Advisory Visit
River Terr, Nounsley, Essex
27 July 2017

Key Findings

- **This section of the River Terr exhibits a relatively natural channel form with a good diversity of habitat for wild brown trout. However, the river has been realigned above the gauging station and it is likely that dredging has taken place where the tree canopy had not historically prevented access.**
- **The reach inspected has limited areas of spawning habitat and limited high quality juvenile habitat, but further improvements can be made through the application of river restoration techniques including brushwood ledge creation, placement of flow deflectors, gravel planting to restore bed levels, and selective tree canopy thinning to increase light availability to channel margins.**
- **The Environment Agency gauging station and its reach immediately downstream to Crabb's Bridge presents the poorest habitat seen during the walkover.**
- **The gauging station, a defunct weir, and the ford present obstacles to fish movements. Their removal should be considered. Where removal cannot be achieved then means of delivering fish passage and easement should be considered.**
- **The river has good connectivity to the Chelmer and Blackwater Canal, and then to the River Chelmer.**
- **The management of the existing tree and shrub stock, combined with the placement of large woody debris within the channel, would provide significant benefits for the reach downstream of Crabb's Bridge to Bumford's Lane.**
- **The reach downstream of the gauging station to Crabb's Bridge should be restored to create a natural channel form that is not over-deep, avoids siltation and is not prone to excessive in-channel vegetation growth. The channel form found downstream could be used as a template for restoration.**
- **Restoration of the channel immediately downstream of the gauging station could focus on the provision of high quality gravel spawning beds.**

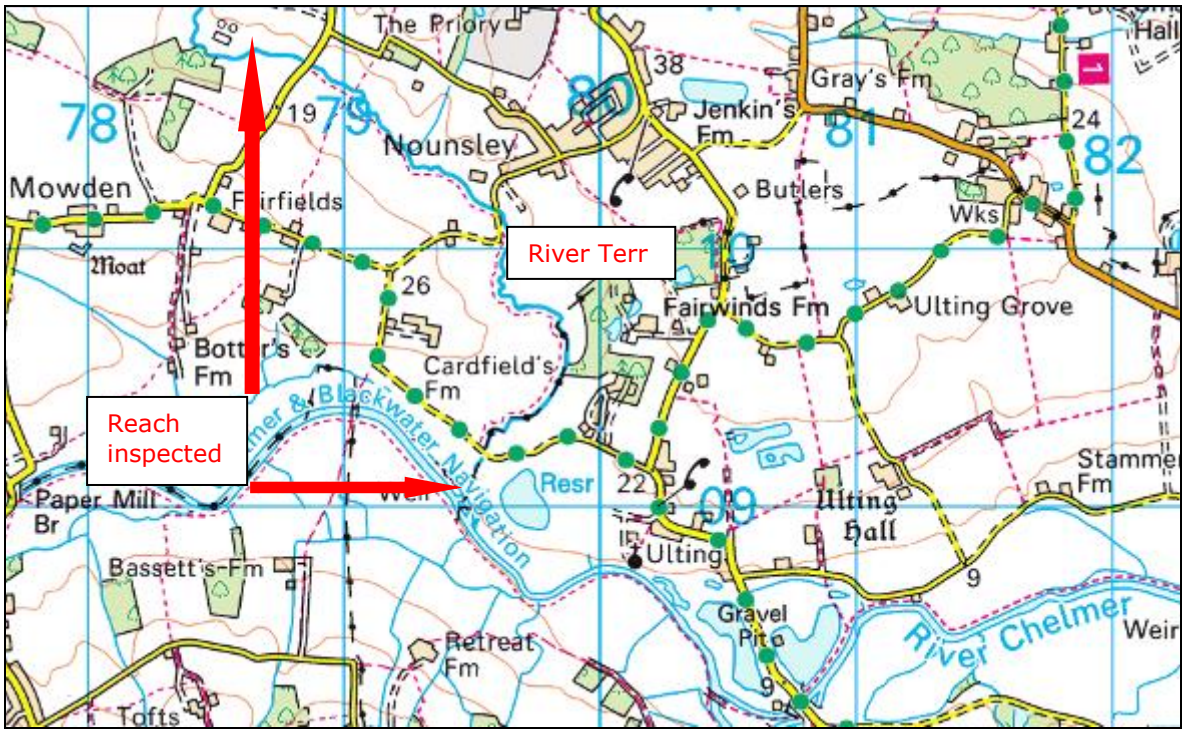
1. Introduction

This report is the output of a site visit to the lower part of the River Terr, near Nounsley in Essex, by Rob Mungovan, WTT Conservation Officer. The 3.32-km reach of channel inspected runs from National Grid Reference TL 7863410743 down to TL 79471089925. The request for the visit came from Mr Ben Norrington, Fisheries, Biodiversity and Geomorphology team (Fisheries), Kelvedon Office. Mr Norrington is keen to maximise the river's potential as a spawning ground and nursery tributary for both brown trout and coarse fish species that ultimately drop back into the River Chelmer. Angling takes places on both the navigation and the River Chelmer.

The River Terr has good connectivity to the Chelmer and Blackwater Navigation, and to the River Chelmer. The River Chelmer has reports of sea trout at Beeleigh Falls, with fish seen jumping at the river's tidal limit.

The River Terr is classified under the Water Framework Directive as Waterbody ID No. GB105037033940 and is currently assessed as being in Moderate ecological condition.

Comments in this report are based on observations made during the site visit and discussions on the day with Mr Norrington. The walkover was conducted by Rob Mungovan alone. 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 may be abbreviated to u/s and d/s, respectively, for convenience. The Ordnance Survey National Grid Reference system is used for identifying locations.



Map 1 - Location of visit to River Terr showing approximate upstream and downstream limits of inspection (www.streetmap.co.uk)

2. Catchment Overview

	River Terr
River	River Terr
Waterbody Name	River Terr
Waterbody ID	GB105037033940
Management Catchment	Combined Essex
River Basin District	Anglian
Current Ecological Status	Moderate
U/S Grid Ref inspected	TL 7865010750
D/S Grid Ref inspected	TL 7948808939
Length of river inspected	3.32km

Table 1 - Summary of Water Framework Directive information from http://environment.data.gov.uk/catchment-planning/WaterBody/GB105037033940

A broadly flat but undulating plateau, covered by glacial till, dominates the northern part of Essex. The southern and eastern edges of the plateau are marked by a shallow wooded ridge, which sweeps round in a curve from Epping Forest to Tiptree. The ridge grades northwards (Chelmsford to beyond Colchester) into heathlands developed on Tertiary sands and gravels and slopes down to a lower-lying area of London Clay.

Four distinct types of deposit are of note: the London clay, boulder clay, sands and gravels deposited during the Ice Age and coastal muds and silts laid down over the past few thousand years. These rocks and sediments give rise to the distinctive landforms of Essex. The main aquifers are from superficial drift.

Soils in the River Terr catchment consist mainly of slightly acidic, but base-rich, loamy and clay soils which give rise to areas of both free and impeded drainage.

The River Terr has its headwaters near Old Basing in North Essex. The River Terr is a small river, not often more than 3m wide and is a tributary of the River Chelmer. The River Terr is over 31km in length with a catchment of 79.5km^2. The river flows in a south east direction from its upper reaches above Terling.

The River Terr receives base flow from the superficial drift aquifer but also receives flow directly overland as a result of impervious soils. The drift geology has laid down a mix of gravel and stone which in turn is providing coarse substrate for the river.

The land use on the RB was entirely arable, and on the LB it was largely arable with gardens near to Nounsley, woodland and a series of on-line ponds feeding the river. These on-line ponds flowing from woodlands may represent important contributory flows which buffer rapid run-off rates and intercept sediment transport. This would be advantageous if controlling the movement of fine sediment but disadvantageous if preventing the downstream transfer of coarse sediment (gravel and cobbles). One pond had an angling match taking place.

Above the gauging station there is Hatfield Peverel sewage treatment works. During the visit the river showed no signs of any detrimental discharge. It is not known if the works has suffered any recent failures. However, the presence of fish throughout the entire reach gives some reassurance on this point.

The WFD classification for the River Terr and the reasons for failure are shown in the table 2 below.

OVERALL STATUS	**MODERATE**	
Ecological Status	**Moderate**	
Failing element		*Reasons for failure*
• Macrophytes and Phytobenthos Combined	Moderate	• Diffuse pollution (arable and road run-off) • Point source pollution (water industry)
• Phosphate	Poor	
Chemical Status	**Good**	

Table 2 – WFD classification for the River Terr

The River Terr is known to support both salmonid and coarse fish species. During the visit, possibly one brown trout was seen along with minnow, perch, chub, dace and roach. The river is also reported to contain the Biodiversity Action Plan (BAP) species of bullhead and brook lamprey, with good numbers of eels also reported in recent surveys.

No invasive plant species were seen during the visit.

There are currently no angling clubs on the Terr. However, there have been active fisheries in recent times and it is believed that a small amount of brown trout stocking has taken place within the last 10 years. Wild brown trout are currently present and have been caught in EA electrofishing surveys.

3. Habitat Assessment

Habitat quality within the River Terr was considered to be good with a mix of gravel riffles, glides, deeper pools and shaded reaches with an abundance of fallen woody material (photo 1).

It was stated that the River Terr had historically been subject to routine flood defence work but in recent times this has been much reduced (Norrington, pers comm, 2017). Consequently, through a combination of local geology, river bed gradient, the input of fallen woody material and a diversity of flow patterns, the river has been able to naturally reach a more ecologically valuable form. However, in places the river is still suboptimal for brown trout habitat.

An EA gauging station is present at TL 7864010743. The structure first appeared on the 1:2500 OS Plan map dated 1965 (www.old-maps.co.uk). Comparison with an earlier map dated 1953 showed that to construct the station, the channel was realigned above it. The channel downstream of the station is significantly over-deep and over-capacity when compared to other parts of the river, this is indicative of a river that has been over-dredged. Consequently, there is now 230m of degraded river between the station and Crabb's Bridge (photo 2). The creation of an over-capacity channel has created a channel that is no longer able to naturally maintain its capacity leading to uniform deposition and the subsequent colonisation of that material with emergent vegetation. This reach of river is almost entirely overgrown with bur reed and reedmace, creating an ongoing maintenance burden for the EA to prevent the gauging station from becoming drowned-out (photos 3 & 4).

The raised, fixed cross-section created by the gauging station (photo 5) also impounds flow u/s, although the extent of this was not investigated as part of the visit. Additionally, the realignment of the channel and its impounding effect prevent the natural movement of coarse material downstream (photo 6), and hence the channel upstream of Crabb's Bridge has over 0.5m of sand and silt on its bed for much of its length.

Photo 1 – The natural form of the River Terr downstream of Crabb's Bridge; note the narrow gravel bed and marginal plants.

Photo 2 – View from Crabb's Bridge looking upstream. Note the over-deep channel which is leading to the excessive growth of in-channel reedmace.

Photo 3 – Note the water depth of ~0.9m and the excessive reedmace growth which is collecting debris and risks impounding flow at the gauging station.

Photo 4 – Note that in places a channel is cutting a path through the dense vegetation but remains deep with fine sediment building up.

Photo 5 – EA gauging station which degrades the River Terr and poses an obstacle to the movement of fish and prevents the natural transport of sediment along the channel.

Photo 6 – Note the exposed clay bed containing very little coarse substrate. This does not present suitable spawning habitat for brown trout nor many coarse fish species.

The banks of the River Terr were largely dominated by exposed clay due to tree canopies creating shade which was suppressing marginal vegetation. In places there were exposed seams of gravel which through the natural process of erosion would be supplying coarse material to the riverbed (photo 7). The input of coarse substrate (gravel and cobbles) is very important to brown trout as they are a gravel spawning species.

The River Terr exhibited a number of clean gravel riffles but the depth of gravel forming the riffles was often less than 0.1m; as such the success of spawning trout may be limited (especially of large sea trout) as female fish must have a suitable depth of gravel in which to cut their redds. Other gravel accumulations contained a fair amount of fines and clay particles (photo 8).

Due to the established mature tree cover along the river (which was excessive in places) it is doubtful that the entire reach has been subject to extensive dredging for 30 plus years (based on the general minimum age of trees upon the bank). However, there was a noticeable deepening of the bed downstream of the concrete ford at Nounsley Road (TL 795701052) and it is possible that due to the proximity of the road and properties, targeted dredging may have deepened that area. Overall though, the River Terr could be considered as stabilising its plan-form after a period of historical maintenance.

The cessation of maintenance in its entirety can bring challenges for a river. Areas that were previously deep and may have provided refuge for fish in hot periods can tend to shallow as a result of uniform infilling by sediment (especially sand in the case of the Terr, photo 9). Large woody material which is no longer removed from the channel can accumulate to form debris dams which in the case of small streams can have positive and negative implications, and the lack of tree and shrub management can lead to excessive shading of the channel, resulting in poorly vegetated banks and margins which no longer entrap fine sediment (photo 10).

In a few locations, fallen trees and large woody material has also helped to create improved habitat quality. Fallen woody material is a critically important component of river habitat quality. For more information about the benefits of retaining both coarse and fine woody material in river channels, go to the WTT web site at: www.wildtrout.org/content/trees-and-rivers

Where full channel width debris dams have formed, it is recommended to cut out a narrow slot to avoid the debris dam becoming completely occluded with fine material where it may start to function as a weir. Where undershot flows are evident, they should be retained due to their value in creating natural bed scour (photo 11). A light touch is recommended and the general advice regarding fallen wood is to move and secure it if deemed a problem but never to entirely remove it from the channel.

Further information on how to effectively use woody material in a river channel can be found on the WTT web site: www.wildtrout.org/content/how-videos#log

The presence of a footpath along the river means that it is visited by dog walkers and children. In places it is clear to see that these pressures are also

causing erosion to the banks resulting in increased levels of fine sediment entering the river (photo 12).

There is a weir located at TL 7926710299 and is believed to be a defunct gauging station. It first appears on the OS Plan map 1953 1:2500 (www.old-maps.co.uk). Whilst it is no longer in use, it is still holding back a head of water estimated to be ~0.15m. The concrete sill of the weir creates a smooth shallow flow which many fish species may find challenging to traverse. Conversely, on approaching the weir, a fish ~0.10m in length swam off the sill and was believed to be a juvenile trout.

The weir's form is unusual in that it turns 90 degrees making the total length of the concrete reinforcement to the bed ~8m. The downstream width of the weir was ~4.5m resulting in a dispersed flow which appears to have lacked the ability to scour any significant depth from the bed. The weir currently degrades the river (photos 13 & 14).

Removal of the weir would return a natural form to the channel, ease fish movement upstream and aid the natural movement of sediment along the channel to assist the river's own natural recovery through geomorphic processes.

At Nounsley Road, a concrete ford crosses the river (photo 15). Fish were observed upstream and downstream of it. The visit took place during a period of low flow and it was doubtful if fish would be able to pass it. In high flows the ford may also become impassable to fish. Only at certain water levels and velocities would the ford be passable to fish. Optimal flow conditions to allow fish passage may not be experienced very often. Replacement of the ford with a wide-span bridge would enable a natural channel to be re-established.

There were no apparent signs of river management or habitat management along the course of the river. There was one rope swing erected from a tree and one child's dam put across (albeit rather leaky).

The majority of the channel was diverse in its general form but runs the risk of degrading as the tree canopy closes in (photo 16). The presence of extensive willow tree roots was clear to see at many locations (photo 17). Only one alder tree with extensive roots was observed. There is no benefit in undertaking tree planting at present unless it was with alder in very carefully selected locations. A number of mature oak and field maple trees added interest to the river. Whilst many parts of the channel were still dominated by an incised channel form, slumping had occurred in places and where light was able to reach the channel vegetated margins were forming.

The River Terr's gradient is clearly providing stream power that enables the formation of a pool and riffle sequence albeit partly interrupted by debris dams and fallen trees at some locations (photo 18). The reach immediately downstream of the gauging station to Crabb's Bridge is in stark contrast, being over-deep and consequently silting up with an excessive growth of reedmace and burr reed.

Photo 7 – Note the seam of gravel and cobbles that can be supplied to the river through the natural process of erosion. The presence of coarse material within a river's banks allows more rapid natural recovery after a period of maintenance when such material may have been removed from the river channel.

Photo 8 – Note the fine sediment starting to accumulate where the channel is over-wide for the velocity experienced. This location (with light) would be suitable for narrowing using a brushwood ledge.

Photo 9 – Note the extent of sand and silt that has accumulated in response to the debris dam just downstream. This debris dam should be managed to ease some flow through it which in turn may draw-off some sand and silt from this impounded reach. However, measures should also be taken to address the upstream supply of sand and silt to the river thus potentially negating the need to adjust this type of feature.

Photo 10 – Note the exposed sand bar on the LB. The shade cast by the mature ash tree is suppressing riparian vegetation from colonising exposed sediments. In places a better balance should be sought. Where exposed tree roots are present they present excellent cover for fish.

Photo 11 – This debris dam is only retaining a shallow head of water and creates an undershot flow which scours the bed downstream of it. This type of feature should be retained in its entirety.

Photo 12 – This meander is becoming wider due to the impact of dogs and people sliding down the banks. The outside of this meander could be protected with brushwood topped with stronger timber to provide increased resilience.

Photo 13 - The former gauging station weir, note the lack of any notable scour pool downstream of the structure.

Photo 14 – Due to the weir turning through 90 degrees it has a much longer concrete apron than most weirs of its size. If this weir serves no purpose then its removal should be sought.

Photo 15 – The active ford near to Nounsley village. In low and high flow conditions this ford represents an obstacle to the movement of fish. The replacement of this ford with a wide-span bridge should be a long-term objective.

Photo 16 – In places the hedgerows adjacent to the river are becoming tall lines of trees. This causes significant shading of the channel and can lead to the situation where if no one can see the river, then no one cares for it.

Photo 17 – Note the natural channel narrowing provided by willow tree roots. This is very useful for providing bank strength, juvenile fish cover and invertebrate habitat.

Photo 18 – This location had an excellent balance of swift flow, stable banks and an abundant coarse gravel bed substrate. This location would be suitable for brown trout spawning.

Downstream of Crabb's Bridge, the amount of in-channel vegetation was very limited. Occasional plants of starwort (photo 19) were observed, as were water lilies. The lack of aquatic plants is likely to be a combination of a firm bed substrate, high scouring flows and extensive shading. Marginal plants tended to be dominated by bur reed, greater willow herb, and pendulous sedge. There was occasional reed canary grass. These marginal plants provide important bank protection, as well as important habitat for a wide range of aquatic invertebrates.

The River Terr becomes impounded due to water levels in the Chelmer and Blackwater Navigation for its last 175m (photo 20). As result of the impounded flow there is excessive in-channel bur reed growth. However, this impounded flow does not appear to restrict fish movement up into the River Terr.

Photo 19 – At one location the canopy was open and flow rate not too swift for starwort to be present. Other than at this point, the river had very limited submerged aquatic flora. Aquatic plants are important for water quality, fish cover and invertebrate habitat. Measures such as canopy opening should be undertaken to increase the amount of aquatic plants.

Photo 20 – The River Terr immediately above its confluence with the Chelmer and Blackwater Navigation.

Adult brown trout will undoubtedly be present in the River Terr (as was confirmed by Mr Norrington) but it is surprising not to have observed any when approaching the deeper pools. It should therefore be assumed that trout are present but in low numbers. Reasons for the low numbers are likely to be a combination of:

- Limited spawning substrates
- A lack of brushwood features to provide fry habitat during periods of high flow
- Limited extents of vegetated riffles to provide parr habitat
- Limited complex cover from predators in deeper pools
- High water temperature as a result of low flows and sewage treatment discharges

Additionally, if large trout were to move up the River Terr for spawning, especially sea trout, then the depth and quality of suitable coarse substrate to spawn into is limited. It is also quite possible that early spawning fish may lose their eggs to later fish which may use the same spawning areas.

4. Conclusions

This particular section of the River Terr has been modified through maintenance and the construction of the gauging station. It is now undergoing a period of recovery as the river responds to geomorphological processes (primarily sedimentation and erosion).

It is fortunate that the River Terr does not appear to have been significantly uniformly-dredged in its past, and where maintenance activities have taken place, the lack of tree cover has enabled marginal vegetation to colonise, thus initiating the process of sediment accretion.

The degraded river in the vicinity of the gauging station should be the focus of channel restoration to create a river that is better suited to the flow regimes that it experiences, and prevents the excessive growth of reedmace and burr reed. Additionally, a restored channel could be formed in a manner that provides a bed substrate that is gravel-rich, with cleansing velocities to prevent sedimentation and excessive in-channel vegetation growth. This would be of significant benefit to brown trout and coarse fish species (chub, minnow and dace).

The presence of the gauging station, ford and defunct weir should be seen as significant obstacles to the natural migration of a range of fish species. At certain flow types (low and/or high especially). These features may represent total barriers to the movement of fish. Barriers to fish should identified as issues to be addressed through removal, ideally in combination with river restoration to make good any areas of poor habitat that may become newly available to fish. Where removal cannot be achieved then the use of various means of fish passage and easement would need to be considered.

Any enhancement scheme will require a consultation with the EA and will be subject to an Environmental Permit.

If restoration of the channel downstream of the gauging station cannot be achieved in the short-term, habitat enhancement using measures such as brushwood ledges, flow deflectors and tree hinging could bring about relatively easy gains. Implementing those types of measures could be the focus of community volunteer sessions and/or engagement with angling clubs.

All of these techniques are explained in detail in the WTT Chalkstream Habitat Manual available as a DVD from our office or as a downloadable pdf file from our web site here: www.wildtrout.org/content/wtt-publications

Although assessment of the river upstream of the gauging station was not undertaken, observations made during the visit suggest that there is an elevated supply of fine sediment in the catchment, as evident by excess deposition in slower-flow areas. Further investigation of potential inputs on the catchment is recommended as they are almost certainly impacting negatively upon this reach.

5. Recommendations

- Address poor habitat and excessive vegetation growth at the EA gauging station. Firstly consider if the gauging station could be removed and replaced with a form that does not require a head difference (such as electromagnetic flow measurement). Secondly, seek a more sustainable solution to channel clearance, and one that also provides brown trout spawning habitat through river restoration.

- Remove the defunct gauging weir.

- Undertake a detailed investigation to establish the extent of the obstacle presented by the ford to fish migration. A long-term objective should be to remove the ford and seek its replacement by a wide-span bridge thus enabling the restoration of the river beneath it. If the ford cannot be removed then modification to aid fish passage should be considered.

- Move, but do not remove, fallen woody material that is deemed to be causing excessive impoundments and siltation; elsewhere, leave it to establish naturally.

- Establish a tree management plan and create a coppice regime that allows light to parts of the river (ideally over the riffles whilst retaining shade over the pools). Look for opportunities to "hinge" leaning marginal trees so as to provide secure marginal cover at water level.

- Retain as much brash and brushwood as possible in marginal zones and encourage it to become vegetated through canopy thinning and/or planting.

- Undertake redd surveys to see if brown trout are spawning, and whether they have any preferred reaches.

- The WTT can design a scheme via a Project Proposal and help to explore options for funding.

6. 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 local authority or Environment Agency (depending upon whether the brook is a designated Main River or not).

- A practical visit, which involves a visit from a WTT Conservation Officer to complete a demonstration plot on the site to be restored. This enables recipients to obtain on-the-ground training regarding the appropriate use of conservation techniques and materials, including Health & Safety, equipment. 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.

- Support for design and supervision of habitat feature placement, tree works and other necessary in-channel works.

The WTT website library has a wide range of free materials in video and PDF format on habitat management and improvement:
http://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 http://www.wildtrout.org/product/rivers-working-wild-trout-dvd-0 or by calling the WTT office on 02392 570985.

7. Acknowledgement

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

8. Disclaimer

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