WILD TROUT TRUST

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The Upper Tillingbourne

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Key Findings

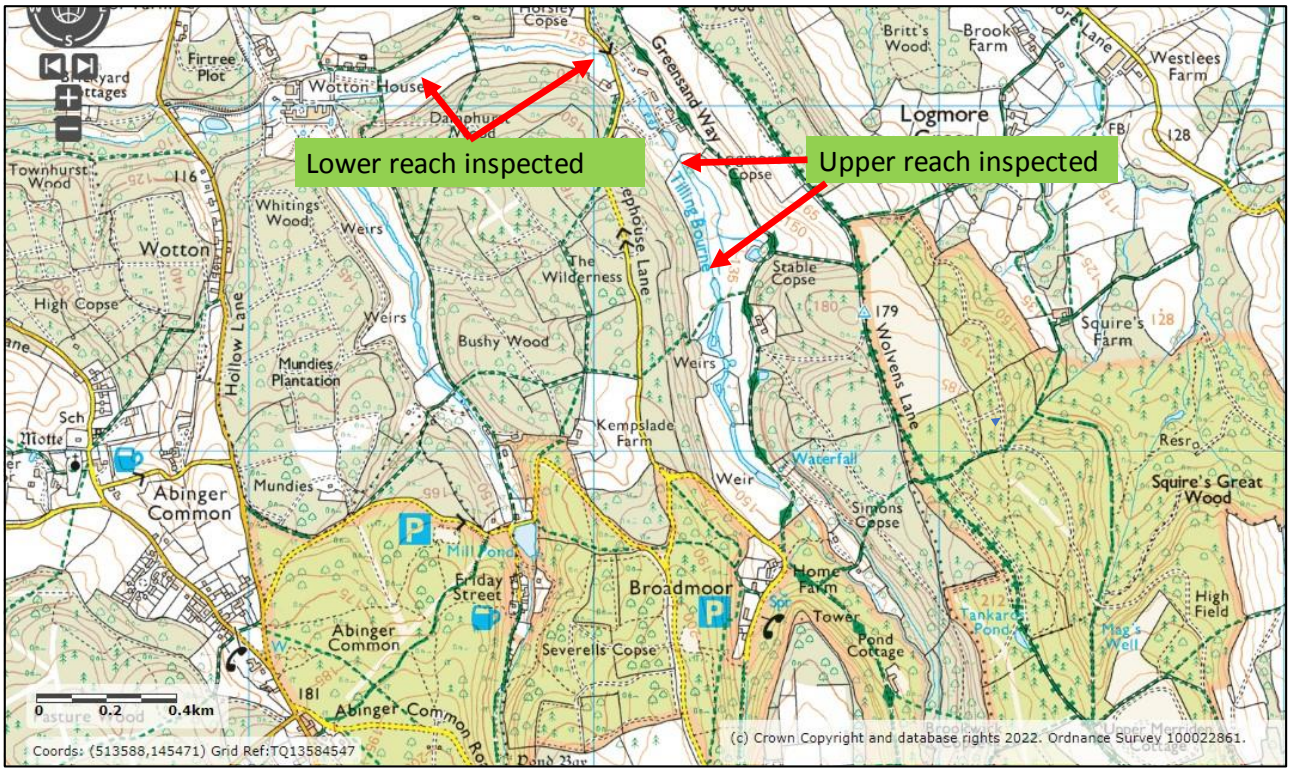
- Both sections support habitat suitable for all trout life stages, however, the lower section has more potential to support a low-key wild trout fishery.
- Trout populations in the top section may be less resilient due to habitat fragmentation.
- Varied flow patterns and scoured pool habitat would encourage resident brown trout and enhance the lower sections fishery potential.
- The lower reach would benefit from more complex low cover in the stream margins.
- Planting trees such as goat willow or thorn into the toe of the bank on the lower section will help to provide dense, low-level cover.
- The top section is adversely impacted by heavy shade and acidification caused by over-hanging laurel shrubs.
- Although the top section has only limited fishery potential, work to improve water quality via the removal of laurel bushes and to enhance habitat for wild trout will have knock-on benefits for the whole system.

1.0 Introduction

This report is the output of a site visit undertaken by Andy Thomas of the Wild Trout Trust, to the headwaters of the River Tillingbourne on the Wotton Estate in the Surrey Hills.

The request for the visit came from the management committee of the Wotton Fishing Club, who lease the fishing rights on a chain of stocked, on-line pools that are located on two parallel valleys at Friday Street and Tillingbourne Valley. The Club is keen to explore options for developing a low-key, wild brown (*Salmo trutta*) trout fishery in two sections of the Tillingbourne that run both above and below their Tillingbourne Valley chain of pools.

Comments in this report are based on observations made during the site visit and discussions with the landowner. 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 specific locations.



Map 1. River Tillingbourne at Wotton.

Table 1. Overview of the waterbody. Information sourced from

http://environment.data.gov.uk/catchment-planning/WaterBody/GB106039017840

River	River Tillingbourne
Waterbody Name	River Tillingbourne
Waterbody ID	GB 106039017840
Management Catchment	Wey and Tribs
River Basin District	Thames
Current Ecological Quality	Moderate Status – forecast good by 2027
U/S Grid Ref inspected	TQ12424706
D/S Grid Ref inspected	TQ13344654
Length of river inspected	2.0km

2. Catchment overview

The River Tillingbourne flows east to west along the valley floor, between the slopes of the North Downs, joining the River Wey at Shalford near Guildford. Its source is at NGR TQ 143 437 near Tilling Springs to the north of Leith Hill and it runs for approximately 18kms through Friday Street, Abinger Hammer, Gomshall, Shere, Albury, Chilworth and Shalford to the confluence with the River Wey.

Water feeding into the Tillingbourne system rises from deep lower Greensand springs but the river is also heavily influenced by the chalk deposits within the Downs and as a result the river shares many of the natural characteristics associated with a true chalk stream, such as relatively clear water, low banks and relatively stable flows. The underlying geology in the valley floor is however, mainly one of greensand and sandstone outcrops. The sandy nature is also characteristic of the wider catchment of the River Wey, which is known to impact on the natural productivity of the river and its tributaries.

A key factor in determining habitat quality on the Tillingbourne is the legacy of channel modifications. The reach inspected at Wotton has been subjected to intense modification via a series of impounding dams designed to create a sequence of ornamental pools, most of which were constructed during the 18th century. Further downstream, old milling impoundments, many of which were constructed for the gunpowder industry are also evident, as well as more recent modifications to facilitate on-line lakes designed to support stocked trout fisheries in the Albury area. The net result of all these modifications has been to fragment

habitat and fish populations, as well as interrupt the free movement of stream sediment.

The pools on the Wotton Estate have been managed as stocked trout fisheries for decades. Despite the impact of the network of dams and on-line pools that pepper the Tillingbourne from Wotton down to Gomshall, the river does support a strong population of wild brown trout, which is testament to the Tillingbourne's reliable water quantity and quality, combined with suitable habitat that does exist, albeit in short, fragmented reaches.

3.0 Habitat assessment.

3.1 Downstream reach

Much of the upper Tillingbourne sits within relatively steep sided valleys (Photo 1) which in theory should restrict natural meandering, and results in a legacy of long shallow runs and only occasional deeper pools. However, the reach here has a relatively steep gradient, promoting vigorous flow velocities and despite the narrow nature of the valley floor, the river has a very active morphology, with a series of meander bends (photo 2) and valuable pools, riffles and glides (photo 3). With little shading, the reach also supports beds of submerged weeds, mainly starwort *Calatriche sp.*

Photo 1. Steep sided valley and extremely narrow flood plain.

Photo 2. The series of tight meander bends looks to be barely possible in such a narrow valley floor.

Photo 3 The sinuous characteristics of this lower reach promote valuable diversity in the shape of the channel, forming pools, glides and broken riffles.

The meanders are extremely valuable in helping to increase the overall channel path length and thus reduce peak flow velocities. The banks' soils here are a mix of friable sands and clays and there was evidence of significant bank erosion and bank slumping in several locations. Tree cover was considered to be sparse on this lower section and there was considerable scope for tree planting for improved bank protection, especially on the outside of meander bends, which are invariably the areas that should support deeper water and opportunities for adult trout to safely lie up. Any new trees planted will require protection from grazing livestock.

Photo 4. The outside of the meander bends would benefit from tree planting to provide cover for trout and reduce bank erosion pressures.

Between the bends, there were numerous riffles, where bed and bank material has been eroded from pools and bends and deposited onto pool tails to form shallow ramps of clean, loose gravel. These areas provide excellent habitat and

the whole reach provided numerous examples of high-quality trout spawning and nursery areas. (Photo 5).

Photo 5. The tail of a gravel-bottomed glide leading into broken riffle provides good quality habitat for trout to spawn on. The provision of more low, overhanging cover, complex root systems and fallen woody material could make sections like this highly productive for trout recruitment and fry/parr survival.

In a few locations there are culverts. The example in (photo 6) is for a path crossing. The capacity of this culvert is modest but on a positive note, all those that were seen have been set down well below the local bed depth, so none are considered to be an issue for fish migration or trapping sediment. The increased flow velocities generated through the culvert in photo 6 has blown out a deep pool that is likely to be an attractive holding water for an adult trout. Squeezing the channel cross section with large piece of tree trunk, or root wads can have a similar effect, where increased flow velocities can be concentrated through a narrow slot to blast away bed sediment and leave attractive holding lies.

Near the top of this reach, the root systems of mature alder trees have joined and spanned the width of the stream bed, forming a natural impoundment (photo 7). The head differential between the upstream and downstream water levels is significant and may impact on upstream fish migration during low flow conditions. As the length of channel above this natural structure up to the first of many on-line pools is modest, no intervention is recommended.

None of the on-line pools were inspected but it is assumed that fish migration up and through the chain of pools is likely to be extremely difficult, if not impossible.

This leaves the wild trout population that resides above the Tillingbourne Valley pools very vulnerable to collapse.

Photo 6. Bridge culvert with deep holding pool below.

Photo 9. A natural impoundment caused by a large tree root system

This lower section of the Tillingbourne supports habitat for all trout life stages and was considered to be an excellent spawning and nursery stream that is likely to be supporting significant wild trout production for the reaches below.

Water quality within this section may be adversely impacted due to the chain of man-made pools located a short distance upstream. Online lakes and ponds can act as thermal radiators and may result in elevated water temperatures and potentially reduced oxygen levels compared to the section located above the ponds. The adverse impact of warming on this lower reach could be mitigated through a programme of tree planting to provide cooling shade.

3.2 Upstream reach

The upstream reach is fragmented, with on-line ponds constructed both above and immediately downstream of the reach. This section has a less active morphology than the downstream reach, probably due in part to the impounding nature of the downstream pond, coupled with a more modest bed slope over the reach as a whole. The valley floor (photo 10) is also much wider. It is possible that the stream has been diverted into its current course as part of the ornamental pool construction.

The reduced gradient, coupled with the impounded nature of the channel, results in significant fine sediment deposits within the reach (photo 11). The difference between this section and the lower reach is stark, and it is highly likely that the chain of pools intercepts huge volumes of mobilised sediment, that might otherwise deposit in the downstream section and beyond. Overall, the reach is also much more heavily shaded via mainly mature alder trees and as a result, very little aquatic weed growth was observed.

A cursory inspection of the stream bed revealed a large biomass of shrimp and caddis that will be processing fallen woody material and leaf litter deposited within this reach.

In a few locations there were significant stands of cherry laurel, or rhododendron (photo 12). Laurel can be highly toxic to aquatic organisms and both plants are highly undesirable stream-side plants that should be removed. Great care should be taken when managing these shrubs and any freshly cut leaves and branches should be kept well away from the stream to avoid damage to local invertebrate and fish communities.

In contrast to the bottom reach, the influence of adjacent iron-rich springs was more evident (photo 13), imparting a tea-coloured tinge of colour to the stream. Iron rich water will be slightly acidic, and it is possible that the combination of the heavy shade and the naturally acidic water is limiting natural productivity. As discussed earlier, the shade and cooling properties of river-side trees is critically important but ideally the reach should have access to more direct sunlight to help promote in-stream primary productivity. A good ration to aim for is a 60:40 ratio of direct shade to available sunlight.

Photo 10. Wide valley floor and heavily shaded stream channel

Photo 11 Sand and fine silt deposits were much more evident in the upstream reach.

Photo 12. Cherry laurel or rhododendron are undesirable stream side plants that will seriously limit productivity.

Photo 13. Upwelling iron-rich springs will be acidic in nature and will limit stream productivity

Spawning opportunities were much more limited in this reach, other than the occasional outcrop of sandstone (photo 13). Any natural trout production in this

reach can potentially result in wild fish dropping down into the chain of pools below.

Overall, the reach supports some reasonably good habitat for brown trout (photo 14). However, the natural water chemistry, when coupled with the local geology and streamside flora may be limiting productivity in this reach. Access for upstream migrating trout may also be limited by the on-line ponds located downstream of this reach.

Work to locally improve habitat and water quality will have knock-on benefits for the Tillingbourne Valley pools fishery immediately below but this section would be considered to only have very marginal potential to support a fishery.

Photo 13. Spawning opportunities were limited to occasional outcrops of eroded sandstone chips.

Photo 14. Good quality habitat for trout but potential for trout growth may well be naturally limited by the stream's water chemistry and local ecology.

4.0 Conclusions

Both reaches benefit from habitat suitable for supporting all trout life stages. However, both sections might be considered to be marginal to be actively managed as fisheries, and our recommendations would be to manage both reaches as a wild trout resource, rather than as a fishery. Should some members wish to explore micro stream wild trout fishing, with suitably appropriate techniques and equipment then I'm sure it will be attractive to a few of the members and could only add interest to the club's existing stocked pool fisheries.

In reality, the bottom reach has more potential for wild trout angling, purely because it requires far less work and because it looks to be holding up more flow likely to be picked up from a network of springs located all the way down the valley. Trout populations in the top reach may well be adversely impacted by the fragmented nature of the available habitat, with on-line ponds potentially isolating populations and making them less resilient. Opportunities in the top section are currently very limited and we would recommend work to tackle the plants that are likely to be adversely impacting on water quality and adding to the acidification of the reach below.

The creation of improved adult trout holding pools could be achieved by promoting increased bed scour using large woody flow deflectors, couple with the provision of more low, overhead cover, especially on the outside of bends and over existing pools. More trees will only make any fishing for wild fish more challenging but the

key to a high-quality trout fishery is to ensure that it has the capacity to hold lots of trout! Fishing for them is the individual angler's challenge!

Access for angling should be controlled, rather than be a complete free-for-all, with angling perhaps restricted to a couple of days a week to ensure that sections are well rested, and the fish not put under too much pressure.

Wild populations throughout the upper Tillingbourne would be more resilient if there were free access for migration through all the on-line pools. No assessments were made of any of the dam structures, or inlet channels but a feasibility study of whether, or not, trout can actively migrate through the network of ponds is recommended. There may be simple easement solutions that could build resilience into the wild trout populations. It must be recognised that any measures designed to improve access for wild trout may also result in a loss of retained stocked fish.

5.0 Recommendations

- Work on the top reach should be focused on protecting water quality. The removal of non-native shrubs that acidify the local environment and adversely impact on water quality is highly recommended: rhododendron is highly invasive on a landscape scale, and the club should engage with the landowner to arrange removal as soon as possible.

- Improving habitat quality for trout in the top reach could increase natural recruitment allowing more wild fish to drop back and populate areas below.

- It would be valuable to provide free fish passage at all of the online ponds. The WTT can help here with recommended modifications, if needed.

- Efforts to develop a wild trout fishery are best concentrated on the lower reach. However, the size of the fishery dictates that any angling activity should be low intensity, and on a strict catch and release basis.

- The lower section would benefit from the provision of increased low, overhanging tree cover through tree planting (such as goat willows), particularly over pools and on the outside of bends.

- Install woody flow deflectors and, if necessary, loosen riverbed materials in the flume created by the deflectors to promote slightly deeper holding lies for adult trout.

- Do not be tempted to widen the stream, or peel back marginal vegetation to facilitate a cast. In reality, this stream is probably only going to be viable as a fishery from April to June.

- Install woody material adjacent to areas where there are natural outcrops of gravel or sandstone to promote scour and free up valuable spawning material.

7.0 Making it Happen

Further assistance from the Wild Trout Trust is available in the form of:

Helping obtain the necessary consents for carrying out in-stream works, from either the Environment Agency or, in the case of river not being designated as "Main River Watercourse", from the local authority.

A practical visit from a WTT Conservation Officer to demonstrate the simple habitat improvement techniques outlined above. This enables recipients to obtain on the ground training in the appropriate use of conservation techniques and materials, including Health & Safety, equipment and requirements. This will then give projects the strongest possible start leading to successful completion of aims and objectives. Recipients will be expected to cover travel expenses of the WTT attendees.

The WTT website library has a wide range of free materials in video and PDF format on habitat management and improvement:
www.wildtrout.org/content/library
The Wild Trout Trust has also 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/shop/products/rivers-working-for-wild-trout-dvd or by calling the WTT office on 023 9257 0985.

8.0 Acknowledgement

The WTT would like to thank the Environment Agency for supporting the advisory and practical visit programme in England, through a partnership funded using rod licence income.

9.0 Disclaimer

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