



Upper Avon, France Farm



An Advisory Visit carried out by The Wild Trout Trust August 2012

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1. Introduction

This report is the output of a Wild Trout Trust visit undertaken on the Hampshire Avon on the Wookey family's waters between Manningford Trout Fishery and Upavon, national grid reference (NGR) SU133571 to SU136549. The visit was requested by Mr Joseph Wookey, whose family own the land and fishing rights. The visit was focussed on assessing the habitat and management of the waters for wild trout. Comments in this report are based on observations on the day of the site visit and discussions with Mr Wookey.

Throughout the report, normal convention is followed with respect to bank identification i.e. banks are designated Left Bank (LB) or Right Bank (RB) whilst looking downstream.

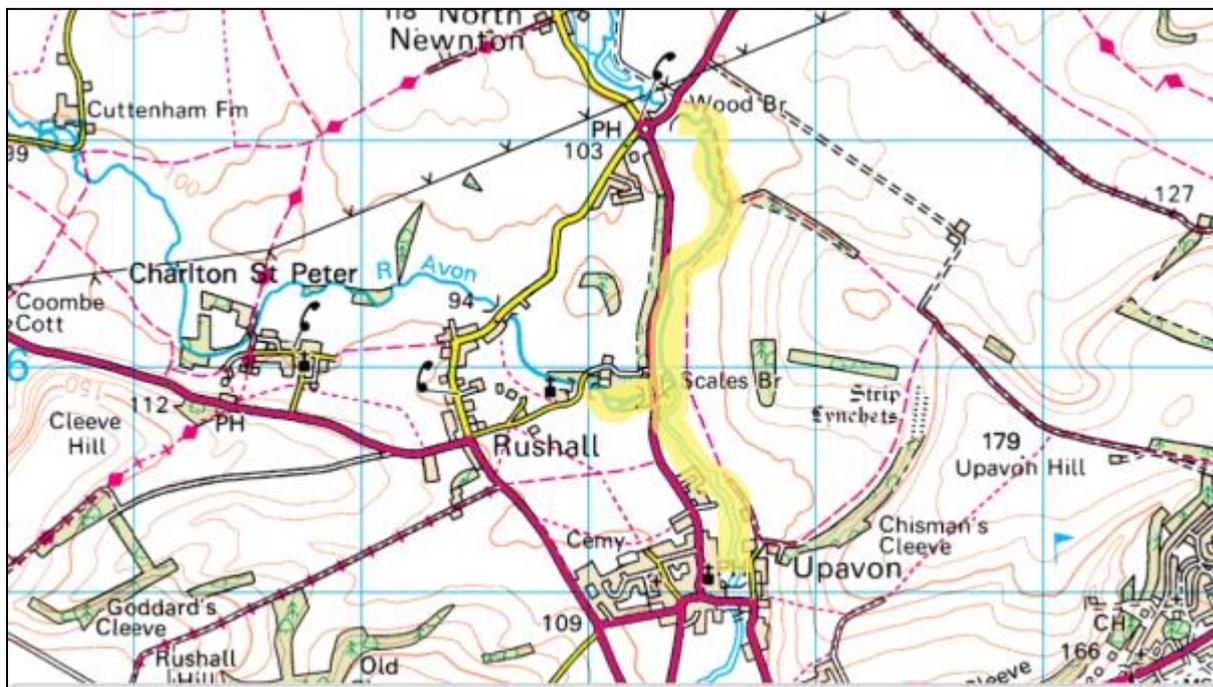


Figure 1: Map showing the section of the upper Avon visited

2. Catchment and Fishery Overview

The Hampshire Avon is recognised as one of the most important river habitats in the UK. It supports a diverse range of fish and invertebrates and over 180 different aquatic plant species. The Avon has been designated as a Site of Special Scientific Interest (SSSI) and Special Area of Conservation (SAC).

However, much of the Avon and its tributaries have been heavily modified for land drainage, agriculture, milling and even navigation.

Many of the historic land uses for which the river was modified are no longer relevant and a strategy has been compiled by the Environment Agency (EA) and partner organisations to restore the Hampshire Avon and its tributaries, with a goal of moving towards "*more naturally functioning and less constrained rivers that can adjust and respond to changes with minimal intervention*". This strategy means that public money has been earmarked for habitat restoration works across the Avon and its tributaries.

The Hampshire Avon begins as two separate rivers in the Vale of Pewsey, the Avon West and Avon East rising near Devizes and Pewsey respectively. The Avon West is designated as a SSSI whilst for reasons unknown, the Avon East is not.

The two rivers meet near France Farm and the Avon then flows south towards Salisbury through Upavon, Netheravon and Amesbury.

The Wookey family waters have been managed as a fly fishery for a number of years, and include the Avon East between Manningford Trout Farm and the confluence with the Avon West, the Avon West through France Farm, and the Avon from the confluence to Upavon. The fishery also includes some stocked ponds that take a sweetening flow of water from the river.

The family have expressed their wish to manage the waters as a wild trout fishery, focussing on maintaining the best possible habitat conditions.

3. Habitat Assessment

3.1 The Avon West

The Avon West through France Farm is heavily impounded by a set of large undershot hatches currently fully closed and acting as a weir. This structure is not only a complete barrier to fish migration but is also critically degrading the

habitat upstream. The river above the hatch is colonised by water lily (probably *Nuphar lutea*) and more closely resembles a pond habitat than that of a southern chalkstream. The river is very slow flowing and this has allowed the bed to become smothered by a thick deposit of sediment.



Figure 2: The hatch at France Farm is a complete barrier to fish movement

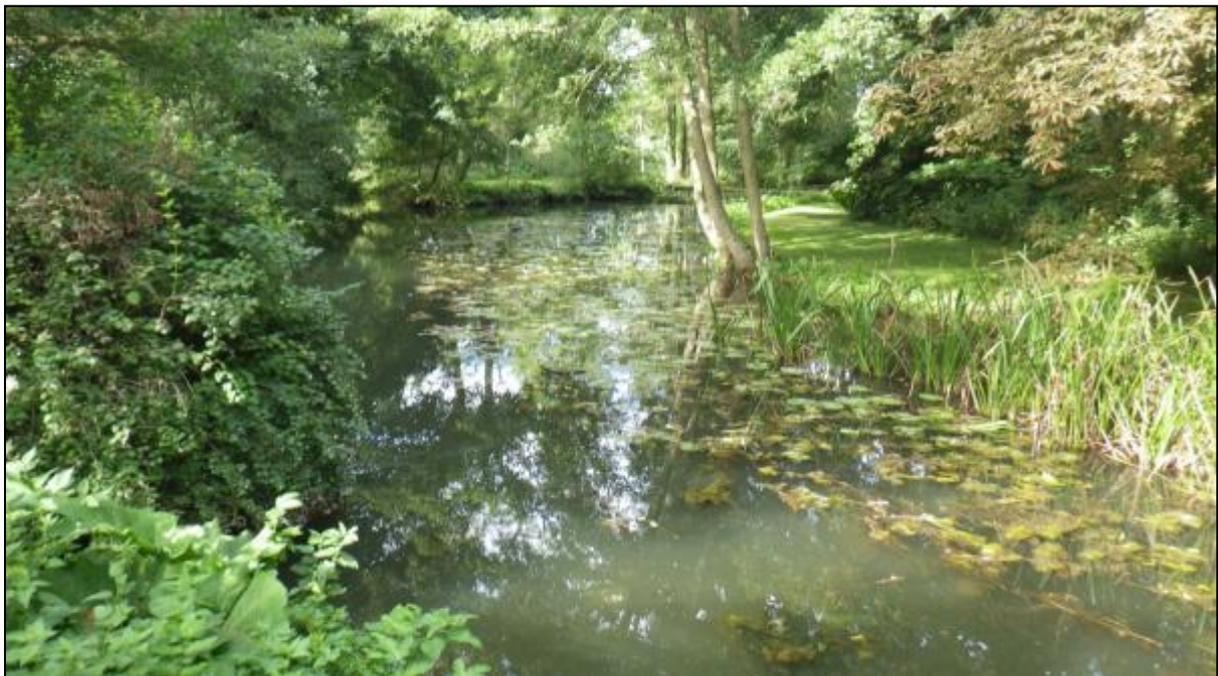


Figure 3: The poor-quality river habitat upstream of the hatches

The remains of an off-take structure are present on the left bank above the hatch. It is not known what this structure was originally used for and the structure is no longer in a usable condition. From a brief observation, the structure appeared to have once taken water from above the hatches, through a small culvert and back into the channel below, bypassing the hatches.

Approximately 80m upstream of the hatch, an off-take on the left bank is dependent on the water level maintained by the hatches and feeds a sweetening flow of water into a large pond stocked with rainbow trout. The off-take is in a dilapidated condition and may require works in the near future to remain functional.



Figure 4: The off-take for the pond is in poor condition and may need replacing in the near future

A small side carrier takes excess water from the pond to re-join the main channel downstream of the hatches.

Immediately downstream of the hatches, the river is over-wide for the flow conditions and forms a homogenous habitat, lacking the diversity required to support high biodiversity. The conditions improve as the river flows downstream towards the A345 and the channel becomes narrower. The river is slightly over-shaded by bankside trees and could benefit from sympathetic tree works to allow some patches of direct sunlight onto the riverbed.

The river passes under the A345 and becomes impounded again by an EA flow-gauging weir where the Avon West meets the Avon East. The flow-gauging weir is also a significant obstacle for fish passage and is likely to be a complete barrier under most flow conditions.



Figure 5: The EA flow-gauging weir is a significant obstacle to fish passage

3.2 The Avon East

The upstream boundary of the Wookey family's waters is fished from both sides of the river with the LB fishing rights belonging to Manningford Trout Farm and the RB under the control of to the Wookey family. The river here is shallow and fast-flowing.

The LB is steep and the land is elevated relatively high above the river. As a result, space for water-loving marginal plants is limited and terrestrial species such as common nettle (*Urtica dioica*) dominate the upper bank. The RB is, by comparison, considerably lower and less steep. However, the neighbouring fishery has mown a path along the bank to facilitate angler access and this has reduced bankside biodiversity in places. Throughout much of the reach, emergent vegetation, such as branched bur-reed (*Sparganium erectum*) and watercress (*Nasturtium officinale*) have established on the LB. Aquatic plants

such as starwort (*Callitriche* spp.) and water crowfoot (*Ranunculus* spp.) grow in the stream itself.



Figure 6: The upper reaches of the fishery on the Avon East

There is some potentially very good spawning habitat along this reach where flint gravels are scoured clean of sediment. This could be further enhanced by the introduction of some large woody debris (LWD) to deflect flows and increase localised scour of the gravel. This method of habitat enhancement will be discussed further in the *Recommendations* section.

Some large trout were observed in the upper reaches and these may be large stocked fish or escapees from the trout farm upstream. A number of smaller wild trout were also observed.

As the river meanders downstream, it runs in a generally more southerly direction. Shade over the river is elevated by a slight increase of trees on the LB and the canopies of the trees on both banks being allowed to grow over the channel. Subtle changes in habitat conditions occur as light levels reduce and in-stream and marginal plant growth is inhibited. Low overhead cover is important for wild trout as overhanging branches provide protection from predatory birds and also help to boost the trout diet with terrestrial invertebrates that occasionally drop from branches and fall into the river.

Shade is also invaluable during hot and dry periods. Water temperature affects all physical, chemical and biological processes in the river and each species has a specific temperature range in which they can survive. Un-shaded rivers in southern England have, during the summer, been shown to reach temperatures above the lethal limit for brown trout (Broadmeadow *et al.* 2010).

Within the more shaded reach, the LB is not fished and has been left more-or-less unmanaged. This allows some low-lying branches to hang close to the water and provide valuable cover for trout. This constitutes the optimal scenario for a wild trout fishery, providing excellent sport for an adept wild fishing enthusiast. Bankside access is made difficult by the unmanaged margin and the steep bank. The river here would be best fished from in-stream and any works to improve access should focus on creating small access points to wade the river.



Figure 7: Overhanging branches provide shade and cover for trout

Some light tree works could be undertaken to create a few select 'skylights' in the canopy over shallow riffles where increased light levels may result in increased weed growth. Additionally, a few overhanging branches could be removed to make casting a little easier. Any such works should be as conservative as possible and be undertaken with a 'less is more' approach, concentrating in the central third of the channel to retain low and trailing branches in the margins.

At the top of the next field downstream, a small impoundment slightly backs-up the flow. This appears to be the remains of an old hatch structure dating back into the 1800s (www.old-maps.co.uk) that once diverted flows through a small, now disused carrier. The remains of this structure form a small weir which slightly impounds the river upstream but does not act as a barrier to fish passage.



Figure 8: The remains of a disused structure slightly impounds the river upstream

A wide semi-inundated ditch also runs alongside the main carrier and appears to drain the floodplain during flood conditions. This semi-inundated channel is populated by a community of reed sweet grass (*Glyceria maxima*) and provides an excellent wetland habitat important for amphibians and invertebrates that benefit the overall ecology of the river. The abundance of reed sweet grass is a potential source of marginal plants that could be translocated (simply dug-up and re-planted) to the river margin to help kick-start habitat improvement works.



Figure 9: A semi-inundated channel adjacent to the river is a good habitat for amphibians and invertebrates

As the river flows from the east side of the field towards the A345 on the west side, it flows through grazed grassland and tree cover is reduced to only the occasional alder or hawthorn. Throughout this reach the river margin has been fenced-off from grazing livestock allowing a diverse range of emergent and marginal plants to establish along both banks. A buffer of rough un-mown grassland on both banks is also present and provides excellent peripheral habitat for fly life. The dense marginal vegetation helps to mitigate the lack of trees by providing alternative shade and cover for fish. However, the reach would certainly benefit from having a few more trees.



Figure 10: Fencing the river margins from grazing livestock has allowed a diverse range of emergent and marginal plants to flourish

A great deal of the river through this reach has been dredged and is very deep. This has slowed flow velocity and allowed sediment to drop out of suspension causing the bed to become heavily silted. Flow-loving aquatic plants such as water crowfoot struggle to flourish and spawning opportunities for gravel-spawning fish are virtually non-existent. Where the river is shallower, water crowfoot and starwort are growing well but the classic fast-flowing riffle habitat is absent. Riffle habitat is not only important for spawning but is also a refuge for juvenile fish from some predators that can only hunt effectively in deeper water.



Figure 11: Dredged sections of the Avon East result in slow flows and a heavily-silted bed

Options to raise bed levels through previously dredged rivers are available and are discussed in the *Recommendations* section.

Where the Avon East meets the Avon West, it is also impounded by the flow-gauging weir near France Farm. Water immediately upstream is backed-up and flows are sluggish. The impounding effect continues for approximately 40m upstream, above which the habitat improves. A ford used as a crossing for tractors and cattle is separated from the river upstream by an electric fence which protects the river from becoming damaged by cattle.

3.3 The Avon from the confluence to Upavon

Downstream of the confluence, the Avon flows through mostly agricultural land and alongside Riverside Mobile Home Park and some private residences. The river appears to have been dredged in several locations where it is very deep and relatively slow flowing. These sections are characterised by the presence of slower-flow loving plant species such as unbranched bur-reed (*Sparganium* sp.) and a dark-looking sandy silt riverbed.



Figure 12: Unbranched bur-reed is an indicator of slow flows and a bed substrate of sandy sediment

The dredging spoil appears to have been positioned on the upper LB to form a wide bund.



Figure 13: A bankside bund most-likely built from dredging arisings

Providing that the percentage of fine material within the bund is not prohibitively high, this may be a potential source of gravel that could be utilised for habitat

enhancement. Excavating a small trial pit would help determine the consistency of the bund material. Removing the bund would also help to reconnect the river habitat to the surrounding floodplain and reduce the steepness of the banks.

Trees are mostly on the RB but overall tree cover is adequate and provides a roughly balanced ratio of shade to direct sunlight. In many locations low-lying branches provide good cover for fish. Marginal plant communities vary in their abundance depending on the steepness of the banks. Where the banks are particularly steep, stinging nettles dominate the habitat.

Many of the deeper sections are too deep to wade and angling access is limited to fishing pegs installed on the LB. Where the water is shallow enough to wade, dense marginal vegetation impedes easy access to the river. Strimming occasional wading access points may help to improve access without spoiling the marginal habitat.

Near to Riverside Mobile Home Park, the remains of a mill weir structure are having an impounding effect and may be an obstacle for fish movement during low-flow conditions. The river becomes suddenly wide through the remnant of the mill pool.



Figure 14: The remnants of an old mill weir and pool

Towards the downstream boundary of the fishery, the left bank is perched very high above the river. As a result, the bank has become particularly unstable on the LB of a right-hand bend. Erosion naturally occurs on the outside bend of a meander and is usually deposited on the inside of the next bend downstream. When a riverbank is particularly high above the water, the process can become accelerated as the exposed face becomes undercut and slumps into the river.

Steep earth cliffs often provide habitat for kingfishers (*Alcedo atthis*) and sand martins (*Riparia riparia*) and erosion is not necessarily a problem for the river. However, if the loss of land is deemed to be a problem, steps can be taken to reduce the rate of erosion providing that protected species such as water voles or nesting birds are not present.

Techniques vary depending on access, and funds available. A cost effective option is discussed in the *Recommendations* section.

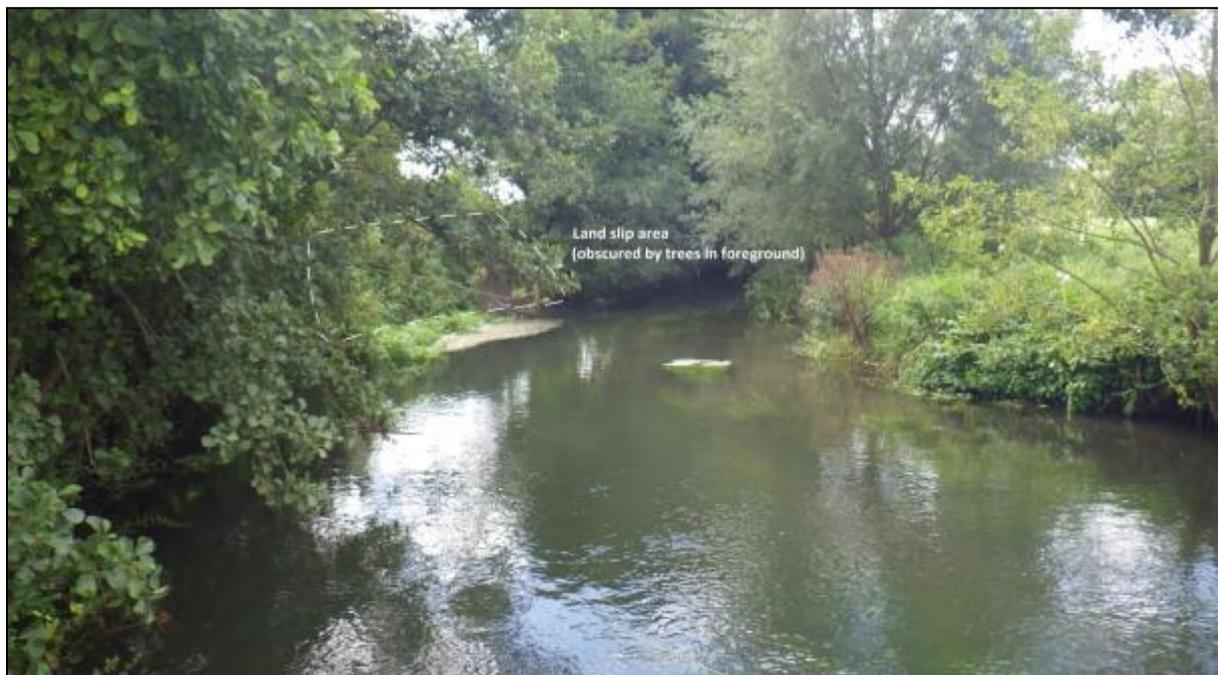


Figure 15: A high, vertical bank is rapidly eroding. Deep water makes access difficult

As with parts of the Avon East upstream, much of the Avon from the confluence to Upavon is suffering from the effects of historic dredging and good quality habitat conditions for flow-loving species are restricted to sections of shallower water. Flow diversity is limited throughout the reach, restricting habitat diversity for plants, invertebrates and fish.

3.4 Ponds

Three ponds were observed on the day of the visit. The first was the aforementioned pond fed from the Avon West above the hatches. This pond is perched above the natural water level of the river and would lose its sweetening flow if the hatch were to be opened. The dilapidated condition of the off-take infrastructure that feeds the pond also puts its fresh water supply at risk. Options are explored in the *Recommendations* section with regards to alternative methods of supplying the pond with water.

Another two ponds were observed near the confluence of the Avon West and Avon East. Both ponds were suffering from blooms of algae and duckweed (*Lemna* spp.). Algae and duckweed were becoming a problem requiring the filter on the outfall pipe from the pond to be regularly cleared of vegetation. Both ponds may benefit from the installation of simple floating islands to provide a refuge for zooplankton that feed on phytoplankton and help control sudden blooms. These are described in the *Recommendations* section.

4. The Strategic Restoration of the River Avon

In October this year, a revised *Directory of Actions* for the River Avon was compiled by the EA, as part of a partnership with a number of other organisations including Hampshire and Wiltshire Wildlife Trusts, NFU, Natural England and the Wessex Chalk Streams and Rivers Trust. This directory outlines proposed actions to be carried out on the River Avon.

Within the directory are recommendations that the EA act as a project lead to rehabilitate the Avon West at France Farm by opening the hatch to allow re-meandering within the existing channel.

A rehabilitation project at France Farm would have significant benefits to fish and wildlife in general. The re-introduction of a naturally sinuous and meandering channel would also return the river next to the France Farm to a beautiful chalkstream befitting the local scenery.

However, in order for this to be achieved, the current flow regime into the pond above the hatches would be halted and a new means of replenishing this pond may have to be considered.

The directory also recommends the removal of the weir downstream of the hatches and some habitat enhancement works such as channel narrowing and the introduction of woody debris.

Unfortunately, the directory does not include any recommendations for the Avon East and it would appear that the eastern tributary has not been included within the scope of the Avon restoration strategy. This is probably owing to the Avon East not being designated as a SSSI and therefore not having targets set to restore it to favourable condition.

The directory recommends bed-raising to rehabilitate the Avon downstream of the confluence towards Upavon with the EA as project lead.

5. Recommendations

In order for the Avon flowing through the Wookey family's land to reach its full potential as a healthy and diverse habitat supporting a healthy population of wild brown trout, the following actions are recommended:

- It is recommended that the hatch currently backing up water on the Avon West through France Farm is opened and a natural flow regime is reinstated. This action will result in a drop in water level and dramatic change in the physical conditions of the river upstream. The river will require a short period of adjustment, possibly followed by narrowing works to accommodate the new flow conditions.

The off-take for the adjacent pond will most-likely be left dry as water levels drop. In order to retain the pond, it is recommended that any restoration works include an alternative water supply to the pond. This could be in the form of a pipe or culvert from further upstream where the natural gradient of the river is higher than the pond, or a pumping system to take water from the new river water-level to the pond.

Another option may be to install a small borehole and pump to supply the pond with water. This option however, may prove controversial as abstraction is a heavily debated topic of contention throughout the Avon catchment.

- Downstream of the hatch, options should be explored with the EA to remove the flow-gauging weir or replace it with a gauging system that does not act as a barrier to fish passage.

Once the weir has been removed, the channel between the hatches and the weir will need some adjustment to the new flow regime. LWD sourced from the wooded area on the left bank could be utilised to achieve this aim and also introduce some extra flow diversity.



Figure 16: An example of an LWD groyne installed to diversify in-stream flow patterns

There are many ways in which LWD can be used in-stream. More information on LWD is available via Wild Trout Trust publications such as The Wild Trout Survival Guide and the Chalkstream Habitat Manual.

(<http://www.wildtrout.org/content/wtt-publications>)

If the gauging weir cannot be replaced in the short-term, options should be explored to improve fish passage over the weir. The EA has some experience in easing fish passage over similar 'crump' style weirs by baffling flows with timber baulks fixed to the downstream face of the structure.

- The upper reaches of the Avon East where the river is shallower and faster-flowing have the potential to provide good quality spawning habitat for wild trout.

LWD flow deflectors secured to the river bed to promote localised scour and accentuate flows over existing riffles will help loosen gravels and to 'sort' bed material into various sizes. This will make it easier for trout to create productive redds (spawning nests) and will ensure that eggs are kept free of silt and provided with a fast flow of well-oxygenated water.

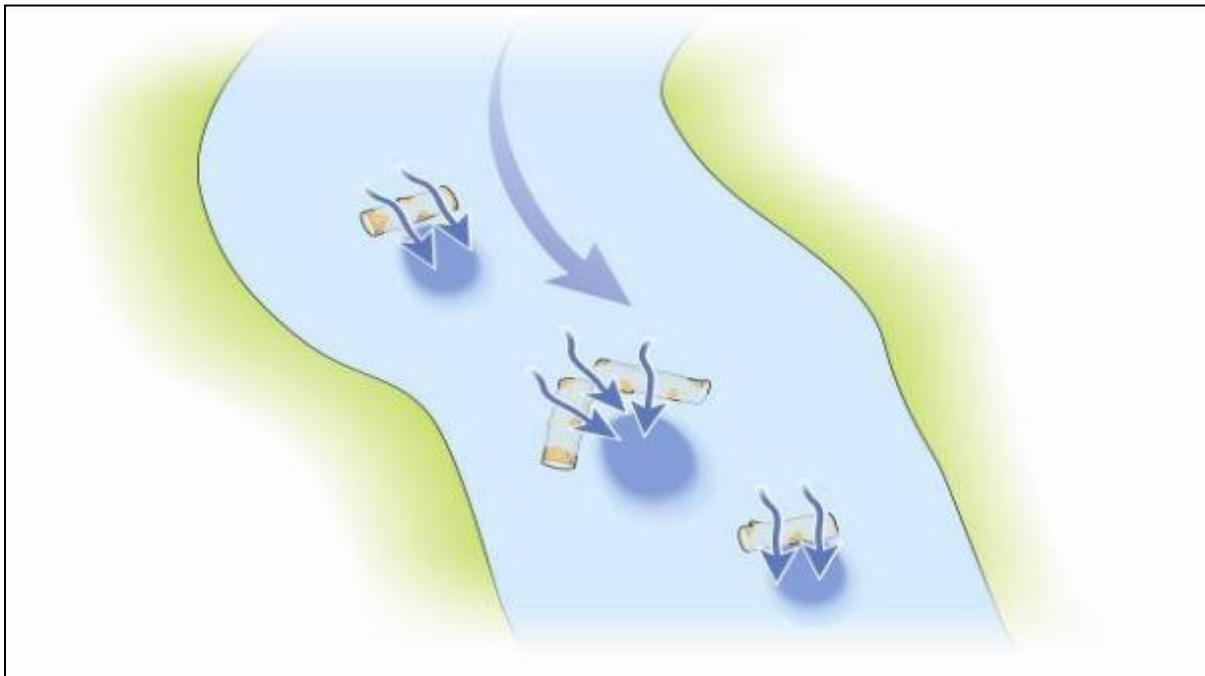


Figure 17: Log deflectors secured to the river bed promoting localised scour and improving gravel riffle habitat

LWD can be sourced from nearby selective tree works to open up some small skylights in the canopy through more shaded reaches.

- The remnants of the mill sluice on the Avon near the mobile home park should be dismantled to allow the river to flow naturally. This will improve the habitat quality upstream and ensure that it connects fully with the habitat downstream.
- A programme of bed-raising through sections of the Avon East would help to speed-up flow velocity through some of the deeper sections. Unfortunately, the Avon East is not currently included within the scope of the Avon restoration strategy. Regardless, the river should still qualify for Water

framework Directive (WFD) funding as it is classified as only 'moderate status'. Opportunities for WFD funding should be discussed with the EA.

There are less expensive techniques that could be used to raise some sections of bed that do not require large quantities of gravel and heavy plant machinery.

One such technique involves the use of hazel faggots to create hurdle-like structures across the bed. These hurdles are positioned approximately 1-2 metres apart and consist of hazel faggots secured between lines of sweet chestnut posts driven into the bed. The hurdles act to trap sediment between them and raise the bed level over time.

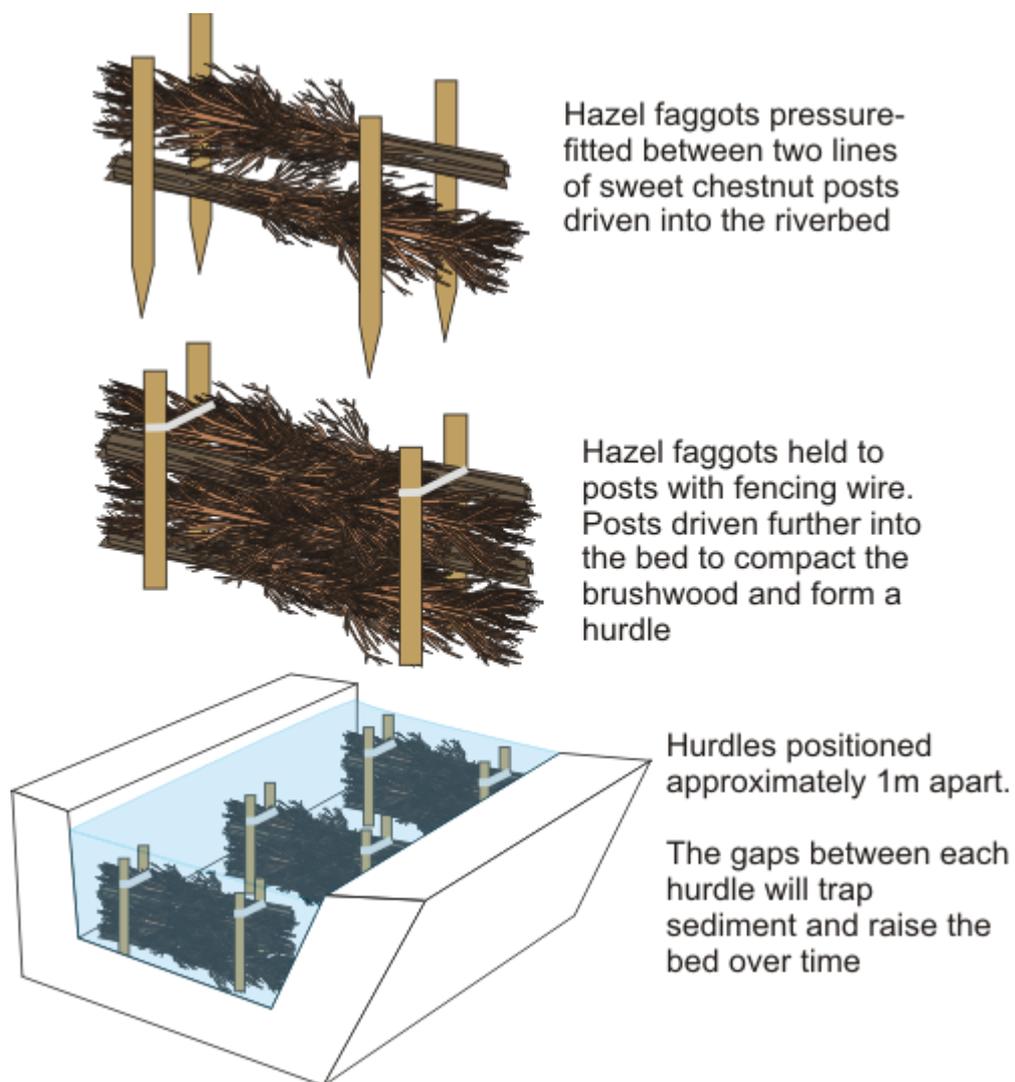


Figure 18: Brushwood hurdle sediment traps used to raise bed-level

This technique was used downstream on the Avon at Chisenbury in 2009 (<http://cainbioengineering.co.uk/wp-content/uploads/2009/10/Chisenbury-II-Poster-2-V2.pdf>).

- Bed raising through some of the deeper sections of the Avon downstream of the confluence may be included in future plans to restore the river as part of the Avon strategy. The raised bunds adjacent to the river may be a potential source of gravel that could be returned to the river as part of the restoration works. Plans to raise the bed through this reach should be discussed with the EA.
- Angling access along the Avon downstream of the confluence should be improved while preserving the marginal wetland habitat. Subtle paths and access points can be trimmed through the vegetation without causing too much harm to the overall health of the system.
- Much of the river through this reach is lacking in flow diversity. Introducing some channel sinuosity in a few locations would benefit flow-loving plant and fish species.

This can be achieved by creating berms that protrude out from the banks to narrow and re-shape the channel. These berms will also improve angler access by reducing the height of the bank.

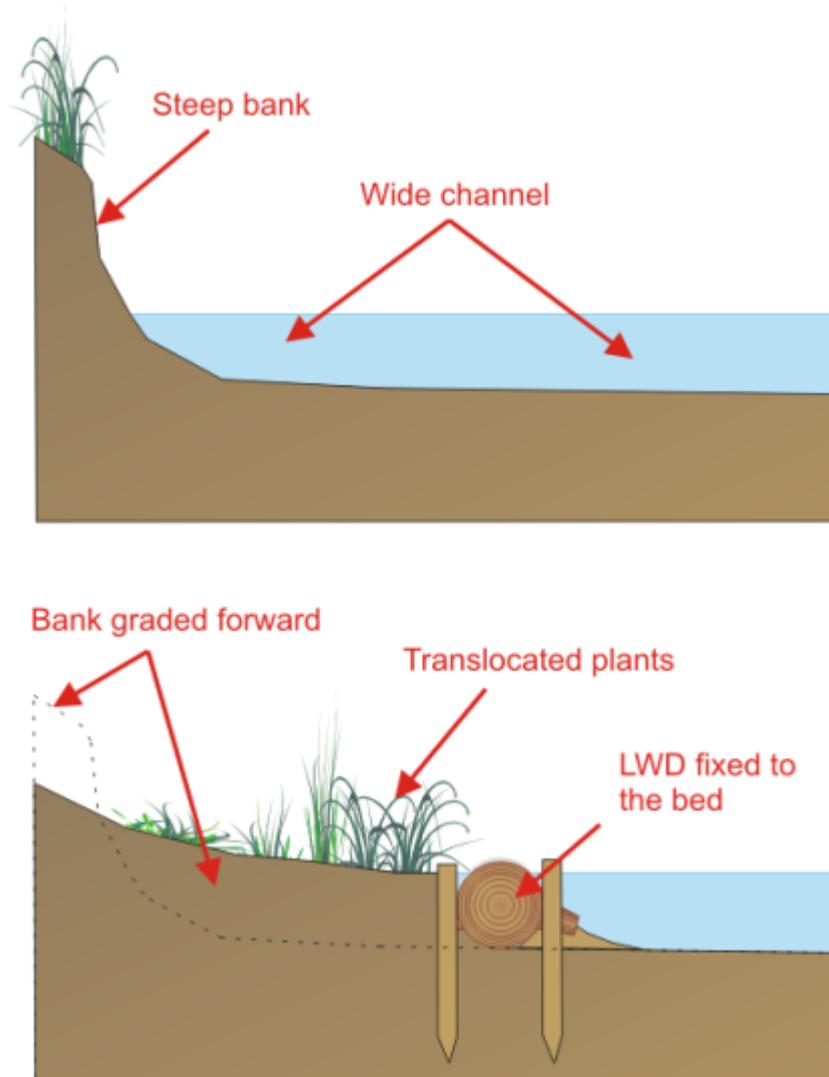


Figure 19: Example bank re-grading works to narrow the channel and provide better angling access

Discussions should be held with the EA regarding the inclusion of angler access improvements within any future plans for this reach of the Avon.

In the meantime, the introduction of some LWD flow deflectors to enhance flow diversity would improve the habitat throughout the reach. Further advice can be found on the WTT website.

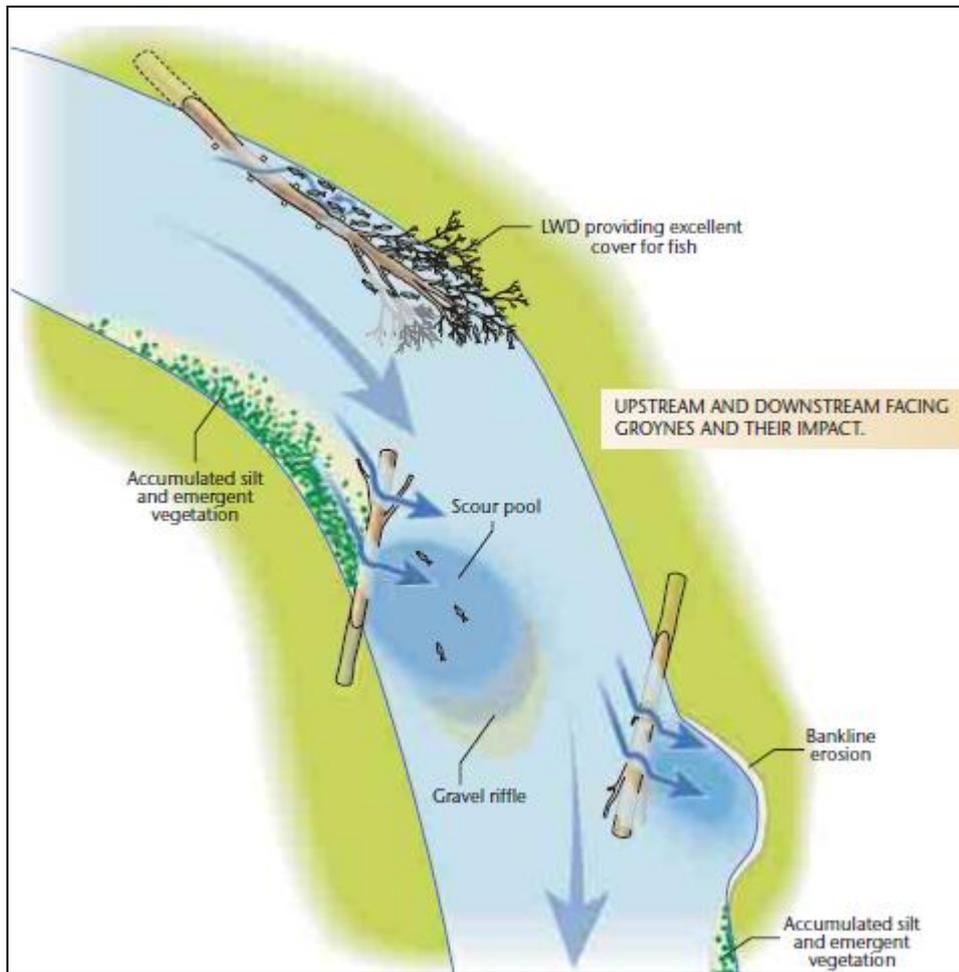


Figure 20: An extract on LWD from The Chalkstream Habitat Manual (www.wildtrout.org/content/wtt-publications)

- Where the bank is perched high above the river, the rate of erosion should be monitored and an assessment made as to whether or not the bank should be stabilised. The potential habitat value of the bank for kingfishers and sand martins should be taken into consideration even if no nesting burrows are observed.

Ideally, natural processes should be allowed to continue but if action is required, the bank could be re-profiled back and planted with live willow stakes to help stabilise the soil. This is a cost-effective and environmentally friendly alternative to hard engineering and will become stronger with time as willow roots spread through the bank.

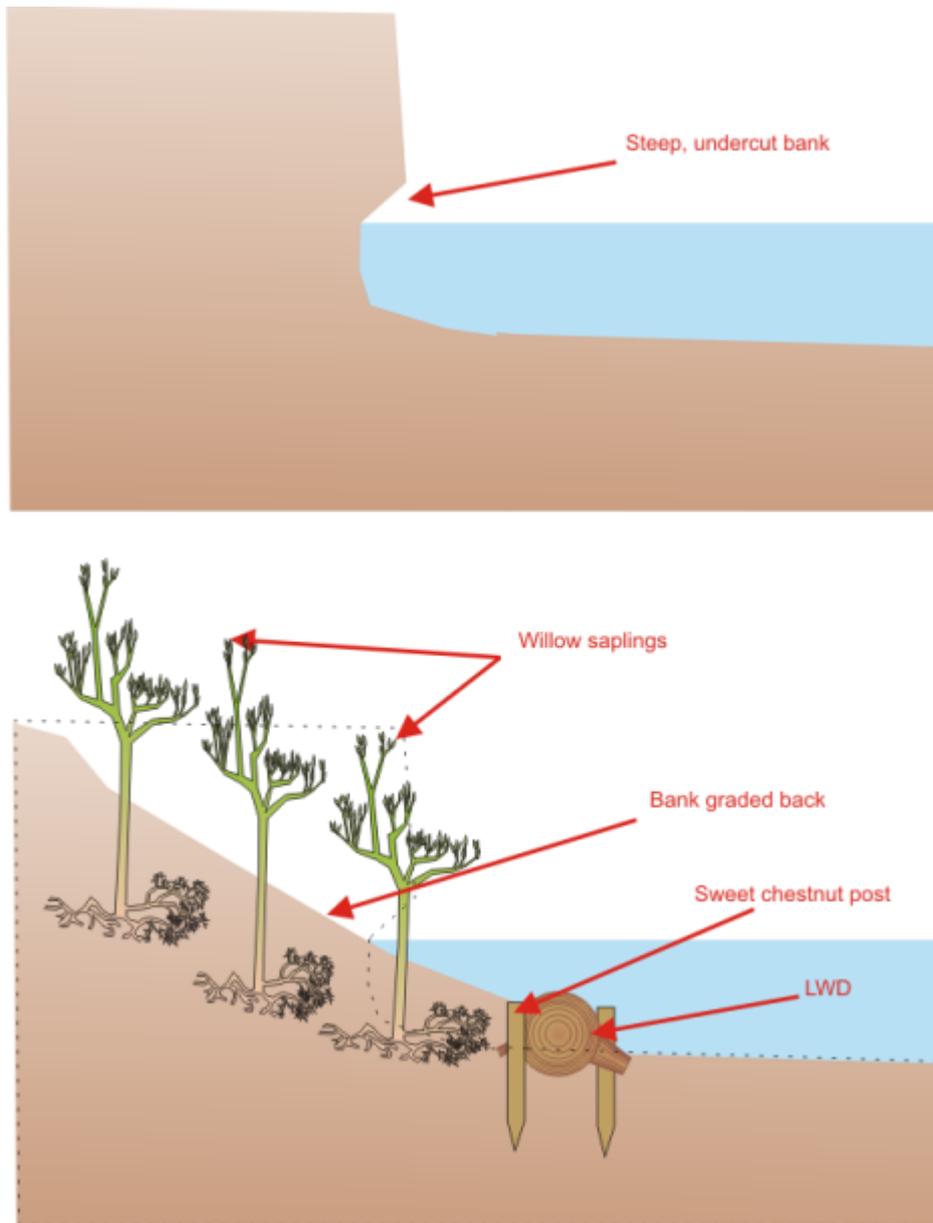


Figure 21: An example bank stabilisation using LWD and live willow

NB: Any such works should be undertaken by experienced contractors as the steep and unstable bank presents a substantial health and safety risk.

- Algal blooms within the ponds could be the result of slightly elevated nutrient levels in the river feeding the ponds combined with stocked fish preying on the zooplankton that would normally control phytoplankton levels. Blooms can be controlled by the introduction of barley straw as a growth suppressant or the construction of some simple floating islands as a zooplankton refuge. These can be purchased as individual modular units or home-made (see below).

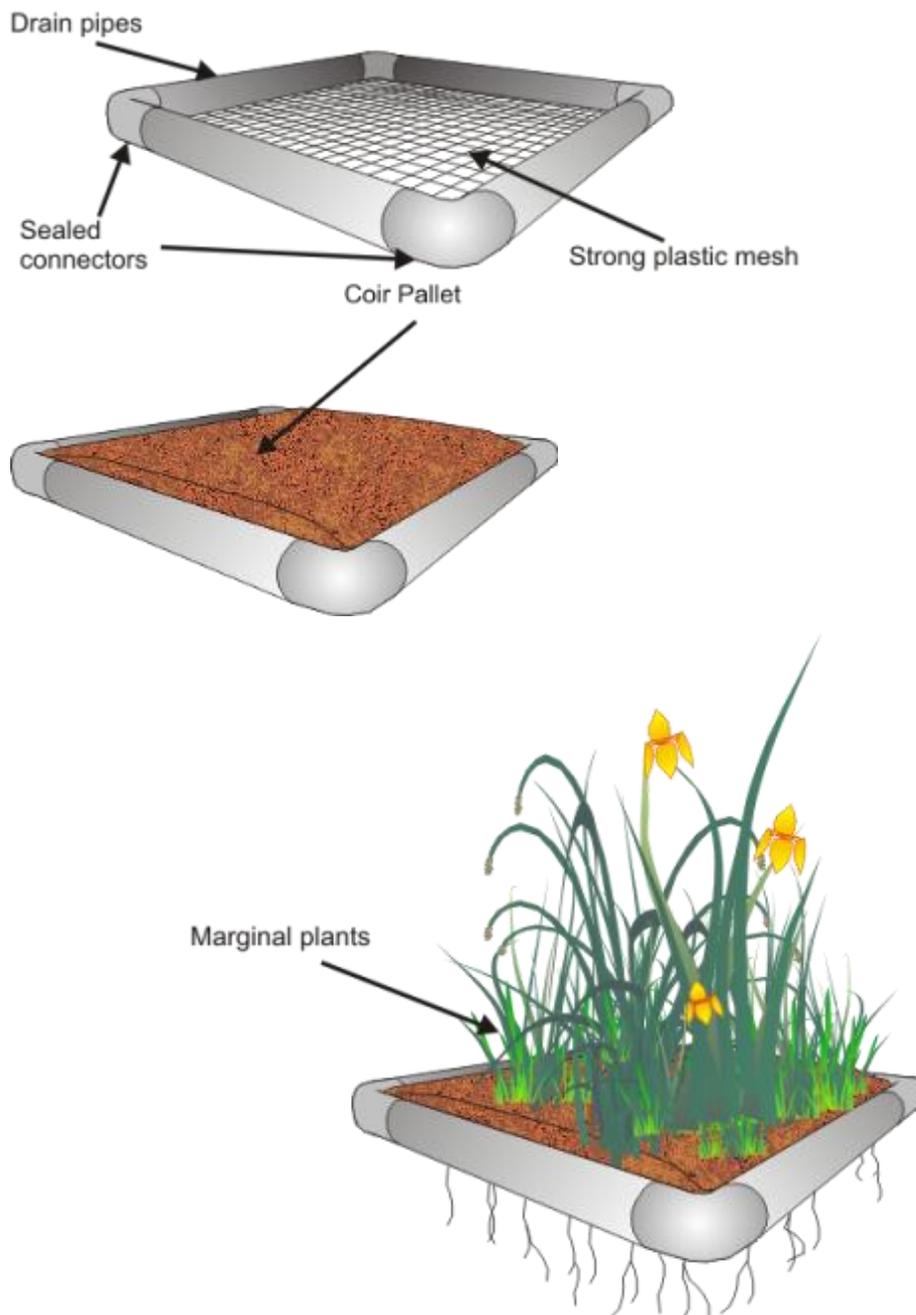


Figure 22: An example of a simple floating island to provide refuge for zooplankton that can help control algal blooms

6. Making it happen

Many of the recommended actions will overlap with the aspirations of the EA. In order to achieve the best outcome for both the fishery business and the ecology of the River Avon, it is recommended that discussions are held with the EA with regards to planning a programme of both short-term and long-term habitat enhancements.

Many fishing consortiums and clubs undertake in-stream habitat enhancement projects by assembling volunteer work parties from club members. This is a great way of getting members involved in the management of the river and is often an enjoyable activity that helps members to understand the habitat of their quarry and can enrich the fishing experience.

There is the possibility that the WTT could help to start a project via a Practical Visit (PV). PV's typically comprise a 1-3 day visit where approved WTT 'Wet-Work' experts will complete a demonstration plot on the site to be restored.

This will enable a working party group 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 PV leader.

There is currently a big demand for practical 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.

It is a legal requirement that some works to the river may require written Environment Agency consent prior to undertaking those works, either in-channel or within 8 metres of the bank. Any modifications to the channel will require flood defence consent on any river designated as "main river". Advice can be obtained from the EA's Development Control Officer.

Acknowledgement

The WTT would like to thank the Environment Agency for supporting the advisory and practical visit programmes.

Disclaimer

This report is produced for guidance only and should not be used as a substitute for full professional advice. Accordingly, 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.

References

Broadmeadow et al. (2010) *The influence of riparian shade on lowland stream water temperatures in southern England and their viability for brown trout*. **River Research and Applications**, 27:226-237

Appendix 1

A summary of the EA River Basin Management Plan for the Avon West

Hampshire Avon (West)	
Waterbody ID	GB108043022370
Waterbody Name	Hampshire Avon (West)
Management Catchment	Hampshire Avon
River Basin District	South West
Typology Description	Low, Small, Calcareous
Hydromorphological Status	Not Designated A/HMWB
Current Ecological Quality	Poor Status
Current Chemical Quality	Does Not Require Assessment
2015 Predicted Ecological Quality	Moderate Status
2015 Predicted Chemical Quality	Does Not Require Assessment
Overall Risk	At Risk
Protected Area	Yes
Number of Measures Listed (waterbody level only)	1

Appendix 2

A summary of the EA River Basin Management Plan for the Avon East

Hampshire Avon (East) & Woodborough Stream	
Waterbody ID	GB108043022410
Waterbody Name	Hampshire Avon (East) & Woodborough Stream
Management Catchment	Hampshire Avon
River Basin District	South West
Typology Description	Low, Small, Calcareous
Hydromorphological Status	Not Designated A/HMWB
Current Ecological Quality	Moderate Status
Current Chemical Quality	Does Not Require Assessment
2015 Predicted Ecological Quality	Moderate Status
2015 Predicted Chemical Quality	Does Not Require Assessment
Overall Risk	At Risk
Protected Area	Yes
Number of Measures Listed (waterbody level only)	-

Appendix 3

A summary of the EA River Basin Management Plan for the Upper Avon

Hampshire Avon (Upper)	
Waterbody ID	GB108043022350
Waterbody Name	Hampshire Avon (Upper)
Management Catchment	Hampshire Avon
River Basin District	South West
Typology Description	Low, Medium, Calcareous
Hydromorphological Status	Not Designated A/HMWB
Current Ecological Quality	Good Status
Current Chemical Quality	Does Not Require Assessment
2015 Predicted Ecological Quality	Good Status
2015 Predicted Chemical Quality	Does Not Require Assessment
Overall Risk	At Risk
Protected Area	Yes
Number of Measures Listed (waterbody level only)	-