WILD TROUT TRUST

River Team

(lower catchment)

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Key findings

- As highlighted in the walkovers for the upper River Team catchment, fine sediment is already an impact upon substrate habitat quality; an issue that continues throughout the lower catchment (exacerbated by sandy soils). This is a major negative impact upon invertebrate populations and the potential for fish spawning.
- The channel through much of the River Team has been subjected to straightening, which has an inevitable impact upon geomorphological processes and the habitat quality. However, in areas not actively being maintained, the river course is recovering (but this process usually increases fine sediment input, at least in the short term).
- The connectivity of the lower catchment is generally much better than the upper, barring the large weir at the lower end of the section walked. That weir will be reducing the potential for natural recolonisation of the river by sea trout, as will the culvert through he Team Valley.
- Rowletch Burn has well recognised water quality issues, and this was confirmed by observations during the walkover. However, if water quality could be improved, it is accessible for recolonisation, assisted by a successfully installed rock ramp easement just upstream from the River Team.
- The Lamesley sewage treatment works discharging large volumes to the lower River Team creates a visible impact upon water quality; the chemical composition of that discharge could potentially have great influence upon the fish and invertebrate populations of the lower river.
- Leachate from the historical landfill site at High Urpeth is likely to be creating an issue for water quality; the composition of that discharge warrants further investigation.
- Japanese knotweed was observed in several locations on the Team and Rowletch Burn, but appeared treatable/manageable if tackled imminently, before it has time to spread.

Contents

1. Introduction

This report is the output of walkovers in the lower River Team catchment, undertaken on the 1st, 2nd & 3rd of March 2021. This work complements walkovers and reporting of the upper catchment undertaken in December 2019 (simply named 'River Team walkover' as it was not known at that time the rest of the lower catchment would also be covered by the further walkover assessments captured in this report). Both suites of walkovers and reports were funded by the Environment Agency Fisheries Improvement Fund, with an in-kind contribution from the Wild Trout Trust.

Normal convention is applied throughout this report with respect to bank identification, i.e. banks are designated left bank (LB) or right bank (RB) while looking downstream. The Ordnance Survey National Grid Reference system is used to identify specific locations and references to upstream and downstream are often abbreviated to u/s and d/s for convenience. The photographs appearing in this report are just a sample of the total number taken, as such, some numbers may be missing (or used out of sequence).

2. Catchment/Site Overview

2.1. Team from Source to Tyne

Table 1 Overview of the section visited

River	Team
Waterbody Name	Team from source to Tyne
Waterbody ID	GB103023075670
Operational Catchment	Lower Tyne and Estuary
Management Catchment	Tyne
River Basin District	Northumbria
Current Ecological Quality	Moderate (potential)
U/S Grid Ref inspected	NZ 21417 54886
D/S Grid Ref inspected	NZ 23995 61453
Length of river inspected (KM)	>15km

Table 2 Current (2019) Water Framework Directive status

Classifications

Cycle 2 classifications

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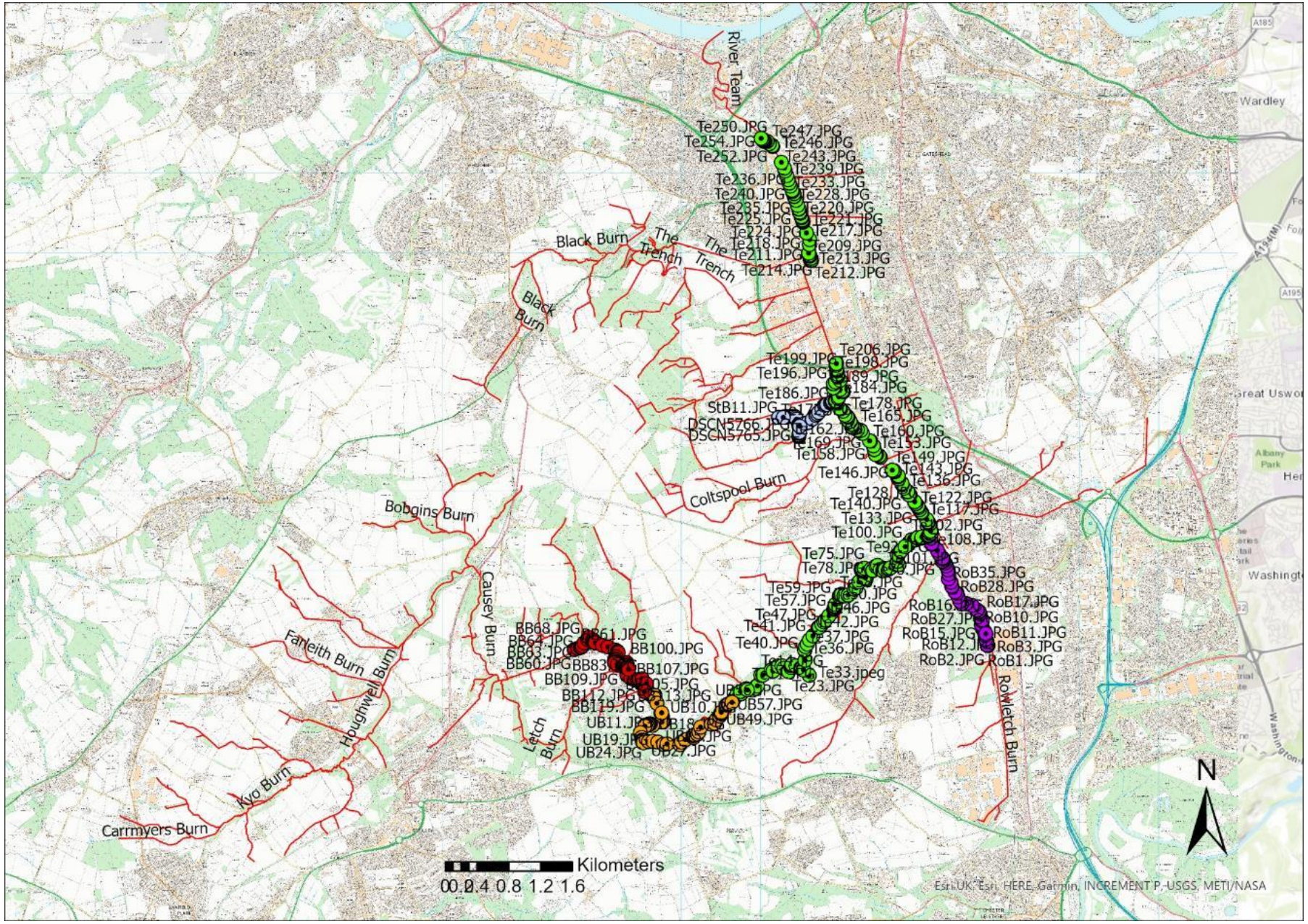
Classification Item	2013	2014	2015	2016	2019
Overall Water Body	Moderate	Moderate	Moderate	Moderate	Moderate
Ecological	Moderate	Moderate	Moderate	Moderate	Moderate
Chemical	Fail	Fail	Fail	Fail	Fail

https://environment.data.gov.uk/catchment-planning/WaterBody/GB103023075670

Under the Environment Agency Water Framework Directive assessment, the River Team is classed as a 'Heavily Modified Waterbody' and achieved only 'moderate' ecological potential. The overall Ecological potential of the waterbody has not changed since the previous walkovers of the upper catchment, but some of the individual parameters assessed have. Notable failures include: Bad for fish, Poor for invertebrates (a fall from Moderate), Poor for phosphate, Fail for tributyltin (which is interesting as the legacy should have worked its way out of the system by now under normal circumstances, indicating it may still be in use somewhere) and Fail for several other priority hazardous substances.

As far as practicable, this report will follow a downstream progression, starting on the Beamish Burn. The report is separated into sections for each sub-catchment of the River Team, with tributaries covered at the end of their respective sub-catchment section.

2.2. Overview Map



3. Habitat Assessment

3.1. Beamish Burn (lower) – Photo numbers continued from previous 'River Team walkover' report .

BB60. A small discharge around the upstream limit (NZ 21660 55001). The water appeared relatively clean with no obvious signs of significantly elevated nutrient levels.

BB62. The straightened nature of this section reduces its habitat value, but the banks are vegetated and bankside trees provide some cover.

BB66. The track crossing of a small tributary is in a very poor state of repair and contributing significant fine sediment (NZ 21808 55142). This could be solved simply with an appropriately sized sunken pipe.

BB69. A small tributary joins the burn (NZ 21882 55123) and supplies elevated volumes of fine sediment, suspected to originate at NZ 21250 56327, where a collapsed field culvert/buried watercourse id visible. Otherwise, the water quality was reasonable, supporting large stone-clinging mayfly nymphs and cases and caseless caddis.

BB74. In-channel habitat in this area would be of a relatively high quality, barring the elevated fine sediment load. Low and trailing branches provide valuable cover.

BB78. The streams of algae associated with this discharge from the Beamish Museum site indicate a high nutrient discharge (NZ 21902 55090).

BB78. Generally good juvenile salmonid habitat in the more naturalised areas but would benefit from more woody material within the channel.

BB83. Scour around bankside alders creates good pool habitat for adult trout, with the associated flow constrictions also providing true Natural Flood Management (NFM) benefits, while maintaining a free channel for fish movement and sediment transport – unlike many fixed, man-made NFM structures.

BB85. Springs or possible field drain discharges create boggy areas that, coupled with heavy footfall along the path, increase fine sediment input to the watercourse (NZ 22194 54994). Cheap and simple drainage with an appropriately sized pipe could rectify the issue.

BB86. The path is threatened by lateral channel erosion (NZ 22196 54962). Ideally the path should be moved back to allow the banks to revegetate and stabilise – possibly with the addition of a willow planting or brash bank protection.

BB90. The more sinuous planform in this area and increased flow diversity allows the development of valuable pool features. However, the considerable fine sediment load clearly visible in lower energy depositional areas (red ellipse).

BB96. The track crossing and bridge create a likely source of surface runoff and fine sediment (NZ 22288 54798). Cross drains discharging to rough ground, away from any watercourse, would be beneficial.

BB93. Where large woody material, or in this case bends, have driven scour into the bed valuable gravel bar deposition can be seen downstream, and the potential quality of salmonid spawning substrate becomes evident (here particularly for lager migratory fish).

BB98. A significant proportion of the Red Burn has been diverted through an old pond, greatly decreasing the accessibility of Red Burn as a potential spawning tributary (NZ 22309 54843 - NZ 22325 54787). This probably illegal diversion should be stopped.

BB102. The pond is clearly acting as a silt trap for large volumes of fine sediment. The source of that fine sediment should be identified and addressed (see previous River Team report for possible causes). The increased flow through the pond will also remobilise this material in high flows, elevating fine sediment output to the Beamish Burn – another reason to cease the flow-through.

BB106. The basic habitat quality of the area around Beamish Museum remains high, with ample basic habitat to support salmonids.

BB107. The downstream end of Letch Burn (tributary) is poorly accessible, owing to steep cascades (NZ 22322 54705).

BB108 & 109. Cased and caseless caddis from Letch Burn.

BB111. The physical habitat downstream remains good for salmonids.

BB114. The field at NZ 22350 54656 appears to be cut for fodder, but then aftermath grazed (as evident by wool on the dilapidated fence). Bankside vegetation and tree regeneration would greatly benefit from reinstatement of a stock proof fence.

BB119. A pipe discharge at NZ 22538 54498 appears to be relatively clean water with slightly elevated iron content.

3.2. Urpeth Burn (contiguous with Beamish Burn)

UB1. The high *potential* of substrate for salmonid spawning continues through a slightly lower gradient area, but the fine sediment loading reduces its value.

UB2. Increased structural diversity within the channel leading to beneficial substrate sorting. At this sharp bend, the RB is also becoming threatened by erosion (NZ 22586 54454).

UB6. Further erosion downstream is likely the result of a hard apron inappropriately installed on the riverbank. Ideally this should just be allowed to find a natural equilibrium.

UB8. More potentially high-quality gravels for invertebrates and salmonid spawning – providing the fine sediment and water quality issues can be addressed upstream.

UB9. Discolouration of vegetation at a pipe outfall suggest an elevated nutrient discharge (NZ 22748 54215).

UB10. Almost level with the pipe, but on the opposite bank, inappropriate garden waste disposal and loss of material into the burn (NZ 22748 54215).

UB12. A small weir / bed check structure impounds the burn upstream slightly but is relatively passable (NZ 22763 54186).

UB19. A disintegrating ford poses a small obstruction and should ideally be allowed to wash out fully to reinstate a more natural dimensions to the overwide channel (NZ 22582 54071). If the ford is reinstated, it should be set below bed level, to create support, over which a natural bed can form - without a step.

UB20. High footfall of dogs and humans in the area is preventing understory vegetation and creating increased erosion, as evident by exposed tree roots (NZ 22583 54071).

UB32. Semi-natural (allowing that much of the surrounding land appears to have been modified by past mining) treefall into the burn through the gorge section downstream is beneficial and should be allowed to remain in situ. Note the fine sediment accumulation on the bed (foreground).

UB25. Elevated iron discharge. Such discharges can cause problems for aquatic life, but with reasonable dilution, as is occurring, the impact is likely to be minimal.

UB28. A strange pipe / weir (seemingly unattached at either end) creates an unnecessary obstruction and should be removed (NZ 22524 53895).

UB32. More bank erosion (NZ 22723 53884). The underlying cause is the straightened, steepened channel and lack of vegetation to bind the soils. Although the woody material is contributing to the erosion locally, the roughness it provides will also slow flow through the section, reducing the overall energy and likelihood of further bed incision, so its retention would be beneficial.

UB34. Another access/fording point creates familiar issues (NZ 22814 53855).

UB37. In wider, lower gradient areas downstream of the gorge, the building impact of fine sediment inputs can be seen in the silt-laden bed.

UB39. Channel straightening has clearly been undertaken throughout much of the next section downstream, pushing the burn to the RB side of the valley bottom, with paleo-channels evident in the adjacent fields (NZ 22987 53841 - NZ 23497 54220).

UB51. In response to the historical straightening, the burn is now starting to win back some sinuosity through lateral erosion (assisted by valuable inputs of large woody material). This should be facilitated wherever possible.

UB52. Poorly installed rock armouring of the bank upstream of the bridge is failing. It would have been preferable to use green engineering techniques and planting to naturally stabilise the banks. The bridge is clear-span and poses no issues.

UB53. Armouring around an old pipe crossing (identified in previous EA surveys as creating a weir/obstruction) now poses less of an issue (NZ 23510 54250). However, the artificial structure should be removed from the watercourse if it is now redundant.

UB58. Downstream, the channel is naturalising nicely. The erosion leading to, and resulting from, tree wash-out is relatively natural and not of concern as the process creates valuable habitat features (pools and in-channel structure). It is the artificially increased erosion rates upstream in the catchment that require action.

3.3. River Team (contiguous with Urpeth Burn)

Te1. The valley progressively opens downstream of Urpeth Burn and the River Team develops a lower gradient meandering channel.

Te4. Basic habitat quality remains high, with valuable woody input. However, with reduced stream energy, the fine sediment issues become increasingly apparent, blocking the interstices of the coarser natural bed material, even in high velocity areas.

TE8. Fine sediment entering from a small tributary (NZ 23815 54513). While the R. Team catchment is clearly susceptible to issues of fine sediment input, it is invariably inappropriate land use that increases the issue to problem levels.

Te13. Lateral erosion threatens a farmer's field (NZ 23964 54558). The river is simply responding to historical straightening (to the left of the floodplain). A lack of trees to consolidate the banks, cultivation too close to the watercourse and the track preventing vegetation growth all further contribute to the erosion here.

Te18. A similar issue downstream (NZ 24138 54741). A greater buffer has been maintained, but the trampled track and lack of vegetation negate the benefit. The solution here would be to allow a greater buffer and relocate the path back from the watercourse to facilitate planting and allow bankside vegetation to establish.

Te21. A pipe crossing creates a potential hazard if it is damaged but was having a minimal impact upon the river (NZ 24264 54787).

Te23. The general habitat remains capable of supporting salmonids, with some interesting pool and riffle features.

Te25. It would be beneficial to undertake tree planting on the outside bend to manage (not prevent) the rates of erosion (NZ 24395 54815).

Te33. Leachate from the historical High Urpeth landfill is entering the watercourse and should be addressed (NZ 24532 54759). Japanese knotweed was also observed here, but not noticed in the many kilometres of suitable areas upstream during the 'River Team walkover'. All knotweed should be treated with herbicide by a licenced operative to eradicate it before it spreads and caused further issues, including increased bank erosion.

Te36. Although still realigned from its natural course, the river downstream is continuing to recover morphologically, where it crosses the floodplain. However, once it reaches the LB side it remains there, following a relatively straight course.

TE37. A further crossing of what is suspected to be the same pipe observed upstream (NZ 24545 55004). While these crossings are far from ideal, the relatively open, connected flood plain probably reduces the chances of major debris build-ups and the associated risk to the pipe.

Te42. More Japanese knotweed (NZ 24676 55189). As for upstream, all stands should be treated before they become a major issue. Note the straight channel that is consequently more uniform in depth than would naturally occur.

Te51. The river naturally responding to its severely straightened channel, cultivation too close to the banks and a lack of bankside trees. Land drains discharging from the bank also destabilise the soil (NZ 24931 55537). In addition, pipes within the channel are acting as downstream deflectors, directing overtopping flow towards the bank (red circle).

Te61. Downstream of the agricultural land, the river has been allowed more freedom to recover from past straightening/realignment and habitat improves greatly. A weir (or possibly failed bank protection) creates an obstruction but left alone this should be scoured out over time, alleviating the issue.

Te62. The water pipe crosses the river again (NZ 25042 55687). As before, creating issues more for the maintenance of the pipe than for habitat quality (providing it remains free from debris).

Te63. The river skirts the edge of a deciduous woodland where habitat is generally good, with valuable woody material input.

Te68. A bank breach threatens to divert the river down a straight drainage channel (red arrow); NZ 25309 55883). Gabions (failing) have been used inappropriately to protect the bank. A solution could be to roughen the drainage ditch with large woody material (LWM) and laying adjacent willows into the channel, thereby making the main river course (blue arrow) the easiest route flow pathway. This would encourage the ditch to block through natural deposition.

Te69. Although it is generally best to leave naturally occurring woody material well alone, a fallen willow in the pool downstream could be realigned to aid conveyance down the river and reduce pressure at the gabion breach a short distance upstream (**Te68**).

Te71. The river makes several large meanders towards the LB side of the valley bottom creating erosion and potentially threatening the land boundaries (NZ 25278 56026).

Te80. The river threatening the boundary of the yard downstream (NZ 25475 56062).

TE78. The RB floodplain is a low, marshy area (contributed to by the drain and lost river flow upstream **Te68**).

Te83. Further stands of Japanese knowteed were observed on a track in the riverside wood (NZ 24931 55537).

Te85. A large diameter pipe was not discharging at the time of the walkover (NZ 25557 56027).

Te86. Highly inappropriate (illegal) bank work has been undertaken to sure up decking along the riverbank (NZ 25620 56036). Concrete has been poured along the banks and even on the bed of the watercourse (red circle).

Te90. The Greenford Lane Bridge is a swim-through, posing no issues for fish or sediment movement (NZ 25710 56092).

Te92. Downstream of the road, the river runs alongside the now disused Union Brickworks Clay Pit. Four bed-check weirs (NZ 25716 56129; NZ 25753 56239; NZ 25805 56297; and NZ 25858 56349) have been used to mitigate head loss though the re-routed channel. The upper weir has a narrow crest and has been outflanked to the RB side, improving its passability to fish.

Te99. The two middle weirs are very similar, with a wider crest extending upstream, creating shallow water and high velocities that are more of an issue for fish passage.

Te101. The furthest downstream weir is similar to the first weir (narrow crest), but is higher and has not been outflanked, so creates more of an obstruction.

Te102. Deposition immediately downstream of the straightened section (where minimal sediment is retained) provides some potential for spawning (although still greatly compromised by fine sediment). This area has been used for spawning in the past (N Cook, EA, 2021, pers.comm., 2 March).

Te103. At several locations along the downstream boundary of the quarry site, the riverbank is precariously close to breaching (10-15 m in places), owing to quarrying having been undertaken far too close to the watercourse. Should the bank breach, the watercourse would be lost ~20m down into the quarry bottom.

Te105. A membrane appears to have been installed to stem seepage to the quarry (and presumably increase bank stability), but this cannot mitigate the lack of space afforded to the river. As a bare minimum, reparation of the quarry should have reinstated a far greater bank area between the quarry and watercourse.

Te107. The river threatens a LB land boundary, with the erosion likely to be exacerbated by shading and lack of understory beneath the pine trees. The pool provides good holding water for adult trout.

Te110. Although clearly realigned, the in-channel habitat quality is recovering and is relatively good.

Te112. At its confluence with the Team (left of shot), Rowletch Burn (right of shot) is clearly much higher turbidity (NZ 26119 56442). Large accumulations of sand and silt highlight the scale of the sediment issues on the River Team catchment, with the majority derived from upstream of Rowletch Burn.

Te114. The unstable nature of the banks along this section of straightened and incised channel contributes further fine sediment as the river adjusts to win back sinuosity.

Te115. Another large pipe crossing poses minimal issue to the river, barring the erosion resulting from failing hard bank revetment. Several natural debris dams were also present in this area, most were providing cover and developing beneficial morphological features.

Te117. Leyburnhold Gill joins from the RB via a pipe culvert (NZ 26118 56575). Access to the culvert is poor, but the watercourse is small and straightened for the majority of its length upstream through an industrial and housing area, so its inaccessibility is unlikely to be a major loss without channel restoration upstream.

Te118. Deeper pools provide potentially good habitat for coarse fish and larger trout in the straightened section downstream to the sewage treatment works (STW) discharge.

Te121. Observed from the far bank, a large capacity culvert on the LB was not discharging at the time of the walkover. A greyish biofilm / sewage fungus on the bed suggests it may discharge poor quality water at certain times - likely associated with the STW (NZ 25998 56723).

Te128. The upstream of the two main STW discharges was creating significant discolouration of the river and had a notable odour (NZ 25970 56794). It also contributes a large volume of water to the lower Team, so has the potential for a major impact.

Te134. Unmaintained culvert screen (NZ 25912 56864). It would be expected that such waste should have already been intercepted before the discharge point to the river, suggesting additional issues further up the system.

Te137. A small weir/possible encased pipe creates a small obstruction (NZ 25869 56939). Investigate whether the weir protects an asset and if not remove it.

Te140. The second main STW discharge appeared to be clearer and had a reduced odour compared to the discharge further upstream (NZ 25846 56995) - perhaps through the benefit of additional reedbed filtration.

Te141. Looking downstream from Moor Mill Ln Bridge: deeper pools continue to provide good potential coarse fish habitat, although it is not known how limiting the STW discharges are upon water quality. The trash dam in the background (red ellipse) was drowning the bridge footings at the time of the walkover.

Te142. The perched footings of Moor Mill Ln bridge: photo taken by the EA before the trash dam d/s established (NZ 25802 57027). These footings were clearly an obstruction previously. If the trash dam (**TE141**) is removed, the structure will require reassessment for passability, owing to the step and shallow water.

Te146. At several points, the river is getting precariously close to the main Lamesley Road (NZ 25721 57188). Any bank protection work should seek to maintain in-channel structure and use green/soft engineering techniques.

Te150. Erosion around a small tributary/ditch, exacerbated by dumping of waste material and garden waste on the riverbank (NZ 25661 57236).

Te153. Looking downstream from the bridge to Moor Mill Farm (NZ 25649 57262). Horses are currently excluded from the watercourse, but the old fence is now barely functional. Previous bank protection is beginning to fail (right of shot)

Te154. Further downstream, the fencing ceases and livestock have access to the RB (NZ 25608 57292 - NZ 25431 57547). Fortunately, the grazing pressure in this area appears to be relatively low. Fencing could facilitate tree regeneration or tree planting, which would be beneficial to habitat quality and bank stability.

Te157. The substrate in this area could potentially be suitable for coarse fish spawning (fine sediment remains an issue), but the naturally reduced gradient and flow velocities in these lower reaches would not usually be expected to support salmonid spawning.

Te160. Much of the river through Lamesley Meadows has been straightened and dredged. The channel is flanked in areas on the LB by a flood bund. The river's paleochannels are visible as wet areas in the LB side fields (NZ 25409 57520).

Te162. Although straightened many areas of the in-channel habitat is capable of supporting trout, although it appears better suited to coarse fish. The RB appears un-grazed and the LB is largely un-grazed (with buffer fencing).

Te170. The lower end of buffer strip (field upstream of Haggs Ln) did appear to have been grazed more recently on the LB (NZ 25108 57889).

Te169. A small outfall was observed at, which appears to discharge slightly elevated levels of fine sediment – possibly road drainage (NZ 25173 57788).

Te173. A reasonable hatch of large dark olive myflies - *Baetis rhodani* - (a species relatively tolerant to pollution) was observed though the meadows.

Te178. Hagg Ln Road Bridge appears to have been extended downstream, requiring in-channel pillars that have increased sediment deposition, but river flow appears sufficient to maintain a free-flowing central channel (NZ 25108 57889). Note just how much fine sediment is in the system by this point.

Te179. The fields on both banks downstream of the bridge are heavily grazed, with a lack of bankside vegetation and tree regeneration (NZ 25031 57964 & NZ 25080 57986). Buffer fencing would be beneficial.

Te181. Areas of in-channel habitat are greatly enhanced again in this reach by trees and large woody material.

Te187. A drinking point/ford creates a particular hot spot for bank erosion (NZ 24989 58164). Buffer fencing and alternative watering required.

Te189. The footings of the dilapidated footpath bridge create an obstruction to fish movement through elevated flow velocities (NZ 25040 58245). This should be replaced with a more appropriate, larger, clear-span structure when the crossing is next maintained.

Te197. The impact of grazing increases further in the final field on each bank side upstream of Lamesley Roundabout (NZ 24899 58355 & NZ 24937 58349).

Te198. Two small watercourses join at a sharp bend upstream of Lamesley Roundabout but appear to be of low ecological quality and potential, both from the fine sediment they discharge, and the extent of culverting and realignment further upstream (NZ 25012 58395).

Te200. EA gauging station at the Lamesley Roundabout culvert 1. Here the shallow, high velocity water across the base of the culvert creates an obstruction to fish passage (NZ 24957 58482).

Te201. There is a distinct step just downstream of the culvert that creates a further issue. It is understood that fish passage at this culvert will be investigated as part of upgrades to the A1 road (N Cook, EA, 2021, pers.comm., 2 March).

Te205. The river beneath the A1 is highly modified, straightened and fast-flowing.

Te207. Lamesley Roundabout culvert 2 marks the start of a ~1.4km culvert beneath Team Valley Trading Estate (NZ 24939 58607). The issue here is high velocity flow and limited water depth. An elevated nutrient discharge (as identified by increased brown algal growth) also discharges at the upstream end (red circle).

Te210. The river was next inspected ~1400m downstream, at the end of the culvert, which was encouragingly sunken below bed level (NZ 24637 59882). If flows can be slowed through the rest of the culvert and water depths increased, fish passage could be greatly improved.

Te212. The river downstream is of reasonable quality for a straightened channel, aided particularly at this point by a slight inset berm. Sewage litter in the bankside vegetation could suggest combined sewer overflows (CSO) discharge within the culvert upstream.

Te215. Black Burn joins via a culvert (NZ 24603 59967), limiting its potential, although poorly accessible from the main river it is possible that there are areas of higher quality habitat upstream. The water appeared to be of a reasonable quality.

Te216. A large outfall was observed at NZ 24606 59978.

Te226. What appeared to be a surface water outfall with associated fine grey sediment input (NZ 24510 60459).

Te227. At several points, paired berm/pinch-points have been installed, providing variability in channel width and no doubt contributing to riverbed diversity through scour. Some areas are further improved with willow trees; tree and scrub cover should be allowed to develop further. Ideally, flow would be deflected from one bank side to the other, but in this urban setting, central pinch-points at least provide some improvement, with reduced risk of increasing bank erosion.

Te229. Discharge on the RB (NZ 24483 60542).

Te231. Of the numerous bridges/road crossings, most posed no issues for fish or sediment movement. Note the aquatic weed (suspected to be water crowfoot) that was present in the few areas where gravel deposition created shallow riffle habitat.

Te236. In several areas, bankside vegetation clearance could be leading to increased bank instability and erosion. Maintaining and increasing bank roughness is likely to reduce the erosive forces acting upon them.

Te243. A RB discharge (NZ 24328 60978). As with most of these structures through the Team Valley, likely to be surface water/road drainage.

Te245. Outfall on the LB (NZ 24287 61062).

Te429. An inappropriately placed pipe crossing creates a potential hazard if it breaks and almost certainly reduces peak flow conveyance through a high flood risk area. NZ 24135 61356

Te253. LB discharge (NZ 24079 61379).

Te245. LB discharge supplying excess fine sediment and elevated iron (NZ 24051 61388).

Te257. A weir at the downstream end of the section of River Team creates a major obstruction to most species, with a significant step and shallow fast flow - as well as increased erosion on the LB (NZ 24025 61405).

Te258. The River then disappears into another section of culvert (NZ 24011 61418). Any potential to skylight the watercourse/break it out of the culvert would provide improvements to habitat, fish passage, safety and the aesthetics of the area.

3.4. Rowletch Burn

RoB1. Rowletch Burn was walked from NZ 26842 55047, where it emerges from a culvert. Significant seepage of iron-laden water was observed from the LB. Rubbish appears to be escaping from the adjacent compound.

RoB2. The channel downstream is particularly straightened and artificial.

RoB4. Observation of the bed revealed a significant smothering of biofilm and grey sediment, symptomatic of enrichment and surface/road drainage (NZ 26842 55047).

RoB8. What appears to have been a reed (suspected to be a filter for leachate from the adjacent land) bed has been infilled with fine sediment (NZ 26828 55153). The efficacy of the reedbed could be improved through maintenance. Boulder features installed within the channel cannot mitigate the poor water quality and concrete lined channel.

RoB20. Wet (at the time) concrete appears to have been discarded down the bank on numerous occasions, sometimes reaching the watercourse (NZ 26714 55500).

RoB24 & **25** (inset). Outfall discharging what appeared to be domestic water, including solids, adjacent to a seemingly purposeless weir (NZ 26564 55586).

RoB26. The culvert beneath Station Ln would be a swim-through, if the burn were capable of supporting fish or natural invertebrate populations (NZ 26564 55586).

RoB29. In the section downstream of Station Ln, adjacent to the road/industrial site, large quantities of both waste/litter and garden waste are being dumped on the bank (NZ 26503 55620).

RoB32. Progressing downstream, the channel is dredged and over-capacity.

RoB33. Leachate from the LB ground into the watercourse (NZ 26433 55731). The iron content is clearly elevated but other contaminants are suspected, owing to the opaque nature and oily residue. Purely Iron-laden water is usually vividly clear owing to the removal of fine particulates as the iron oxidises and precipitates out of solution.

RoB37. Clears signs of material washing out of the site compound into the burn (NZ 26413 55811).

RoB40. Japanese knotweed may have escaped from the site as it was not observed further upstream (NZ 26360 55964).

RoB41. A slight increase in gradient improves flow diversity but the uniform width and a lack of structure contribute to a uniform bed profile. Marginal deposition is beginning to occur, but in-channel structure would really kick-start improvements in channel morphology.

RoB44. A hole in the site bund appears to have been plugged with gravel but demonstrates the potential risk of materials washing out of the site into the watercourse.

Rob46. A small concrete weir would pose an obstruction to fish, but the burn is unlikely to support any in its current state (NZ 26295 56119).

RoB49. A small LB tributary/ditch supplies what is suspected to be higher quality water (NZ 26283 56125).

RoB51. The track crossing to the disused Union Brickworks Clay Pit (now decommissioned) creates another fine sediment input to the burn, particularly after heavy rain (NZ 26286 56152). The raised footings and twin pipes of the bridge also create an obstruction.

RoB59. Ironically, in a degraded and probably fishless burn, an excellent example of a naturalistic rock ramp fish easement was observed – presumably installed to drown out the culvert a short distance upstream. This design would serve as an excellent template for other small watercourses.

3.5. Strandy Burn

SB1. A perched culvert with a blocked grid at the upstream limit of the Strandy Burn section walked (NZ 24475 57682).

SB6. Livestock access and associated erosion, and runoff from RB arable field (NZ 24487 57756).

SB10. Numerous culverts appear to have been removed from the burn, which may account for strange steps in the bed that reduce the burn's accessibility (NZ 24607 57869).

SB16. Suspected signs of the burn's pre-straightening paleochannels in the adjacent field. Note how they are still wet, being the natural low point in the floodplain. These channels could be restored to naturally improve land drainage (NZ 24704 57922). Buffer fencing would also be beneficial on one or both banks from here, downstream to the River team.

3.6. Right Bank tributary of Strandy Burn

SB25. Livestock access and significant poaching/erosion at the furthest point upstream that was inspected (NZ 24217 57926). Note that although being the un-named tributary of Strandy Burn, this watercourse supplied the majority flow.

SB28. Active tufa growth, forming barrages (natural calcium carbonate weirs) within the channel that naturally reduce fish access, but certainly do not preclude their presence (NZ 24346 57937). This demonstrates a particularly high alkalinity and potentially high productivity of the watercourse.

SB29. Inappropriate use of the watercourse for rearing wildfowl, creating increased fine sediment input and almost certainly elevated levels of nitrate and phosphate (NZ 24323 57941).

SB35. Track crossing and significantly increased erosion, along with a partial barrier (NZ 24427 57939).

SB36. The final straight downstream to the Strandy Burn is protected by a rough buffer, resulting from mowing not having been undertaken too close to the watercourse. However, the channel is very poor habitat quality. This potentially high-quality watercourse would really benefit from channel restoration to a more sinuous course. Paleochannels of this tributary are also present in the adjacent fields (NZ 24434 57939).

4. Summary of Recommendations

4.1. Beamish Burn

Observation	**Photo** (If required)	**Priority (1-3)**	**Location**	**Proposed action**
Tributary crossing in poor state of repair	 **BB66**	1	NZ 21808 55142	Install sunken pipe to separate the track from the watercourses.
Small tributary with elevated fine sediment load	 **BB69**	3	NZ 21882 55123	Investigate source of fine sediment (track crossings, field drainage, etc). Google Maps aerial imagery suggests potential issues at NZ 21250 56327, where the headwaters (possibly seasonal) of the watercourse have been ploughed over as an arable field.
High nutrient discharge	 **BB78**	1	NZ 21902 55090	Identify the source and prevent further pollution.

Spring/track crossing	 **BB85**	2	NZ 22194 54994	Install sunken pipe to separate the track from the watercourses.
Threat to the path through erosion	 **BB86**	2	NZ 22196 54962	Simply move the path back from the watercourse.
Track crossing and surface runoff	 **BB96**	2	NZ 22288 54798	Capture water with cross-drains, discharging to rough ground.
Partial diversion of Red Burn	 **BB98**	1	NZ 22309 54843 - NZ 22325 54787	Reinstate the natural course.

Livestock access to the riverbank	 **BB114**	2	NZ 22350 54656	Install appropriate (sheep-proof) buffer fencing.

4.2. Urpeth Burn

Observation	**Photo** **(If required)**	**Priority (1-3)**	**Location**	**Proposed action**
Bank erosion	 **UB2**	2	NZ 22586 54454	If green bank protection is undertaken, selective pruning of the adjacent trees is likely to be required to allow sufficient light in.
Elevated nutrient discharge	 **UB9**	2	NZ 22748 54215	Identify source and see if the nutrient load can be reduced.

Inappropriate management of the riparian area	 **UB10**	2	NZ 22748 54215	Advice to the property owner.
Small weir	 **UB12**	3	NZ 22763 54186	Ideally this would be removed, but it may provide stability to the bridge footings upstream and contribute to the current swim-through conditions, so removal is not a priority.
Disintegrating ford	 **UB19**	2	NZ 22582 54071	Ideally, allow to fully disintegrate. If reinstated, that should be set below bed level.
Pipe / weir	 **UB28**	1	NZ 22524 53895	Remove the pipe.

Bank erosion through a straightened reach	 **UB51**	1	NZ 22987 53841 - NZ 23497 54220	Accommodate lateral erosion to allow natural channel recovery wherever possible.
Pipe crossing and associated protection	 **UB53**	2	NZ 23510 54250	Remove if redundant.

4.3. Team

Observation	**Photo** **(If required)**	**Priority (1-3)**	**Location**	**Proposed action**
Bank erosion threatening the footpath	 **Te13**	1/2	NZ 23964 54558 & NZ 24138 54741	Relocate the path back from the watercourse to allow a well vegetated bank line to establish – complemented by tree planting to consolidate the bank material. Farm advice to encourage larger buffer strips would be beneficial. Brash bank protection could also be installed.

Semi-natural bank erosion	 **Te25**	2	Around NZ 24395 54815	Tree planting to manage erosion rates.
Leachate from the redundant refuse site & Japanese knotweed	 **Te33**	1	NZ 24532 54759	1. Action should be taken to prevent the leachate reaching the watercourse and/or the current realigned channel could be restored/directed away from the issue to facilitate a larger reedbed area. 2. The Japanese knotweed should be treated as it is already escaping from the site into the wild, creating an offence.
Japanese knotweed	 **Te42**	1	NZ 24676 55189	Treatment with herbicide.

Bank erosion	 **Te51**	1/2	NZ 24931 55537	1. Increase buffer along the watercourse 2. Allow lateral erosion which is greatly improving the morphology of the straightened channel 3. Install brash bank protection if erosion is required 4. Investigate whether the pipe crossing the watercourse is redundant and can be removed
Channel breach and potential to lose the River Team down a drainage ditch	 **Te68**	1	NZ 25309 55883	Work is required to protect the breached area of bank. Installing woody material / undertaking selective tree laying within the ditch channel could start to address the issue naturally. Adjustment of the fallen willow downstream on the River Team could reduce pressure at the breach in high flows.
Japanese knotweed	 **Te83**	1	NZ 24931 55537	Treat with herbicide.
Concrete work on the banks and within the cannel	 **Te86**	1	NZ 25620 56036	This work is almost certainly illegal, so action should be taken by the EA and/or Local Authority.

Weirs	 **Te92**	2	NZ 25716 56129; NZ 25753 56239; NZ 25805 56297; and NZ 25858 56349	These weirs should be removed or eased. One option could be to replicate the situation occurring at the first weir **TE92**, but bypassing the weir to the LB side, away from the clay pit. Alternatively, rock ramps/engineered riffles could be used to replace the weirs.
Large capacity pipe/discharge	 **Te121**	1/2	NZ 25998 56723	Potential poor water quality discharge from the STW.
Significant discolouration from the 1st STW discharge	 **Te128**	1	NZ 25970 56794	Further investigation of the discharge water quality.
Unmaintained screen	 **Te134**	1	NZ 25912 56864	This issue should be reported to Northumbria Water as it may lead to further issues and pollution if it backs up the discharge.

Weir	 **Te137**	2/3	NZ 25869 56939	Investigate options for removal.
2nd STW discharge.	 **Te140**	2	NZ 25846 56995	Ensure the discharge is meeting the parameters of its consent.
Potentially perched Moor Mill Ln bridge footings	 **Te142**	1	NZ 25802 57027	Reassessment will be required if the trash dam alters or is removed (as may happen in associating with protecting the road downstream).
Erosion threatening Lamesley Road	 **Te146**	1	NZ 25721 57188	Seek to retain in-channel material and employ green bank protection measures (rather than hard engineering).

inappropriate dumping of waste and spoil on the riverbank	 **Te150**	2	NZ 25661 57236	Stop the inappropriate dumping of material which is contributing to bank instability by preventing vegetation growth.
Livestock access	 **Te154**	2	~NZ 25608 57292 - NZ 25431 57547	1. Install buffer fencing 2. Undertake planting
Signs of grazing within the buffer strip upstream of Haggs Ln	 **Te170**	2	NZ 25108 57889	Ensure buffer strips are maintained and stock are excluded from the riverbank.
Discharge (elevated fine sediment)	 **Te169**	2/3	NZ 25173 57788	Road drainage is difficult to deal with, but should ideally discharge to soak-away, well away from a watercourse.

Livestock grazing	 **Te179**	1/2	NZ 25031 57964 & NZ 25080 57986	Install buffer fencing – this could facilitate planting and natural regeneration.
Obstruction at footpath bridge	 **Te189**	2	NZ 25040 58245	Replace with larger, completely clear span structure.
Further increased grazing pressure in the final two fields upstream of Lamesley Roundabout.	 **Te197**	1	NZ 24899 58355 & NZ 24937 58349	Install buffer fencing.
Lamesley Roundabout culvert 1	 **Te200**	1	NZ 24957 58482	Ensure that free passage is provided for all fish species.

Lamesley Roundabout culvert 2	 **Te207**	1	NZ 24939 58607	1. Ensure fish passage improvements are created throughout the ~1400m culvert 2. Identify the source of the pipe discharge and ascertain whether he nutrient loading can be reduced
Black Burn	 **Te215**	2/3	NZ 24603 59967	Further investigation of the habitat potential and accessibility of the burn upstream.
Elevated levels of fine sediment from a culver	 **Te245**	2	NZ 24051 61388	Further investigation to identify the source.
Weir (significant obstruction)	 **Te257**	1	NZ 24025 61405	Remove the weir.

Large culvert	 **Te258**	1	NZ 24011 61418	Investigate options to break the river out of the culvert – possible 'daylighting' as part of the Team Valley Flood Alleviation Scheme.

4.4. Rowletch Burn

Observation	**Photo** **(If required)**	**Priority (1-3)**	**Location**	**Proposed action**
Rubbish and seepage emanating from adjacent compound	 **RoB1**	1	NZ 26842 55047	Further investigation to identify the source.
Poor water quality	 **RoB4**	1	Upstream of NZ 26842 55047	Further investigation of the potential water quality issues in the upper areas of Rowletch Burn.

Reedbed in need of maintenance	 **RoB8**	2	NZ 26828 55153	Undertake maintenance to ensure that leachate does not reach the watercourse untreated.
Concrete discarded down the bank	 **RoB20**	1	NZ 26714 55500	Identify who owns the adjacent land and prevent this illegal activity.
Dumping of waste	 **RoB29**	1	NZ 26503 55620	Action from the EA's enforcement team.
Leachate from the LB	 **RoB33**	1	NZ 26433 55731	Water quality testing to ascertain the composition, which will inform what action is required.

Fine sediment and waste escaping from the adjacent refuse site	 **RoB37**	1	NZ 26413 55811	Enforcement by the EA.
Japanese knotweed escaping from the refuse site	 **RoB40**	1	NZ 26360 55964	Advice to treat the infestation and/or Enforcement by the EA.
Small weir	 **Rob46**	2/3	NZ 26295 56119	This weir would be a higher priority for removal if other improvements could help the burn to support fish.
Track crossing to Union Brickworks Clay Pit creates more fine sediment input and obstruction.	 **RoB51**	1/2	NZ 26286 56152	1. Seek better maintenance of the track (free from mud) and install cross-drains to discharge to soak-away. 2. An easement would be beneficial if the burn can be brought up to a standard that supports fish life.

4.5. Strandy Burn

Observation	Photo (If required)	Priority (1-3)	Location	Proposed action
Perched culvert with blocked screen	 **SB1**	2	NZ 24475 57682	Removing the screen would improve the situation but ideally the culvert should be partially sunken below bed level. This would be a higher priority if electrofishing showed fish to be present.
Erosion and runoff	 **SB6**	2	NZ 24487 57756	1. Install buffer fencing on the LB side to exclude livestock from the watercourse. 2. Maintain a much greater buffer along the watercourse in the RB arable field.
Paleochannels in the adjacent fields and livestock access	 **SB16**	2	Throughout the section of Strandy Burn walked.	1. Potential for channel restoration to improve habitat quality and land drainage throughout. 2. Buffer fencing from here to the River Team.

Poaching / erosion	 **SB25**	1	NZ 24217 57926	Install buffer fencing.
Inappropriate wildfowl enclosure	 **SB29**	1	NZ 24323 57941	Advice to the landowner/culprit so that they cease this inappropriate/illegal activity.
Erosion issues and partial barrier	 **SB35**	1	NZ 24427 57939	1. Buffer fencing 2. Replacement of the outflanked culvert pipe with a clear span bridge or an appropriately sized sunken pipe (set at a level gradient)
Straightened channel	 **SB36**	2	NZ 24434 57939	River restoration from here, and downstream. This watercourse and the Strandy Burn are so realigned there are a range of options potentially worth investigating, allowing that their small size may limit the overall catchment benefit.

5. Techniques

Where multiple trees are present, the occasional trunk can be used to provide structure within the channel. This would entail partially cutting through the trunk, so that it remains attached and can be laid into the channel (Figure 1) and is one of the techniques that could be used to increase channel roughness around the bank breach on the River Team (Te68).

Figure 1 Willow hinged into the river margin to increase cover and structure. The method involves cutting part way through the stem, quickly through the first two thirds, then continuing until it collapses down over the river. The depth of the cut should be limited to only that which is required to bend the stem over, as this will maintain maximum size and strength of the hinge and the health of the tree/shrub.

Alternatively, a tree can be felled to create a coppice, encouraging low-level regrowth from the stool, providing material that can then be lodged between two or more standing trunks (Figure 2), or hung over another tree if a 'V' branch is available (Figure 3). Again, this technique could be employed to encourage further accumulation of woody material within the straightened drainage ditch that is fed by the bank breach on the River Team (Te68). That increased roughness should encourage flow down the main channel, rather than the breach (where increased sediment deposition should then occur).

Figure 2. A lodged flow deflector securely but naturally lodged in place between two upright trees (red circle). The technique can utilise a single pole (primarily to increase scour) or a branched limb (to create greater flow dissipation and deposition). The elevated butt end (bank end) reduces the potential detrimental bank scour usually associated with downstream deflectors as a through-flow is maintained along the bank.

Figure 3. Medium-sized, lodged woody material, securely anchored by the 'V' of the branches against an upright tree.

6. Further information

The WTT may be able to offer further assistance such as:

- WTT Practical Visit
    - Where recipients require assistance to carry out the improvements highlighted in an advisory report, there is the possibility of WTT staff conducting a practical visit. This would consist of 1-3 days' work, with a WTT Conservation Officer(s) teaming up with interested parties to demonstrate habitat enhancement methods (e.g. tree kickers and willow laying etc.).

In these examples, the recipient would be asked to contribute to the reasonable travel and subsistence costs of the WTT Officer.

The WTT website library has a wide range of free materials in video and PDF format on habitat management and improvement:

www.wildtrout.org/content/wtt-publications

We have 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 populations 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.

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