



Advisory Visit

River Ceiriog, Brynkinalt Estate, Chirk

August 2016



1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the River Ceiriog on the Brynkinalt Estate, Chirk, Wales on 23rd August, 2016. Comments in this report are based on observations on the day of the site visit and discussions with the landowner, Iain Hill-Trevor.

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.

2.0 Catchment / Fishery Overview

	Brynkinalt Estate Water
River	River Ceiriog
Waterbody Name	Ceiriog - confluence Dee to Teirw
Waterbody ID	GB111067051910
Management Catchment	Dee
River Basin District	Dee
Current Ecological Quality	Overall status of Good ecological status in 2015 (second assessment cycle) and Moderate in 2009 (first assessment cycle)
U/S Grid Ref inspected	SJ2951737323
D/S Grid Ref inspected	SJ3176439499
Length of river inspected	c. 4 km

The River Ceiriog is an 18-mile (29km) long tributary of the Welsh Dee, rising at about 550m altitude on the eastern slopes of the Berwyn Mountains and flowing eastwards to join the Dee east of Chirk, its lower reaches forming the border between Wales and England. The Ceiriog has a steep gradient, falling approximately 515m over its 29-km course (17m / km).

The Ceiriog forms part of the Afon Dyfrdwy (River Dee) Site of Special Scientific Interest (SSSI) and the River Dee and Bala Lake / Afon Dyfrdwy a Llyn Tegid Special Area of Conservation (SAC). The species and habitat types for which the SAC is designated are bullhead (*Cottus gobio*), river lamprey (*Lampetra fluviatilis*), brook lamprey (*L. planeri*), sea lamprey (*Petromyzon marinus*), Atlantic salmon (*Salmo salar*), otter (*Lutra lutra*), floating water plantain (*Luronium natans*) and rivers with floating vegetation often dominated by water crowfoot.

The Ceiriog is an important spawning area for salmon and also holds populations of bullhead and lampreys (*Lampetra* and *Petromyzon* spp.) and indigenous migratory and non-migratory trout (*Salmo trutta*). Grayling (*Thymallus thymallus*) have been introduced in recent years and are restricted to the lower reaches around Chirk, downstream of the weir at National Grid Reference SJ2701537387.

The Brynkinalt Estate fishing is leased to Ceiriog Fly Fishers Ltd., which stocks a number of hatchery brown trout throughout the season. The Wild Trout Trust has carried out a previous advisory visit (in May 2008) for Ceiriog FF and assisted the club with practical habitat improvement works on the river upstream of Brynkinalt Estate waters.

3.0 Habitat Assessment

The river was walked in a downstream direction from the Natural Resources Wales (NRW) gauging weir at National Grid Reference (NGR) SJ2951737323 to the confluence with the River Dee at SJ3176439499. A 1:5000 scale plan of the Brynkinalt Estate ownership was provided by Iain Hill-Trevor and reference is made below to field numbers from this plan.

3.1 Gauging weir to A5 viaduct

The flow gauging weir marks the upstream extent of the water inspected on this visit. Being a steep, rain-fed river, the Ceiriog actively transports its bedload of gravel and cobbles. The gauging weir is a trap for this sediment

and regular maintenance is carried out by NRW to clear the accumulated gravels from upstream; these were deposited in-channel downstream of the weir, but at the request of the Estate have recently been deposited on the bank. This was because an Irish ford (pipe crossing) used for forestry access a short distance downstream was prone to blocking with sediment. The ford has since been destroyed by floods and access for forestry machinery has yet to be re-established. If a ford is rebuilt, it is important to set the bed below the existing river bed level, at the natural slope of the river channel, to allow active sediment transport over the structure; this will avoid the issue of material being trapped upstream or the structure becoming perched.

Reintroduction of the gravels to the river channel is good practice from a fishery/biodiversity perspective, because it reduces the disruption of the natural sediment transport process caused by the presence of the weir. Maintaining natural sediment transport within a system also reduces the extent of unwanted bed and bank scour that can occur when a channel is starved of sediment. Natural sediment dynamics support the habitats favoured by salmon, trout, lampreys, bullhead, water crowfoot, etc. Any future crossing points should not interrupt sediment transport.



Photo 1 Gauging weir with gravels removed from upstream and deposited on the bank downstream. Ideally these should be re-introduced to the river channel, as per previous practice.

Much of the in-stream habitat downstream of the weir is fast and shallow (ankle – calf depth) with the river bed dominated by cobbles and large gravel (Photo 2).



Photo 2 Fast, shallow, gravel/cobble dominated reach.

Deeper pool habitat is rare, with only two areas present between the weir and the viaduct; both these occur on the outside of bends in the river, where the current is deflected against a stable bank (Photos 3 and 4). In the second case (Photo 4), a stable accumulation of large woody material on the outside of the bend combines with the deep scour pool to produce superb adult fish habitat.

Inspection of the 1872 1:2500 scale OS map (www.old-maps.co.uk) shows there was a weir present in the approximate location of Photo 4, with a sluice and offtake channel on the left bank. No clear evidence of the weir remains but the offtake channel is still visible on current maps and led to a pump (hydraulic ram?) in the vicinity of the present viaduct and onwards across present field numbers 2343 and 6063, feeding into ponds and re-joining the river at Lady's Bridge.



Photo 3 Current deflected against a resilient bank produces deeper water habitat.



Photo 4 A scour pool on a bend combined with large woody material provides excellent adult fish habitat.

Field numbers 6533 (left bank) and 6921 (right bank) are grazed, but have a recently installed, high quality stock fence bordering the river (sheep netting topped with barbed wire). The fence is a very positive move for improving river habitat. The stability of river banks and their resistance to erosion is directly linked to the extent of vegetation present. Grazed banks with a short sward and no trees are easily eroded, leading to a widening and shallowing of the river channel. In contrast, banks which are not grazed and support trees, bushes and tall herbage resist erosion, promoting a narrower and deeper river channel, with more suitable fish habitats.

There are some positive signs that the fencing in this location is working and having an impact on the form of the river channel. Photos 5 and 6 show areas on the right and left banks respectively where reduced grazing pressure is allowing self-seeded trees to establish and where marginal gravel shoals are colonising with vegetation, stabilising and narrowing the river channel.



Photo 5 Self-seeded alders establishing in the absence of grazing.



Photo 6 Herbaceous vegetation and tree seedlings consolidate a gravel bar, narrowing and eventually deepening the river channel.

Unfortunately, in other areas the fence is not proving as effective and grazing is evidently taking place on the river side. It appears stock are getting through the water gate barrier at the crossing/drinking point as reflected in the bankside vegetation upstream and downstream of this point (Photos 7 – 9). The shallow nature of the river here means that once behind the fence, stock can access long lengths and both banks, negating the benefit of the fence. The crossing point is gated, so if alternative watering arrangements could be made, stock could be excluded from the river.



Photo 7 Upstream of the cattle drink/crossing, the banks are evidently being grazed.



Photo 8 Cattle drink/crossing with ineffective water gate



Photo 9 Downstream of the cattle drink/crossing – less grazing pressure, better bankside habitat. If stock can be excluded, planting some willow whips here (with a view to laying them in the margins in future) is recommended.

3.2 A5 viaduct to Lady's Bridge

Downstream of the viaduct the river channel is straight, bordered by woodland/forestry on the steeper right valley side and grazed pasture on the flatter left bank. This changes to woodland/forestry on both banks at field number 6063 (left bank).

Apart from a cattle drinking area, the left bank (field 2343) is fenced off from livestock and vegetation is recovering well here, with self-seeded alders and coarse grasses. Along with the woodland on the right bank, this provides excellent riparian habitat and the bank stabilisation/channel narrowing process described above is taking place.



Photo 10 Excellent riparian habitat contributing to bank stabilisation and natural channel narrowing.

A short section of the right bank has recently been cleared of trees and the timber extracted via the left bank. This area coincides with a deeper glide and it would be useful to re-establish some low cover along the right bank to encourage fish to hold in the deeper water.



Photo 11 Valuable deeper water habitat that would benefit from additional low and trailing cover.

The lack of meanders in the river channel means there are hardly any deeper pool areas, the in-stream habitat comprising mainly steep, shallow riffle-glide habitat over coarse bed material. The deeper glide areas rarely exceed knee depth. The river channel follows a very similar planform to that on the 1872 map, so if any artificial straightening has been carried out it must have been prior to that. There are no clues from aerial photography which suggest the channel has been straightened, so it could be the natural course. It is not unusual for steeper gradient rivers like the Ceiriog to have a relatively straight course naturally, particularly when constrained within a narrow valley.

There has been some channel engineering probably for drainage and bank reinforcement associated with forestry. Embankments are evident downstream of the footbridge which merge into a concrete wall along the left bank. Large concrete blocks which were constructed at the time of the viaduct have been used for bank reinforcement and the occasional groyne (Iain Hill-Trevor, pers. comm.).

Downstream of the footbridge, some timber has been cleared from the left bank and some tree trunks have been laid along this bank, creating some

good marginal habitat and helping to narrow and deepen the channel, complementing one of the few deep pools present in this section (Photos 12, 13). The cleared area has been re-planted with conifers; broadleaved trees would be better immediately alongside the watercourse, providing deeper bank stabilising root systems and a more diverse invertebrate fauna.



Photo 12 Tree trunks laid along the bank have helped to narrow and deepen the channel.



Photo 13 Coarse woody material laid along the bankside provides good cover for juvenile salmonids.

The invasive non-native plant species Japanese knotweed and Himalayan balsam are present here. These should be controlled and care is required to prevent their spread, for example on forest machinery. Knotweed can easily be spread from fragments of the plant.

Further down this section towards Lady's Bridge, the fast, shallow nature of the river continues with no pool habitat. There are a number of bankside trees which lend themselves to being positioned in the river channel to promote scour and hopefully increase depth variation.



Photo 14 Trees close to the watercourse could be felled and fixed in position to encourage scour and depth variation.

3.3 Lady's Bridge to Pont-y-blew

The straight, steep, shallow channel continues through the upper part of this section, bordered on both banks by woodland. There are numerous opportunities for introducing bankside trees to the channel, but this is likely to be of limited value here because bedrock is present in many areas which would prevent scour.

The river makes a sharp right turn at the downstream end of field 7086 and there is a pool here bordered by bedrock on the left bank and a gravel point bar on the right bank (Photo 15). The 1872 map shows this was the site of a weir with a sluice on the left bank sending water along a leat to Pont-y-blew, possibly for water power for the forge there. There are no remains of the weir, although the leat is still evident on the left bank.



Photo 15 Site of former weir

Below the old weir site, the river habitat becomes more varied, with deeper glides and pools present, as well as the faster, shallow sections. The deeper areas provide good habitat for adult fish, as demonstrated by the one found in a poacher's net alongside the pool at the downstream end of field 8893!



Photo 16 Deep pool habitat found on the outside of a bend – good for adult fish.



Photo 17 A trout from the above pool found in a poacher's net!



Photo 18 Stable large woody material often creates depth by promoting bed scour.

Below this area is another deeper pool/glide associated with some large woody material; trout were observed rising in this area. Downstream of this point, the Brynkinalt Estate ownership ends on the left bank and the land use changes from woodland to grazing for one field down to Pont-y-blew.

3.4 Pont-y-blew to Pont Llygoden

Downstream of the road bridge, the gradient of the river increases and the in-stream habitat becomes a series of cascades and large boulders (Photo 19) before returning to riffle and glides. The banks are tree lined with previously coppiced sycamore present on the left bank which would lend itself to hinging into the river margins.

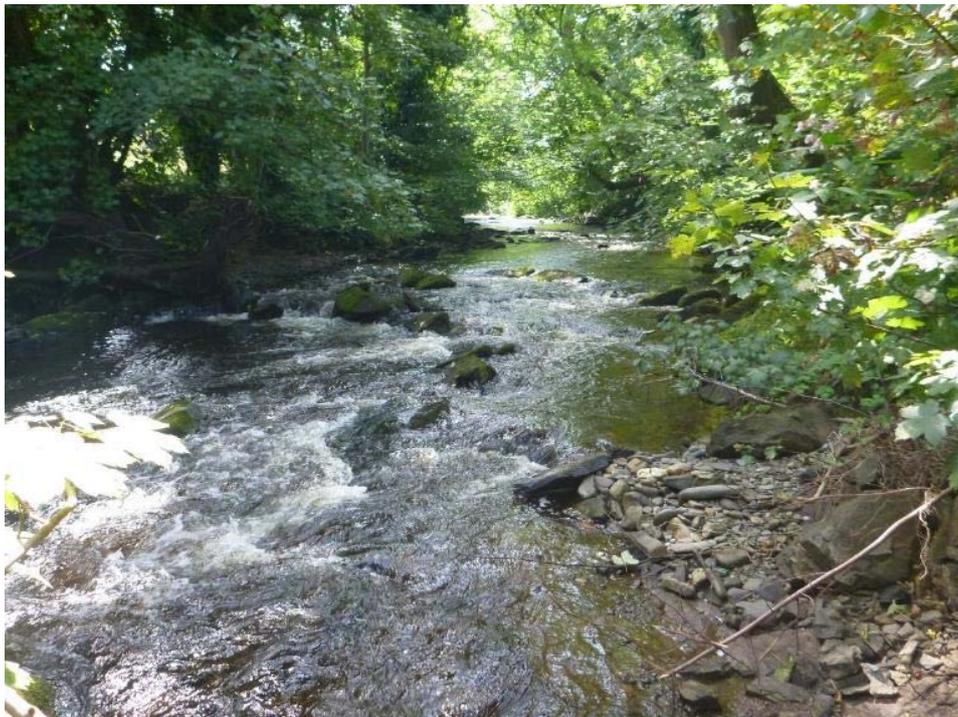


Photo 19 Steeper channel section of cascade and boulder habitat.

Past the chapel towards the forge, the river is heavily shaded with coppiced hazel and sheep are present here. The combination of shade and grazing means the banks are very bare, contributing to widening and shallowing of the river channel (Photo 20). Selective coppicing to reduce shade and restriction of grazing adjacent to the river would greatly improve riparian habitat.



Photo 20 Bare banks due to sheep grazing and shading.

The Morlas Brook joins the river from the right bank opposite the forge. This tributary is designated as “good” by the Environment Agency under the last two assessment cycles for the Water Framework Directive, with “good” score for fish and “high” for invertebrates. It is potentially a valuable spawning tributary for trout, sea-trout, salmon and possibly lampreys. Unfortunately, a short distance above the confluence is a concrete ford which is an impediment to free fish passage, particularly at low flows (Photo 21).

On the main river, there are houses backing onto the river along the left bank and woodland continues on the right bank. There is some good pool habitat along this reach, one being associated with scour under a fallen tree and another a narrowing of the river through a bedrock outcrop. There are some excellent examples of large woody material in the river here derived from fallen trees; they are creating excellent cover, scour and depth variation and should be retained.



Photo 21 Concrete ford on the Morlas Brook, an impediment to fish passage.

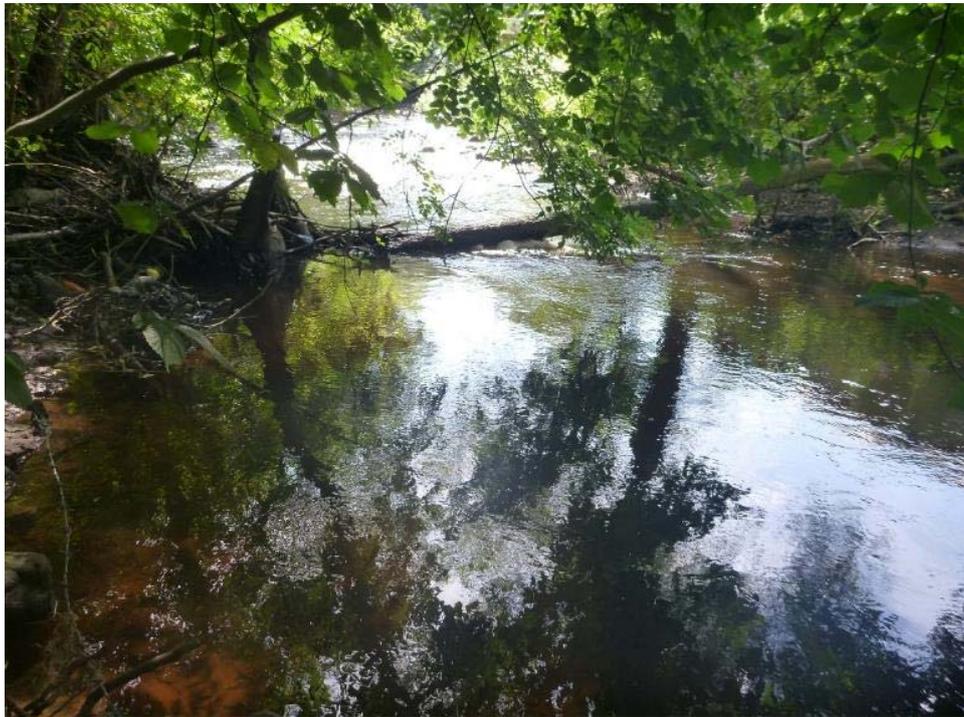


Photo 22 A deeper pool associated with undershot scour beneath the fallen tree.



Photo 23 Deeper pool area associated with fallen trees.

Below Forge Farm, the river follows a more meandering course and the frequency of deeper holding pools increases (Photo 24). This continues down to Pont Llygoden, with some very good quality in-stream habitat present. Large woody material dams are present which create deep bed scour and alternate pathways for the river at high flows; these provide good habitat features and should be left in place (Photos 26, 27).

At Riverside Cottage on the left bank, a small stream (Bolas's Dingle) enters the river. There is heavy livestock trampling of the stream in the field below the cottage, an undesirable fine sediment input to the river (Photo 25).



Photo 24 Good pool habitat with excellent woody cover along the far bank, below Forge Farm.



Photo 25 Livestock trampling causing a fine sediment input via Bolas's Dingle.



Photo 26 Large woody material in the river has created undershot scour and a deep pool, plus thrown up clean, sorted gravel downstream – both good habitats for adult fish and spawning respectively.



Photo 27 One of numerous examples of deeper pool habitat with good cover, upstream of Pont Llygodyn.

3.5 Pont Llygoden to Dee confluence

Downstream of the bridge the left bank is unfenced, grazed pasture and cattle are creating access points to the river (Photo 28). The left bank vegetation is currently good, with trees, bushes and tall vegetation present, but this could change over time with continued stock access.

There are some good holding pools on the outside of bends here, downstream towards the Dee confluence (Photo 29).



Photo 28 Cattle with free access to the river.



Photo 29 Deep pools on the outside of bends towards the Dee confluence.

Any improvements to access for angling along the reaches where holding pools are present should focus on retaining low cover over deeper water, as this is a key feature which holds fish. Photo 27 is a good example where far bank cover, in-channel structure and deep water combine, yet it is accessible from the near bank for angling.

4.0 Recommendations

The habitat quality on this section of the Ceiriog is generally good, the downstream sections of the river (below Pont-y-blew) having more adult habitat (pools) than the straighter, steeper sections upstream which are dominated by shallow riffles and fast glides more suited to juvenile salmonids. It appears that the straighter upstream sections are a result of the natural channel form in this steep gradient river, rather than the result of any channel realignment, so the opportunities to increase pool habitat in these areas may be limited. The following recommendations should however maximise the chances of long-term, sustained improvements to the channel form.

- Maintain and improve the stock fencing to prevent grazing of the river banks. The recovery of natural vegetation along the banks will

gradually lead to a narrowing and deepening of the river channel, as the banks and gravel point bars vegetate and stabilise. Reaches where this is applicable are upstream of the viaduct, upstream of Pont-y-blew and between Pont Llygoden and the Dee confluence.

- Retain large woody material that falls into the channel wherever possible. The scour and sorting of bed material by large, stable, natural woody material is extremely difficult to replicate by artificial means, so should be valued and preserved.
- Provide some low cover over the water along the length of river on the right bank downstream of the viaduct which has been recently cleared of trees (Photo 11). Tree kickers (see below) could be attached to suitable anchor points on the bank (e.g. tree stumps) and in the longer term, regrowth of trees on the bank from coppiced stools can be hinged into the margins.
- The reach of river between the viaduct and Lady's Bridge could have some tree kickers installed. These are whole trees felled into the watercourse and attached securely to their stumps with steel cable. They are generally swept parallel to the bank in high water events. Their presence changes flow patterns and creates localised scour and deposition and hence depth variation. The viaduct to Lady's Bridge is a particularly straight section which would benefit from some variation. Downstream of Lady's Bridge is similar, but the river bed there is largely comprised of bedrock so would not scour.

Trees are felled into the watercourse and winched back as close to their stump as possible. A hole is drilled through the tree trunk and stump with an auger (or a boring cut with a chainsaw) and steel cable and fixings used to secure. The short cable prevents the floods from lifting the tree onto the bank. If commercial forestry equipment is in use then installing tree kickers at the same time should be very straightforward.



Photo 30 A tree kicker installed on the Ceiriog upstream of Brynkinalt waters. Laying a series of overlapping trees would increase the effect.



Photo 31 An example of deposition in the lee of a tree kicker with channel deepening beyond.

- Hinging of trees to provide marginal cover and channel narrowing can be undertaken throughout the river, where there are suitable opportunities. Smaller, pliable species of trees alongside the river can be partially cut and laid into the river margins, in a similar manner to laying a hedge (Photo 32).



Photo 32 Several willow limbs laid into a river margin to provide cover and in-channel structure.

The reach downstream of the former weir site (field number 8893) is heavily shaded by trees and largely a shallow glide. This area would benefit from tree hinging.

- The ford/weir on the Morlas Brook should be modified to improve opportunities for fish passage. River crossings have the potential to impede fish passage and sediment transport and comprehensive guidance can be found here <https://www.sepa.org.uk/media/151036/wat-sg-25.pdf> . This should

also be considered if a river crossing is to be reinstated on the Ceiriog itself near the viaduct, for forestry access.

- The practice of trout stocking should be reviewed with Ceiriog Fly Fishers. There is increasing evidence that stocked trout compete with wild fish to the overall detriment of stocks, yet often do not themselves persist for more than a few weeks in the river, especially in high energy systems such as the Ceiriog.

The relatively limited availability of deeper pool habitat suitable for adult fish on some sections of the Ceiriog is likely to exacerbate the competition between stock and wild fish. Displacement of wild fish followed by only short-term persistence of the stock fish could lead to a reduced number of trout compared to a situation where no stocking takes place. There is ample spawning and juvenile habitat available within the river to provide good recruitment of adult wild fish.

A number of angling associations have ceased the introduction of stock fish and found that overall catches have remained stable or in many cases improved. The WTT website contains case studies on this subject <http://www.wildtrout.org/content/trout-stocking> .

Please note it is a legal requirement that all the works to the river require written permission from Natural Resources Wales of the Environment Agency (England) prior to undertaking any works. Being a SSSI and SAC, permission from NRW or Natural England is also required. A memorandum of understanding exists between these organisations to avoid having to duplicate applications.

5.0 Making it Happen

We have 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 www.wildtrout.org/product/rivers-working-wild-trout-dvd-0 or by calling the WTT office on 02392 570985.

The WTT website library has a wide range of materials in video and PDF format on habitat management and improvement www.wildtrout.org/content/library .

There is also the possibility that the WTT could help via a more specific Project Proposal (PP). This service is designed to help land owners, fishing clubs and community groups put together the necessary plans and documentation to obtain the relevant permissions to undertake a project.

The WTT could also help with a Practical Visit (PV). PV's typically comprise a visit where WTT Conservation Officers will complete a demonstration plot on the site to be restored. This enables recipients to obtain on the ground training regarding the appropriate use of conservation techniques and materials, including Health & Safety, equipment and requirements. This will then give projects the strongest possible start leading to successful completion of aims and objectives.

Recipients will be expected to cover travel and accommodation (if required) expenses of the WTT attendees.

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

6.0 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.

7.0 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.