WILD TROUT TRUST
wildtrout.org

River Pitt: Pitcombe to Cole, Somerset

Advisory Visit April 2025

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Contents

1. Introduction

This report is the output of a visit undertaken by Theo Pike of the Wild Trout Trust on approximately 1.5 km (0.9 miles) of the River Pitt in Somerset, from Pitcombe downstream to Cole, on 14 April 2025.

A walkover of this stretch was requested by the local Brue CREW community group (www.bruecrew.org) and the Pitcombe Flood Action Group, on behalf of relevant landowners. The visit focused on assessing habitat for wild brown trout *(Salmo trutta),* other fish species, and biodiversity in general. It is hoped that this report will inform local plans for improving the health of the River Pitt as part of the wider River Brue catchment.

Comments in this report are based on observations on the day of the visit, as well as discussion with local landowners, their representatives and members of the Pitcombe Flood Action Group. Throughout the report, normal convention is followed with respect to bank identification i.e. banks are designated Left Bank (LB) or Right Bank (RB) whilst looking downstream.

At the time of the walkover, river flows were judged to be at low spring or summer level after several weeks without significant rainfall: water clarity was very good.

Figure 1: A map showing the River Pitt from Pitcombe to its confluence with the River Brue at Cole

2. Catchment overview

The River Pitt is a limestone-dominated stream which rises from sources near Bratton Seymour, Hadspen and Redlynch: these meet near Lower Shepton before flowing north-west through Pitcombe to meet the River Brue at Cole.

Most of the Brue catchment, including the Pitt, has been highly modified by centuries of human activity, and indeed the lower Brue now reaches the Bristol Channel at Burnham-on-Sea (instead of via its original course, including the present Somerset Axe, at Weston Bay).

River	River Pitt
Waterbody Name	Pitt Water Body
Waterbody ID	GB108052015150
Management Catchment	Somerset South and West / Brue and Axe
River Basin District	South West
Current Ecological Quality	Good (as at 2022)
U/S Grid Ref inspected	ST 67255 33126 (approx.)
D/S Grid Ref inspected	ST 66669 33665 (approx.)
Length of river inspected	1.5 km approx.

Table 1: WFD summary information for the River Pitt. The overall physical, biological and chemical health of all rivers in the UK is periodically assessed by the Environment Agency for the purposes of the Water Framework Directive (WFD). The most recent assessment (from 2022) can be found via this link:

https://environment.data.gov.uk/catchment-planning/WaterBody/GB108052015150

Like the rest of the upper Brue catchment, the River Pitt flows over a mixed geology of mudstone and limestone, overlain with impermeable clay soils. Beneath these soils, the calciferous bedrocks are prone to erosion by mildly acidic rainwater: the resulting steep-sided combes (often now lacking woodland cover as a result of agricultural activity) mean that flows in the Pitt can suffer from very low flows at times of little rainfall, and then respond dramatically to sudden storms or more prolonged wet weather. Steep local roads may also act as high-capacity flow pathways into the Pitt valley and river.

A recent example of this occurred on 9 May 2023, when exceptionally heavy rainfall in the Hadspen area caused flash flooding down the Pitt valley, apparently 'higher than seen in living memory' and Somerset Council (SC) declared an emergency due to 'risk to life'. As Lead Local Flood Authority under the Flood & Water Management Act 2010, SC later conducted a flood investigation (report published in January 2025) which concluded inter alia that Pitcombe suffered predominantly from the impacts of fluvial rather than pluvial flooding, with river levels possibly exacerbated by land use changes in the steep upper catchment.

Following a previous notable flood in 2008, the local community had already set up the Pitcombe Flood Action Group (PFAG) and in 2011 commissioned consulting engineers Such Salinger Peters (SSP) to produce a study on local flooding issues, together with potential solutions, in 2011: some of their conclusions are referenced in this report. More recently, PFAG has also worked with the EA on a flood telemetry pilot; the Farming & Wildlife Advisory Group (FWAG); and local landowners on natural flood management (NFM) opportunities in the upper catchment.

3. Habitat assessment

Thanks to their need for clean, well-oxygenated water, structurally-varied habitat, and free movement between different types of habitat at different life stages – as shown in Appendix A - the UK's native wild brown trout makes an ideal indicator species for healthy rivers.

As such, a simple and effective assessment for overall river health can be based around the life cycle requirements of wild brown trout: these are described in detail in Appendix B, and applied throughout this habitat assessment.

For the purposes of this report, the stretches of river assessed are ordered from the upstream to the downstream extent visited.

Figure 2: Pitcombe bridge, viewed from the gardens upstream

At National Grid Reference ST 67255 33126 the River Pitt flows through private gardens and under an old road bridge in the village of Pitcombe.

Along both banks of the river upstream of the bridge, a healthy fringe of sedges, water parsnip and other marginal plants was evident - offering plenty of low, trailing cover as habitat for trout and many other species, and providing a good example of how keeping a beneficially 'shaggy' (and light-touch, low-maintenance) river bank can easily be incorporated into the design of a traditional village garden.

At the time of this visit, it was noticeable that the gravel and cobbles in the river channel were thickly covered in mats of algae, possibly exacerbated by low flows and lengthening durations of sunlight, but also suggesting high levels of nutrients entering the river from sources further upstream.

These sources could include farm runoff, misconnections from domestic properties (when e.g. washing machines are mistakenly plumbed into rainwater pipes), and improperly-maintained septic tanks. The Rivers Trust's Sewage Map also shows a number of small, apparently unmonitored discharge points for treated sewage in the Shepton Montague area of the Pitt's upper catchment, so it may be worth investigating the performance of these sites with Wessex Water, or via a citizen science water testing scheme (including participation in the Brue CREW's wider riverfly monitoring programme).

Figure 3: A map showing treated sewage discharge locations in the upper Pitt catchment. Source: https://theriverstrust.org/sewage-map

This part of Pitcombe village lies in a relatively built-up area of the valley which is reported to be quick to flood at times of heavy or prolonged rainfall: the 'pinch point' of the single-arched bridge apparently causes high flows to back up before flowing around the ends of the bridge and partly flooding the adjacent Mill Lane (and sometimes at least two of the properties at its northern / upstream end before the gradient of the road rises just enough to protect the other houses). SC's flood investigation report also suggests that part of the bridge may be 'sinking into the river'.

Figure 4: The River Pitt downstream of Pitcombe bridge, with a depositional area on the LB which would be suitable for naturalisation with native emergent plants

On the downstream side of the bridge, there is a wide area of shallow water (once perhaps an access ford for the cottages on the RB) with a depositional area on the inside bend of the LB where coarse woody material collects out of the river's main current.

This area is reported to be periodically cleared of collected sediments and woody material. For improved biodiversity as well as aesthetics, however, it would be preferable to leave much of this material in place, whilst adding a variety of ecologically valuable native emergent plants such as yellow flag iris, purple loosestrife, marsh marigold, water forget-me-not and water mint.

Establishing a range of colourful plants in this backwater area would provide a matrix of complex habitat which would be very valuable for small, weakly-swimming trout fry as well as other species, and is unlikely to make a significant difference to the channel's overall capacity and flood conveyance.

Figure 5: A pinch point in the River Pitt's channel at the upstream end of the gardens behind Mill Lane, over-shaded by a non-native cherry laurel tree

From ST 67221 33129, the channel of the River Pitt becomes much narrower, and flows in a steep-sided gully between the back gardens of the houses along Mill Lane.

As shown in the photo above, the upstream end of the channel is deeply over-shaded by a large cherry laurel tree on the RB. Cherry laurel is a potentially invasive non-native species (INNS) which offers very little habitat value for native insects and other species, partly due to its natural biochemical defences, including potentially poisonous levels of cyanide which can be released by pruning. Its seeds are also toxic to humans, pets and livestock. For all of these reasons, it would better be replaced with a specimen native tree such as hawthorn.

Downstream of this point, the river's plan form seems to retain a vestigial meander, which has been formalised with vertical rock revetments protecting the outside edges of its bends from erosion. On inside bends, attempts have been made to stabilise and vegetate over-steep banks with geocellular webbing, fixed with steel rebar and planted with various garden plants. In at least one area this webbing is now sloughing off the bank, having apparently become destabilised during recent high flows when a large 'dumpy bag' became caught under a small footbridge, forcing the river to scour downwards and outwards in this area (and incidentally also creating a new shallow riffle with the scoured-out gravels c 20m downstream).

Observation at the time of this visit suggested that the narrowing channel and floodplain at ST 67221 33129 may potentially act in conjunction with the road bridge upstream as a second 'throttle' in high flow conditions, causing flood waters to back up towards the bridge again. This impression may be borne out by SSP's report on flooding issues in Pitcombe, which concludes from their modelling as follows:

'Our conclusion is that the channel has been reduced by various landscaping activities over the years and that this is having an adverse affect on the channel capacity… The channel has a width less than 3 m in some places.'

As SSP's report suggests, it is likely that the present constrained form of the channel in this area is the unintended result of many years of piecemeal dredging and landscaping, and it is not easy to see how increasing channel capacity and 'making more space for water' to escape would be possible without modifying the gardens from ST 67221 33129 to ST 67206 33160.

However, reducing the slope of the LB to increase channel capacity could also offer an exciting opportunity to reimagine both the form and the function of the river through this area – perhaps creating a new and stable, naturally-meandering low-flow channel, well below the level of the houses and gardens on the RB, with attractively planted floodplain wetlands on one or both banks – offering significant biodiversity benefits as well as reducing flood risk.

Such a flood defence scheme could possibly be funded via Somerset Rivers Authority. Next steps could include commissioning an options appraisal and feasibility study, to verify the impacts of this second potential pinch point, and possible solutions, from a suitably qualified hydromorphologist.

Figure 6: The River Pitt's channel through the Mill Lane gardens: armoured with rock walls (left) and over-steep and slumping (right) despite attempts at vegetation with planted geocellular webbing

Figure 7: Looking upstream from ST 67147 33216: the river's RB is recovering some of its trailing vegetation following historic 'stream clearance' and dredging, but the square-profiled LB still lacks vegetation, partly due to grazing, and continues to be subject to block failure. Fencing off a 5-10m buffer strip, and perhaps regrading the angle of the bank, will help to ensure that the LB landowner will not continue to lose land to excessive erosion in future.

Proceeding downstream from the centre of Pitcombe, the River Pitt flows between gardens (and then woodland) on the RB, and farmland on the LB.

An outfall pipe from a sewage pumping station was noted at ST 67198 33161 on the RB: it was not discharging at the time of the Advisory Visit, and there was no noticeable difference in the thick algae coverage on the river's substrate, upstream and downstream of the outfall.

Throughout this stretch, the channel of the river is notably square in profile, with vertical banks and a flat bed, most likely as a result of past maintenance activities which are understood to have included dredging by the LB landowner, as well as annual community 'stream clearance' days when vegetation was removed from the channel in an attempt to improve conveyance. Areas of 'block failure' on the LB may also result from livestock grazing very close to the bank top – preventing grass and herbs from creating deep root structures, and restricting natural regeneration of trees whose roots would also reinforce the banks against excessive erosion. (It is understood that a number of mature trees were removed from this bank c 2012 in an attempt to improve conveyance of flood water across the floodplain).

From ST 67164 33201, where the woodland begins on the RB, marginal vegetation including shade-tolerant sedges appeared to be recovering – binding the banks as well as offering valuable low-level trailing cover for trout and other species – and indeed the RB landowner has often observed trout in this area.

In terms of future management, it is strongly suggested that such beneficially 'shaggy' marginal vegetation should be retained, and augmented wherever possible. Unfortunately, well-intended 'stream clearances' in the past are likely to have damaged the river's ecology (including dumping silt into the river from collapsing banks - smothering fish eggs and aquatic invertebrates) whilst producing very little benefit in terms of flood conveyance.

The landowner on the LB should also be encouraged to fence off a wide, ungrazed buffer strip at the top of the bank – at least 5m in width, and ideally 10m or more – to allow a healthy riparian fringe to develop, while providing alternative water sources so that animals have no need to cause additional erosion by trying to reach the water.

To accelerate ecological recovery, vertical banks could be regraded to a shallower angle (c 30 degrees) and planted with suitable deep-rooted native plants, facilitating the development of a gradual 'ecotone' which slopes from water to land, and would offer a much greater variety of habitats than the present failing vertical banks.

Suitable small trees on the RB could also be 'hinged' over and secured into the river margins (a process analogous to aquatic hedge-laying) to provide complex cover for fish, birds and invertebrates. If laid parallel to the bank, the additional 'hydraulic roughness' would also be very unlikely to significantly reduce flood conveyance. (See also comments below regarding the impoundment effect of Cole Manor Mill).

Figure 8: At ST 66982 33359 the river channel has been invaded by reeds, probably resulting from a combination of historic dredging and the continued 'ponding' effect of Cole Manor Mill further downstream

From ST 67043 33285, the River Pitt flows along the western edge of a wide expanse of community-owned grassland which extends downstream on the RB as far as ST 66941 33574 - while the LB continues to be used as grazing land (apparently with significant overland flows at times of heavy rain).

Between ST 67002 33319 and ST 66962 33387 the straightened channel suggests at least one past episode of dredging: the resulting over-deepened channel and lack of flow velocity may have resulted in excessive and uniform sediment deposition in this area, and the channel has been invaded with reeds which would not normally be able to tolerate higher flow velocities in a healthily-flowing mid-channel environment.

An additional factor in assessing this stretch of river may be the presence of Cole Manor Mill, c 0.5km downstream, and the upstream 'ponding' effect which its impoundment creates. This would also help to account for low water velocities and high sediment deposition, and illustrates how mills and their weirs can artificially raise water levels (and thus flood risk) for a long distance upstream. (It is understood that a similar indication was provided several years ago, when the mill's sluice gates were opened during a stream clearance event in Pitcombe village, and participants noted that the level of the river dropped significantly, even that far upstream).

Along this stretch of the river, it was noted that a number of mature alder trees (perhaps affected by phytophthora disease) may be at risk of failing and falling into the channel. Although fallen trees may raise local water levels slightly before they shed some of their complex structure of leaves and twigs, their long-term presence in an area is unlikely to increase flood risk significantly (certainly by comparison to the impacts of human infrastructure like Cole Manor Mill).

As a result of over-zealous past flood risk management and over-tidying, many UK rivers are still ‘functionally starved’ of ‘large woody material’ (LWM), which would naturally be deposited by processes such as wind-blow or beaver activity. LWM ‘drives’ many essential river processes like localised scour and deposition of sediment, as well as providing complex cover for fish and birds, and surface area for aquatic insects. Whenever possible, LWM in the form of fallen trees should always be left in place as a valuable ‘gift from nature’.

Figure 9: Cole Manor Mill head weir, seen from upstream (left) and downstream (right): a barrier to fish passage despite being in a state of disrepair. The pool below the weir offers habitat for adult trout, but the weir will block any efforts to migrate upstream

At ST 66961 33491, the flow of the River Pitt is split by the head weir of Cole Manor Mill. The site is believed to have hosted a mill since at least 1503; most recently, since the turn of the millennium, it has been converted to micro-hydropower generation as part of the South Somerset Hydropower Group.

At the time of writing this report, there is a possibility that this activity has proved financially, environmentally or otherwise unsustainable, and that (like Gants Mill on the River Brue nearby) the site’s micro-hydropower infrastructure is now due to be decommissioned. If so, this could provide a very welcome opportunity to restore the ecology of a significant stretch of river which has suffered from centuries of degradation by being managed for hydropower.

In general terms, weirs like the ones at Cole Manor Mill cause problems for rivers because they impound long stretches of very slowly-moving water, where sediment carried in suspension drops out of the water column uniformly across the stream bed; habitat quality and diversity are severely degraded. Such conditions can sometimes provide sufficient deep-water habitat for small numbers of adult trout and other species (until the deep water inevitably fills with sediment) but are generally unsuitable for gravel spawning fish, fry and juveniles. Long stretches of unshaded water, with dark sediments on the river bed, can also act as heat sinks, causing water temperatures to rise dangerously high, and oxygen levels to fall, affecting both the immediate area and the river downstream of any such impoundment.

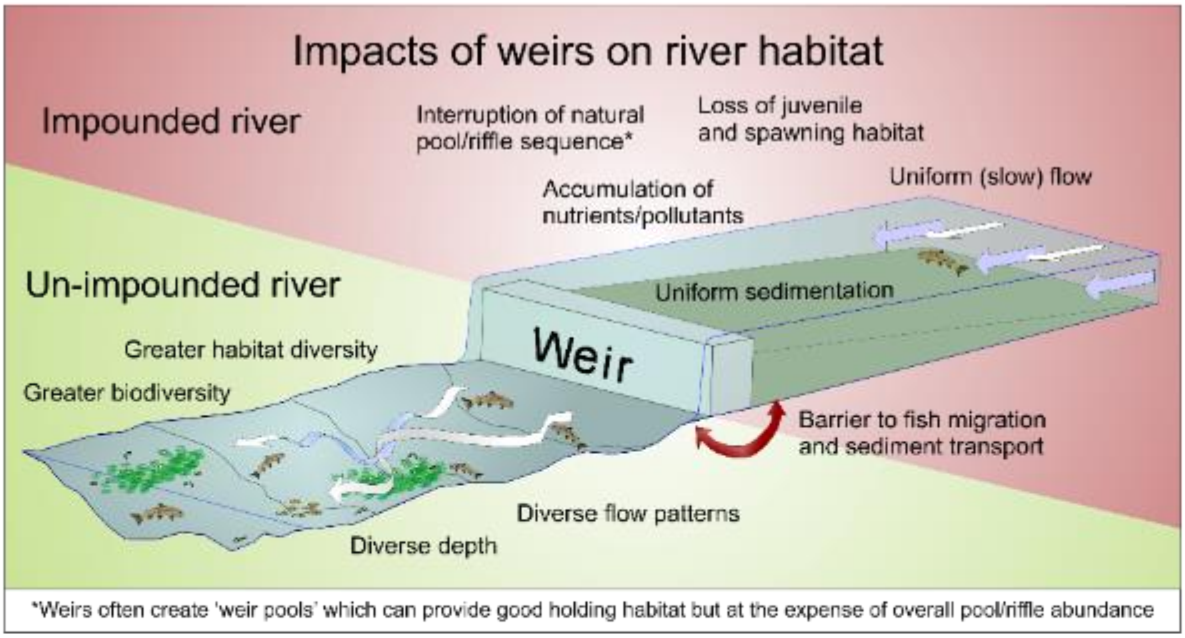

Figure 10: An illustration showing the impacts of weirs on habitat quality

Weirs are also problematic because they form significant obstacles to fish passage, preventing many species from moving up and down rivers freely to fulfil the different stages of their life cycles.

In addition to these problems, weirs interrupt the natural transport of river sediment. This can cause the river downstream to become depleted of coarse sediment, and increase rates of bed and bank erosion in an attempt to compensate for the interrupted supply of suitable gravel and cobbles.

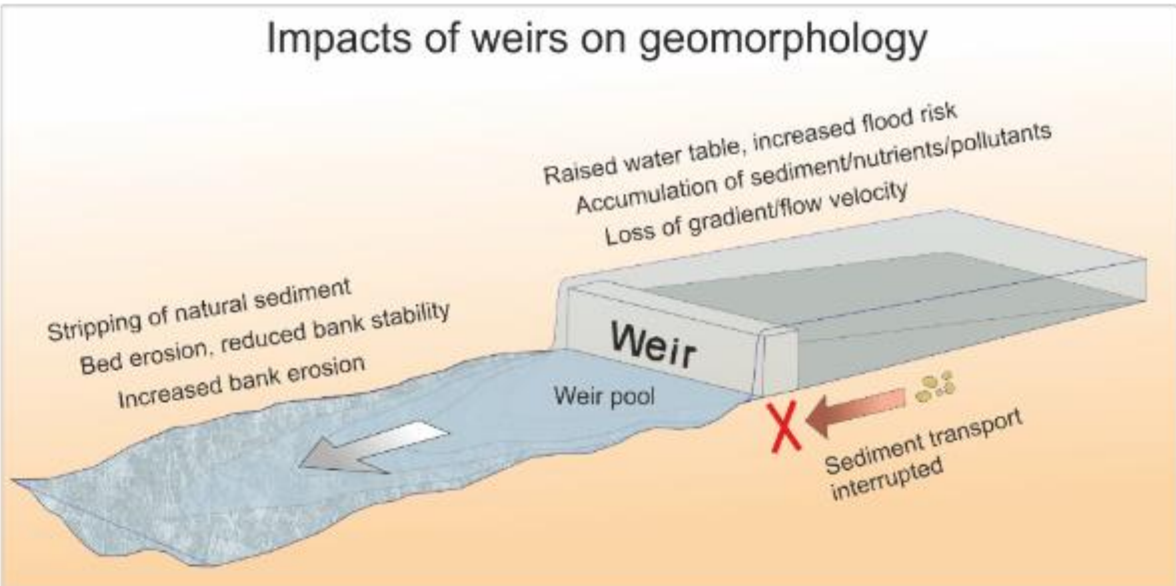

Figure 11: An illustration showing the impacts of weirs on river geomorphology

In the case of the Cole Manor Mill head weir, on the day of this Advisory Visit, most of the river's flow was still directed towards the mill via a heavily silted high-level leat, with only limited flow over the crest of the weir into the main river (which may still follow part of an earlier course of the Pitt), and some additional flow via a sluice hole at the side of the main weir structure. Neither of these flow pathways is considered passable for trout and other fish at any height of water.

The leat is heavily shaded and filled with fine sediment, and offers very little habitat for trout. The weir's age is undetermined, but it is considered to be in a state of some disrepair - with mature trees growing out of it, and part of the sluice apparently blocked with a stone slab rather than with an adjustable sluice gate.

Figure 12: Two areas of bank failure on the main channel of the River Pitt in the Cole Manor Mill gardens, possibly associated with seepage from the higher-level leat

In the process of inspecting the weir and its wider surroundings, at least 3 small 'springs' were noted at separate points of the main river's RB near ST 66932 33513; a similar flow was also seen below and adjacent to the sluice gate on the head weir (as shown in Figure 9 (right) above).

Together with 2 seemingly associated areas of slumping of the main river's bank, these may suggest that seepage from the leat, which is artificially perched above the floor of the valley, is progressively undercutting the upstream end of the 'island' between the leat and the river. These areas of collapsing bank are already acting as point sources of sediment into the river, potentially smothering areas of gravel which would otherwise be suitable for trout spawning. They were also providing areas of bare soil for easy colonisation (and subsequent further destabilisation) by invasive Himalayan balsam (see detailed discussion below) and perhaps other invasive non-native species (INNS).

Even more urgently, the possibility of catastrophic failure (landslip) of this whole area at any time - particularly in high flow conditions, as the river attempts to reclaim its natural course through the valley - should provide impetus for investigating (via SC and the EA in the first instance) a more controlled approach to removing the weir and its impoundment completely. This would help to reduce flood risk both up and downstream, and would be the best solution by far for the river and its ecology.

Figure 13: Cole Manor gardens: the silted ornamental pond (left - with a sluice gate from the mill leat visible in the background) and erosion caused by a back eddy from the abutments of a footbridge (right)

Moving downstream through the gardens of Cole Manor Mill, a number of structures were noted which relate to the mill's working past. One of these, at ST 66861 33631, was a heavily-silted ornamental pond, situated below a relief sluice in the side of the mill leat: this pond is apparently scheduled for desilting and restoration as a flood storage basin as well as an ornamental feature. In the event that the head weir (and thus the flow of water along the leat) is removed, it could still function very beneficially as backwater habitat for fish, birds, insects and amphibians.

At ST 66837 33619, the main channel of the River Pitt was pinched by the abutments of a small footbridge. Water swirling in a back eddy on the downstream side of the bridge has created a deepening area of erosion on the RB. Although the bank may have been strengthened for some time by a structure of thick roots (from a tree which is no longer present in this area), the developing area of erosion may eventually threaten the bridge; in the meantime it is also eroding fine sediment into the river.

To halt this excessive erosion and sustainably repair the bank line, a 'green engineering' approach is advised: staking brushwood bundles or a hazel lattice (whose complex structure will dissipate the energy of swirling currents) across the embayment, before back filling with further brushwood and locally-sourced limestone cobbles and gravel, and planting the area with deep rooted plants, including goat willow.

Figure 14: Cole Manor gardens weir: smaller than the head weir, but still an obstruction to fish passage and sediment transport

At ST 66792 33657 a further weir was observed, just upstream from the formally landscaped outflow channel from Cole Manor Mill, with particularly thick growths of algae in the slow-moving water exposed to sunlight upstream of the structure. Although this weir is lower and less vertical than the head weir discussed above, it still constitutes an obstruction to fish passage and natural sediment transport, and should similarly be removed for the health of the river, its fish and other species.

Figure 15: Himalayan balsam seedlings on the river bank at Cole Manor: note how previous years' growth has suppressed native plants, making the bank more prone to erosion

At several points along the river banks in the gardens of Cole Manor Mill, as well as in the grounds of Cole Manor further downstream, abundant quantities of young Himalayan balsam (HB) seedlings were seen. HB is a damaging invasive non-native species (INNS): a tall, shallow-rooted plant which spreads with floating, spring-loaded seeds which can be ejected up to 7m from the parent plant. It grows in dense monoculture stands that shade out native species before dying back in winter, leaving bare soil without perennial root structure to help resist erosion. River bank erosion can contribute significantly to river bed sedimentation (one recent study suggests a rate of 10 tonnes per km per year) smothering gravels, invertebrates and fish eggs. More generally, HB also reduces biodiversity by suppressing native plants with allelopathic compounds in the soil and attracting insects to pollinate its flowers preferentially with its strong scent and prolific nectar.

Extensive areas of HB monoculture can be brought under control by repeated strimming or mowing, with hand-pulling as a follow-up measure. For smaller areas, or greater selectivity when HB is growing among other more desirable plants, hand-pulling is a tried and tested means of control and eventual eradication, as well as an excellent form of community engagement.

For sustainable long-term results, a catchment-scale approach is required: the furthest upstream extent of the infestation should be located, with a systematic programme of eradication designed to progressively push HB further and further downstream, and eventually out of the catchment completely.

In general, HB seeds appear to survive in the soil for around 3 years, so it may be necessary to revisit previously infested areas for at least this length of time. For best results, areas of infestation should also be revisited repeatedly through the growing season, up to the time of the first frosts in autumn, to prevent late-germinating plants from flowering and setting a seed bank for the next year.

Once pulled or strimmed, HB plants should be piled up to compost well away from any watercourses, with the stems snapped between the root and the first node of the stem to prevent resprouting: the fleshy plants will desiccate quickly, and experience shows that few seeds will survive this process to germinate in future years.

In recent years, efforts have been made to introduce suitably co-evolved varieties of rust fungus as a biocontrol for HB:

https://www.cabi.org/projects/biological-control-of-himalayan-balsam/

However, these have not yet achieved widespread levels of success, and strategic hand clearance is still considered to be the most effective approach.

Apart from the cherry laurel at ST 67221 33129, no other INNS were noted in the course of this Advisory Visit, but any future management plan for the River Pitt should include remaining alert for HB, Japanese knotweed, giant hogweed, floating pennywort, American signal crayfish, American mink and other damaging INNS.

Figure 16: A pool and riffle sequence on the River Pitt at Cole Manor: this natural river structure maximises habitat niches for many species including wild trout

Downstream of the road bridge at ST 66747 33657, the River Pitt flows along the western boundary of Cole Manor’s gardens to join the River Brue at ST 66669 33665.

The gradient of this stretch of river is relatively steep, with a pronounced pool and riffle sequence which offers excellent habitat for all stages of the trout life cycle – including spawning opportunities in an abundance of fine gravel within the brown trout’s preferred size range of 10-40mm. Together with trailing marginal vegetation, and diverse emergent native plants such as water cress, these features could offer a reference for restoring other reaches of the River Pitt.

At the time of this Advisory Visit, HB seedlings were already appearing thickly on the RB, and several areas of steep, exposed soil showed how HB’s suppression of deeper-rooted native plants is contributing to bank instability alongside the Cole Manor garden. As part of wider efforts to control HB across the Brue catchment, it would be very valuable to focus on this area just upstream of the Pitt / Brue confluence: during this survey, HB was not noted upstream of Cole Manor Mill, and it is possible that this damaging INNS is (rather unusually) spreading upstream from the lower end of the Pitt sub-catchment.

4. Recommendations

Opportunities	**Locations**	**Recommended actions**
Flood risk mitigation	River Pitt through Pitcombe village	Investigate possibilities for reducing pinch point and renaturalising / regrading river banks behind Mill Lane houses: build on SSP report to commission options appraisal and feasibility study from consultant hydromorphologist
Fish passage barriers; mitigating risk of large-scale bank collapse and landslip	Cole Manor Mill weirs	Engage with the EA (and SC as Lead Local Flood Authority) to investigate possibilities for removing weirs and renaturalising main river channel – particularly to mitigate risk landslip near Cole Manor Mill head weir
Localised bank repair	River Pitt in Cole Manor Mill garden	Implement 'green engineering' to repair localised area of bank erosion: brush bundles, backfilled and planted
'Shaggy', well vegetated river margins and bankside buffer strip	All riverside land used for grazing and in gardens	Discontinue community stream clearances; maintain a 'shaggy' overhanging fringe of native vegetation along the bank tops of all water courses - ideally fenced off 5m (minimum) width for agricultural land. Include gates and/or stiles for easy maintenance access; install alternative water source; consider supplementary planting of deep-rooted herbs
LWM augmentation and tree hinging	Survey area generally	Retain naturally fallen LWM in river channel when opportunities arise; identify suitable locations for tree hinging and adding further LWM
INNS clearance including Himalayan balsam and cherry laurel	Survey area generally; cherry laurel at ST 67221 33129	Collaborate with Brue CREW local community group to clear Himalayan balsam; remain alert for appearance of other INNS; replace cherry laurel with native hawthorn

Citizen science: water quality monitoring	Survey area generally	Collaborate with Brue CREW local community group to monitor water quality via riverfly monitoring and other citizen science initiatives

5. Making it happen

The creation of any structures within 'Main Rivers' or within 8m of the channel boundary (which may be the top of the floodplain in some cases) may require a formal Environmental Permit from the Environment Agency (EA). This enables the EA to assess possible flood risk, and also any possible ecological impacts. The headwaters of many rivers are not designated as 'Main River', in which case the body responsible for issuing consent will be the Local Authority (often the County Council as the Lead Local Flood Authority). In any case, contacting the EA early and informally discussing any proposed works is recommended as a means of efficiently processing an application.

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/index

A focused Trout in the Town Urban River Toolkit (which also contains many valuable insights for general community engagement) is available at:

https://www.wildtrout.org/content/trout-town

There is also the possibility that the WTT could help via a Practical Visit (PV). PV's typically comprise a 1-3 day visit where WTT Conservation Officers will 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 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 and accommodation (if required) expenses of the WTT attendees.

There is currently high demand for practical assistance and the WTT has to prioritise exactly where it can deploy its limited resources. The Trust is always available to provide free advice and help to organisations and landowners through guidance and linking them up with others that have had experience in improving river habitat.

An important source of income which helps to fund the WTT's work is our Annual Spring Auction. The auction is our biggest fundraising event and includes fishing days, tackle, books, art and more. Many of our AV and PV recipients subsequently help us with auction lots each year, and we're very grateful for this extra support. To donate a lot, please contact WWT via Christina Bryant @ office@wildtrout.org

6. Acknowledgement

The Wild Trout Trust would like to thank the Environment Agency for their continued support of the Advisory and Practical Visit programme in England, through a partnership funded using rod licence income.

7. 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.

8. Appendix A : Trout life cycle

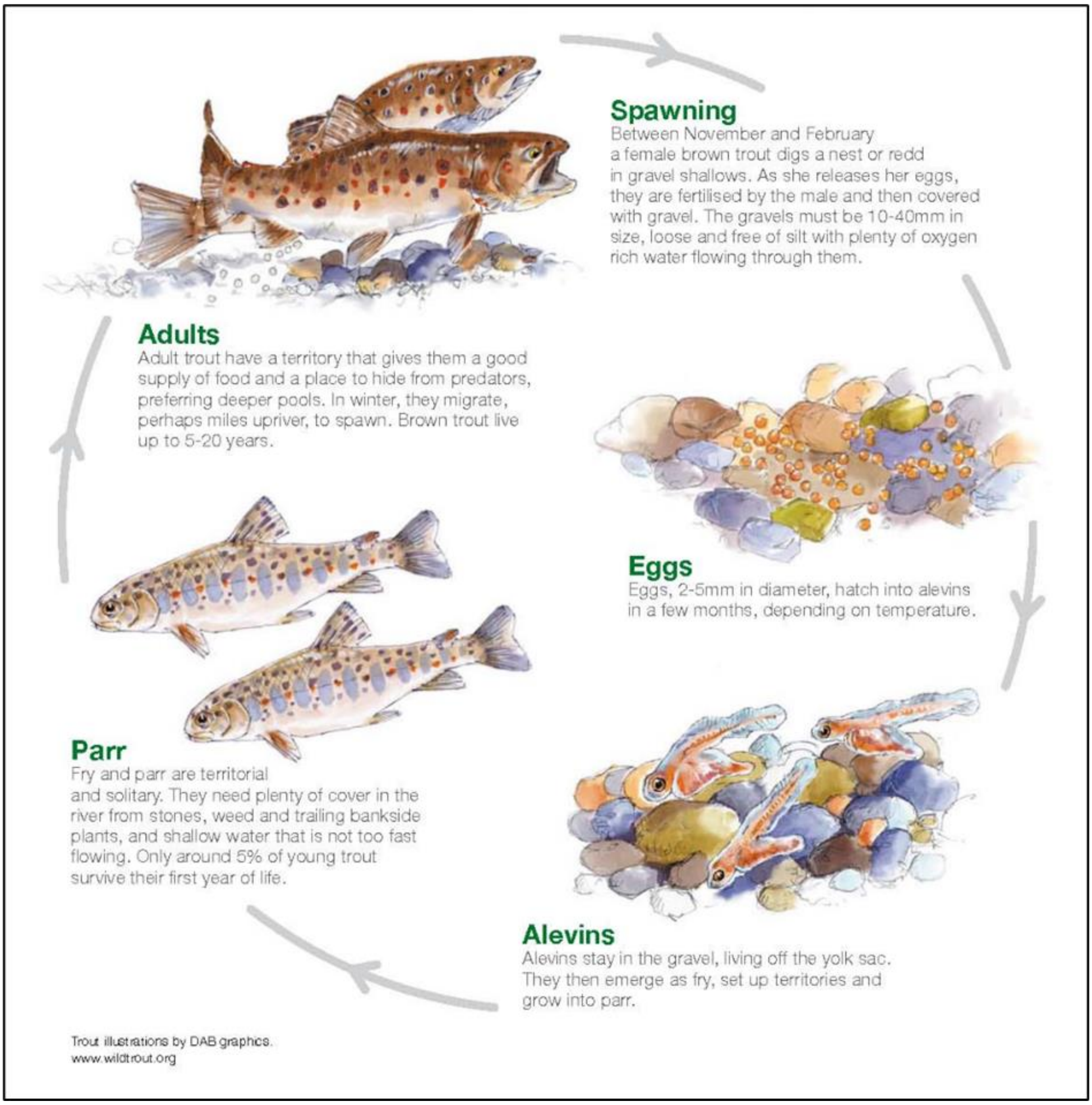

Figure 17: The life cycle of the native wild brown trout, Salmo trutta

9. Appendix B : Trout habitat

Due to their need for clean, well-oxygenated water, structurally-varied habitat, and free movement between different types of habitat at different life stages, the UK's native wild brown trout makes an ideal indicator species for healthy rivers. These characteristics mean that a simple and effective assessment for overall river health can be based around the life cycle requirements of brown trout.

As a result, identifying and noting the presence or absence of habitat features that allow trout to complete their full life cycle is a very practical way to assess overall habitat quality. By identifying the gaps (i.e. where crucial habitat is lacking), it is often possible to design actions to solve those habitat bottlenecks.

To put all this into context, there are three main habitat types required for wild trout to complete each of their three key life cycle stages. This creates a demand for varied habitat, which is vital for supporting a wide diversity of other species too.

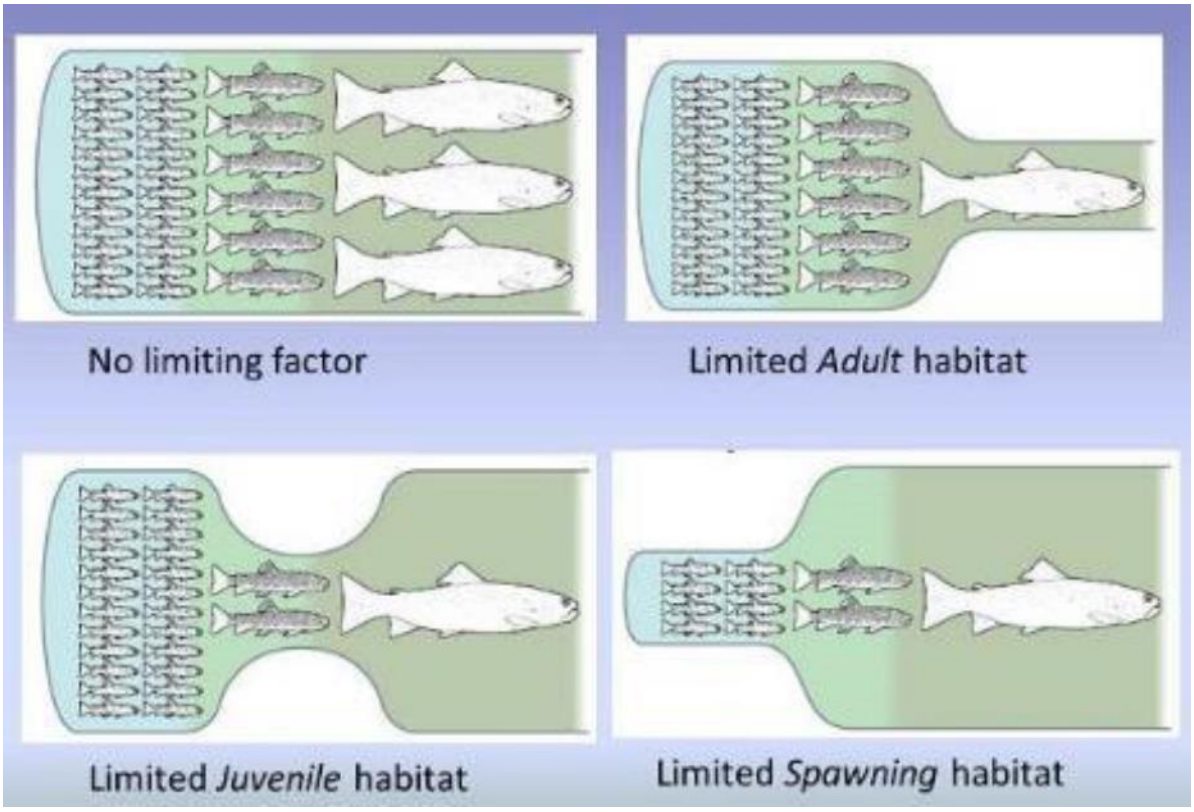

Figure 18: The impacts on trout populations lacking adequate habitat for key life cycle stages. Spawning trout require loose gravel with a good flow-through of oxygenated water. Juvenile trout need shallow water with plenty of diverse structure for protection against predators and wash-out during spates. Adult trout need deeper pools (usually > 30cm depth) with nearby structural cover such as undercut boulders, 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 mitigate a 'weak link' in the remaining critical habitat.

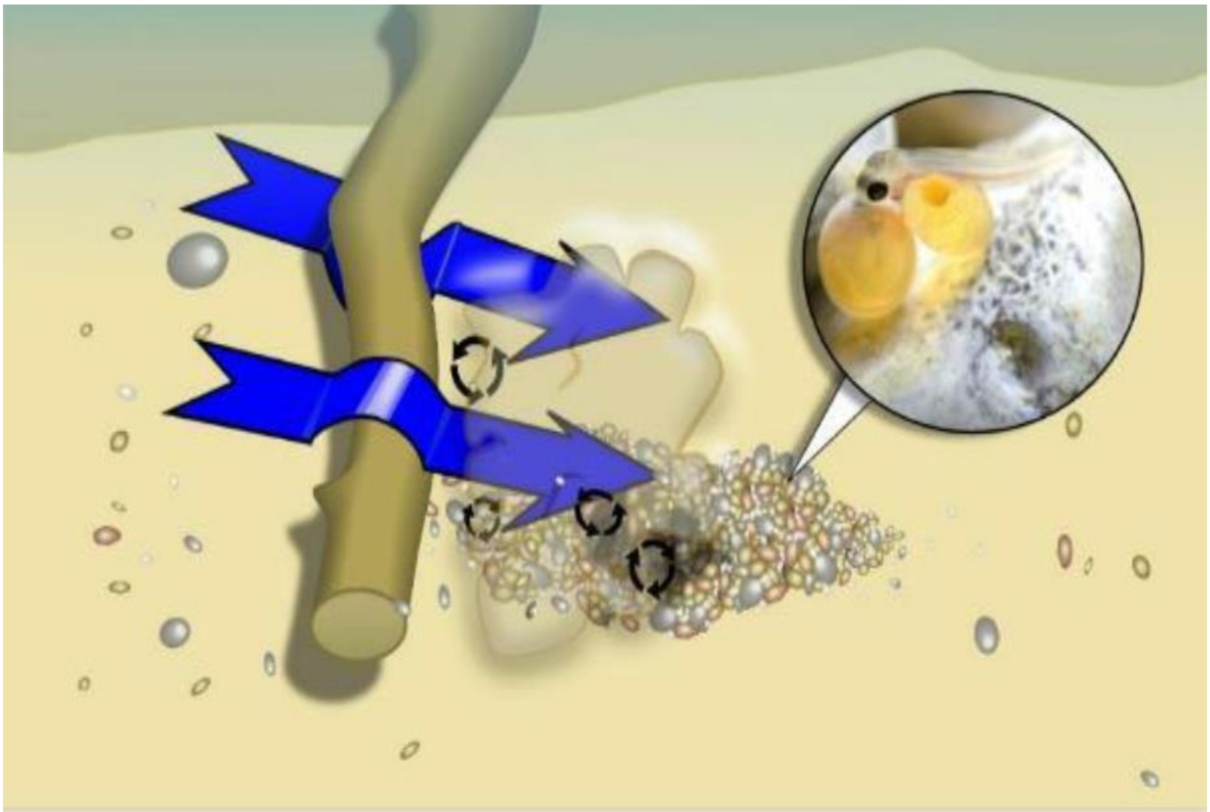

Figure 19: Successful trout spawning habitat requires relatively silt-free gravels. Here, the action of a fallen tree limb is focusing the flows (both under and over the limb as indicated by the blue arrows) on a small area of riverbed that results in silt being washed out from between gravel grains. A small mound of gravel is deposited just below the hollow scoured out by focused flows: this mound will be selected by trout to dig a 'redd' for spawning. In the silt-free gaps between the grains of gravel it is possible for sufficient oxygen-rich water to flow over the developing eggs and newly-hatched 'alevins' to keep them alive as they hide within the gravel mound (inset) until emerging in spring.

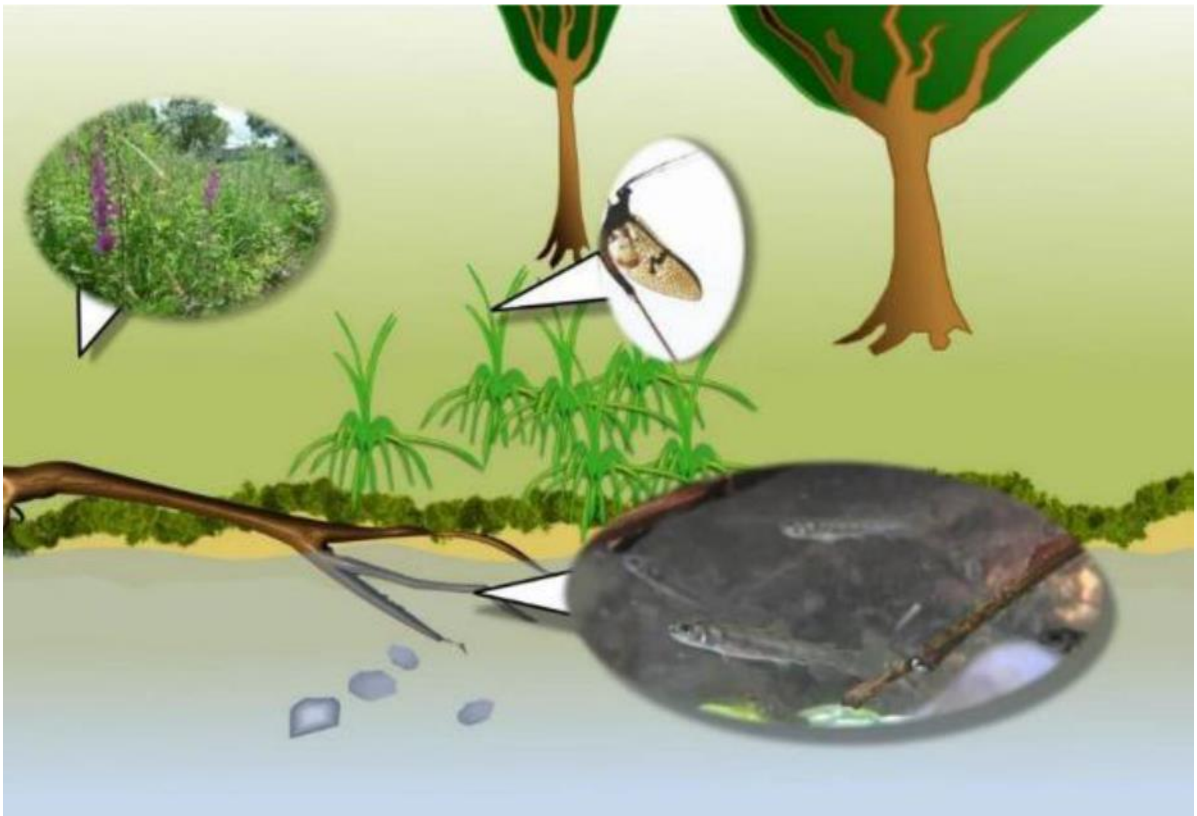

Figure 20: Larger cobbles and submerged 'brashy' cover and/or exposed fronds of tree roots provide vital cover from predation and spate flows for tiny juvenile fish in shallower water (<30cm deep). Trailing, overhanging vegetation also provides a similar function, and has many benefits for invertebrate populations (some of which will provide a ready food supply for the juvenile fish).

Figure 21: The availability of deeper water bolt holes (>30cm), low overhanging cover and/or larger submerged structures such as boulders, fallen trees, large root-wads etc. close to a good food supply (e.g. below a riffle in this case) are all strong components of adult trout habitat requirements.

10. Appendix C : Deep-rooted plants

In addition to small willows and emergent plants such as yellow flag iris and canary reed grass, which can help to stabilise eroding river banks at water level, many of the deep-rooted native UK plants shown in the diagram below may be considered for supplementary planting in dryer bankside areas as a means of counteracting excessive erosion.

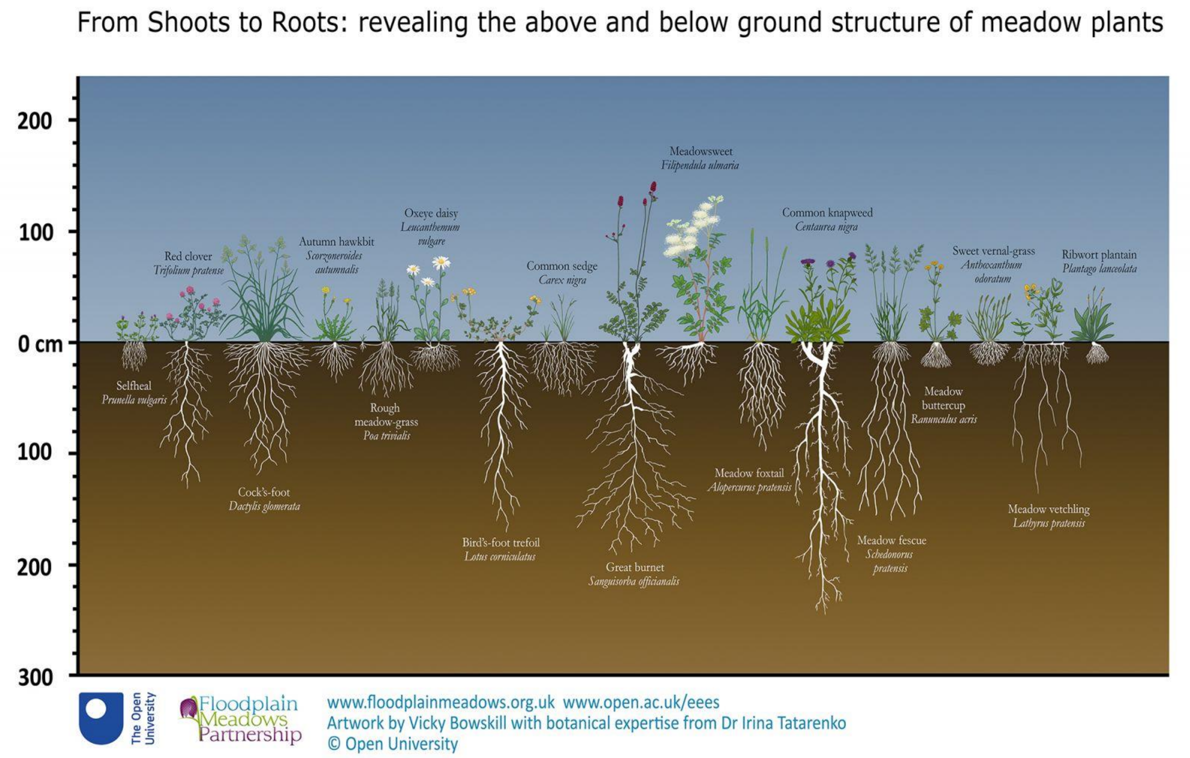

Figure 22: A diagram showing the root structures of native UK plants

11. Appendix D: Tree hinging and similar works

The Wild Trout Trust website contains detailed guidance on improving river habitat, including ‘habitat sheets’ providing details on using woody material in beneficial ways.

The summary web page is here:

https://www.wildtrout.org/content/habitat-improvement

Structure-specific ‘habitat sheets’ include:

Tree hinging:

https://www.wildtrout.org/assets/img/general/Habitat-Sheet-Hinging.pdf

Tree kickers:

https://www.wildtrout.org/assets/img/general/Habitat-Sheet-Kicker.pdf

Lodged LWM:

https://www.wildtrout.org/assets/img/general/Habitat-Sheet-Lodged-WM.pdf

Pinned woody material:

https://www.wildtrout.org/assets/img/general/Habitat-Sheet-Pinned-Woody-Material.pdf