Pont and Blyth Investigation

River Pont – from Fenwick Burn to Med Burn

(Waterbody ID - GB103022076840)

Date 19/12/11

1.0 Introduction

This report is the output of a site visit undertaken by Gareth Pedley of the Wild Trout Trust to the River Pont, on 19 December 2011. Comments in this report are based on observations on the day of the site visit.

Normal convention is applied throughout the report with respect to bank identification, i.e. the banks are designated left hand bank (LHB) or right hand bank (RHB) whilst looking downstream. Location coordinates are given using the Ordnance Survey National Grid Reference system.

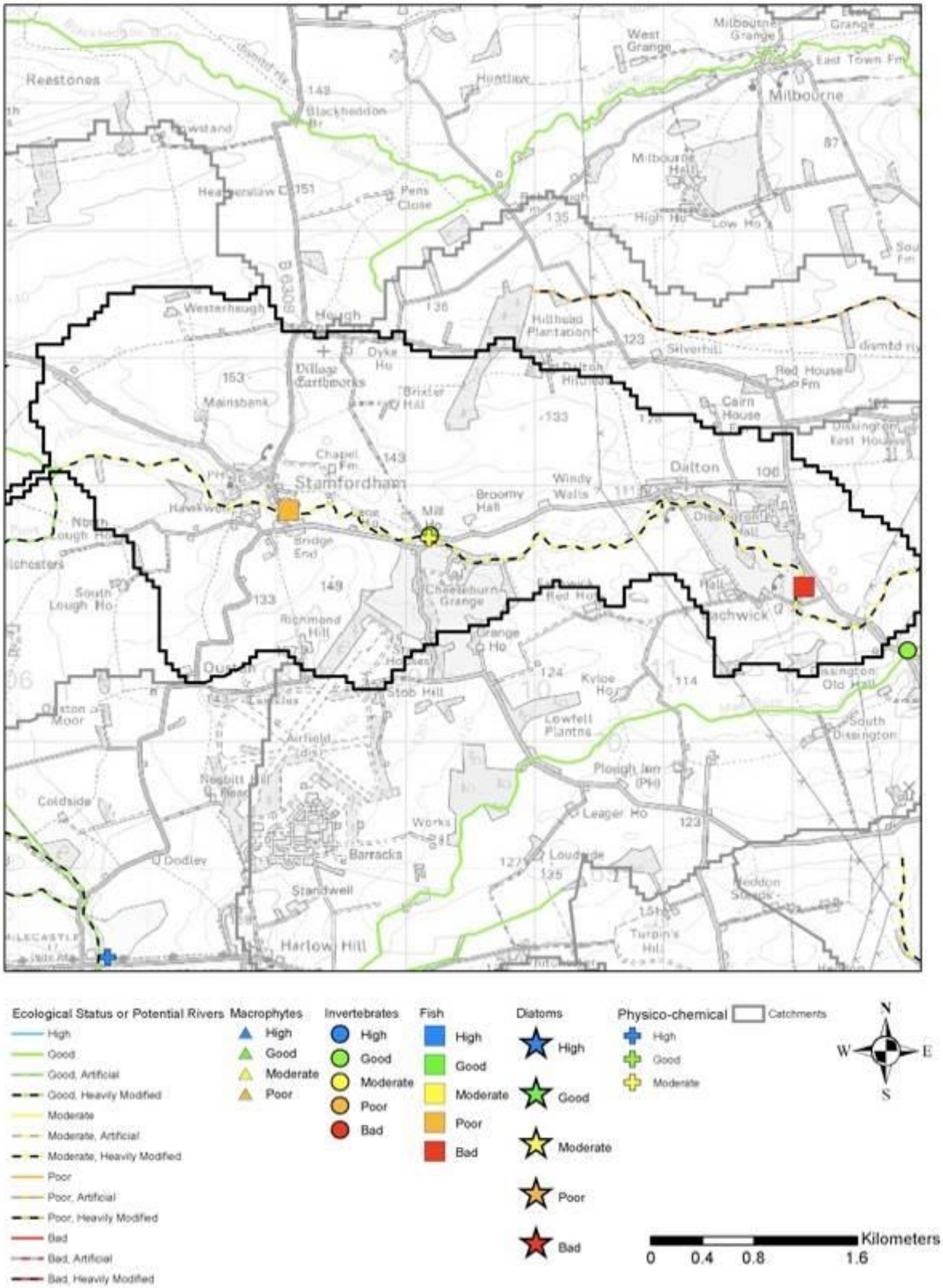
The walkover assessment was undertaken from the upstream limit of the waterbody, starting at the Fenwick Burn (NZ0586572276), following the course of the river to the downstream limit at the Med Burn confluence (NZ1302371379).

The River Pont from Fenwick Burn to Med Burn waterbody has been assessed as moderate for fish under the Water Framework Directive (WFD) classification which suggests that less fish are present than would be expected.

This report will aim to assess the suitability of habitats for fish within the waterbody, identifying pressures and possible mitigation measures that can be undertaken to improve habitats.

A map showing the extent of the waterbody and brief detail on its WFD designation can be found on the next page.

Ecological Status or Potential for GB103022076840



2.0 Habitat Assessment

2.1 Upper limit (NZ0586572276) to Stamfordham (NZ0769471853)

Access to the upstream limit of the waterbody was gained along the Fenwick Burn at the bridge to Fenwick Sheild (NZ0586572276), and walked from there, down to its confluence with the River Pont.

It was immediately apparent that the Fenwick Burn was subject to significant dredging and straightening which has left a uniform clay/earth channel with little natural stream bed material present. This greatly limits the potential of the tributary for spawning due to an absence of suitable substrate. The habitat of the Burn is also compromised for juvenile and adult trout by the uniformity of the channel and flow, and general lack of aerial cover.

The Burn was buffer fenced downstream of the bridge with single breast barbed wire that would prevent cattle access to the LHB in all but a drinking area (Picture 1). However the fence was not suitable to exclude sheep. Grazing in the field appears to have prevented beneficial riparian vegetation from becoming established (this may have occurred before the fence was erected). The RHB is protected by a buffer strip which separates it from arable land use.

The adjacent un-named Burn/drain was also fenced in its lower reaches but due to small size and lack of natural substrate was also unlikely to provide much spawning habitat for fish. The Fenwick and adjacent Burns may provide some habitat for juvenile fish if present, but both of these burns would benefit from the reinstatement of a more natural gravel bed.

Picture 1. Fenwick Burn. The channel is straightened and uniform, with little cover on the LHB. Some cover is provided on the RHB where livestock are excluded.

On the day of the walkover the Fenwick Burn appeared to be the main constituent of the waterbody, providing more water than either the upper River Pont or adjacent Burn. The size of the River Pont catchment and size of the river upstream would suggest that it should be the largest of the three. Abstraction is known to occur in the upstream waterbody on the Pont and with this in mind it is suggested that the level of abstraction and compensation flow be investigated.

Picture 2 (NZ0634372139). River Pont on the left. The main channel to the right is the Fenwick Burn, and the adjacent Burn enters on the right about half way up the picture.

The main river channel below the confluence was subject to similar dredging activity to the tributaries, identifiable by the trapezoidal channel profile and dredged spoil embankment in picture 3. This has left the channel straightened and over deep, with consequential lack of fish habitat. The channel in this section varied from 1.5-4m wide and 0.4-1.5m deep. This is much narrower and deeper than other more natural reaches.

Where present, and maintained, buffer fencing offered protection to riparian vegetation. This vegetation provided cover and flow diversity, narrowing the channel to <1m and slightly increasing sinuosity within the straightened channel. In the narrowed sections bed material was relatively clean and although not suitable size for spawning should provide beneficial invertebrate habitat. In many areas the buffer fence had fallen into disrepair (Picture 3) and was not completely stock-proof limiting the protection it provided. The section would greatly benefit from maintenance of the fence to exclude stock fully and allow further establishment of riparian vegetation.

Picture 3. Increased channel sinuosity from encroaching marginal vegetation within buffer fenced areas (NZ0680972227). Fence in need of repair to allow vegetation to establish as on far bank.

There was a general lack of riparian trees throughout much of this section and habitat along the river would greatly benefit from planting of species such as alder (*Alnus glutinosa*) and native willows (*Salix sp.*); maintenance of a buffer fence would help to facilitate this by protecting them from livestock.

2.1 Stamfordham Village (NZ0769471853-NZ0805771797)

Much of the dredging observed on the river associated with land drainage for agriculture ceased as the river enters Stamfordham. Here, the river becomes more natural with shallow riffles occurring and a natural range of substrate type. Through the village, channel maintenance appeared greatly reduced and consisted primarily of small scale bank revetment to protect property frontage. This allowed a more natural range of depth and width to the channel which exhibited good stretches of 0.3m or less deep riffles, interspersed by deeper pool areas and the channel was a more natural 4-5m width. The reduction of dredging in this area may also be influenced by the presence of bed rock in several areas.

Shallower riffle sections through the village were the first areas where healthy *Ranunculus* beds were observed within the waterbody and where habitat and substrate were suitable, trout had attempted to spawn. There was evidence of several attempted redds and one definite redd of a size that would suggest sea trout spawning (approx 100cm).

Picture 4. Large trout spawning redd in Stamfordham (NZ0787371883).

In the section upstream of the main road bridge some dredging had again taken place, presumably to reduce flooding. In this section habitat quality was again reduced by the resulting over wide, deep and straight channel but an absence of grazing had allowed some naturalisation of the channel and aerial cover was provided in places by overhanging willows.

2.2 Stamfordham Bridge (NZ0805771797) to Mill House Bridge (NZ0805471801)

The section downstream of the road bridge in Stamfordham, down to the EA gauging station was tree lined and provided some riffle and glide habitat, but was very straight and appeared to have been dredged from about 30 metres below the bridge. A shoal of grayling was observed here which is encouraging following recent pollution incidents in the area.

From the gauging station down, the LHB was heavily grazed, providing little habitat and a potential sediment source to the river. The RHB had a healthy buffer fenced strip and stable bank. This situation, as with the dredging, extends downstream through the section to a point below the Stamfordham sewage works outlet. From here down, both banks suffer from over grazing but there is a notable bend where a reduction in dredging means that habitat could be greatly improved (Picture 5). Buffer fencing would be beneficial wherever stock has access to the river but through this section the lack of dredging and suitable natural bed characteristics may allow spawning and juvenile habitat to establish if both banks are fenced. This would allow the channel to naturalise through marginal encroachment that would provide cover and increase velocity.

Picture 5. Potential for significant habitat improvement through buffer fencing (NZ0851171780).

Further downstream the channel is again dredged and exhibits the same issues described on upstream sections. Similarly, where livestock have been excluded marginal vegetation encroachment and the associated natural channel narrowing have benefitted the river but there is little of the natural gravel substrate present. The increased depth means that although the channel is relatively narrow (down to 1m in places), it is still mostly too uniform in width, with a lack of flow diversity and gradient. In this section another suspected area of channel realignment was also visible (Picture 6).

Picture 6. The course of the old channel can be seen as a low lying area on the right of the picture. Emergent species extending up the LHB also show how bed material has been dredged from the channel (NZ0874471674).

A short distance further downstream the first notable weir in the waterbody was encountered (picture 7). Contours in the adjacent field suggest that the purpose of the weir was originally to provide water to Mill House. This point also marks a change in the channel characteristic as from here down to the bottom of the section (Mill House Bridge) the bed is slightly improved exhibiting cobble and some gravel substrate.


Picture 7. Mill House weir, causing water to be impounded upstream (NZ0894771603).

The weir is in a dilapidated state and poses no real issue to fish passage; however, the impounded section upstream drowns the natural channel characteristics and compromises potential spawning habitat.

At the tail of Mill House weir pool, fish have attempted to cut redds but hit bedrock through the shallow gravel layer (picture 8). This highlights the scarcity of spawning habitat in the area and increases the importance of removing barriers that compromise the habitat that is available.


Picture 8. Attempted spawning redd just downstream of Mill House weir. The dark areas are bedrock.

At this point the river enters a wooded area and the channel becomes constrained in many areas by stone wall bank revetment. Another double weir also impounds the flow. The weir poses no obstacle to fish passage but is likely to have a negative impact on potential of spawning areas upstream. The obstruction is caused by two ¾ width weirs that hold back water (Appendix A, Picture a). It was not obvious as to what purpose the weirs performed here.

2.3 Mill House Bridge (NZ0805471801) to Dalton (NZ1099371833)

Below Mill House Bridge, the channel continues to be constrained and consequently remains straight for long sections, with a regular width of around 5-6 metres (Picture 9). This results in a lack of pools and gravel bars but the greater gradient and bed level in this area, the presence of natural bed material (boulder to gravel), and the more natural flow characteristics mean that habitat in this area is generally of a higher quality for salmonids. This is particularly true with regards to spawning and juvenile habitat supported by the observation that wherever suitable size range for trout spawning were present, redds had been attempted.

Picture 9. Straightened channel constrained by revetment (NZ0926171578).

Although this section of the river flows through a wood, the woody debris expected in the watercourse was largely absent. Small scale clearing and logging in the wood may suggest that someone is removing this material from the watercourse. This is something that should be avoided where at all possible as trees and branches within the watercourse provide flow diversity and structure within the channel and increase habitat quality. If this material has the potential to be displaced and cause a flood risk downstream, it should be anchored in place and retained.

Small weirs were also present throughout this section and it is assumed that they were previous attempts to improve angling or fish stocks on the river as they are numerous and seem to serve no purpose. None of the weirs prevent fish passage but they may affect the function of the river by inhibiting substrate mobilisation and scouring flows. Many of the smaller weirs are of little consequence but there are several large enough to impound the river for more than 10m. Location details for these can be found in the recommendations section, with additional photos in Appendix A.

Much of the river bank downstream of the wood was buffer fenced and the habitat was of good quality. Redds were observed where substrate and flow were suitable. In some areas, dredging was evident, degrading habitat.

Most of the river bank through this section had stone revetment which had in places washed out. Constraining the river within stone walled channels is not conducive to good habitat, limiting the potential for the creation of natural channel features such undercut banks and overhanging cover. However, the walls had obviously been in place for a long time and the river has naturalised to an extent within the channel. The lack of dredging in most parts and natural gradient creates a reasonably healthy pool and riffle habitat (Picture 10).

Picture 10. Typical habitat for much of the section between Mill House Bridge and Dalton. The habitat is generally more natural, but with stone revetment in sections on both banks.

2.4 Dalton (NZ1099371833) to Eachwick Bridge (NZ1204171073)

At the upstream edge of Dalton the river passes through a series of gardens where it is further constrained by high walls for approximately 200m. It then passes into deciduous woodland at which point several trout were observed, ranging from 15-25cm. They were congregated in a pool with good cover provided by woody debris within the channel (Picture 12). This demonstrates the value of woody debris-type habitat which can greatly improve the fish-holding capacity of a pool.

Unfortunately, the log providing the cover had been cut, presumably to allow it to wash out in a flood. The level of elevation of the houses above the river means that that the log is unlikely to have caused flooding and so it would have been beneficial to retain the structure for habitat.

Picture 12. Woody debris within the channel. This greatly improves the holding capacity of the pool but is likely to be lost in the next flood.

Shortly below this point the river bed became very grey with what appeared to be sewage fungus (Picture 11). This is usually associated with an elevated nutrient loading, possibly indicating chronic sewage pollution in the area. Correspondingly, no fish were observed for over 100m downstream.

Due to the rural location of the buildings it is quite possible that they are operating sceptic tanks. Leaking tanks are certainly a possible cause of the observed issues which should be investigated further.

Much of the river bed from this point down to Eachwick Bridge exhibited a grey or brown coating, again suggesting excessive nutrient loading. Algal growth, even in the well tree lined areas, was elevated well above that observed in upstream sections, even when compared to areas with better light penetration through the canopy.

Picture 11. Greyish coating on river bed (NZ1120671887), approximately 150m downstream of Mill Bank House.

Picture 12. Gravel with uncharacteristic grey film still evident much further downstream (NZ1203371175). The substrate appeared to be suitable for spawning but had not been used, unlike similar gravel upstream. Buffer fencing in this area would allow natural vegetation encroachment into the channel increasing flow velocity and improving the habitat as a potential spawning area.

At the point where the river emerges from the wood an old concrete ford poses a barrier to fish migration (Picture 13). This is unlikely to pose an obstacle to larger fish in medium or higher flows, but is likely to limit fish passage at lower flows due to the shallow water depth and uniform the bed. This type of structure is also likely to be significant a barrier to juvenile fish, preventing their exploitation of upstream habitats. It was obvious from recent tyre tracks that the ford is still in use.

Picture 13. Concrete ford which poses a barrier to juvenile fish migration, and adult fish migration at low flows (NZ1148571797).

Approximately 200m below the ford were the remains of a derelict weir and sluice system (NZ1157571685). The purpose of this appeared to be the feed for a defunct leat on the LHB. The weir was barely recognisable and posed no issue to fish passage but still impounds the river for approximately 100m upstream.

The bank in this area appeared to have been previously protected either by a fence, or by a buffer being left between the river and any mowing (Picture 14). Correspondingly, the marginal vegetation was abundant and healthy, providing good cover and bank protection.

Picture 14. Buffer strip between field and river bank (NZ1156471693).

A short distance downstream the river enters an area of horse grazing on both banks. From here down to Eachwick Bridge, most of the banks are heavily grazed with little or no marginal cover and livestock poaching evident (Pictures 15 & 16). The habitat in this area was noticeably degraded; the livestock poaching is likely to input a significant sediment load to the river.

The majority of habitat was provided by flow diversity and bed substrate as the gradient was significant to create a pool and riffle sequence. Where the banks were wooded and stock did not have access, habitat was improved by aerial cover from overhanging tree bows. The channel in this section was generally wide and excessively silty, but had a natural range of substrate size incorporating suitable spawning substrate. This suitable substrate was seriously compromised by smothering from sediment, algae and other organic growth.

Buffer fencing here would allow much more dense marginal vegetation to establish, increasing bank stability and liberating less sediment to the watercourse. The vegetation would also encroach into the watercourse causing natural narrowing which would increase flow velocity and gravel cleaning. Much of this section would also benefit from an increased level of aerial tree cover but this is unlikely to be possible without fencing.

Picture 15. Over grazed banks and potential excess sediment source. Habitat is sub optimal due to the channel being wide, with an absence of aerial cover and marginal vegetation (NZ1168371539).

It is important to note that electrofishing data collected in this section suggests poor fish densities, worse than those in the upper sections of the waterbody. Initially this may seem anomalous as the habitat in this section was physically better in many aspects with a lesser degree of dredging and more natural channel characteristics. However, the nutrient enrichment observed at NZ1120671887, coupled with the heavily grazed banks, lack of marginal vegetation and associated aerial cover in the horse fields are likely to be significant contributing factors requiring further investigation.

2.5 Eachwick Bridge (NZ1204171073) to Med Burn (NZ1302371379)

The first field below Eachwick Bridge (NZ1204171073) is subject to the same management as the fields above and as such suffers from the same lack of vegetation, and sedimentation issues due to over grazing. From the second field, down to Dissington Bridge (NZ1254870933) both banks were subject to less grazing pressure and a slightly healthier range of vegetation was observed (Picture 16 the far ground). Buffer fencing here would still be advisable where livestock have access as this would provide better bank stabilisation and potentially allow some self-set trees to become established. If a fence were installed, planting within the fence would also be beneficial.

Picture 16. Intensive horse grazing in foreground, less intensive, presumed sheep grazing in far-ground behind the broken fence (NZ1244570903).

There was another significant weir in this section which is unlikely to be an issue for adult fish but may cause a behavioural barrier and an obstruction to juvenile fish. It also impounds the river for some way upstream (Picture 17).


Picture 17. Small weir causing an impoundment to the river (NZ1247470894).

Although re-sectioned for much of its length, the area directly downstream Dissington Bridge had much better habitat due to an absence of grazing pressure. This has allowed beneficial bankside trees to become established which provide a suitable balance of light and shade. The channel was incised through most of this section but appeared to have naturalised to an extent with natural bed material and some sinuosity provided by marginal vegetation encroachment (Picture 18).

Picture 18. Well vegetated banks below the second bridge (NZ1272371167).

The bottom field of this section down to the Med Burn confluence was heavily grazed on the LHB. This has led to bank erosion and increased sedimentation of the watercourse (Picture 19). As with other such sections this would greatly benefit from buffer fencing to create a more naturalised channel with marginal vegetation.


Picture 19. Overgrazed field that would benefit from stock exclusion through buffer fencing (NZ1276371305).

3.0 Recommendations

3.1 Pollution investigation

As an initial measure the suspected pollution occurring around Dalton should be investigated. It is possible that this is an intermittent or low level chronic discharge so a detailed site investigation may be required. Diatom sampling in the area and samples of the grey coating on the bed would also be beneficial. This factor alone could be rendering a long section of the river unsuitable for aquatic life.

3.2 Physical Habitat Improvements

Most of this waterbody has undergone major human modification including straightening/bank reinforcement, dredging and impounding. Consequently improvement to this waterbody must be considered at several levels.

3.2.1 Full Restoration

Where the river has been straightened the ideal remediation would be to re-meander or reinstate the original course. Due to the extent of this being in excess of 50% of the total waterbody, it is considered unlikely to be financially feasible at the current time. However, in line with other such projects currently being undertaken around the country this may be a consideration for some sections in the future. This would also require reinstatement of the natural bed material in many areas.

3.2.2 Removal of bank reinforcement

The next option would be to remove the constraining revetment and allow natural readjustment. This may be feasible in some areas where the channel has not been excessively dredged and there is a wide riparian zone and no infrastructure or valuable farmland directly adjacent to the river. This could be applicable to the section from Mill House Bridge (NZ0918771574) downstream to Dalton (NZ1098971830).

The ideal scenario for this would be to allow a sacrificial buffer zone. This would be set back from the river to allow natural readjustment once the reinforcement was removed. The area for adjustment would not need to be large in areas where the river was already sinuous, but would require more room in straighter areas.

The main restriction on this would be reluctance from the landowners to lose land, particularly as many of the modifications appear to have been created by landowners to improve drainage, straighten field boundaries and prevent erosion. In the majority of these cases erosion can be easily controlled by allowing a natural channel form and protecting a well vegetated buffer strip, as demonstrated in the areas that currently support healthy vegetation on the banks.

3.2.3 Buffer Fencing

If the measures detailed above are infeasible the minimum action required for this waterbody is exclusion of livestock from the riparian zone. This is particularly important in the heavily grazed sections.

Possible Buffer Fencing Location

NGR	Picture
NZ0680972227	3
NZ0851171780	5
NZ0874471674	6
NZ1203371175	12
NZ1168371539	15
NZ1244570903	16
NZ1247470894	17
NZ1276371305	19

As a single measure, stock exclusion from the riverbank would allow a greater diversity of herbaceous vegetation to establish and greatly increase the level of protection provided to the bank against erosion. Well-vegetated banks would provide valuable habitat for terrestrial wildlife in addition to the aerial cover provided to terrestrial and aquatic species, particularly fish.

With the inclusion of fencing, several areas identified in the report could possibly improve naturally to a state where they provide spawning and juvenile habitat (Pictures 5, 12, 15 and 19) and remediate the river towards good status.

3.2.4 Riffle Creation

Spawning habitat and natural recruitment on dredged sections could be greatly improved by installing gravel riffles in the areas where past dredging activity has occurred. The prime location for this would be from the upstream limit of the waterbody (NZ0634372139) down to Stamfordham (NZ0769471853) and on the Fenwick Burn (NZ0586572276).

To gain the full benefit of this the work should be carried out in conjunction with buffer fencing. The associated improvement in marginal vegetation would greatly enhance the carrying capacity of the river for juvenile salmonids, providing cover from predation and shelter from high flows.

Riffle creation would also be beneficial in other sections dredging has taken place, but it may be beneficial to remove/reduce weirs and any other channel modifications first in the areas that they are present and see how much naturalisation occurs.

3.2.5 Weir removal

Removal of the more significant weirs throughout the waterbody would greatly improve juvenile and spawning habitat. This would be achieved by reducing the level of impoundment to the river which would increase flow velocity and natural gravel cleaning. Beneficial transportation of bed material down the river would also be increased.

In most cases, removal of the middle third of each weir may be sufficient. This would retain a degree of channel narrowing, increasing scour and pool formation and improving habitat within the altered sections.

This remediation is of relevance to the weirs above Mill House Bridge (Pictures 7 & 17), and all weirs downstream of Mill House Bridge (Picture in Appendix A).

Weir picture reference and NGR locations.

Picture	NGR
7	NZ0894771603
a (Appendix a)	NZ0909671614
b (Appendix a)	NZ0987971454
c (Appendix a)	NZ0999171590
d (Appendix a)	NZ1039071534
e (Appendix a)	NZ1049471538
f (Appendix a)	NZ1062271553
g (Appendix a)	NZ1081071621
17	NZ1247470894

3.2.6 Improvement to fish passage

Excluding the weirs, which should be removed or notched as previously described, there was only one structure that posed an obstacle to fish passage. This was the ford in the Dalton to Eachwick Bridge reach, at NZ1148571797 (Picture 13). It was ascertained that the structure is still in use so removal is likely to be infeasible.

The optimal solution for this structure would be to create an additional rock ramp, graduating the ford bed down to the river bed level. If this incorporated a lower channel or pools, fish would be assisted, at least to the level of the ford. There would still be an issue caused by the shallow water over the ford but this would be a lesser obstacle than currently exists. Any measure to deepen water over the ford would render it less efficient and so are impractical, but a shallow notch through the ford bed could be beneficial in creating increased depth and would assist fish movement.

4.0 Disclaimer

This report is produced for guidance only. 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 comments made in this report.

Appendix A

Picture a - NZ0909671614

Picture b - NZ0987971454

Picture c - NZ0999171590

Picture d - NZ1039071534

Picture e - NZ1049471538

Picture f - NZ1062271553

Picture g - NZ1081071621