WILD TROUT TRUST

Advisory Visit

River Wensum, Bintry Mill (Goff's Beat), Norfolk

June 2025

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Key Issues

- It is thought that North Elmham mill has impounded approximately half of the beat. Reducing the height of the impoundment could bring flow benefits to the beat.

- Most of the beat appeared to be embanked on the right bank. The levee was ~0.75m. If the levee were removed or breached in multiple places it would allow floodplain connection, allowing the river to drop fine sediment beyond its channel.

- The beat contained extensive lengths of deep dark silt. The silt is likely to remain on the bed unless flow diversity, velocity and bed scour is increased.

- The river lacked in riparian tree cover. With the beat having so few riparian trees, where they do occur and trail to water, all branches should be retained for the cover and flow diversity that they bring.

- The river lacked flow diversity, partly due to it being depleted of large woody material.

- The reach has areas that would respond to habitat enhancement measures of bed raising and the installation of large volumes of large woody material (i.e. treetops).

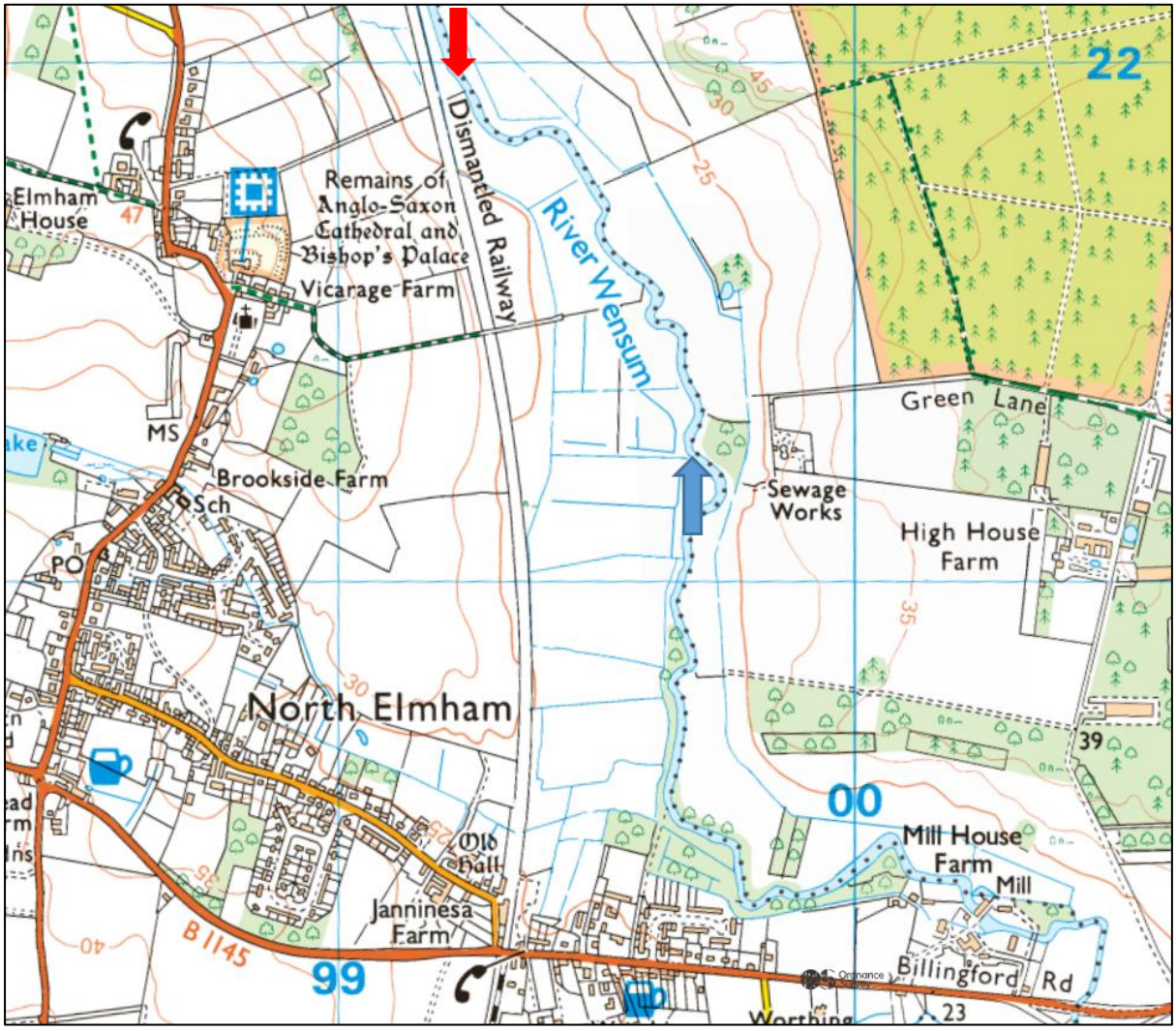
- The right bank fence has been erected too close to the river to allow a natural vegetated fringe to evolve.

1.0 Introduction

This report is the output of a site visit undertaken by Rob Mungovan of the Wild Trout Trust to the River Wensum on 4th June 2025. The author was accompanied by three representatives from Bintry Mill Trout Fishery (BMTF). Comments in this report are based on observations made on the day. The purpose of the visit was to advise on the suitability of the river for wild brown trout, and to broadly consider what type of habitat enhancement/restoration options should be considered by BMTF to further improve the river for its wild brown trout population.

Normal convention is applied throughout the report with respect to bank identification, i.e. the banks are designated left bank or right bank whilst looking downstream.

Specific locations are identified using decimal latitude and longitude (e.g. 53.054667, -1.9038695), which can be pasted straight into Google Maps to identify locations.



Map 1 – The River Wensum near North Elmham. Red arrow is upper limit, blue arrow is downstream limit of visit, © Ordnance Survey.

2.0 Catchment Overview

The River Wensum is the largest chalk-fed river in Norfolk flowing some 66km. Its source can be found between the villages of Colkirk and Whissonsett from where it meanders through low-lying productive agricultural land and various urban areas including Fakenham and Norwich, before entering the Broads National Park after combining with the River Yare. The River Wensum aptly takes its name from the Anglo-Saxon word for 'winding'.

Tables 1 and 2 summarise the Water Framework Directive (WFD) data for the River Wensum. The Wensum is classified as overall 'moderate' ecological status, which constitutes a failure. Parameters that make up the overall classification include 'high' for fish and 'high' for invertebrates. Phosphate is classed as 'good' which is particularly pleasing given that so many rivers are affected by high levels of phosphate often as a result of sewer overflows or agricultural run-off. But like so many rivers in the country, the Wensum fails to meet its expected standard due to the impact of 'forever chemicals' that persist in the aquatic environment.

	Waterbody details
River	River Wensum
WFD Waterbody Name	Wensum Upstream of Norwich
Waterbody ID	GB105034055881
Management Catchment	Wensum Operational Catchment
River Basin District	Anglian
Current Ecological Quality	Moderate Ecological Status
U/S location inspected	52.758072, 0.951582
D/S location inspected	52.752089, 0.957375
Length of river inspected	~1km

Table 1 Data from Wensum US Norwich | Catchment Data Explorer | Catchment Data Explorer

Classification Item	2019	2022
Ecological	**Moderate**	**Moderate**
Biological quality elements	**Moderate**	**Moderate**
Fish	**High**	**High**
Invertebrates	**High**	**High**
Macrophytes and Phytobenthos Combined	**Moderate**	**Moderate**
Macrophytes Sub Element	**Moderate**	**Moderate**
Phytobenthos Sub Element	**Moderate**	**Moderate**
Physico-chemical quality elements	**Good**	**Good**
Ammonia (Phys-Chem)	**High**	**High**
Biochemical Oxygen Demand (BOD)		**High**
Dissolved oxygen	**High**	**High**
Phosphate	**High**	**Good**
Temperature	**Good**	**High**
pH	**High**	**High**
Hydromorphological Supporting Elements	**Not high**	**Not high**
Hydrological Regime	**Does not support good**	**Does not support good**
Supporting elements (Surface Water)	**Moderate**	**Moderate**
Mitigation Measures Assessment	**Moderate or less**	**Moderate or less**
Specific pollutants	**High**	**High**
Arsenic	**High**	**High**
Copper	**High**	**High**
Iron	**High**	**High**
Zinc	**High**	**High**
Chemical	**Fail**	**Does not require assessment**

Table 2 - Data from [Wensum US Norwich | Catchment Data Explorer | Catchment Data Explorer]

Much of the river, including the beat visited, is designated as a Site of Special Scientific Interest (SSSI) and a Special Area of Conservation (SAC). The River Wensum SSSI was notified in 1993 as one of the best examples of an enriched, calcareous lowland river. With over 100 species of plants and a rich invertebrate fauna, it is one of the best whole rivers of its type in nature conservation terms, but it is currently under a range of stresses.

A condition assessment by Natural England in 2024 highlighted the following failings:

1) Flow is impacted by abstractions resulting in reduced summer flow.
2) Nutrient enrichment and organic pollution are leading to water quality problems, and the assessment states "water pollution impacts fish, plants and insects in the river".
3) The habitat structure is impacted by extensive historical modifications including straightening and re-sectioning, weirs and mills.
4) Invasive species including Himalayan balsam and signal crayfish place further pressure on habitats.

5) Widespread sedimentation impacts.
6) Little resilience against climate change.

Bintry Mill is primarily a trout fishery, but members may fish for coarse species throughout the closed season (the river is a mixed fishery). The river contains a wild brown trout population, but in recent seasons catch returns suggest that wild trout numbers have fallen and opinions vary as to the causes. BMTF have taken the view that to reduce pressure on the remaining wild trout population, a stocking policy is in place, but it is kept deliberately low. In 2025 they will stock 300 trout over a three mile stretch of river. Long term they hope to achieve a sustainable wild trout population through a programme of habitat improvement. WTT is pleased to be able to advise BMTF on the need for improved wild trout spawning and juvenile habitat needs, which ultimately should replace the need for any stocking. The introduction of stocked fish to an existing trout population that is under pressure does little to improve it, as greater levels of competition are introduced without the outcome of additional naturally spawning fish.

3.0 Habitat Assessment

The visit commenced at the upstream end of Goff's Beat (pic 1) where the channel exhibited a wetted width of ~5m but it was clear that marginal vegetation had considerably narrowed the channel from an apparent former width ~12m. The depth could only be estimated from some distance back from the water, it was considered >1.2m.

Pic 1 – The Wensum at the start of the Goff's beat, extensive channel narrowing through marginal encroachment has taken place from the right bank.

Progressing downstream it became apparent that the river was lacking riparian trees, had little in the way of flow diversity and contained deep areas of dark silt (pic 2). The lack of trees, and the shade they would provide, allows the water to be warmed by sunlight. As the effects of climate change become more pronounced this issue will increase in magnitude. Dark silt also warms quicker than bright clean gravel. Trout require cool water and so may actively avoid areas of water prone to warming.

The lack of trees also results in less large woody material (LWM) input to the river. The occurrence of fallen branches and tree limbs, together with the organic matter that they collect, may look unsightly but their presence is of great importance within rivers. Where LWM presents no flood risk it should be retained as it improves hydraulic roughness within the channel and as water is forced around and under, it can initiate bed scour. Where

possible, fallen trees and timber should be secured in river margins to increase habitat and cover. LWM leads to an increase in the surface area on to which a biofilm (algae, bacteria and other microbes) can grow.

Pic 2 – The Wensum is open to sunlight with no trees to shade it.

Aquatic plants observed in the Wensum included unbranched burr reed, curled pond weed, yellow water lily, lesser water parsnip and starwort (the last two plants being chalk stream indicator species) (pic 3). Water crowfoot was not seen in Goff's beat. This is quite concerning given the Wensum is designated due to its value as a lowland chalk stream. Water crowfoot is important for providing cover, for holding back flow and channelling it between stands of the plants, and for collecting fine sediment at its roots. It also provides a shade as its fronds float to the surface. The presence of >7 swans and the grazing on plants is likely to have contributed to its apparent loss, but a combination of factors including the lack of flow, nutrient enrichment and high sediment inputs will have affected its growth. It was seen growing in rapid water near to Bintry Mill, but it was still heavily browsed. More information on the plant can be found at Ranunculus Rivers Leaflet.

Marginal plants were dominated by extensive stands of reed sweet-grass, water forget-me-not and lesser pond sedge.

Pic 3 – The Wensum lacked the high plant diversity that is normally present in chalk streams.

The fence line has recently been re-established to protect the river from grazing. Unfortunately, the fence is very close to the top-of-bank (pic 4), and bank failure is likely to result in the fence being compromised. Ideally, the fence should have been set-back at least 5m to allow a wide naturally vegetated fringe to evolve which could have:

1) Allowed cover for aquatic invertebrates emerging from the river.
2) Allowed the grasses and herbs to establish their full depth root structure without interference from mowing of the path.
3) Allowed space for tree planting.
4) Allowed an access strip in case of future maintenance or enhancement of the river by machinery.

Pic 4 – The fence has been set too close to the river.

Factors accelerating the bank collapse included extensive burrowing by signal crayfish (an invasive non-native species) and water voles, and recent scouring winter flows. If the bank had been strengthened by trees and deeply rooted grasses, it would hold better. Instead, the bank is collapsing with little root mass to hold it strong (pic 5). The collapse of bank adds more damaging fine sediment to the river.

Pic 5 – The bank is collapsing, adding more fine sediment to the river.

With little flow diversity the riverbed was dominated by silt and sand. The fine sediment is clogging the underlying gravels. The clogging of the (interstitial) spaces between gravels is degrading to the river environment as it limits the availability of niches to aquatic invertebrates and limits fish spawning success. Brown trout require clean and well-sorted gravel generally in the range 10mm-40mm, which will remain stable and undisturbed for up to 100 days before young trout (the fry) emerge in early spring (illustration 1).

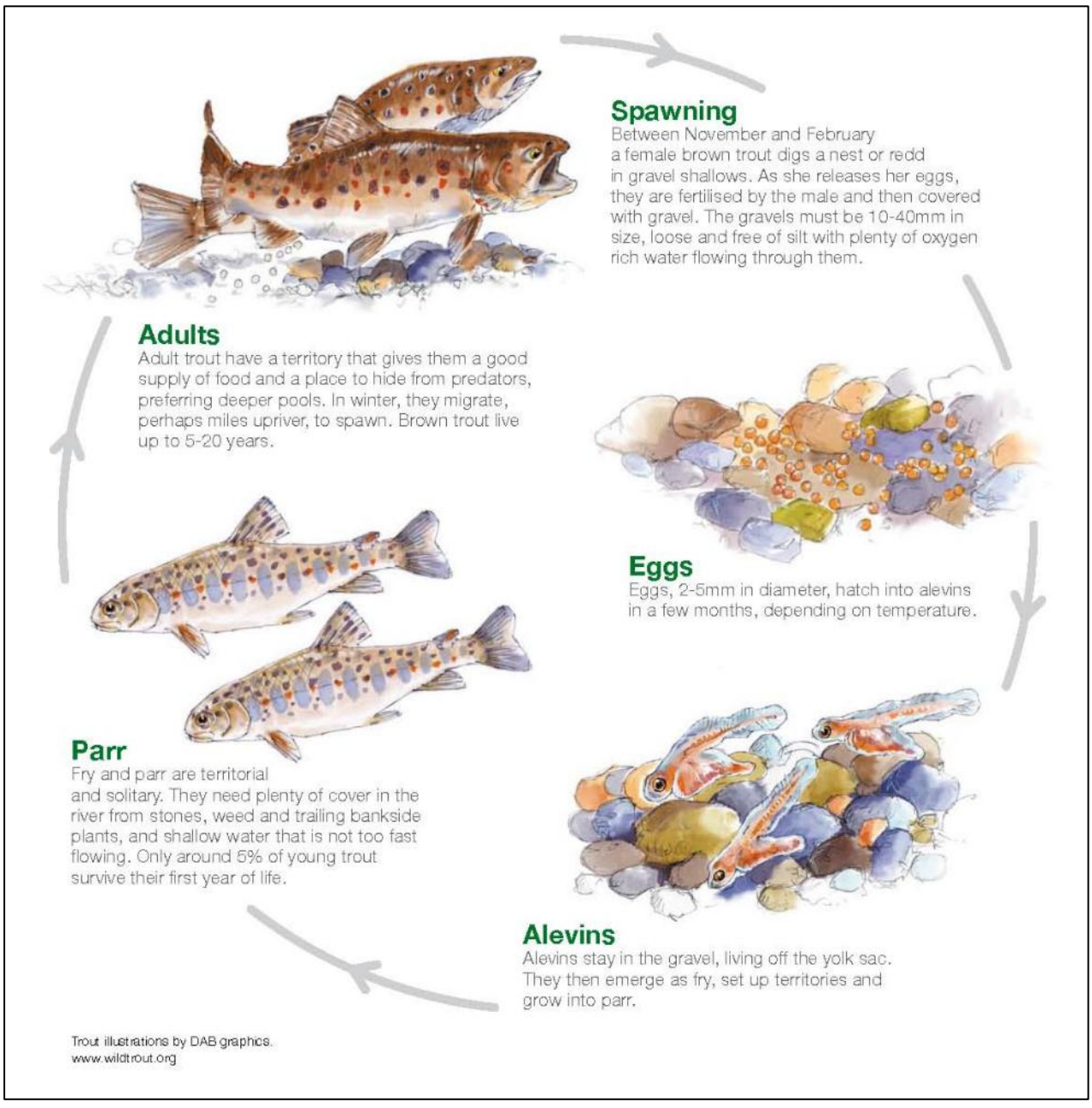


Illustration 1 – The lifecycle of the brown trout.

It was very pleasing to see tree planting taking place by BMTF (pic 6), with species obtained from the Woodland Trust including common alder and sallow (inset). These trees will provide important cover and bank strength in time (but may need to be protected from water voles).

Pic 6 – BMTF has undertaken taken riparian tree planting which will bring benefits to the river in time.

Approximately a quarter down the beat (at 52.75749, 0.953231), the bed lifted as the river turned (pic 7). The shallow depth of the gravel bed resulted in an accelerated flow velocity and diversity, which had cleansed the bed of fine organic silt revealing sand and gravel (pic 8). Most encouraginly, the bed was shallow making it suitable to be further enhanced through the the introduction of mixed grade gravel (see recommendations).

Pic 7 – An up-lift in the bed occurred (blue line) presenting an opportunity for habitat enhancement through gravel addition to the “shallow reach”.

Pic 8 – Where the river ran shallow it revealed sand and gravel, but the substrates were poorly sorted limiting their potential for successful trout spawning.

Within the "shallow reach" left bank margin an extensive stand of yellow flag iris was present. The shape of the stand suggests it was once a cattle watering bay. Re-establishing former bays should be considered by BMTF as they provide fish refuge from high flows when the river is in flood, which in turn reduces the risk of fish washout from the beat. Flag iris is also an important cover plant for trout fry. The plants' rhizomes can become strongly rooted, providing cover like fallen branches, which in turn give shelter from flow for trout fry. The plants could be divided up and replanted throughout the fishery to increase marginal cover.

Pic 9 – A possible former cattle watering bay that has become colonised by yellow flag iris.

After ~170m the shallow reach ended abruptly (at 52.756509, 0.954969) returning to a depth estimated at ~1m, and returned to a rather featureless river again with little to hold wild brown trout (pic 10). NB post visit thought, is this actually an area of previous bed raising that wasn't known when on site?

Pic 10 – Much of Goff's beat had little to hold wild brown trout.

Moving downstream ~100m a small willow on the left bank illustrated its value; it had caught material drifting on the flow resulting in the establishment of weed wrack. This provided important overhead cover (pic 11) in a largely open fishery. If it does not retain a trout, it will attract chub.

Pic 11 – In an otherwise open fishery the occurrence of small willows collects drifting material allowing valuable overhead cover to establish.

At 52.754353, 0.956439 a series of tight meander loops were observed, although it was reported that the spring drought had caused the river's flow to significantly reduce, the lack of flow diversity through the meanders was surprising. ~2km downstream is the North Elmham mill, it is suspected that the mill is impounding approximately half of Goff's beat. With flow impounded, natural river processes of scour and sediment transport are reduced (or possibly even stopped). Trout require environments that have flow and habitat diversity, impounded reaches are not where one would find naturally diverse and sustainable trout populations. However, the beat should support a mixed fishery with trout present (typically larger adults utilising the deeper water). The ideal situation would be to reduce the head of water retained by the mill. Lessening the impounded flow would most probably increase flow velocity through Goff's beat. However, it is recognised that this could be complex request given the SAC designation afforded to the grazing marshes which require a high water table.

Pic 12 – The glass-like water surface through a series of meanders suggests impounded flow

Towards the end of the beat a few mature trees were observed. A large willow trailed to water (pic 13), with an accumulation of material which forced water down against the bed. A small, but important, area of bed scour had been produced illustrating how trees could provide flow diversity to the beat to some extent (but does not negate the belief that the impounding effect of the mill is leading to a range of constraints on the beat).

Pic 13 – Willows trailing to water are an important habitat feature.

A large ash tree covered the water, shading out aquatic vegetation beneath it, presenting an interesting, and ecologically valuable, contrasting habitat to the more open and weedy areas. It's interesting to note that it was only the left bank that held notable trees. Historic grazing of an unfenced right bank has left a legacy of few trees, it is good that BMTF is already taking steps to establish trees to the right bank.

Pic 14 – An ash tree over the river provides valuable shade.

The beat ended as the river flowed into a tree-lined reach, and with more tree cover at water level, the river below Goff's beat is more likely to hold trout than the more open water within the beat.

Pic 15 – Trailing trees downstream of the beat may retain more trout (and other fish species).

Whilst walking back up the beat attention was drawn to the grazing marsh. It was clearly embanked to a height ~0.75m (pic 16), probably the legacy of a mill embankment. The embankment was growing coarse vegetation which had not been cut for hay. Removal of the embankment (or breaches to it) would allow the river to connect to its floodplain, presenting the opportunity for fine sediment to be deposited on land. This would help to address one of the issues negatively affecting the river as identified in the 2024 Natural England condition assessment: widespread sedimentation impacts. NB as mentioned previously, any activity that could impact upon the ecological value of the grazing marshes must be first discussed with the landowner and Natural England given the site's SAC status.

Pic 16 – The river is significantly embanked (red arrow), this stops floodplain connection.

4.0 Recommendations

The river was generally sparse in riparian tree cover. BMTF have commenced tree planting, and more should be undertaken.

The river lacked flow diversity, partly due to it being depleted of LWM. The river was open and could respond well to whole tree-tops being fixed in margins to create flow deflecting features and areas of complex underwater cover. The beat has much capacity to introduce LWM (pic 17). If placed in an off-set opposing arrangement it might be possible to create a more sinuous channel within the current one.

Pic 17 – Introducing tree-tops as LWM would be a valuable habitat enhancement for enhancing flow diversity and increasing cover (such as at 52.757506, 0.952295).

Where naturally occurring LWM presents no flood risk it should be retained as it initiates bed scour, as well as providing multiple ecological benefits. It improves hydraulic roughness within the channel and as water is forced around and under it, it can initiate bed scour. Where possible, fallen trees and timber should be secured in river margins to increase habitat and cover.

The beat contained extensive lengths of deep dark silt. The silt is likely to remain on the bed unless flow diversity is increased to initiate scouring flow, or if significant bed raising is undertaken to increase to flow velocity. BMTF should explore how further lengths of the beat could be raised to

bring about bed restoration (but the issue of impoundment from the downstream mill may negate even bed raising).

One clear location for bed raising/enhancement was observed at 52.757479, 0.953186 through to 52.756509, 0.954969 a length of ~170m. It would be suitable for bed raising and narrowing using mixed grade gravel (pic 18). Placed gravel should not be level, it should taper across the river from just above water level at the right bank, to possibly a depth of 0.3m towards the left bank. A large tapering shoal-like feature will be more adaptable to differing flow heights. As was seen further upstream in the fishery, adding LWM over raised gravel ensures that complex cover is provided (excellent for juvenile trout), that multiple flow pathways are established and that flow diversity is maximised. Potentially, these features could offer trout spawning areas.

Pic 18 – The “shallow reach” annotated to show how additional further gravel could make a significant improvement to the reach. Adding LWM over the gravel would bring further benefits.

The right bank fence had been erected too close to the river to allow a natural vegetated fringe to evolve. Instead, the narrow width is taken almost by the mown path. Mowing suppresses the root systems of plants preventing them from reaching their full potential whereby they could offer more bank strength (illustration 2).

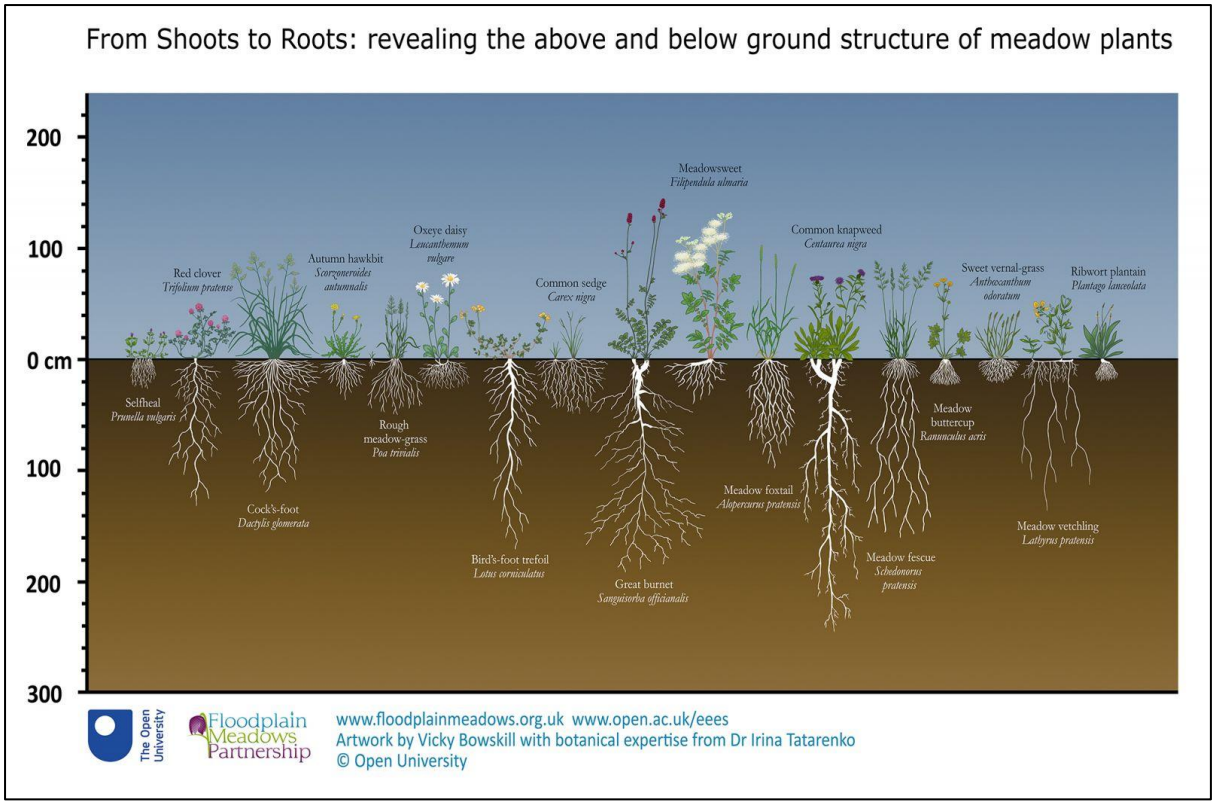


Illustration 2

A very significant stand of yellow flag iris was present. It could have some plants removed, divided-up and replanted throughout the fishery, especially where the river runs fast and shallow. The plant provides excellent early season cover when few other plants have emerged (pic 19).


Pic 19 – Yellow flag iris providing cover in late March when few other marginal plants have grown.

It is thought that North Elmham mill impounds approximately half of the beat. Any negotiations to reduce the head of water impounded by the mill would improve flow velocity along the beat, which in turn could initiate scour and fine sediment transport, ultimately improving conditions for wild brown trout.

With the beat having so few riparian trees, where they do occur and trail to water all branches should be retained for the cover and flow diversity that they bring.

The majority of the beat appeared to be embanked on the right bank. The levee was ~0.75m. It is assumed that the embankment is formed from past river dredgings, thus it may contain a high proportion of coarse sediment (gravels, cobbles and grit). If the levee were removed or breached in multiple places to allow floodplain connection, then the material may be suitable for screening and return to the river to restore its rather uniform bed profile.

Lastly, knowing where the river's trout spawn is important if they are to be conserved. Site specific habitat enhancements can then be focused to bolster the population. Currently, trout have limited high quality spawning substrate and it is doubtful that juvenile cover is sufficiently abundant. Juvenile trout tend to reside in riffles (shallow broken water) which keeps them protected from avian predators and away from adult trout. The river did not have many riffles. The numbers of adult trout seen (including some probable stock fish) suggests that the population is skewed towards poor recruitment and poor juvenile habitat, but adult survival is good. Understanding the bottlenecks to the river's trout population is important if a sustainable population is to be achieved. Although it is accepted that stocking is occurring in low numbers, the introduction of stocked fish will disrupt the natural balance that wild trout are struggling to achieve in the Wensum. BMTF may find that the numbers of wild fish increase if stocking is ceased, but then the challenge is to manage the expectation of the anglers.

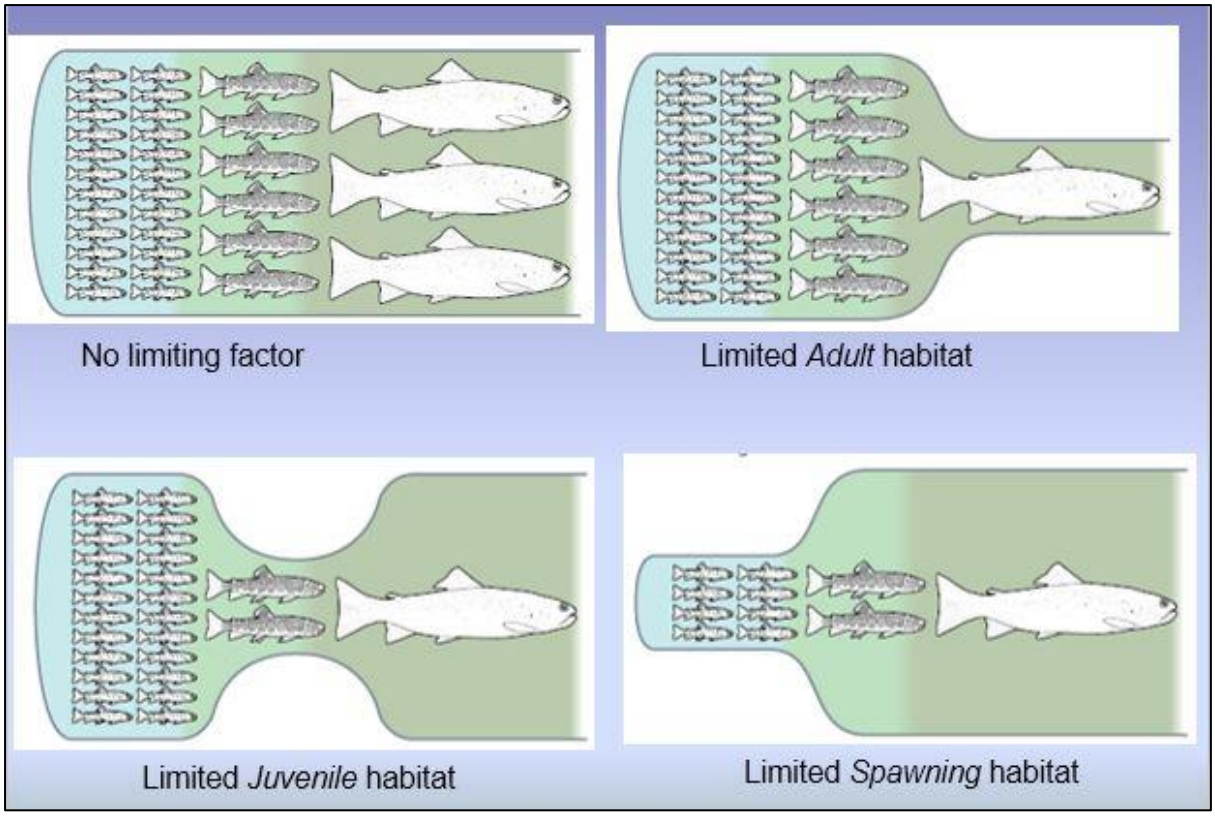


Illustration 3: The impacts on trout populations lacking adequate habitat for key lifecycle stages. Spawning trout require loose gravel with a good flow-through of oxygenated water. Juvenile trout need shallow water with plenty of diverse structure for protection against predators and wash-out during spates. Adult trout need deeper pools (usually >30cm depth) with nearby structural cover such as undercut banks, sunken trees/tree limbs and/or low overhanging cover (ideally trailing on, or at least within 30cm of, the water's surface). Excellent quality in one or two out of the three crucial habitats may not make up for a "weak link" in the remaining critical habitat.

5.0 Making it Happen

It is a legal requirement that works to a Main River require an Environmental Permit from the EA.

The Wild Trout Trust can provide further assistance in the following ways:

- Investigation of potential impoundments downstream.
- Walking the river to undertake project scoping, followed by the production of a Project Proposal report.
- Assisting with the preparation and submission of an Environmental Permit, or by identifying appropriate exemptions to take forward small-scale habitat improvement works.
- Running training days to demonstrate the techniques described in this report.

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 material, 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 02392 570985.

The WTT website library has a wide range of materials in video and PDF format on habitat management and improvement:
www.wildtrout.org/content/library

6.0 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.

7.0 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.

Legal permissions may be required before commencing work on site. These are not limited to landowner permissions but may also involve regulatory authorities such as the EA, lead local flood authority and any other relevant bodies (e.g. Natural England and Forestry Commission) or stakeholders. Alongside permissions, risk assessment and adhering to health and safety legislation and guidance is also an essential component of any interventions or activities in and around your river.