weir

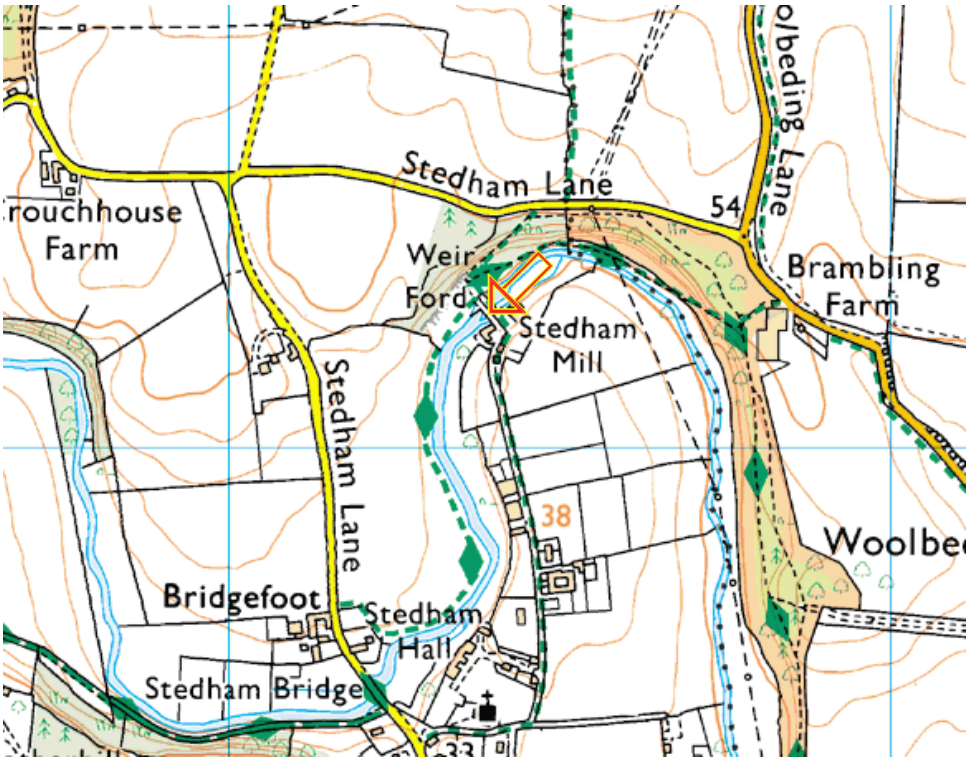
A Project Proposal by the Wild Trout Trust – November 2014

1. Introduction

This report is the output of a site meeting organised by the Arun and Rother Rivers Trust (ARRT) to explore options to resolve Water Framework Directive issues associated with the milling weir impoundment located on the River Rother at Stedham.

Present at the site meeting were Veronika Moore (Project Development Officer ARRT), Ses Wright (Project Officer ARRT), Damon Block (Fisheries Technical Specialist, Environment Agency) and Malcolm Lewis (Stedham Mill property manager). Throughout the report, normal convention is followed with respect to bank identification, i.e. banks are designated Left Bank (LB) or Right Bank (RB) whilst looking downstream.

The reach inspected ran from Stedham Bridge at NGR SU 862226 down to Stedham Mill at SU 863232. The Rother (Waterbody ID GB107041012810) has been assessed as being in 'poor status' under the Water Framework Directive.



Map 1 River Rother Stedham

2. Catchment overview

The Western Rother is the main tributary of the River Arun. The river rises from the chalk hanger near Hawkley in Hampshire, and is quickly augmented by tributaries rising from the South Downs, as well as streams emanating from the greensand ridge which runs parallel with the Downs to the north of the valley.

Much of the Rother is characterised by a soft sand substrate, a function of the local geology. River bed gravels are relatively scarce. Those that are present tend to be derived from three principle sources, either from broken outcrops of sandstone or ironstone, or occasional seams of flint.

Strong populations of wild brown trout (*Salmo trutta*) are to be found upstream of Petersfield, with lower densities of trout and coarse fish found through the middle reaches where in-channel habitat is poor and often smothered by the soft, mobile sand. Sections that possess a coarse substrate and more varied habitat, however, do support better fish populations.

The Rother supports migratory sea trout, which run the lower and middle river and tend to spawn on short sections of favourable habitat in some of the small tributaries. Sea trout can occasionally push as far upstream as Petersfield during exceptionally wet seasons. Access to the upper Rother is extremely difficult due to the numerous weirs and milling structures which restrict upstream migration.

Water quality is generally good, particularly above Petersfield. Occasional pollution incidents have been reported in the area, resulting in minor fish mortalities, but these are fortunately rare.

The Rother suffers periodically from the adverse effects of low flow and the intensive nature of agriculture within the catchment can put enormous pressure on the river. Large quantities of water are removed for spray irrigation in the middle reaches. In recent years, a move towards salad crop production has led to concerns over run-off from finely tilled soils in the flood plain and surrounding valley slopes increasing siltation. Coniferous plantations on the greensand valley side are another source of fine sediments, which find their way into the river via a network of small tributaries and side streams. The huge volume of sand entering the Rother (photo 1) is thought to be compounded by intensive rainfall events regularly experienced during the last decade.

Photo 1. Sand deposited under Woolbeding Bridge. A Rother speciality!

Photo 2. Section of impounded water between Stedham Weir and Stedham Bridge. Slow, impounded water providing poor habitat for fish like chub, dace, grayling, trout and bullhead.

3. Habitat assessment and project opportunities

The weir structure at Stedham poses an unacceptable environmental burden on the River Rother. The water head-loss at the structure is in excess of 1m high. As already discussed, it is possible for large sea trout to make some progress up and over the structure during exceptionally high flow conditions. Some upstream passage for migrating eels (*Anguilla Anguilla*) might also occasionally be possible, where elvers can creep up via wet areas of rough stone or brickwork. For the majority of the time, Stedham Weir is a major blockage for upstream migration for trout and eels and represents an impenetrable barrier for coarse fish species at all times.

For small trout and all coarse fish, the weir at Stedham is a one-way valve, with any fish washed over the weir in a flood event being unable to migrate back upstream. The cumulative impact of structures like Stedham Weir on wild fish populations is likely to be huge and is a major reason why the Western Rother and other similar rivers are failing to meet Water Framework Directive targets for healthy fish populations.

It might be possible to improve fish passage opportunities at Stedham by building technical fish passes. This would, however, be a missed opportunity. In-channel habitat quality within the reach upstream from Stedham Bridge to Stedham Mill (photo 2) is considered to be very poor. This section of channel is heavily influenced by the impounding effect of the weir structure, which has drowned out the natural gradient of the upstream channel, promoting 'canal-like' habitat in what once would have been a much more varied habitat.

The reach running downstream from Stedham Mill gives us a clue as to how the upstream channel looked before the weir was built. Habitat quality in the reach running downstream to Woolbeding is excellent, supporting areas of pool, riffle and glide habitat over a clean gravel bed. The quality of the downstream habitat only begins to fade when it again comes under the impounding influence of the weir located at Woolbeding House.

These un-impounded stretches provide good quality spawning and holding opportunities for a range of flow loving fish species. Beds of submerged aquatic macrophytes, such as water crowfoot (*Ranunculus* spp.) and starwort (*Callitriche* spp.) are present where sufficient light hits the channel and provide habitat for invertebrates and cover for fish. Submerged plants are rarely found in the reach upstream of Stedham Mill, with only classic pond species present, such as the yellow lily (*Nuphar lutea*) and marginal and emergent reeds and rushes.

As already described, the reach above is slow flowing and relatively deep; however, the water depth is likely to be much shallower than when the Mill structure was in regular operation. The principle section of the weir structure is now owned and managed by the Environment Agency, who adopted the structure and replaced the old sluice boards with an automated under-shot gate (photo 3) to maintain a consistent upstream water level. The weir structure itself does not provide any flood protection for properties either upstream or downstream of the Mill and will always pose an elevated risk for increased flooding, should the automated gates block or fail to open when required. With the weir gates currently controlled to provide a fixed upstream water level, the

reach above will in effect be a long sediment trap full of deposited sand and fine silt.

Photo 3. Under shot weir gate at Stedham. A sea trout was observed jumping at this structure on the day of the visit and failing hopelessly to make any upstream progress.

4. Conclusions

If the Catchment Partners are to achieve the goals set out under the Water Framework Directive then there is no 'do nothing' option at Stedham. Various options designed to improve opportunities for fish migration were discussed including:

1. The construction of a new bypass channel to be taken off the LB and rejoin the main channel approximately 50m downstream of the existing impoundment. This option would involve the construction of a new off-take structure approximately 100m upstream of the existing weir and taking the flow through a meandering, naturalistic channel running parallel with the existing channel. Due to the land take required and potential project costs (£100k plus) this option was not favoured by the group and in particular by the property manager.

2. Utilise an existing by-wash channel that runs down the RB through the garden of Stedham Mill, rejoining the main river approximately 150m downstream of the existing impoundment. This option will still require a technical fish pass to overcome a differential headloss through the old eel trap sluice (photo 4).

Photo 4 Eel house sluice.

The structural integrity of the eel house and sluice arches looks to be very poor. Constructing a technical fish pass at this location is likely to be very expensive. An additional issue would be creation of sufficient attractant flow via the bypass channel to ensure that fish pick up the passable route, rather than running up to the main impoundment. Currently this RB bypass channel runs a long distance downstream before rejoining the main river. It is likely that a bypass channel discharging at this particular location is going to be very inefficient, unless it takes the majority of the flow. This would require significant remodelling of the existing bypass channel to take the extra flow required. Possible project costs estimated to be in excess of £150k.

Cost and efficiency is likely to rule out this option as a viable choice.

3. Technical fish pass on the main structure. It might be possible to fabricate a technical fish-pass within the existing channel on the over-spill section, adjacent to the LB. The sloping gradient of the section running up above the overspill invert would also require modification to slow water velocities and provide resting zones for fish ascending any fish pass.

Estimated cost £125k.

4. Resolve fish passage issues by reducing the head created at the weir by removing the automated gate. This option potentially provides the best solution for improved fish passage, but crucially, also provides an opportunity to restore a substantial length of channel up to and possibly beyond Stedham Bridge. In

dropping the impoundment, the 750m section of channel immediately upstream may require rehabilitation work to manage bank slumping, which is likely to occur as a result of increased water velocities and the geology of the river bank and bed. A crucial aspect of this option is to clearly explain the implications to the upstream interests of what the new channel will look like, both in the short, medium and long term and how the restored channel will bring benefits for flood defence, ecology and fisheries.

The section of river is currently let to the Stedham Angling Club who regularly fish this section. Part of the project must be the restoration of high quality holding pools and improved access for angling as a direct result of dropping upstream water levels. In pool sections, the river should be no shallower than it currently is because although the water level will be reduced, increased velocities will naturally scour features within the sediment laden bed to create a much more attractive environment for holding fish. The fishing club will also benefit, in so much that fish displaced during high flow conditions will be able to navigate back up and into the newly created habitat.

Clearly explaining the potential benefits to the angling club and local community will be of fundamental importance in driving this option forward. Some modification of the spillway sluice may be required to take flow in conditions other than full spate.

Estimated costs £80k -£100k.

5. Recommendations

Option 4 is the only option that provides a combination of tangible flood defence benefit, habitat creation opportunities and resolves fish passage issues. It is also likely to be the cheapest of the four options considered.

If the project group agrees that option 4 is the best way forward then an early meeting with the landowners and the EA is required. A detailed consultation with the local upstream landowners and tenants is also required. It is highly recommended that this should not be a mail shot but a public meeting. Gaining the support of the local community and the Stedham AC will be very important and it is suggested that the ARRT and WTT could offer to present at both a public meeting and to the angling club if deemed appropriate.

Hopefully support can be garnered for the project but it is highly unlikely that everybody will agree. The EA have a crucial role to play as owners of the structure. An early meeting between representatives of the catchment partners and the EA is also recommended.

If a broad agreement can be reached, the first phase of the project could simply be lifting the gate during winter spate conditions and leave it up in the fully drawn position. A full topographical survey of the structure and long-section of the upstream channel is required. Once the information is gathered, work to lower and stabilize the bank, create new fishing stations and create a series of high quality holding pools using a combination of flow deflectors and possibly a redistribution of river bed substrate could take place the following

summer/autumn. A second phase of work looking to improve spawning opportunities for flow loving fish species could be considered once the levels have been dropped, the bed lowered and a better understanding of existing bed substrate is gathered.

Acknowledgement

The WTT would like to thank the Environment Agency for supporting the advisory and practical visit programme.

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