WILD TROUT TRUST
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Advisory Visit

Brailsford / Spinneyford Brook, Derbyshire

January 2026

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Contents

Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the Brailsford Brook, Ednaston, Derbyshire on 15th January, 2026. Comments in this report are based on observations on the day of the site visit and discussions with the Fishery Manager for Ednaston Estate.

Specific locations are identified using decimal latitude and longitude (e.g. 52.690489, -0.905236), which can be pasted straight into online mapping tools to identify locations. Figure references within the text of the report are hyperlinked (green font), so holding Ctrl and left-clicking on them will move to that point within the document.

A previous WTT advisory visit was carried out at this location in July 2015 and subsequently extensive habitat improvement works have been undertaken on the brook. This visit provides a review of progress and includes an additional section of the brook recently acquired by the Estate.

Catchment / Fishery Overview

The Brailsford Brook rises to the south east of Ashbourne and flows south, joining the Shirley Brook to form the Sutton (or Hilton) Brook, which joins the lower Dove near Egginton. The brook flows over a geology of Mercia mudstone with superficial deposits of alluvium and river terrace material; this is reflected in the bed substrate which is predominantly gravel.

Land use in the catchment is predominantly agriculture with a mix of arable and livestock farming. There are no statutory conservation designations such as Sites of Special Scientific Interest (SSSI) in the vicinity.

The section of brook inspected is over 3 km in length and includes two lakes (Secret Lake and Sandy's) and several ponds which are fed from the brook. The latter (Top, New, Long, Middle, Round and Rainbow Ponds) are known collectively as the hatchery (fish) ponds because of their former use as such. In addition, two lakes (Bradley Pond and Monk's Pond) are present on dammed side streams to the west of the brook; these were not inspected on the visit. An additional reach of the brook and Thacker's Pond, recently acquired by the Estate, was also inspected directly upstream of previously visited sections.

The section of the Brailsford Brook inspected was engineered and adapted for fishing in the early C20th, as described in the 2015 Advisory Visit report, with the creation of numerous weirs and lakes and ponds fed by the brook. Since 2015, the majority of the weirs have been removed, apart from those supporting lake offtakes; the latter have been modified to facilitate fish passage. In 2025, an extensive habitat restoration project was carried out on a c.350m reach of the brook alongside the hatchery ponds. This involved realignment of the channel, restoration of a pool-riffle sequence, reconnection of the floodplain and fish passage improvements at the downstream boundary of the restored reach.

A small syndicate fishes the brook and lakes, along with the owner and family. Since the Advisory Visit in 2015, trout stocking in the brook has ceased and it is maintained as a wild fishery. The non-native, invasive signal crayfish (*Pacifastacus leniusculus*) is present throughout the fishery and several thousand are removed and destroyed annually by licensed trapping.

Under the Water Framework Directive, the Environment Agency assesses rivers and streams against targets for water quality, ecology and physical condition of the channel. This section of the brook falls within waterbody ID GB104028052870 which encompasses the whole Hilton Brook catchment to its confluence with the Dove. It was classified as being in overall *good* status in 2009, *moderate* status in 2014 and 2019, and most recently *poor* status (Table 1). The reason for the *poor* status is a *poor* classification for fish (failure of a single parameter affects the overall classification). Measures for invertebrates, plants and algae remain good or high; phosphate is moderate and there are the ubiquitous failures for 'forever chemicals' (PFOS and PBDE).

River	Hilton Brook
Waterbody Name	Hilton Bk (trib of R Dove) Water Body
Waterbody ID	GB104028052870
Management Catchment	Dove– Dove Lower Rivers and Lakes
River Basin District	Humber
Current Ecological Quality	Overall status of **Poor** ecological status, last assessed in 2022
U/S Grid Ref inspected	SK2472345095

D/S Grid Ref inspected	SK2424442047
Length of river inspected	~3.1km

Table 1 Summary of Water Framework Directive information for the Hilton Brook waterbody which includes the Brailsford Brook https://environment.data.gov.uk/catchment-planning/WaterBody/GB104028052870

The above classification depends upon the location of sampling points within the waterbody which is 42km long, thus more localised areas (such as the inspected reach) may differ. The Estate undertakes regular professional invertebrate surveys (with derived water quality indices), which provide a more detailed picture of water quality in their watercourses.

The Brailsford Brook is known as Spinneyford Brook upstream of the Bradley Brook confluence.

Habitat Assessment

The brook was walked in an upstream direction and is described as such, divided into five sections: downstream limit to Longmeadow; Longmeadow to Hatchery Ponds; Hatchery Ponds to Blue Bridge, Blue Bridge to Secret Lake; Secret Lake to upstream limit.

Downstream limit (52.975231, -1.6404015, SK2424442047) to Longmeadow (52.980351, -1.6384180, SK2437542617)

This reach has the most natural stream habitat seen during the visit, providing a good environment for wild trout: a pool-riffle sequence, good supply and natural transport of coarse sediment and sensitive adjacent land use. The downstream end of this reach is largely unchanged since the 2015 advisory visit.

In contrast to the left bank, the right bank has more areas of accelerated bank erosion and relatively few trees. The right bank is strimmed to facilitate angling access and to control Himalayan balsam. Leaving a marginal strip unstrimmed alongside the brook would improve bank stability (through a deeper root horizon), allow managed succession of self-seeded trees and provide good cover for anglers to fish over. Hand pulling of balsam within the margin would be required.

There is a lack of large woody material (LWM) in the brook. LWM has multiple benefits including shaping physical habitat through scour and deposition, retention of leaf litter (and hence natural productivity of invertebrates and fish) and, importantly, cover for fish. Naturally occurring LWM should be retained and could be supplemented by introduced structures (see Appendices). The recommended change to riparian management would complement this approach by ensuring a succession of trees and hence supply of LWM.

Whilst abundant clean gravel habitat for trout spawning is present, no redds were observed, which is surprising for the time of year and may be related to a lack of cover, as trout are vulnerable to predation during spawning and favour areas where suitable gravel and flow coincide with cover close by. Introducing cover in the form of cross channel trees, hinging and lodged wood is recommended (see Appendices), as is the retention of natural deadfall of trees to the brook.

Photo 1 Good natural habitat features including pool-riffle sequence, gravel sidebars and mature tree root systems. The right bank (left of shot) is strimmed to control Himalayan balsam. Leaving an unstrimmed marginal strip alongside the river (and hand-pulling balsam from it) is recommended. This would improve bank stability by increasing the vegetation's root depth profile and also provide opportunity for some tree succession (e.g. self-seeded alders) which is generally lacking.

Photo 2 Land on the west bank – a wide buffer strip between the river and a wet meadow is excellent practice to protect water quality and riparian habitat. Drainage ditches are present within the buffer strip which could be 'soft blocked' with woody dams to enhance wetland habitats and slow runoff. This area is identified as a Local Wildlife Site (Brailsford Brook Marsh, lowland swamp habitat) in the Derbyshire Local Nature Recovery Strategy, alongside adjacent areas of lowland fen (Mill Farm Wet Meadows LWS).

Photo 3 The 'Pipe Pool' in January 2026 compared with a decade ago (Photo 4). Note the single tree on the right bank (arrow) compared with the growth in the background. A change in management of the marginal strip would allow managed natural tree regeneration and reduce the rate of bank erosion.

Photo 4 The 'Pipe Pool' in February 2016.

The upstream section of this reach is where a number of small weirs were removed in 2016. This has improved in-stream habitat and restored the natural supply, transport and sorting of sediments, creating excellent areas for fish spawning and invertebrate habitat.

Some cross-channel logs and flow deflectors have been installed (Photo 5) which need to be on a larger scale to have the desired effect. The cross-channel log is set too high to cause effective undershot scour, but is probably too small to withstand washout if set lower. The numerous alders on the left bank provide opportunities to introduce LWM structures on a larger scale.

Natural deadfall trees could be modified to create some LWM habitat at scale, for example the fallen pine in Photo 6. The crown could be winched around to sit within the channel. Alternatively, cutting off the crown would rest the trunk across the stream at floodplain level, and the crown branches could then be lodged upstream.

The works carried out to stabilise the eroding bank in 2017 using posts and alder root plates has prevented further erosion, but has not colonised with self-seeded trees as anticipated (Photo 7 - Photo 10). As mentioned above, allowing a strip of coarser vegetation and trees to develop along the right bank will contribute to its longer-term stability. The protruding posts at this location could be cut off at water level to improve the aesthetics, with one or two retained as anchor points for lodged woody material (see Appendices).

Photo 5 Introduced structures need to be on a larger scale to have the desired habitat effects.

Photo 6 An opportunity to create a good habitat feature: cut the trunk as indicated, lowering the main trunk across the stream. Lodge the crown upstream of the cross-channel trunk. Alternatively, the whole tree could be winched around upstream into the channel.

Photo 7 July 2017

Photo 8 July 2017

Photo 9 July 2017

Photo 10 January 2026

At the upstream end of the reach is a recently (2024) constructed rock ramp which is the transition from the higher Longmeadow river restoration site to the downstream river level (Photo 11). This structure replaced a concrete side weir in the mill leat which is fed by the upstream water level, which itself was the subject of an unsuccessful fish passage improvement in 2018 (pinned boulders on steep weir apron/rock ramp).

Photo 11 Rock ramp and former leat overflow channel (right), now a backwater.

The rock ramp consists of low, rough boulder weirs with infill of angular cobble and coarse gravel in-between, which is a great improvement for fish passage compared with the previous situation. However, much of the infill has been displaced during flood conditions, leaving areas of underlying clay exposed on the bed and banks (Photo 12).

The difference in bed height across this structure is a legacy of historic changes to the watercourse for milling and there is uncertainty over the true natural course of the stream. Adjacent ground levels have also been raised in recent years through the landscaping of spoil from nearby construction works, thus the rock ramp channel is cutting through an artificial bund.

Photo 12 Upstream end of rock ramp showing loss of introduced bed material (bare clay).

There are essentially two options for countering the erosion at this location. Firstly, to increase the length (and thereby reduce the gradient and energy) of the channel; secondly, to further engineer the existing structure to be more resistant to erosion. The first option would have to take a course into the field on the right bank. The second option could still be vulnerable to erosion, but incorporating some living willow may help stabilise and retain bed material (Photo 13).

Photo 13 Example of the use of living willow 'weirs' to stabilise introduced bed substrate at the transition in levels between a restored river/floodplain (upstream) into the incised, historically modified channel downstream (upper River Witham, Lincolnshire).

Longmeadow (52.980351, -1.6384180, SK2437542617) to hatchery ponds (52.984131, -1.6388961, SK2434143038)

Longmeadow is the location of the restoration project carried out by the Estate in 2025 involving realignment of the channel to the valley bottom east of its previous course. The lower part of the restoration (Photo 14) was constrained by the historic impoundment to feed the mill leat (as described above) and hence is relatively low gradient compared with the upper section (Photo 15). The project has created some excellent habitat and restored natural processes, including a pool-riffle sequence, well-connected floodplain, and large woody structures. The key to maximising these benefits will be encouraging the development of a treelined watercourse with diverse marginal and riparian vegetation to provide plentiful shade and cover for all trout life stages.

Photo 14 Upstream view of restoration project, Longmeadow.

Photo 15 The upstream limit of the Longmeadow restoration site, where the brook regains its natural gradient.

Photo 16 Weir upstream of Photo 15

Photo 17 (52.983966,-1.6383241) Ford: passable in certain conditions, but an obstruction to fish dispersal and migration. Ideally this would be replaced with a clear span bridge or appropriately oversized sunken culvert, alleviating the issue for fish movement and also improving access.

Photo 18 Weirs leading up to hatchery ponds offtake

Photo 19 Weirs leading up to hatchery ponds offtake

Some introduced gravel has been transported from the upstream end of the restoration site (Photo 15) and it appears this is not being replaced, probably because of the interruption of natural sediment transport by the series of weirs up to the hatchery pond offtake (Photo 16 - Photo 19). The introduction of gravel between the upstream end of the restoration (Photo 15) and the first weir above (Photo 16) is recommended to compensate for this. The gravel should be of a size range and shape that occurs naturally within the brook.

The weirs (Photo 16 - Photo 19) step-up the water (and bed) level to supply the offtake, controlled by a penstock, into the hatchery ponds on the right bank. Some of the weirs are notched to facilitate some improvement to fish passage, whilst others (ford, weir immediately d/s of offtake) still present a challenge, especially at lower flows. Further modification of the weirs could improve fish passage, but this does not address the underlying issue of weirs being poor practice. A better approach would be to work out how to avoid the problem completely with a fresh look at the whole working of the site and what would be required to remove all the obstructions. For example linking the ponds with a pipe or gutter that was sufficient to keep them full from a single offtake well upstream.

Hatchery ponds (52.984131, -1.6388961, SK2434143038) to Blue Bridge (52.989470, -1.6359497, SK2453543633)

Above the hatchery ponds the brook is impounded for c.150m (Photo 20). The deep water and vertical clay banks here provide favourable conditions for dense concentrations of signal crayfish in galleries of underwater burrows in the banks; large numbers are trapped and removed from this location. Where the impoundment runs out there is substantial deposition of gravel, indicating the sink effect of the impounded reach on natural sediment transport, as noted above (Photo 21).

The brook channel alongside Sandy's Lake is straightened and thus relatively featureless. The banks alongside the track have been re-profiled to a shallower angle and the toe stabilised with rock rolls (Photo 22). Planting of marginal vegetation behind the rock rolls has not succeeded because of the high-energy, erosional flows on the outside of the bend; planting sallow willows here is worth trying to improve low cover and add to bank stability.

Further upstream, at the site of weir removals around a decade ago, bank reprofiling to a shallow angle has created a less confined channel and allowed some nice in-stream habitat features to develop, including gravel shoals and sidebars (Photo 23). Reprofiling could be extended further upstream for similar benefits (Photo 24 and Photo 25).

Photo 20 Impounded reach upstream of hatchery ponds offtake. A hotspot for signal crayfish and degraded habitat for flow-loving species like trout.

Photo 21 Gravel deposition at the upstream extent of the impoundment in Photo 20.

Photo 22 Hard bank protection (rock rolls at the toe) has stabilised erosion alongside the track, but the issue stems from the historical realignment of the brook from its likely natural course into the straightened channel, which also lacks natural habitat features.

Photo 23 Weir removal and left bank reprofiling (right of shot) have greatly improved this area, leading to development of gravel features. Note the improved morphology where the channel has greater sinuosity and more varied dimensions.

Photo 24 Deposition of fine sediment within a brushwood mattress on the inside of the bend in Photo 25. This, along with the turbid water, highlights an issue with fine sediment inputs further upstream.

Photo 25 Reprofling the inside of the bend here is recommended to create a similar profile to Photo 23.

Upstream of the Bradley Brook confluence (Photo 26), the channel diversion and rock ramp, constructed around a decade ago to replace the weir supplying water to Sandy's lake, has remained stable and continues to provide much better fish passage (Photo 27). Upstream of this point the brook is impounded (supplying an offtake to Sandy's Lake) and possibly in a channel which has been historically realigned to the east (Photo 28 and Photo 29). The fishery manager has consultants looking at the potential for channel realignment/restoration here; if it were possible to sustain the levels in Sandy's lake (which is also spring fed) without the input from the river, this would greatly increase such opportunities. The brook channel here lacks meanders (probably due to historical straightening/realignment), and thus deeper pool habitat which forms on the apex of bends.

Beyond the Sandy's impoundment, better instream habitat has developed where some small weirs were removed around a decade ago (Photo 30), but this is quickly succeeded by a series of three boulder weirs which replaced the concrete beam types (Photo 31). These structures, along with the one immediately upstream of Blue Bridge (Photo 33) were retained as a precautionary measure to avoid the risk of scour to the bridge. With hindsight, the retention of these weirs was over cautious; there has been no major scour or erosion resulting from weir removal elsewhere. Their removal, particularly in conjunction with re-meandering the brook channel, would greatly improve habitat.

Photo 26 Confluence of Bradley Brook (left) and Spinneyford Brook (right).

Photo 27 Rock ramp maintaining water levels for the Sandy's Lake offtake.

Photo 28 Impounded reach above rock ramp in Photo 27.

Photo 29 Land on the right bank downstream of Blue Bridge that may have once been a former course of the brook.

Photo 30 Some better instream habitat where weirs were removed around a decade ago, above the impounded section in Photo 28.

Photo 31 Boulder weirs and the type of structure they replaced (inset).

Photo 32 Impounded reach above weirs in Photo 31 towards Blue Bridge.

Photo 33 (52.989597,-1.6358706) Boulder weir immediately usptream of Blue Bridge, and structure it replaced (inset).

Blue Bridge (52.989470, -1.6359497, SK2453543633) to Secret Lake (52.994225, -1.6354588, SK2456644162)

This section of channel, particularly through The Far Carr, is artificially straight and possibly realigned (Photo 34 and Photo 35), although there are few clues to its previous planform from historic maps or LiDAR levels. The straight channel lacks variety and is generally shallow; re-meandering would promote the formation of pool habitat. Weir removal has improved flow variety and substrate quality, but the channel lacks varied depths. Some LWM structures introduced shortly after weir removal have helped, but these need to be at a bigger scale to achieve the desired effects (some more recent, good examples are found further upstream- Photo 40 and Photo 48).

Photo 36 and Photo 37 show a weir now and a decade ago when many others were removed. This illustrates the issues caused by not removing all possible weirs; removal of just some weirs makes the remaining ones worse in terms of greater head loss and poorer fish passage, and attempts to improve this (notching, pre-barrages) are not working and/or impacting habitat quality. Another example is illustrated in Photo 41 - Photo 44. Given former concerns over headcutting and channel stability proved unfounded, re-visiting the removal of the remaining weirs is recommended, alongside the introduction of multiple, large-scale LWM structures, bank reprofiling and (if possible) re-meandering.

Note that part of this section of brook falls within a Local Wildlife Site (the Spinneyford Brook Complex) – see Section Secret Lake (52.994225, -1.6354588, SK2456644162) to Upstream Boundary (53.002607, -1.6330439, SK2472345095).

The rock ramp at Secret Lake offtake does not reach the crest level of the weir here, impeding fish passage (Photo 49). The simplest solution is to remove brick courses from the weir if this doesn't compromise the lake inflow (now controlled by a new penstock). Otherwise, the top of the rock ramp should be built up to drown out the weir crest.

Photo 34 (52.990879, -1.6354474) Artificially straight section from which a number of weirs were removed a decade ago, and below in 2015.

Photo 35

Photo 36 (52.991435, -1.635491) A retained weir and subsequently constructed boulder pre-barrage (foreground), and the same area in 2015 below.

Photo 37

Photo 38 (52.991990, -1.635546) Partially removed weir and the same area in 2015 below.

Photo 39

Photo 40 (52.992360, -1.635636) Introduced LWM forming a nice feature with bed scour at a point where the channel bifurcates.

Photo 41 (52.992452, -1.635620) Notched weir and same structure below in 2015 (Photo 42).

Photo 42

Photo 43 (52.992460, -1.635787) Notched weir and pre-barrage, and same structure below in 2015 (Photo 44).

Photo 44

Photo 45 (52.992893, -1.635654) Impounded section upstream of weir in Photo 43…

Photo 46…and a little further upstream where small weirs were removed post-2015….

Photo 47…but some small weirs remain alongside Secret Lake.

Photo 48 Introduced lodged LWM forming an excellent cross-channel feature, driving bed scour, depth variation and substrate sorting.

Photo 49 (52.994224, -1.635426) Rock ramp installed downstream of the weir maintaining water levels for Secret Lake offtake.

Secret Lake (52.994225, -1.6354588, SK2456644162) to Upstream Boundary (53.002607, -1.6330439, SK2472345095)

This section, encompassing c. 1km of the Spinneyford Brook and Thacker's Lakes, is recently acquired and has not been covered by previous WTT advisory visits. The majority of the section (and part of the downstream section) falls within a Local Wildlife Site (Spinneyford Brook Complex) and contains Irreplaceable Habitat - Lowland fens (Derbyshire Local Nature Recovery Strategy).

Beyond the impounded reach above Secret Lake (Photo 50), the brook has generally good in-stream habitat which is compromised by the presence of multiple low weirs. The weirs are in various states of repair, of similar construction (hollow concrete panels) to those found elsewhere on the Estate and now largely removed (Photo 52 - Photo 53). The brook is bordered by high quality riparian habitats as recognised above (Photo 51) and crossed by a public footpath which includes wooden walkways and a footbridge.

It is recommended that the weirs are removed to reinstate natural river processes and realise the potential for excellent in-stream habitat here. This must be done with proper regard to the Local Wildlife Site (LWS) and its irreplaceable habitats, and it is recommended that a method statement is developed in consultation with interested parties – Derbyshire County Council is responsible for both the Local Nature Recovery Strategy (LNRS) and issuing the Ordinary Watercourse Consent which is required for weir removals. Derbyshire Wildlife Trust are a partner in the LNRS and would be a good starting point for consultation.

A good example of a natural LWM accumulation is shown in Photo 55. Naturally occurring features such as this should be retained.

Just downstream of the lake, livestock poaching is occurring on the left bank and should be addressed to prevent ingress of fine sediment to the watercourse (Photo 57).

Photo 50 Impounded length above Secret Lake offtake, low weir visible in background.

Photo 51 Well-connected, high quality floodplain habitat (lowland fen). Public footpath on raised walkway.

Photo 52 Public footpath bridge and one of numerous weirs.

Photo 53 Typical weir within this section, constructed from hollow concrete beams.

Photo 54 Partially breached weir.

Photo 55 Natural accumulation of woody material, providing multiple habitat benefits and promoting floodplain connection. This structure appeared passable to fish at the time of the visit.

Photo 56 View downstream from above the feature in Photo 55, showing flood flow pathway to the right and deposition of fine sediment on the floodplain.

Photo 57 (52.999580, -1.6330066) Livestock watering point is a source of fine sediment. Repair/set-back the fence and provide alternative watering, e.g pasture pump.

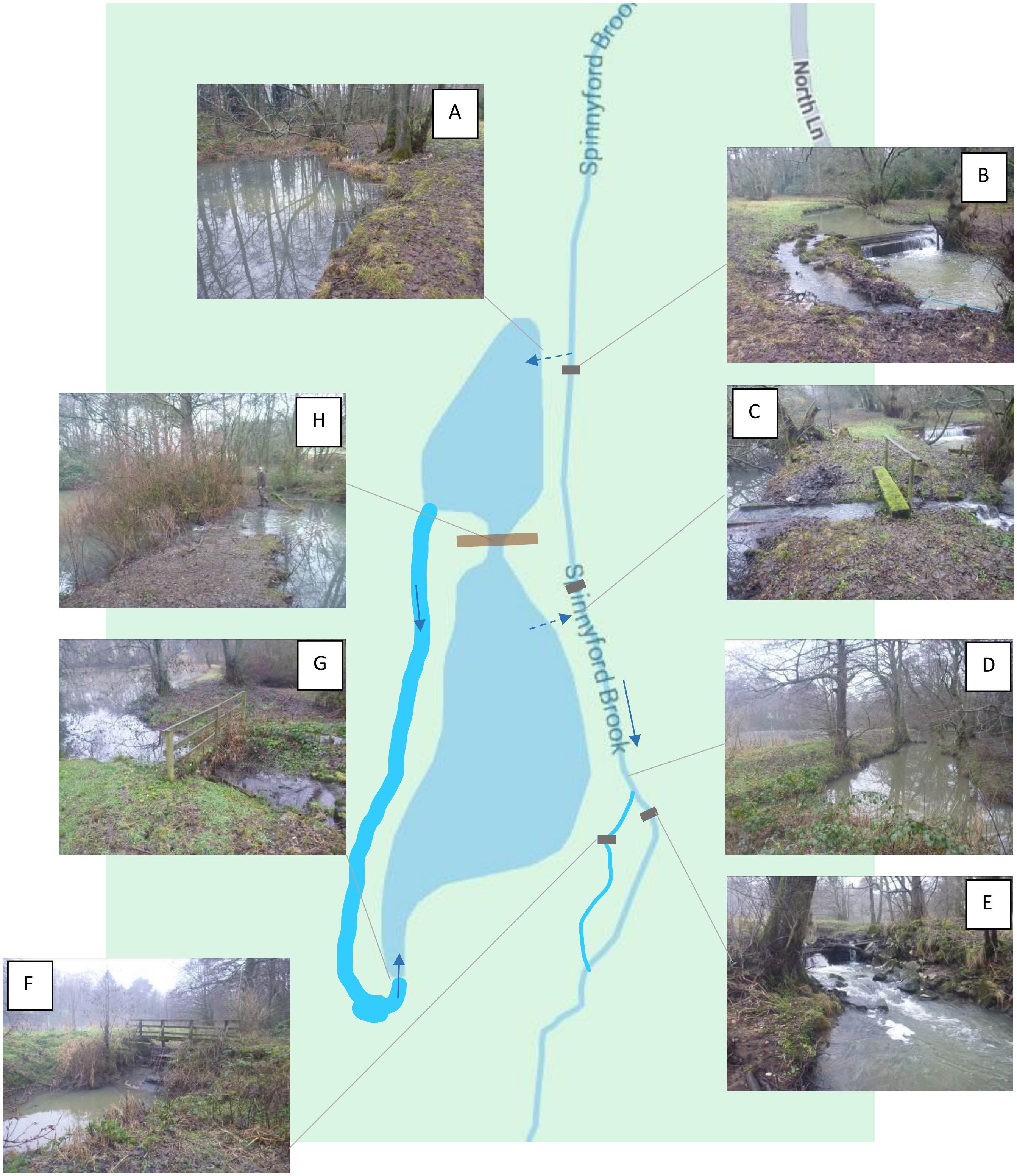

Figure 1 Thackers Lakes showing flow paths. (A) piped inflow above weir (flow dependent on river level); (B) weir maintaining inflow level; (C) lake outflow (level dependent); (D) brook alongside lake; (E) weir at bifurcation of brook; (F) weir and footbridge; (G) inflow to main lake from top lake; (H) bund between lakes (overtopping at time of visit).

Photo 58 Weir in Figure 1 E

Photo 59 Weir in Figure 1 F

Photo 60 Weir in Figure 1 C

Photo 61 Weir in Figure 1 B

Photo 62 Downstream view from above Thackers Lake (right), brook channel to the left. Bund in the foreground suggests the top lake was formerly more extensive and has silted and reverted to terrestrial habitat.

Photo 63 (53.001672, -1.6333821) Channel bifurcation with weir (right) and remains of sheet piling (left).

Photo 64 Brook and final field towards the upstream boundary. Historic maps show the channel was realigned to its present course from a route in the field to the west (left of shot), which is clearly visible on LiDAR maps (below).

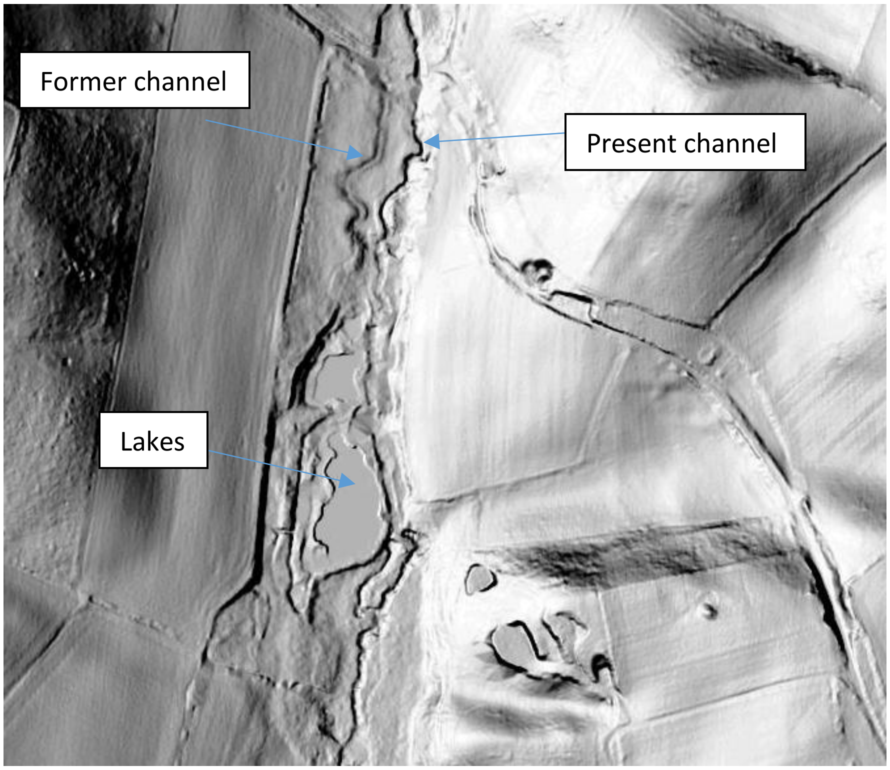

Figure 2 LiDAR of Thacker's Lakes area, © Environment Agency (ALERT tool).

The flows into and around Thacker's Lakes are shown in Figure 1. Historic maps suggest the brook channel was realigned to the east and straightened between the OS First Series (Sheet LXXII Stafford, surveyed 1827-1836) and OS Six-inch (XLIII, surveyed 1880). This pre-dates the construction of the lakes, which map regression analysis indicates was sometime between 1916 and 1949.

An embankment separates the lakes and brook (Figure 1, D), and four weirs are present in the brook alongside the lake, but only one (Figure 1, B) appears to divert water into the top lake, probably intended as a silt trap, via a pipe through the bank. The pipe is reported to flow intermittently depending upon water level but was flowing at the time of the visit.

The top lake is at a higher level than the bottom lake and separated by an earth bank which was overtopping at the time of the visit (Figure 1, H). Water is channelled from the top lake to the west to enter the south-west corner of the bottom lake (Figure 1, G). Water spills from the east side of the bottom lake to the brook via a concrete channel (Figure 1, C), again intermittently depending on levels.

Of the four weirs alongside to the lake, two are adjacent to each other where the channel bifurcates (Photo 58 and Photo 59). The majority of the flow follows the left (east) channel over the weir in Photo 58 which is in disrepair, shored-up with boulders. These structures are impassable to fish and would represent the upstream limit of free fish passage within the Estate's ownership, once the smaller weirs downstream have been removed. The further two weirs (Photo 60 and Photo 61) are also considerable barriers and within 150m upstream, so fish passage improvements would have to be considered across all four structures to be worthwhile.

The presence of the lakes, their inflow and the narrow corridor in which the brook is confined constrain the options for improving fish passage. Weir removal (the best fish passage option) would lower brook water levels presenting risks to the lakes' inflow and slumping of retaining embankments. Bypass channels may be possible on the right bank adjacent to the two upstream weirs, but there is insufficient room at the downstream weirs. Rock ramps are likely to be the best compromise between fish passage and the above constraints, but access for construction is challenging.

Recommendations

Downstream Limit - Longmeadow

- Modify the strimming regime on the right bank with the aim of preserving a marginal fringe of deeper-rooted, coarser vegetation and tree succession. Providing two narrow paths, one near the water's edge and one further back, reduces the impact of cutting in any one location, but allows anglers to move about the fishery without disturbing the fish, or other anglers. It is appreciated this approach has to be balanced with the need to control Himalayan balsam.
- Retain naturally occurring large woody material (LWM) within the channel.
- Introduce LWM using the techniques in the Appendices.
- Consider options for stabilising the transition between the restored reach and downstream.

Longmeadow to Hatchery Ponds

- Encourage the development of diverse marginal and riparian vegetation to provide plentiful cover for all trout life stages.
- Introduce gravel at the upstream end of the restoration of a size range and shape that occurs naturally within the brook.
- Review options for improving fish passage at the ford and weirs above, e.g. replacement of weir and penstock arrangement with a water supply piped/channelled from an offtake further upstream. Or, more short-term, strategic boulder placement, further notching.

Hatchery Ponds to Blue Bridge

- Plant sallow willows at selected locations on the left bank behind the rock rolls to improve cover.
- Carry out further bank reprofiling as indicated.
- Remove the boulder weirs below and above Blue Bridge in conjunction with re-meandering and bank reprofiling.

Blue Bridge to Secret Lake

- Remove remaining weirs through this section.
- Introduce multiple LWM structures at scale to drive scour and depth variation.

- Consider re-meandering the brook channel to introduce sinuosity, pool formation and depth variation.
- Rectify the lip at the crest of the Secret Lake rock ramp.

Secret Lake to upstream boundary

- Remove all low weirs from the section up to Thacker's Lake. Note the sensitivity of riparian habitats within this Local Wildlife Site; agreeing a method statement with interested parties is recommended to avoid damage.
- Retain naturally occurring LWM in the brook.
- Address the livestock bank poaching as noted, by fencing back from the brook and providing an alternative watering source such as pasture pump, or mains-fed trough.
- Explore options for improving fish passage at the weirs alongside Thacker's Lake.

Please note, it is a legal requirement that certain the works to the brook require written consent from the local lead flood authority (Derbyshire County Council) prior to undertaking any works.

Making it Happen

The WTT can provide further assistance to help implement the above recommendations. This includes help in preparing a project proposal with more detailed information on design, costs and information required for obtaining consents to carry out the works. We do have a high level of demand for our services, but this is an interesting and challenging project and we would be pleased to work with you if resources allow.

Acknowledgement

The WTT would like to thank the Environment Agency for supporting the advisory and practical visit programme in England, through a partnership funded using rod licence income.

Disclaimer

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

Legal permissions must be sought before commencing work on site. These are not limited to landowner permissions but will also involve regulatory authorities and any other relevant bodies or stakeholders. Alongside permissions, risk assessment and adhering to health and safety legislation and guidance is also an essential component of any interventions or activities in and around your fishery.

Appendices

Tree Hinging Introduction

Hinging (also called laying, folding or pleaching) trees into a watercourse is an excellent way of adding flow diversity and roughness to a channel. Hinging replicates the natural process of trees falling into the channel, with the added benefit that the hinged section of tree should continue to grow, developing even more habitat complexity over time.

Willows are the best type of trees for hinging directly into the channel and can still thrive with up to 50% of their canopy submerged. Many other species also hinge well but should be laid into shallower areas or along the river margin, to ensure that the majority of their canopy remains in the dry.

Small, pliable species like, willow, hazel, elm, hawthorn and even alder (with a bit of practice) can easily be hinged, using hand tools such as pruning or bow saws. Trunks or limbs up to 100 – 150mm diameter can be cut by hand, in a process much like hedge laying. The more brittle species such as sycamore, ash or elder should generally be avoided as they tend to break off rather than bend.

In its simplest form, hinging involves a single quick cut through the first two-thirds of the trunk/branch, then continuing to cut a little at a time until the trunk/branch collapses down over the river or along the bank (depending upon species). The cut should be made from the exact opposite side of the tree to the desired felling direction. This is similar to conventional tree felling, however the face cut should be omitted. As a result the retained material forms the necessary hinge.

Advanced Hinging

A more advanced technique for suitably-qualified chainsaw operators to use on large or leaning trees, utilises a plunge or bore cut. This defines the extent of the hinge first, while retaining holding wood at the back side of the tree. The final fell can then be achieved by extending the plunge cut out to the back side of the tree, or with a dog tooth cut, from the back (as above). This method provides more control over the extent of the hinge, and can be safer with large or leaning trees.

When hinging larger or leaning trees, please also take the following into account:

- This is specialist work and should only be undertaken by trained, experienced personnel and proper assessment of the risks
- Large crack willows can hinge well, but may be susceptible to cracking or "barber-chairing" (collapsing and folding back on itself)
- Alders tend not to produce a strong hinge, so may not be appropriate in high energy or high flood risk areas. They can also crack suddenly, especially if badly affected by *Phytophthora* disease. However, smaller trunks can be laid effectively with practice and in appropriate places
- Poplars can be tricky too: the bark tends to crumple and ruck up (reducing their survival rate), and should only be used if nothing else is available
- Ash and sycamore are very brittle, and tend to lay very poorly as a result
- In cold weather, trees can react particularly explosively to being cut – failing more suddenly, and splitting further and in a less controlled way

Large Woody Material

Some of the most beneficial in-channel habitat structure results from fallen trees and branches, often referred to as large woody material. Where trees are present, this occurs naturally and creates features that may be stable for many years but eventually disintegrate. Naturally occurring woody material therefore relies on a dynamic supply to replenish that material.

Where lacking, wood can be installed as a habitat improvement. In its most effective form, this mimics natural fall of wood into a river, so it is often best to leave the material unsecured and allow it to find its own position in the channel (using complex pieces >1.5 times the channel width).

Lodged Woody Material

Where there are overriding flood risk considerations or other reasons for retaining wood where it is installed, lodged woody material offers a simple, quick and effective way of securing woody material, without man-made fixings. Choosing the right trunk or branch, and optimal location to install it, requires an understanding of river processes, but installation is relatively straightforward. Lodged woody material simply replicates the natural occurrence of trees and limbs lodged between or against other standing trees or stumps. The structure is secured by its own weight and the force that high flow exerts against it, pinning it even more securely to the anchor point - usually one or more vertical trees (ideally at least two). The picture below shows a simplified form of the technique for illustrative purposes, as a flow deflector that has been lodged between two vertical trunks.

Another simple method for installing lodged woody material is as a hanger, where a forked branch is hooked over a vertical trunk, with the butt end facing upstream and the canopy end downstream. Again, this completely secures the material, with no requirement for wire, rope or posts.

A hybrid of the two techniques can be used, being demonstrated below in a habitat workshop on the River Leven in north Yorkshire. Note the canopy of a sycamore tree being dragged butt end first between two bankside alders, lodging and hanging it in place to leave the bushy, diffuse canopy in the channel. Depending upon the porosity of the material used, this technique can create flow diversity, encourage sediment deposition or scour, and provide cover for fish and invertebrates.

Pinned Woody Material

This technique can be utilised where woody material is lacking in-channel, but where there are no bankside trees to act as an anchor point. Instead, the material is securely held in place with stakes. These are driven into the bed and/or bank to secure the wood, with the butt end u/s, replicating how the woody material would usually come to rest naturally.

Use of this technique is usually more suitable for lowland rivers or lower energy areas, like sheltered inside bends. In these positions, it can be incredibly effective at driving bed scour or increasing sediment deposition to reshape a uniform channel, depending upon exactly how it is used.

This is generally a deadwood technique, with the main material not usually expected to grow; it is more to kickstart river processes. However, depending upon the channel conditions, a living structure can be created by using a live willow limb or trunk. Similarly, where live willow is used for the posts, they will usually form a new tree that can be used for future habitat enhancement, often by simply hinging it down into the channel.

Above, live willow posts were used to secure a branch into a recently restored channel to assist the retention of coarse sediment during high flows. The following two pictures show a piece of live willow pinned into the channel (still healthy and growing) and large ash tree pinned into a stream, both providing much-needed cover and refuge for fish, along with flow deflection that will aid in scouring and sorting of the substrate, diversifying the otherwise uniform bed profile.

Toppling

Toppling can be a great way of introducing substantial woody material into a channel. Even in higher energy areas, the technique can be effective, but it may be more difficult to gain a permit for completely unsecured material in higher flood risk areas and some degree of burying may be required. As with any of the more natural techniques that can be applied, this technique closely mimics nature and the occurrence of windblown trees. A major benefit of this technique is that any tree with its rootball attached will be more stable within a channel, as the root plate acts as a natural anchor.

With natural treefall, the weight in the root-plate and associated friction against the bed usually causes flow to naturally drag a tree canopy round to lie downstream. The structure often then settles along a straight or inside bend, where the flow energy is least and where the structure will often lie for many years, sometimes until it degrades sufficiently and naturally disintegrates into much smaller pieces. The installation of root planted trees should follow this blueprint, installing the material to similar in-channel locations, unless there really are no concerns about the structure naturally adjusting in the channel.

The technique is usually initiated with the use of an excavator, which is used to dig out the back side of the roots (the opposite side to which the tree is intended to fall) and then push the tree over to the desired position. A similar effect can be achieved by winching a tree over, but loosening of the root-plate is still generally beneficial first. Alternatively, the entire root-plate of a tree can be exhumed and the tree transported from any location to be installed to the channel.

The structure provided within the channel can create valuable pinch-points, which increase flow diversity, focussing scour into the bed locally around the rootball and larger stems/trunk and encouraging deposition in other areas, usually among or downstream of the canopy.

Because of the sheer size and mass of the structure, it can be used to initiate large and quite rapid changes within a channel, which can be great to use where past channel modifications have left an overly straight channel or unform bed profile and significant scouring/reshaping of the bed or banks are required.

Chop and Drop

The chop and drop technique is particularly suited to treelined watercourses, where the larger the tree is the less chance there is that it will be transported away as it cannot travel far before becoming naturally lodged against another tree, stump or in-channel feature. This makes it particularly good for woodland environments and can be one of several more natural measures that can be used to create true natural flood management (NFM), without the need for the often very artificial structures used in 'NFM'.

As with many of the larger tree techniques, chop and drop can rapidly create a considerable increase in flow diversity and drive beneficial bed scour and/or deposition, depending upon how and where it is used. The technique is about as simple as it could be, it just involves felling tree over or into a watercourse. The only real trick is picking the correct location and correct tree, so that the overall tree canopy of the area is not negatively affected and the material will have the desired impact upon flow and natural processes within the channel.

In the example below the tree was felled just downstream of a bankside tree, but with sufficient length of trunk retained on the bank that it cannot be carried away downstream. An alternative option is to fell the tree to the upstream side of the tree or between multiple tree trunks, thereby creating an even more secure Large Lodged Woody Material feature (LLWM). Note how even within a few minutes of initiating the technique, a natural foam raft had accumulated on the upstream side of the structure, creating valuable in-channel cover, a source of shade, and accumulation of invertebrates for fish to eat.