River Don Walkover

(River Tyne Catchment)

29th & 30th November 2016

Undertaken by Gareth Pedley, Wild Trout Trust

1.0 Introduction

This report is the output of two days' site visits to the River Don, undertaken by Gareth Pedley of the Wild Trout Trust (WTT) as part of the Tyne Tributaries Project: a collaboration between the Tyne Riparian Owners Association (TROOA), the Tyne Rivers Trust (TRT) and the Environment Agency (EA). The walkover was requested by Niall Cook (EA fisheries officer), who was also present during the visits.

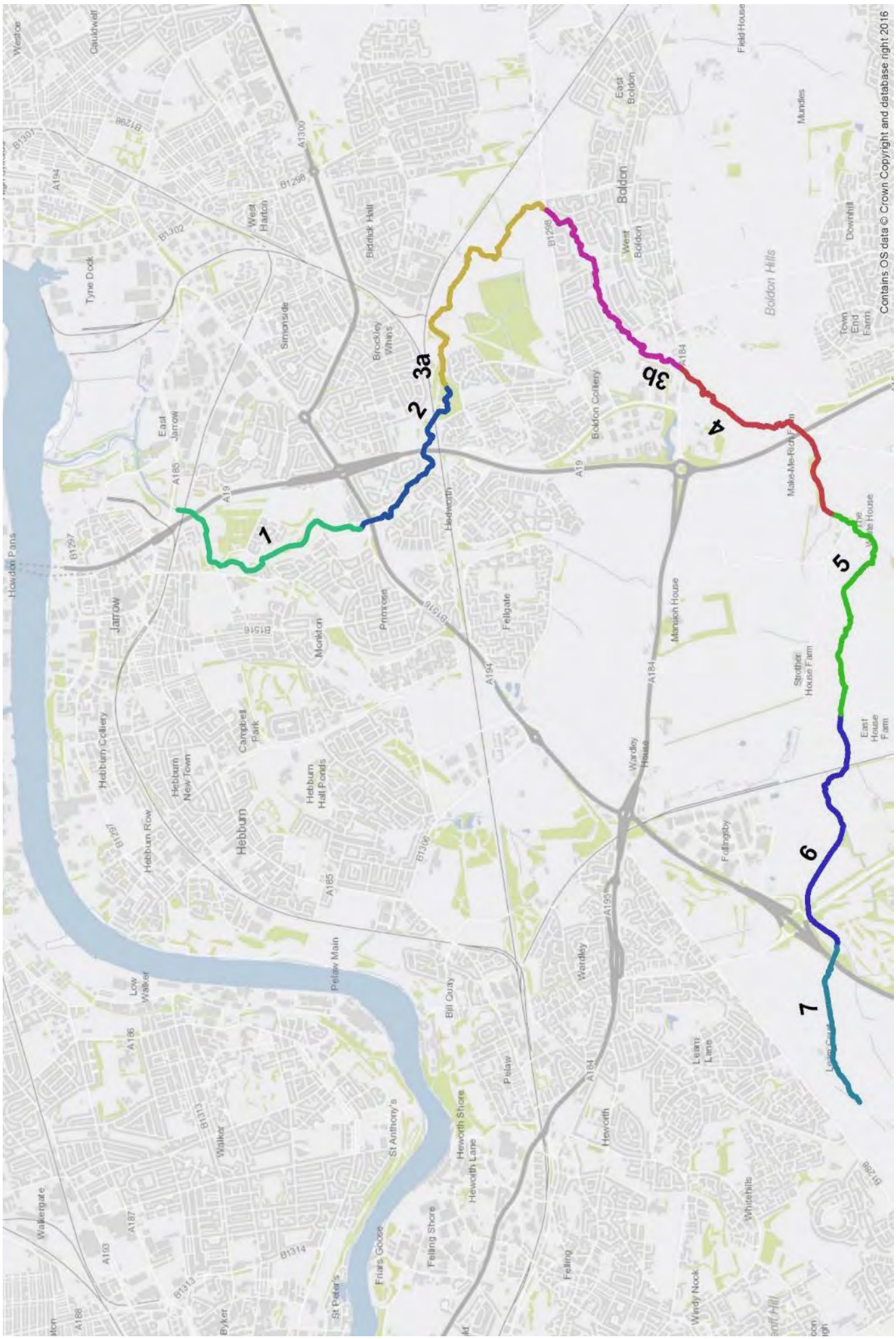
The walkovers cover several kilometres of watercourse so will be reported in sections. For consistency, the sections used will be those designated in the 'River Don Restoration Feasibility Study 2017', an EA scoping project produced by the River Restoration Centre (RRC), which identifies seven reaches. Within this report, the seven reaches will be covered from the upstream end first, working in a downstream direction (Reach 7-1).

Reach	From (u/s)	To (d/s)	Description
7	NZ 28950 59565	NZ 30154 59714	Source to George Washington golf course
6	NZ 30154 59714	NZ 31911 59686	George Washington golf course to Stother House Farm
5	NZ 31911 59686	NZ 33461 59759	Strother House Farm to Hylton Grove
4	NZ 33461 59759	NZ 34601 60943	Hylton Grove to Mount Pleasant
3b	NZ 34601 60943	NZ 35818 61962	Mount Pleasant to Boldon North Bridge (New Road)
3a	NZ 35818 61962	NZ 34435 62733	Boldon North Bridge (New Road) to Station Burn
2	NZ 34435 62733	NZ 33351 63403	Station Burn Nature Reserve to Primrose
1	NZ 33351 63403	NZ 33495 64819	Primrose to Jarrow

Table 1. RRC reaches (supplied by EA).

For a full list of the issues and potential opportunities, see the accompanying Excel spreadsheet and photos/.kmz file from the EA (Fisheries Biodiversity and Geomorphology Team). All photo names were generated by the camera software and have been retained for consistency.

Normal convention is applied throughout the report with respect to bank identification, i.e. the banks are designated left bank (LB) or right bank (RB) whilst looking downstream. The Ordnance Survey National Grid Reference system is used for identifying any specific locations. Upstream and downstream references are often abbreviated to u/s and d/s, respectively.



Plan 1. Overview of Reaches RRC designated reaches on the River Don.

2.0 Habitat Assessment

2.1 Reach 7

The majority of Reach 7 was not walked but elevated levels of fine sediment in Reach 6 suggests excessive input is occurring within Reach 7 u/s. Inspection of aerial photography identified several likely sources around grazed fields. From the d/s side of the A194 culvert the river flows through a golf course, within a realigned and often re-sectioned channel. Straightening has greatly reduced the occurrence of discrete pool and riffle features and the diversity of substrate provided. An oversupply of fine sediment is also evident (Photo DSCN4983).

Photo DSCN4980. Modified channel through the golf course.

2.2 Reach 6

Where bends remain, greater depth variation and substrate sorting were observed (Photo DSCN4980), providing a greater range and quality of habitat. In areas of higher habitat quality, ephemerids were found (Photo DSCN4981). In other areas, the channel appears to have been excavated down to the underlying boulder clay, with the resulting uniform width/depth channel compounding the fine sediment and degraded habitat issues (Photo DSCN4986). While some of the substrate in this area is capable of providing good invertebrate and salmonid spawning habitat, the inputs of fine sediment u/s and reduced bed sorting within the modified channel greatly reduce its ecological quality.

Photo DSCN4980. Where bends remain, greater depth and substrate diversity are present, although these features are not as abundant or structured as would be expected on a more natural channel.

Photo DSCN4981. Ephemerids were observed within the golf course at low densities. Also note the fine sediment accumulation on the biofilm.

Photo DSCN4986. Straightened, uniform capacity channel sunken into the underlying boulder clay. Note the lack of sediment sorting, high loading of fine sediment and resulting poor habitat quality.

At the d/s extent of the golf course the river enters the A195 culvert, which is not considered to be an obstruction to fish passage. At the u/s side, a pipe was observed to be discharging discoloured water (Photo DSCN4989). Immediately d/s of the culvert another large culvert joins the channel but was not discharging at the time (Photo DSCN4991). Detailed invertebrate surveying was not undertaken but further stone turning failed to identify ephemerids (or much else) for some distance d/s of the culverts. Further investigation of the quality of both potential discharges and the local invertebrate populations would be beneficial.

*Photo DSCN4989. A195 culvert. No fish passage issues, but a notably discoloured water discharge immediately u/s of the culvert (*NZ 30348 59922).

Photo DSCN4991. The d/s end of the A195 culvert with an additional culvert on the LB (right of shot). No issues with fish passage at this location although no ephemerids were identified by stone-turning in the channel for some distance d/s.

Major channel realignment and re-sectioning continues d/s of the A195 culvert, where there is a general lack of gravel and depth variation, with predominantly coarse cobble substrate remaining (Photo DSCN4997); almost certainly a result of bed scouring at high flows within the straightened, incised channel. The result is degraded salmonid habitat, with long sections only capable of supporting fry habitat and younger parr (e.g. no spawning, older juvenile or adult habitat). The issues with channel incision and high flows will also make it a particularly hostile place for juvenile fish in high flows and have also led to a major logjam/debris dam to become established in one area which inhibits fish passage (Photo DSCN5004). Areas of the substrate could potentially support larger migratory salmonid spawning, but the lack of sorting and fine sediment issues greatly degrade that habitat (probably below viability).

Woody material and slight bends in the channel provide habitat improvements but healthy salmonid populations are currently unlikely to be supported for most of the reach. An improvement was observed in the last c.700m u/s of the railway (disused) culvert, where increased sinuosity and more varied morphology exist. Encroachment of trees and improved channel diversity/morphology provide much of the basic substrate for salmonid populations but excess fine sediment significantly degrades these areas.

Photo DSCN4997. Straightened, uniform and incised channel, lacking in finer gravel substrate and depth variability.

Photo DSCN5004. The deeply incised, trapezoidal channel has led to woody material becoming lodged and causing a more significant obstruction than is likely to occur on a more naturally profiled channel. With the extent of debris now trapped, this is likely to obstruct fish passage.

Photo DSCN5027. Tree encroachment and woody material greatly enhance habitats in the area u/s of the railway culvert – excess fine sediment remains a major issue.

The stepped d/s entrance to the culvert, and shallow water within, create a major issue for fish passage and inhibit access to the higher quality habitat from d/s (Photo DSCN5035). A further river crossing/culvert creates a lesser issue a short distance further downstream (Photo DSCN5039).

The lower section of Reach 6 (d/s of the culvert) is again straightened, but to a slightly lesser extent, with potential for high flows to spill out into a higher second stage channel in areas (wider/lower gradient upper bank in many areas). This may account for the slightly greater substrate diversity when compared to the straightened sections u/s. Where trees have encroached into the channel, the greater flow diversity (particularly at high flows) and beneficial scouring of the bed and banks has facilitated some natural channel recovery and the formation of beneficial morphological features (Photo DSCN5044); these in turn provide some improvement to salmonid and invertebrate habitats but the habitat remains relatively poor/marginal for supporting salmonids.

All areas of this reach would benefit from major river restoration to improve the planform and function of the channel. The adjacent land use may make this complicated.

Photo DSCN5035. Railway (disused) culvert (NZ 31523 59644).

Photo DSCN5039. Another perched culvert and issue for fish passage (NZ 31637 59635).

Photo DSCN5044. Bed and bank scouring has accentuated a small bend, scoured greater depth and facilitated retention of valuable gravel bar (improved invertebrate and salmonid spawning habitat. Fine sediment remains a major issue.

2.3 Reach 5

A river crossing/culvert at the start of Reach 5 (Photo DSCN5049) poses another issue for fish movement. The issue is not as bad as the previous two but is still likely to inhibit passage at low and high flows. The occurrence of riparian trees reduces within Reach 5 but, where present, they contribute to the higher habitat quality areas through cover and encroachment into the channel.

Slumping of the banks and consolidation of the slumped material (along with depositional features) is gradually improving the reach; however, it remains overly straight and uniform (Photo DSCN5052). Excessive amounts of slumping and regrading would be required before the river can develop the more natural planform and dimensions that would be required to support high quality invertebrate and salmonid habitat. In the interim period, issues should also be expected d/s from the further increase of fine sediment input.

Deeper areas and overhanging vegetation improve habitat for salmonids somewhat, but the lack of natural bends and deeper pools is severely limiting. Finer gravel is retained in areas but remains compromised by fines and a lack of sorting; an issue compounded by the areas of bank slumping and fine sediment input (Photo DSCN5074).

Photo DSCN5049. Another impediment to fish passage (NZ 31926 59688), although a slightly lesser issue than the two u/s in Reach 6.

Photo DSCN5052. Slumping banks and sediment deposition are part of the natural channel recovery but the increased fine sediment input to the channel is compounding the habitat issues. Undercut banks and trailing vegetation provide some improvement to salmonid habitat.

Photo DSCN5074. Areas where beneficial coarse gravel and cobble substrate are retained are degraded by finer material.

Just u/s of a tributary, the channel becomes less incised but is then flanked by flood banks (Photo DSCN5084). These are clearly retaining out of bank flows on the field, inhibiting water from receding to the channel as river levels drop.

Although less incised, recent dredging of the tributary is clearly inhibiting its natural recovery (Photo DSCN5089). Fine sediment input And a lack of bed sorting is clearly an issue in what could, potentially, recover or be restored to much higher quality salmonid habitat (Photo DSCN5093).

Photo DSCN5084. Debris line within the field, showing the extent of water that will be trapped behind the flood banks at out of bank flows. The River Don flows along the field boundary (line of rough vegetation) and the tributary is located behind the photographer.

Photo DSCN5089. Straightened but less incised tributary with signs of recent dredging along the bank top (red ellipse).

Photo DSCN5093. Dredged areas of the tributary where coarser, gravel substrate is being supplied but a high proportion of finer material limits its quality as invertebrate and spawning habitat.

From the confluence of the tributary and the Don, d/s to Hylton Bridge Farm, the channel has been subjected to a greater extent of dredging, leaving it even deeper and over-capacity (Photo DSCN5099). This area is only likely to be suitable for older parr and adult fish and, even then, it provides poor quality habitat for rheophilic species. Adjacent to the farm, a malodorous, discoloured discharge was entering the watercourse (Photo DSCN5105). This is suspected to be from a poorly maintained sceptic tank, adding to existing water quality issues.

Areas of the channel just d/s of Hylton Bridge are heavily incised, with gabion bank protection evident (Photo DSCN5109). Occasional trees and other in-channel structures improve the habitat and morphology slightly (Photo DSCN5115), but the habitat quality was generally poor; the slower deeper channel areas emphasising the now major fine sediment issues.

Reach 5 would greatly benefit from full river restoration as the habitat is currently barely capable of supporting its native salmonids. The reach is unlikely to support healthy salmonid populations without intervention.

Photo DSCN5099. The channel around Hylton Bridge Farm, u/s to the tributary has been subjected to even greater dredging impact. Also not the manure pile/midden (red circle), some of which will be washed into the channel at high flows.

Photo DSCN5105. Suspected sceptic tank discharge with sewage fungus.

Photo DSCN5109. The channel d/s of Hylton Bridge is incised between high banks and is uniformly over-capacity. Note the bed smothering with sand and fine sediment.

Photo DSCN5115. Collapsed riprap bank protection provides coarser substrate features and artificially enhances the degraded habitat of the area with some flow diversity.

2.4 Reach 4

Some flow diversity was evident at the start of Reach 3, particularly around in-channel structures such as trees and bridge footings (Photo DSCN5121), but the channel remains a relatively uniform width for long sections (Photo DSCN5127). A lack of silt-free, sorted gravel precludes salmonid spawning and limits the diversity/quality of invertebrate habitat. Some habitat capable of supporting older juvenile and adult salmonids was observed.

Photo DSCN5121. Around a small access bridge, some beneficial features exist; however, the channel is generally of a uniform width and depth for long sections.

Immediately u/s of the A19 culvert the channel is straight and significantly lacking features or flow diversity (Photo DSCN5127). Neither end of the A19 culvert appeared to pose an issue but the structure should be investigated for fish passability (Photo DSCN5130). Evidence of spawning immediately d/s of the culvert may suggest a barrier within it; however, the spawning activity could just be a result of the coarser material there raising the bed, accelerating flow and mimicking a natural gravel bed (appears to be aggregate associated with the road)(Photo DSCN5132). This was the only potential spawning site observed for medium/large salmonids in the area.

Throughout the rest of Reach 4 the habitat quality improves slightly, with some increase in sinuosity, but the channel remains uniform, lacks discrete pool and riffle features and therefore lacks salmonid spawning and juvenile habitat (Photo DSCN5169). Where present, bankside trees provide some habitat improvement/cover.

Photo DSCN5127. The area u/s of the A19 suffers from significant straightening/re-sectioning.

Photo DSCN5130. The A19 culvert appears passable but it should be investigated as it was not possible to see right through – spawning immediately d/s could suggest an issue.

Photo DSCN5132. A salmonid redd on the only area of suitable, coarse (fine sediment free) substrate observed. The material appeared to be artificial, possibly washed out of the culvert structure.

Photo DSCN5169. The slightly increased sinuosity of the rest of Reach 4 offers some habitat improvement, with occasional deeper areas but a greatly reduced occurrence of pool and riffle features limits the habitat potential.

2.5 Reach 3

2.5.1 Reach 3b u/s of Boldon North Bridge (New Road)

The very u/s end of Reach 3b suffers from most of the same impacts as Reach 5, with a straightened re-sectioned channel, although occasional encroaching trees provide some habitat improvement (Photo DSCN5180). In this area, the paleo-channel is even evident in one of the fields adjacent to the current channel (Photo DSCN5184). A strong sewage-like odour was also perceived in the area d/s of the A184 (NZ 34602 60965), although the source could not be identified. At NZ 34721 61242, a small outfall to the river appeared to be the source of an oily film on the water surface (Photo DSCN5186). Although, the impact of the oil at the time of the walkover was not considered to be major, investigation of the source would be beneficial as the discharge may be greater at other times.

Photo DSCN5180. Habitat towards the upper limit of Reach 3b, a short distance d/s of the A184.

Photo DSCN5184. Obvious signs of the pre-realignment paleo channel as a low, more sinuous wetted area of the field.

Photo DSCN5186. The suspected source of a light oil slick on the water surface.

The remainder of this section, from North Road d/s, represents the highest quality/most natural habitat of the entire river and, although impacted, provides a reminder that this river should naturally support salmonids. Presumably the urban location has reduced the extent of realignment and subsequent re-dredging that is so apparent on more rural/agricultural sections. This has allowed the retention/re-establishment of a greater extent of natural substrate and some semblance of a pool and riffle sequence (Photo DSCN5196).

Photo DSCN5196. A more discernible pool and riffle sequence was observed in many areas of Reach 3b, despite evidence of past realignment.

A basic buffer strip alongside the watercourse provides valuable overhanging and trailing cover habitat and improves bank stability, although some areas of high, eroding bank were observed. It would be easy to overlook this section for restoration as it is already the best habitat on the catchment; however, improvements here could provide real benefit for the impoverished fish and invertebrate populations.

The lesser degree of straightening and bed lowering (and greater width variation) has preserved some degree of substrate retention and sorting (Photos DSCN5201 & Photo DSCN5213). This provides valuable areas of gravel, on which trout (Photo DSCN5244) were observed to be spawning (Photo DSCN5254). This is the only Reach with multiple fish sightings.

Photo DSCN5201. Where sharper bends remain, they provide valuable deeper water pool habitat, adjacent to shallower riffle areas. An important combination for salmonid and invertebrate habitat.

Photo DSCN5213. The lack of (or reduced occurrence of) recent dredging and ongoing maintenance has allowed the retention/development of a more natural channel (although clearly modified in places).

Photo DSCN5244. A c. 250mm brown trout (circled red).

Photo DSCN5254. The redd at which the trout (Photo DSCN5244) was first observed. The composition of the gravel is sub-optimal for spawning but about as good as it gets for small resident trout on the Don.

Despite being the highest quality habitat observed, this area is far from optimal and represents an ideal location for restoration, with suitable adjacent land use (restoration would actually enhance the area) and potential to capitalise upon the greater diversity of fauna already supported. This area could then provide a stronghold/refuge population from which the rest of the river can be repopulated.

Four additional impacts were observed within the reach: a very unsympathetically installed outfall (Photo DSCN5202); a grey water outfall (pollution) and revetted bank (Photos DSCN5258 & DSCN5260); and a weir/possible pipe crossing around the mid-point of the reach, u/s of the New Road crossing (Photo DSCN4806) which impounds flow, interrupts sediment transport and inhibits fish passage. The actual road culvert poses no barrier for sediment or fish.

Photo DSCN5202. Very unsympathetically installed outfall that is also likely to have created a minor pollution (NZ 34964 61438). This area will now be subject to severe scouring and erosion at high flows.

Photos DSCN5258. Grey water discharge/pollution (NZ 35738 61798).

Photo DSCN5260. An area of concrete walling/bank revetment degrades the riparian habitat quality.

Photo DSCN4806. A weir/possible pipe crossing immediately u/s of New Road (NZ 35812 61959) impounds the river u/s, inhibiting fish passage and sediment transport.

2.6 Reach 3a d/s of Boldon North Bridge (New Road)

In contrast to the slightly higher quality habitat of Reach 3b, land use in 3a (d/s of New Road) reverts to agriculture and the channel is again straightened, and heavily re-sectioned, providing poor habitat quality for salmonids and invertebrates. The generally uniform channel, combined with removal of much of the coarse cobble substrate, has left an incised channel with relatively uniform bed (Photo DSCN4809). Some gravels remain but they are heavily impacted by an over-supply of fine sediment and lack of substrate sorting (Photo DSCN4816). The impacted character of the river continues throughout much this reach (Photo DSCN4820), d/s, to another railway (disused) culvert, which poses no issue to fish passage (Photo DSCN4829).

The level of turbidity appeared to increase significantly in this reach, although owing to the increased depth of much of the reach, it was difficult to identify exactly where; especially as there was a general ongoing increase in turbidity along the length of the river, to a greater extent that should naturally occur.

Photo DSCN4809. The channel d/s of New Road retains some bends but is straightened, incised and of uniform dimensions for long sections. The resulting substrate and general habitat quality is poor.

Photo DSCN4816. Gravel lift and potential small salmonid spawning substrate severely compromised by fine sediment and a lack of sorting.

Photo DSCN4820. Put simply, the most heavily dredged and realigned sections do not provide salmonid habitat.

Photo DSCN4829. The old railway culvert u/s of Newton Garth Farm (NZ 35520 62534). Deep water and natural substrate though the culvert pose no issues for fish passage.

At Newton Garth Farm, habitat quality is further degraded by a lack of buffer fencing and livestock (horse) access to banks (Photo DSCN4831), where further fine sediment inputs result (Photo DSCN4836). Adjacent to the farm, a pipe crossing creates a potential impediment to fish passage and increased flood risk (Photo DSCN4835).

Obvious pre-realignment paleo-channels on the LB and RB, d/s of the farm provide a clue as to a more natural sinuous planform (Photos DSCN4839 & DSCN4843. These areas also highlight possible areas for river restoration, should permission be obtainable.

Photo DSCN4831. Around Newton Garth Farm a lack of vegetated buffer allows livestock access to the river bank, denuding it of vital vegetation.

Photo DSCN4836. Livestock trampling and poaching is resulting in further fine sediment input to the river.

Photo DSCN4835. A pipe crossing at Newton Garth Farm (NZ 35408 62585) poses a potential issue for channel blockage, fish passage, flooding and possibly pollution, should it break.

Photo DSCN4839. Paleo-channel on the LB (NZ 35187 62680).

Photo DSCN4843. Paleo-channel on the RB.

Towards the d/s end of Reach 3a, the adjacent land use changes (possibly along the outskirts of a historical mining area) and, aside from a significantly straightened and concrete-lined section (Photo DSCN4855), the form and habitat quality of the river improves. An old weir-like structure has degraded, now posing no issue to fish passage (DSCN4863), and the habitat quality d/s (including substrate diversity) improves somewhat. This may again be due to a lesser extent of straightening, dredging and re-dredging in comparison to agricultural areas.

A proliferation of pipe crossings occurs in this area and continues within Reach 2 (Photo DSCN4865). Where elevated above the channel, these pipes pose a potential blockage issue that could then prevent fish passage if flood debris obstructs the river channel. Straightening has clearly been undertaken in places (Photo DSCN4868). The general physical habitat quality is likely to be capable of supporting salmonids but is far from good. The water quality may be questionable as it grey/turbid.

Photo DSCN4855. Straightened, concrete-lined channel.

Photo DSCN4863. The remains of an old weir now poses no major issue to habitat, fish passage or sediment transport.

Photo DSCN4865. A series of pipe crossings start at the d/s end of Reach 3a. This one poses no real issues at low flows (unless it is breached) but is likely to have potential for blockage with debris at higher flows.

Photo DSCN4868. Obvious signs of straightening - the red line depicts a past, naturally more sinuous channel.

2.7 Reach 2

The physical habitat within much of Reach 2 appeared capable of supporting salmonids but was of a generally degraded quality and turbidity was high. Pipe crossings throughout much of the reach pose issues for sediment transport and fish passage, although none are major/impassable barriers (Photos DSCN4871, DSCN4873, DSCN4875 & DSCN4878). Also evident in Photo DSCN4878 is a flap valve; from this point a significant increase in the amount of sewage litter was observed. A grey water outfall just u/s of the Metro line culvert poses another water quality issue (Photo DSCN4879), but the culvert appears to provide free sediment and fish passage (Photo DSCN4882). However, the culvert is long and it was not possible to ascertain whether there are any obstructions on the bed within it.

In the short section of river between the Metro culvert and the A19 culvert two further obstacles were identified. The first, a small rock ramp (likely protecting a pipe crossing) poses minimal issue to fish passage but does create a small impoundment (Photo DSCN4886). The second, a small concrete weir poses a greater obstacle to fish passage, creating a vertical step with relatively shallow water d/s and over the structure (Photo DSCN4888).

Photo DSCN4871. Small impoundment and minor issue for sediment and fish passage.

Photo DSCN4873. Small impoundment and minor issue for sediment and fish passage.

Photo DSCN4875. Small impoundment posing a slightly greater issue for sediment and fish passage.

Photo DSCN4878. Small impoundment and issue for sediment and fish passage. Note the blue flap-valve in the background (blue circle) and sewage litter d/s on the far bank (red circle) that appeared to increase from this point.

Photo DSCN4879. Grey water discharge and sewage fungus just u/s of culvert (NZ 34251 62786).

Photo DSCN4882. The partially sunken nature of the culvert appears to pose no problem to fish passage or sediment transport.

Photo DSCN4886. Small rock ramp that is relatively passable to fish but creates a small impoundment u/s.

Photo DSCN4888. Concrete step/weir and shallow water create a small obstacle to fish passage.

At the d/s end of the A19 culvert, a collapsed side-wall creates a step and small obstruction (Photo DSCN4890). The sloping nature of the concrete block provides some water depth over the structure. Such obstructions should generally be removed, but in this instance the block may be acting as a pre-barrage and increasing water depth at the weir u/s, thereby improving its passability until fish passage at the weir can be improved. A further pipe crossing a short distance d/s of the A19 culvert poses another minor obstacle (Photo DSCN4895).

Although likely to be capable of supporting salmonids, the turbidity of the water is clear evidence of poor water quality discharges and the cumulative impact of fine sediment inputs u/s; correspondingly, even where coarser gravels are present, they are heavily laden with fine sediment and provide very poor invertebrate habitat (Photo DSCN4893). It is highly unlikely that salmonids would even attempt to use such substrate for spawning.

Photo DSCN4890. Collapsed side-wall that creates another obstacle but appears to be acting as a pre-barrage to the weir u/s of the culvert, making its retention beneficial in the short-term.

Photo DSCN4895. Minor obstruction created by another pipe crossing.

Photo DSCN4893. Even where the basic characteristics for salmonid spawning habitat are present, the fine sediment loading of the substrate is likely to preclude its use.

Immediately u/s of Headworth Lane, the river flows through gardens, within a walled channel. A partially sunken pipe culvert poses no issue to fish passage but is likely to restrict high flows and sediment transport (Photo DSCN4905). Three weirs within the gardens also create obstacles to fish passage and sediment transport. The first is relatively passable (Photo DSCN4906), but the next has collapsed and blocks the channel (Photo DSCN4911); the final weir/possible pipe crossing creates an obvious step above relatively shallow water and is a major issue for salmonid and eel passage, particularly at lower flows (Photo DSCN4909). Headworth Lane road culvert d/s of the gardens poses no issues (Photo DSCN4908).

Photo DSCN4905. Partially sunken pipe culvert posing no issues.

Photo DSCN4906. Small stone weir which is reasonably passable but should be removed.

Photo DSCN4911. Collapsed weir partially blocking the channel (red ellipse). The extent of the obstruction could not be ascertained without further inspection (requiring waders).

Photo DSCN4909. Pipe crossing with relatively shallow water on the d/s side creates an issue for fish passage at low-medium flows and is probably a significant barrier to eels (further inspection required).

Photo DSCN4908. A sunken road culvert with natural bed poses no real issues for fish or sediment movement.

No further obstructions were noted between Hedworth Lane and the A194 culvert. The habitat in that area is slightly improved by the greater presence of meanders, although channel straightening/realignment has clearly also been undertaken in places (Photo DSCN4912). The substrate provides relatively poor habitat quality, even in areas of diverse flow, but cover and structure are available within the channel that should be capable of supporting salmonids (Photo DSCN4914), providing the water quality is sufficient. Although The A194 culvert is long, both ends appeared to support sufficient water depth to allow fish passage (Photos DSCN4918 & DSCN4920).

Restoration in the upper section of this reach may be possible, owing to the minimal land use, but the pipe network may make the work infeasible. The short section between Hedworth Lane and the A194 also provides an opportunity but is not considered to be one of the highest priority areas on the river, certainly not from a fish and invertebrate habitat perspective.

Photo DSCN4912. Modified, straightened channel but some meanders remain.

Photo DSCN4914. Overhanging and trailing cover provide some improvement to fish habitat but he bed material is choked with fines, even where flow is of higher velocity.

Photo DSCN4918. Natural bed material at the u/s end of the A194 culvert.

Photo DSCN4920. The well-sunken d/s end of the A194 culvert.

2.8 Reach 1

At the u/s end of Reach 1 a pipe crossing poses an obstruction to flood debris that is likely to block, restricting fish passage (Photo DSCN4923). An adjacent double flap combined sewer overflow (CSO) poses the potential for significant impact upon water quality owing to the impounded/near stagnant nature of the river at this point (Photo DSCN4924).

This area of river (upper Reach 1) represents the largest area of poor quality habitat for rheophilic fish and invertebrates. The large scale realignment and channel re-sectioning has created a channel with minimal flow or depth diversity for an extended length. Occasional overhanging/trailing willows provide some cover (Photo DSCN4925) but are barely sufficient to increase flow diversity within the over-capacity channel (Photo DSCN4926). Just u/s of the offtake for a small wetland, the channel appears to have been so over widened that the loss of flow energy has allowed emergent vegetation to encroach across most of the channel (Photo DSCN4929). Similar issues were observed in the area d/s of the wetland where the channel ranges from overwide and choked to deep and narrow (Photo DSCN4940). A small concrete bag weir (Photo DSCN4947) and other raised bed cross sections further d/s are likely to further exacerbate the lack of flow/gradient.

Photo DSCN4923. Pipe crossing partially blocked with flood debris. This is unlikely to pose an issue to fish passage unless it becomes completely blocked. Note that even though partially blocked, the constriction is barely sufficient to create flow diversity within the over-capacity channel.

Photo DSCN4924). Large double flap valve which appears to be a CSO by the sewage litter observed on the screen. Any sewage discharge into such a low flow river section is likely to pose water quality issues.

Photo DSCN4925. Occasional willows provide some cover but are insufficient to improve flow diversity.

Photo DSCN4926. Typical channel and lack of flow within much of the upper section of Reach 1.

Photo DSCN 4929. In the widest sections flow velocity is so low that emergent vegetation has encroached across most of the channel (probably assisted by uniform sediment deposition). Some areas are barely recognisable as a river.

Photo DSCN4940. Overly deep and narrow channel resulting from past re-sectioning and realignment.

Photo DSCN4947. Small impoundment caused by a concrete bag weir. This is passable but the flow characteristics upstream would be improved by its removal.

A short distance d/s, Monkton Burn joins the Don and provides the source of Japanese knotweed (*Fallopia japonica*) on the river (Photo DSCN4944). A fixed bed cross-section/possible pipe crossing (Photo DSCN4950) and weir pose a small issue to fish passage and should ideally be removed. However, if the upper structure is an active pipe crossing that can't be removed, the weir may actually improve fish passage somewhat by creating a pre-barrage, with access via the broken/collapsed RB side (Photo DSCN4952). On the d/s side of the weir areas of slightly improved habitat were observed but channel straightening limits their value (Photo DSCN4953). Between the weir and Cemetery Road d/s, another large flap valve with sewage litter (Photo DSCN4956) and a small weir/possible pipe crossing (Photo DSCN4957) were noted.

Immediately u/s of the Cemetery Road culvert, Bede's Burn joins the river via a culvert perched well above the river bed level, making it poorly passable to fish (Photo DSCN4959). However, subsequent inspection of aerial photography would suggest that the burn culverted for much of its length and likely to be of minimal habitat value.

Photo DSCN4944. Monkton Burn – the source of Japanese knotweed on the Don.

Photo DSCN4950. A fixed, concrete bed cross-section, possibly protection of a pipe crossing. If that is not the case or the pipe is disused the structure should be removed.

Photo DSCN4952. Weir, possible other pipe crossing. This currently provides some pre-barraging for the u/s weir but, ideally, both structures should be removed if possible.

Photo DSCN4953. Outside the influence of the raised bed sections habitat improves a bit, although the channel is still straightened.

Photo DSCN4956. A large flap valve/CSO with sewage litter (NZ 33063 64320).

Photo DSCN4957. Small weir/possible pipe crossing – such structures should be removed if they are not protecting active infrastructure.

Photo DSCN4959. Bede's Burn discharging to the River Don via a poorly passable, perched culvert.
Owing to the extent of modification, this tributary is likely to provide minimal habitat value anyway.

The Cemetery Road culvert poses no obstacle to the free movement of fish and sediment (Photo DSCN5958). The channel immediately d/s of the culvert has widened (Photo DSCN4960), likely due to the focusing of flow through the culvert and the increased head-loss immediately u/s as a result of straightening further u/s. This is facilitating some habitat improvement in what is otherwise a very uniform channel with only the occasional muted bed feature (Photo DSCN4965) until it again becomes widened around the A19 (Photo DSCN4803) and other culverts/crossings in the area.

Two notable water quality issues were evident in this area: the first, a suspected wrong connection, probably associated with the adjacent housing estate (Photo DSCN4805) and the second, another large CSO surrounded by sewage litter (Photo DSCN4802).

The river was not walked d/s of the A19, although brief inspection of aerial imagery reveal it remains largely straightened and featureless. A short distance d/s of the A19 the river becomes tidal. Restoration may be possible in large areas of Reach 1, dependent upon the locations of surrounding infrastructure that may render restoration cost prohibitive. This could be easily ascertained through service checks. The actual land use should be relatively conducive to river restoration.

Photo DSCN5958. Cemetery Road culvert – no issue for fish or sediment movement.

Photo DSCN4960. Area of scour d/s of Cemetery Road culvert that has facilitated formation of a gravel bar.

Photo DSCN4965. A slightly raised area of bed/coarse substrate; one of very few features in the lower section of Reach 1.

Photo DSCN4805. Suspected wrong connection draining straight into the river (NZ 33353 64608).

Photo DSCN4802. Yet another large CSO that clearly discharges unscreened waste into the river (NZ 33436 64685).

Photo DSCN4803. Around and under the A19, wider areas of channel where the gradient remains provide some coarser substrate habitat but the fine sediment and poor water quality is clearly visible.

3.0 Recommendations

3.1 Reach 7

Investigate suspected fine sediment issues/sources around grazed fields. The likely solution would be simple buffer fencing and improved land management/reduced stock density.

3.2 Reach 6

Issue	Proposed action	Photo	Priority (1-3)
Channel modification - Golf Course	Possible channel restoration if agreeable with Golf club.	DSCN4980	3
WQ issues	Sample outfall / invertebrate surveys d/s.	DSCN4989	1
Channel modification - agricultural land	Consider options for future river restoration. Difficult with adjacent land use.	DSCN4997	3
Barrier to fish movement	Remove debris dam from incised channel	DSCN5004	1
Barrier to fish movement	Create rock ramp that partially drowns/increases depth in culvert.	DSCN5035	1
Barrier to fish movement	Remove bridge/culvert – if not possible, create rock ramp.	DSCN5039	1
Barrier to fish movement	Create rock ramp. If not possible increase depth in culvert/install baffles.	DSCN5049	1

3.3 Reach 5

Issue	Proposed action	Photo	Priority (1-3)
Channel modification	Seek full river restoration of River Don and tributary. Ideal opportunity to improve fish and invertebrate habitat in a conducive reach.	DSCN5052 & DSCN5089	1

Pollution from midden too close to watercourse	Ensure no further farm/stable waste is dumped by the watercourse.	DSCN5099	1
Suspected poorly maintained sceptic tank/sewage discharge	Investigate WQ.	DSCN5105	1

3.4 Reach 4

Issue	Proposed action	Photo	Priority (1-3)
Channel modification	Seek full river restoration.	DSCN5127	1
Passability at A19 Culvert	Investigate passability through A19 culvert.	DSCN5130	1

3.5 Reach 3b

Issue	Proposed action	Photo	Priority (1-3)
Sewage smell	Investigate area around NZ 34602 60965), although the source could not be identified. At NZ 34721 61242	N/A	1
Oil on water surface	Investigate culvert discharge NZ 34721 61242	DSCN5186	2
Channel modification	Investigate options for restoration within community ground – possible easy win as a higher habitat quality refuge area and to increase amenity value of the area.	DSCN5213	1
Inappropriate consenting or unconsented work	Raise issue with the council.	DSCN5202	1
Poor WQ	Investigate discharge.	DSCN5258	1
Weir/pipe crossing u/s of New Road culver	Investigate purpose/service check then remove or ease, as appropriate.	DSCN4806	1

3.6 Reach 3a

Issue	Proposed action	Photo	Priority (1-3)
Channel modification	Seek options for channel restoration, although unlikely owing to adjacent agricultural land use.	DSCN4820	3
Lack of buffer / livestock access / bank erosion at Newton Garth	Seek buffer fencing along watercourse at Newton Garth Farm.	DSCN4831 & DSCN4836	1
Pipe crossing / possible barrier / flood risk	Investigate options for alteration to pipe crossing.	DSCN4835	3
Channel modification	Investigate options for river restoration. Obvious paleo-channel and associated loss of grazing land.	DSCN4839 & DSCN4843	2
Channel modification	Investigate options for river restoration on rough ground u/s of Metro line. Service checks may eliminate this area owing to pipe network.	DSCN4868	3

3.7 Reach 2

Issue	Proposed action	Photo	Priority (1-3)
Channel modification	Investigate options for river restoration on rough ground u/s of Metro line. Low-ish priority as channel is moderate condition and service checks may eliminate this area owing to pipe network.	DSCN4871	2
Barrier to fish movement	Install easements at pipe crossings. Structures relatively passable, so only moderate priority.	DSCN4875	2/3

CSO discharge / litter	Investigate with NWL why sewage litter / unscreened waste is clearly regularly being discharged to a watercourse.	DSCN4878	1
WQ u/s Metro Line culvert	Investigate suspected wrong connection.	DSCN4879	1
Barrier to fish movement	Rock ramp. Alternatively notch/chamfer the structure. If neither of previous possible: baffle on crest to increase depth with installation of an adherent nappe on step	DSCN4888	1
Barrier to fish movement	Once fish passage is addressed at u/s structure, remove collapsed sidewall. DO NOT remove until u/s step/weir issue is addressed as the collapsed sidewall is providing a pre-barrage.	DSCN4890	2
Barrier to fish movement	Investigate options to notch/remove small stone weir	DSCN4906	3
Barrier to fish movement	Further assessment of collapsed weir and weir removal	DSCN4911	1
Barrier to fish movement	Investigate / service check pipe crossing: remove if inactive. If still in use, ease (possible rock ramp).	DSCN4909	1
Channel modification	Options for river restoration on rough ground between Hedworth Lane and A194. Short section but no issues with land use.	DSCN4912	3

3.8 Reach 1

Issue	Proposed action	Photo	Priority (1-3)
CSO discharge / litter	Investigate (NWL) why sewage litter / unscreened waste is being discharged to a watercourse.	DSCN4924	1
Channel modification u/s end of Reach 1	Investigate options for river restoration. Severely degraded channel (not suitable for salmonids) with great potential for restoration on community land.	DSCN4926	2
Barrier to fish passage	Remove concrete bag weir.	DSCN4947	1
Invasive species	Investigate source of Japanese knotweed on Monkton burn and treat with herbicide	DSCN4944	1/2
Barrier to fish movement pipe crossing and weir.	Investigate / service checks for structures. If not live, remove. Possibly improve weir passability if not removed.	DSCN4950 & DSCN4952	2
CSO discharge / litter	Investigate with NWL why sewage litter / unscreened waste is being discharged to a watercourse.	DSCN4956	1
Barrier to fish movement	Investigate / service checks for structures. If not live remove. If live, notch/baffle/nappe.	DSCN4957	2
Channel modification	Options for river restoration. Adjacent land suitable but possible pipe line.	DSCN4965	2
WQ	Investigate wrong connection	DSCN4805	1
CSO discharge / litter	Investigate with NWL why sewage litter / unscreened waste is being discharged to a watercourse.	DSCN4802	1

4.0 Further assistance

The Tyne Tributaries Walkovers were initiated to identify the range and location of issues impacting upon selected underperforming watercourses within the River Tyne catchment. The accompanying reports highlight potential solutions to the issues encountered and provide the supporting evidence for future projects and funding bids.

Further to the walkover reports, the WTT can undertake specific Project Proposals for the more complex issues highlighted, detailing exactly what is required and how the work can be undertaken. Project Proposals then often form the supporting documentation for any EPR applications and consents that may be required.

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/index

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 stocks and managing invasive species.

The DVD is available to buy for £10.00 from our website shop http://www.wildtrout.org/product/rivers-working-wild-trout-dvd-0 or by calling the WTT office on 02392 570985.

5.0 Acknowledgement

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6.0 Disclaimer

This report is produced for guidance; no liability or responsibility for any loss or damage can be accepted by the Wild Trout Trust as a result of any other person, company or organisation acting, or refraining from acting, upon guidance made in this report.