



River Tillingbourne – Albury Estates



Advisory Visit April 2018

Key Findings

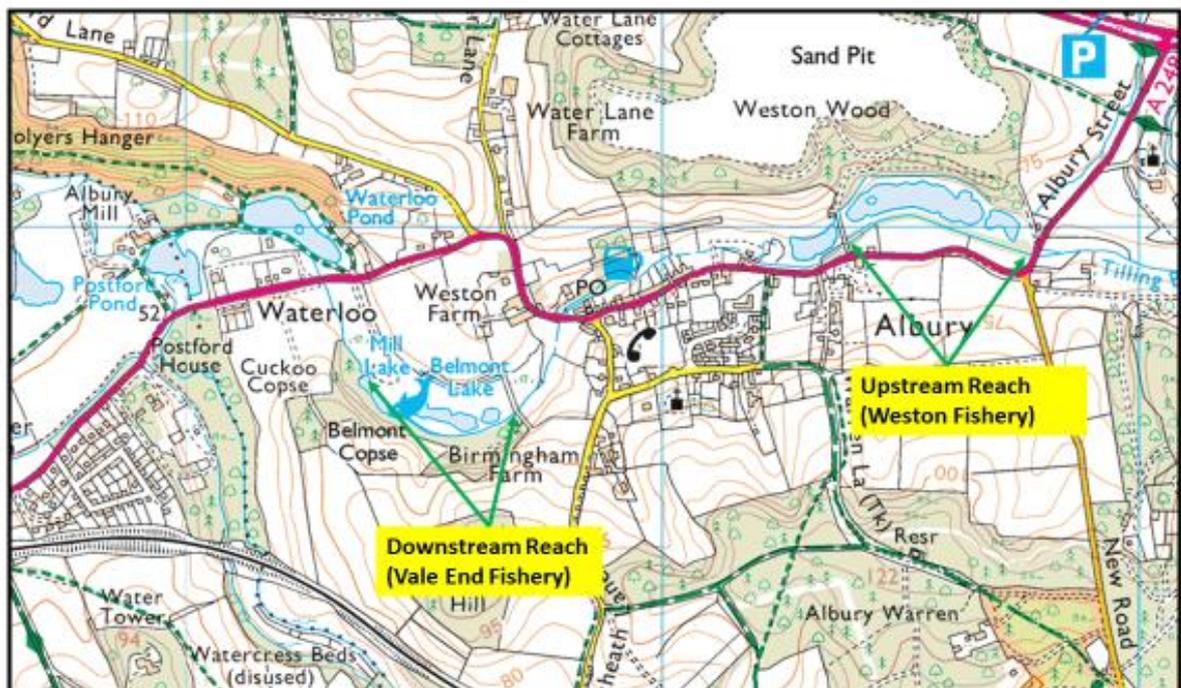
- **The Tillingbourne through the Albury Estate land holdings does support viable wild trout habitat but is severely compromised by impounding structures on both beats.**
- **The move to an unstocked, wild fishery will enable the wild component of the stock to develop.**
- **Some excellent work designed to improve habitat quality has already been undertaken but the scope for further enhancement is huge.**
- **The bottom lake on the Vale End Fishery is unsustainable, fragments river habitats, blocks natural fish migration and locally impacts water quality. Removing the dam and reinstating a natural stream would be a flagship project but would undoubtedly attract external funding and support from government agencies as well as catchment partners.**
- **The WTT can help to prepare a costed project proposal and partner the Estate in helping to deliver a sustainable wild trout fishery at Vale End.**

1.0 Introduction

This report is the output of a site visit to the River Tillingbourne on the Albury Estate in Surrey. The Estate management currently runs a network of still-water game fisheries, primarily stocked with farm-reared rainbow trout (*Oncorhynchus mykiss*) and occasional brown trout (*Salmo trutta*). In addition, the Estate offers chalkstream fly fishing opportunities on two separate beats of river which run parallel with the Estate's stocked trout lakes. The Estate also runs a section of syndicated river fishing immediately upstream of the Weston Fishery which is not included in this report.

Historically, the river sections available to paying day rods have been stocked with farm-reared brown trout and the Estate have recently ceased stocking on these two day ticket beats and are looking to develop the wild component of the stock via a programme of improved habitat management.

Comments in this report are based on observations made during the site visit and discussions on the day with Mr. Cameron Craigs, Fishery Manager with the Albury Estate. 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.



Map1. River Tillingbourne Albury Estate. © streetmap

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	TQ 05780 47946 to TQ 05395 47962 (Weston Fishery)
D/S Grid Ref inspected	TQ04752 47672 to TQ 04372 47690
Length of river inspected	2.0km

Table 1. Overview of the waterbody. Information sourced from

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

2.0 Catchment Overview

The River Tillingbourne flows along the south side of the North Downs joining the River Wey at 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 bubbles up from the chalk downs and as a result the river shares many characteristics associated with a true chalk stream, such as relatively clear water, low banks and 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 and is known to impact on the natural productivity of the rivers.

A key factor in determining habitat quality on the Tillingbourne is the legacy of old milling impoundments, many of which were constructed for the gunpowder industry. The relatively steep gradient of the river was intercepted by a series of mills, which also took advantage of the local source of alder trees lining the river valley floor for charcoal production. The trees have returned but the river still has a legacy of structures which locally restrict free access for fish migration and drown out potentially high-quality spawning and nursery sites for a range of fish species.

The Albury Estates own a significant length of river. Management of the river has predominantly been focused on providing good fishable access for the rods and managing a trout stocking programme designed to augment the local wild stock.

3.0 Habitat Assessment.

3.1 Weston Fishery

The 500m section of river running downstream from the access bridge adjacent to the Weston Fishery (cover photo and photo 1) supports some surprisingly good habitat for wild trout, despite being located a short distance above an old milling impoundment and running parallel with the main A249.

The channel here has obviously been straightened and possibly moved and is now perched slightly south of the valley floor where the lower of the two lakes at the Weston Fishery is now located. The channel was probably moved to promote a greater head for milling purposes but despite the impoundment, the river bed still possess a slight gradient and enjoys some sections of what looks to be firm gravel bed.

Currently, the Estate undertakes light management of the LB with a more heavily managed RB, where the anglers have access for bank fishing.



Photo 2. Upper boundary of the Weston Fishery, an area with good opportunities for trout spawning

The management team have undertaken sympathetic bank protection work on the LB using brushwood and faggot revetment to maintain a sustainable channel width which encourages brisk central channel flow velocities. The upper sections immediately downstream of the access bridge benefits from a slightly steeper bed gradient than that found in the lower half of the beat, which progressively comes under the influence of the downstream milling impoundment.

Where the channel has some bed gradient, especially where the channel width has been slightly pinched, there are high quality habitats available for wild trout. A few woody flow deflectors have been installed and these appear to be working well in helping to promote flow diversity and local bed scour.

The fringe of small trees growing out from the LB (south bank) will be providing some dappled shade throughout this reach. Low level shade is very important and managing riparian trees to also allow direct sunlight to penetrate is also vital for chalkstreams to help promote luxurious in-channel weed growth. Chalkstream plants such as water crowfoot (*Ranunculus* spp) and Starwort (*Callitriche* spp) provide critically important habitats for specialised chalkstream invertebrates and also provide valuable cover for fish. Getting the balance of dappled light and shade, with mainly shade over holding pools coupled with open shallow runs, will help to maintain a balanced habitat providing opportunities for both bugs and fish of all life stages. Opportunities to hinge and fold some of the young marginal willow trees into the LB margin exist and could prove to be a very simple and effective enhancement, helping to create complex winter cover in the margins, as well as ensuring plenty of light hits the shallow runs during the summer months.

The marginal strimming regime on the RB is considered to be on the harsh side and the river would undoubtedly benefit from a fringe, or vegetated toe of rough emergent vegetation. Retaining much low, overhanging cover is particularly important in the winter months, when in-channel weed growth can be sparse. The shallow margins are particularly important zones for young of the year brown trout and any trailing dead annual plants can provide critically important winter cover. Additionally, should the Estate move to a completely wild fishery, rods will benefit from the additional cover provided by a thick fringe of terrestrial and aquatic emergent vegetation from the fishing bank.

Two thirds of the way down the beat, there is a culvert (photo 3) with a low stone weir located just above. It is recommended to remove the stone weir to allow free flow through the culvert and in so doing reduce the upstream impounding effect of the structure. Winning as much bed slope as possible through the reach will enable better quality trout habitats to develop. The resultant stones removed from the centre of the weir can be dotted around shallow runs to make micro habitats for individual trout.

Low stone weirs are a common sight on trout streams and have inevitably been installed in an attempt to hold up water levels. The reality is that bed levels rapidly rise upstream of full width impoundments, leading to a reduction in fine sediment transport and a gradual reduction in water depth. The principles of sound habitat management where deeper holding lies for adult trout are required is to drive the river bed down, rather than trying to hold up water levels with impoundments.

It was noted that non-native gunnera has been planted adjacent to the river in a few locations. Although a spectacular plant in the summer months, gunnera will heavily shade out all other bank-top plants and potentially leave the river banks vulnerable to erosion in a high flow year.



Photo 3. The small weir above this culvert should be removed to improve habitat in the reach above.

Some high-quality habitat was seen downstream of the culvert (photo 4) where a combination of elevated water velocities and a lovely rough margin provides some ideal habitat for trout. Chalkstream channels are renowned for being low-energy environments and this often leads to long sections of flat, uniform bed shape. Where the channel width gets squeezed, in this case by the culvert, flow velocities are increased promoting valuable diversity in the shape of the river bed. Creating the combination of pool, riffle and glide with associated cover is the key to building sustainable fish stocks. Winning as much bed slope as possible will help these features to form naturally over time. Full width structures should be avoided and removing the central third of the small stone weir to bed level in photo 5 will still create an attractive flume but will not impound the channel above.



Photo 4. High quality trout habitat where a pool gives way to a shallow run adjacent to a well-covered river margin. Trout will be very comfortable in this location.



Photo 5. A small stone weir should be modified to reduce the impounding effects above. Planting the toe of the bank with low overhead cover via a goat willow or two will add to the holding value of this section.

3.2 Vale End beat

Habitat quality in the Vale End beat of the river is hugely influenced by the on-line Mill Pond (photo 1) which is the lower of the two stocked lake fisheries. A significant share of the flow is also lost to the top lake, however the impacts of this off-line fishery on the quality of the river are modest compared to the bottom on-line lake, which seriously impacts the ecological and fishery quality of the River Tillingbourne.

As well as impounding the reach above, the on-line lake is also having wider implications for the river outside of the boundaries of the Estate by interrupting sediment transport, blocking free wild fish migration (photo 2) and acting as a thermal radiator, potentially warming the stream below following periods of warm sunny weather. All of the ponds are also contributing towards the supply of algae, potentially impacting long sections of channel downstream.



Photo 6. The bottom on-line lake a Vale End is nothing short of a catastrophe for the River Tillingbourne. The lake is totally unsustainable and will continually collect sediments as well as adversely impacting on downstream water quality.



Photo 7. The dam and outlet structure of the bottom pond taking 100% of the flow of the Tillingbourne and completely blocking access for migrating wild fish.

At the top end of the reach, in-channel habitat quality is reasonably good (photo 8) and gives an indication of what the whole reach could look like if allowed to flow unhindered. Some excellent work has been undertaken by the Fishery Manager throughout the reach using natural woody materials to repair vulnerable banks (photo 9) and planting with emergent sedge (*Carex* spp) to create resilient and biologically valuable river margins (photo 10).

A series of low stone impounding weirs (photo 11) have been installed to create sufficient head to drive a sweetening flow into the upstream lake. Ideally, this flow should be the bare minimum required to hold the lake level and rather than a series of individual steps, the impoundment could be spread out of a greater length of channel using imported gravels to create a high quality stream environment with a semi-natural bed slope rather than a series of sharp steps.



Photo 8. Top end of the Vale End beat where a semi-natural channel supports good quality habitat for a wide range of species including wild brown trout.



Photo 9. The live brushwood inserted into the outside of the bend will help to provide cover and protect the bank from erosive flow velocities.



Photo 10. View of the channel adjacent to the top lake at Vale End. Planted sedge margin provides habitat as well as excellent bank protection.



Photo 11. One of several low weirs designed to facilitate flow into the top lake.

It was noted that water colour in this section of the Tillingbourne is influenced by iron rich springs (photo 12) emanating from water draining the sandy southern slopes of the valley.

The whole valley is a delightful environment but could be fantastic. The river here is severely degraded by the presence of the on-line lower pond. It was noted that the pond was very shallow, especially near the top half of the lake where sediments have settled first, leaving probably less than 50% of the area as being viable for a stocked trout fishery. Obviously, the pond can be dredged as a temporary fix but with all the usual expense and adverse implications for the river downstream, only to require dredging again in the very near future. It is understood that this particular fishery does provide opportunities for angling when all the other lakes on the Estate are frozen, but the costs are extremely high in terms of its overall impact on the river system as a whole.



Photo 12. An iron-rich greensand spring augments flow into the Tillingbourne, mainly derived from water emanating from the chalk based North Downs.

5.0 Stocking

It is recognised that the Albury Estate are now thinking about moving to wild trout fishing on their Tillingbourne beats. Whilst many land owners, clubs and commercial fisheries still stock rivers and streams with domesticated farm-reared fish, increasingly more fishery managers are realising the benefits of investing in better habitat management and a reduction or cessation of stocking, to see increasing numbers of wild trout repopulating the river. Fishing for wild

fish in a wild environment is infinitely more rewarding than catching stocked fish but there is no doubt it can be a challenge for some.

The following text has been pulled together by my colleague Gareth Pedley and encompasses many of the issues associated with trout stocking which impact on wild trout and may help with any decision-making process:

The native trout populations of Britain possess great genetic diversity, being the product of several separate colonisations following the last ice age. Many are now further distinct from each other, having adapted to their local environments over time. The natural genetic variability of these populations makes them amazingly resilient and adaptable to changing environmental conditions, which they should continue to do providing human impacts upon them and their habitats can be limited.

However, over the last 150 years, human impacts upon fish populations have increased exponentially, with major issues arising from the way in which we manage our land and rivers. To compound these issues, direct interference with wild fish populations has also increased, with large numbers of hatchery-bred fish being introduced to rivers.

The artificial mating that occurs within hatcheries bypasses vital chemical and visual aspects of mate selection; a process that ensures mate compatibility and maximises the fitness of wild fish. Stocked fish (both diploid and triploid), are also affected by domestication and selection for the farm environment, even within one generation in the hatchery (so this includes fish from wild brood-stock schemes). After all, farmed fish are the individuals that have survived within a concrete raceway, earth pond or tank etc. and are therefore poorly adapted for the very different conditions of a natural river. Adaptation to a farm environment is cumulative, with genetic diversity, natural behaviours, and survival rates when released to the wild all decreasing with each generation in captivity.

Stocking fish therefore produces a 'no-win' situation: if they don't successfully reproduce in the wild, or are infertile (triploids), the fish are simply a negative impact upon the ecosystem; if they do survive long enough to breed, their offspring have much poorer survival than the offspring of wild fish. This poor survival is also why, even after a long history of stocking, the genetic integrity of the wild population often remains intact and, after cessation of stocking, the farmed fish genes are often quickly bred out of a population. However, stocked fish do still temporarily take up space and resource within a river that could have been used by wild fish. Naïve stocked fish also make an easy target for predators, potentially increasing predator survival rates, attracting greater densities of predators, and increasing the negative impact they have on a river.

So, what is the other option?

Natural rivers (without stocking) have a far greater capacity to produce and hold healthy fish populations. A major key to the success of wild salmonids is their life strategy: over-production of offspring that are then subject to density-dependant mortality. The greater the habitat availability in any year, the greater the number of trout that will survive, thereby mitigating for mortalities and annual fluctuations in the population. This also means that underperforming populations can be increased by improving habitat quality.

As soon as they emerge from the gravel, trout fry disperse throughout the available habitat, constantly competing to maintain territories. This ensures that the fittest, dominant fish control the best lies, with easy feeding for low energy expenditure. They will then remain there until they challenge for a new territory or are displaced by a more dominant individual. Wild fish production therefore ensures habitat is fully utilised and a river holds the optimal number of fish, with the available space being naturally repopulated each year. Such efficient habitat utilisation is impossible to achieve through artificial stocking or alongside stocking, because stocked fish disrupt the wild population structure, territories and hierarchies.

Wild fish constantly defend their adopted territory and strive to stay within it, while stocked fish have little affinity or suitability to the arbitrary areas in which they are stocked. A large proportion of fish stocked into rivers therefore leave the stocking location or lose condition and die within a short time (particularly during high flows). Consider where the thousands of fish stocked in previous years are at the beginning of each season and why there is even a requirement to restock. In contrast, un-stocked wild fisheries provide some of the best fishing early season, as the fish take advantage of early-season hatches to regain condition after the winter.

Consequently, most angling clubs actually report increased catches after ceasing stocking, as demonstrated by the ever-increasing number of case studies on the WTT website - www.wildtrout.org/content/trout-stocking. There is sometimes a lag period as the wild fish population begins to recover from any impact of stocking but increased catches of juvenile trout are often reported from year one.

An excellent video produced by Wild Fish Conservancy North West documents how the state of Montana in North America ceased stocking after realising the major negative impact it was having - www.youtube.com/watch?v=U_rjouN65-Q&app=desktop

6.0 Conclusion

There is no doubt that the River Tillingbourne can and does sustain viable populations of wild brown trout. Where habitat is good and well connected, these fish will thrive and provide high quality sport for wild brown trout enthusiasts. The market for small stream wild brown trout fishing is significant and growing, with the market for still water stocked fisheries seemingly going in the opposite direction. Given the Tillingbourne's proximity to the capital, a well-managed wild brown trout fishery would be a fabulous addition to the Albury Estate portfolio. The Vale End beat in particular has massive potential and re-instating a good-quality river channel would be a high profile, flagship project that would not only provide the Estate with a viable and sustainable income but would also set down a marker that the Estate is keen to contribute towards the health and ecological value of the River Tillingbourne as a whole.

I suspect the owners of the Estate would not have built this lake with all the knowledge and information that is now available on the long-term implications for river ecology from on-line lakes. The irony is that the lake itself is suffering for being on-line and only provides very limited angling opportunities which are rapidly shrinking as it silts up.

Reinstating a naturally functioning river channel would significantly contribute towards government targets for the Water Framework Directive for getting the Tillingbourne into good ecological condition. As such, a large-scale project here is likely to attract external funding. The WTT would be delighted to help the Albury Estate through this process as an active partner.

Removal of the bottom lake dam and reinstating a semi-natural meandering channel would create a brilliant opportunity for high quality wild brown trout habitat in approximately 500m of channel. A bed slope utilising imported gravels could be created to maintain the sweetening flow into the top lake.

Further improvements to the Weston Fishery can be achieved by exploring opportunities for reducing the impounding effects of the weir structure below the bottom boundary. If this could be notched or slightly lowered the whole section above would benefit.

Lastly, it was obvious that the Fishery Manager has a very good feel for habitat management. Building on the decision to stop stocking with large hatchery-bred trout and concentrating on developing better quality habitats will see the wild component of the population grow and attract discerning wild trout enthusiasts.

7.0 Recommendations

- Consider a radical river restoration project for the Vale End Beat. The WTT can draw up a costed Project Proposal and help to raise funding for what would be an incredibly exciting and valuable project.
- In lieu of a full-scale restoration, consider removing the low stone weirs in favour of raising the bed over a much longer section of channel with imported gravels. This would create better quality habitat though a poor substitute for a wholesale restoration project.
- Explore the possibility of working with downstream neighbours on the Weston Fishery to lower the downstream impoundment, thus pulling the water through faster and lower on the bottom end of the Weston reach.
- To create improved lies for adult trout, drive the bed down with woody flow deflectors and plant adjacent cover, especially over potential pool habitats.
- Continue with the programme of in-channel and riparian habitat improvement. Create improved habitat for fish rather than for anglers. True wild trout enthusiasts understand this necessity.
- Market the fishery as a "wild trout" fishery.
- Catch and release tactics with barbless hooks should be mandatory on any wild trout fishery.
- Encourage the rods to record all catches and review fishery performance annually.
- Retain as much brash and brushwood in marginal zones as possible. Scruffy margins are an essential component of trout habitat.
- Consider hinging in some of the small willows near to the top end of the Weston Fishery and plant more low, scrubby trees into the toe of the bank on the downstream section.
- Allow a scruffy fringe of riparian vegetation to develop on the RB (fishing bank) on the Weston beat.
- Consider dividing the fishery up into wild beats with regular rest days.
- Consider monitoring water quality via invertebrate surveys.
- Note that before undertaking works, Environmental Permits may be required from the Environment Agency.

8.0 Making it Happen

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 which is supported by funding from rod licence sales.

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.