



Advisory Visit to the River Coln,
Williamstrip Estate, Glos.
Undertaken on behalf of the Wild
Trout Trust, by Vaughan Lewis,
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1.0 Introduction

This report forms the output of a site visit undertaken to the River Coln, Williamstrip Estate, Glos, on 14 September 2004 on behalf of the Williamstrip Estate.

Information for the report was gathered during the site visit. Additional information was provided by the river keeper, John Reeves and fishery survey reports carried out by the National Rivers Authority/Environment Agency (EA). Throughout the report, normal convention is followed, with banks identified as RB (right bank) and LB (left bank) when facing downstream.

2.0 Description of fishery

The source of the River Coln is located at a spring line to the north of Brockhampton near Cheltenham (SP 035234). The river flows in a south-easterly direction to join the River Thames upstream of Lechlade, a distance of some 52 km. The river has a mean gradient of 1:430.

The geology of the catchment is dominated by oolitic limestone and clay, with the river encountering the following strata in a sequence from source downstream: Upper Lias clay, inferior Oolite limestone, Great Oolite limestone, and alluvium on Oxford clay.

The mean daily flow as measured at Bibury is approximately $1.5 \text{ m}^3\text{sec}^{-1}$, with a typical dry weather flow in the order of $0.5 \text{ m}^3\text{sec}^{-1}$ and flood discharges in excess of $4.5 \text{ m}^3\text{sec}^{-1}$. WS Atkins assessed the impacts of groundwater abstraction on the flows of the River Coln in a report prepared for Thames Region of the NRA. The Atkins report assessed groundwater abstraction for public water supply as having reduced natural mean flow in the River Coln by between 2 and 7 % (Period 1964-90) and Q_{95} flow by between 3 and 15% over the same period.

Water quality in the river is generally good, although there has been an increasing number of complaints regarding a milky grey turbidity present in the river. This mirrors complaints in other Cotswold rivers and is believed to be due to a diffraction effect caused by a combination of lias clay micelles and calcium carbonate precipitate.

The river downstream of Withington is an EU designated salmonid fishery, imposing imperative water quality criteria. Failure to meet these standards must be reported to the EU by the Environment Agency.

3.0 Habitat Assessment

The Williamstrip fishery runs from downstream of Bibury Court, Bibury to the village of Coln St Aldwyn. There is a total of 23 season rods let on the fishery, with day ticket access available on a short reach at the downstream end of the fishery.

The top reach of the fishery was subject to a major habitat enhancement scheme by the National Rivers Authority (NRA) in 1992/93. The river was narrowed using individual stone revetment and shallowed by the introduction of pebble reject gravel in order to

- reduce cross-sectional area, and hence increase flow velocity
- increase the availability and quality of gravel riffle areas for spawning brown trout *Salmo trutta* and grayling *Thymallus thymallus*
- increase the abundance and distribution of water crowfoot *Ranunculus spp.*

The scheme was largely successful in the first two of these aims, although grazing pressure by large flocks of sheep on the unfenced RB margin of the river has reduced the overall benefits of the scheme. The growth of water crowfoot and other submerged weeds, was in common with the majority of the fishery, poor, with only small stands of unbranched bur-reed *Sparganium emersum*, starwort *Callitriche spp.* and common club rush *Schoenoplectus lacustris* present.



Narrowed channel showing section eroded by sheep behind stone revetment

As a result of the lack of weed growth, cover in the channel was restricted to sections of increased depth and under-cuts formed by the stone revetment. There was no appreciable amount of Large Woody Debris (LWD) in the channel. The bed of the river had a significant growth of filamentous algae over much of its area.

The LB fields were in permanent set aside, thus removing any risk of significant erosion of the banks on this side of the river.

Downstream of the enhanced reach, land use on the RB was arable, with wide, uncultivated margins providing a buffer strip. The river in this reach was over-wide,

with a relatively uniform bed, with little variation in depth or sorting of gravel. Submerged weed was dominated by common club rush.



Over-wide river reach downstream of enhancements

A number of wooden groynes had been introduced to the river in an attempt to increase water velocity locally. However, these had proved largely inadequate given the length and scale of this over-wide reach. Cover boards had also been placed in the river at strategic locations in order to improve deposition and survival of the eggs of Ephemeroidea and Trichoptera species.



Cover board in river

The river downstream of this point then divided into a 'high level' mill stream and 'low level' stream. Enhancements had been undertaken on both channels as part of the NRA scheme in 1992/93. Small stone groynes had been introduced to the high level channel, with loose gravel spread in the section immediately downstream. These had produced some local changes in bed profile, with adult trout often lying in the small, excavated pools. However, the impact of the mill impoundment downstream was the over-riding limit on habitat type and quality in this reach.

A large spawning weir had been constructed in the low level channel. This remained a key area for spawning on the fishery, with trout cutting redds here annually.



Constructed trout spawning weir

Downstream, there were short sections of excellent flow dependent, gravel dominated riffles. However, there were also considerable lengths of channel that were over-wide, with over-grazing on the RB, and un-sorted substrate in the channel overlain with deposits of fine sediment. Significant amounts of 'Tufa' gravel were also present. Tufa gravel is formed by the precipitation of calcium carbonate on a nucleus (often a very small piece of gravel). Continued precipitation over time causes the Tufa gravel to increase in size. Tufa is of limited value for spawning fish due to its tendency to concrete into larger lumps, thus reducing through-flow of oxygenated water to trout eggs within redds.

The bed profile of this reach was relatively uniform, with the continued absence of water crowfoot and other submerged weeds limiting the availability of instream cover. Numbers of small stone weirs and groynes had been placed in this reach in order to create more diversity in flow velocity and bed profile.

Water clarity was very poor, with a noticeable grey colouration present.



Installed stone flow deflector. Note grey colouration to the water

4.0 Fish Stocks

Regular fishery surveys have been undertaken at Williamstrip by the EA. These have revealed a moderate stock of brown trout, with some recruitment. A deep substrate incubation box has been operated on the estate for several years. Hatch rate of eggs and emergence of alevins from the box has been good, although at present no measure of the contribution of these fish to the river system has been possible. In addition, the constructed spawning weir continues to be operated, with annual cleaning taking place prior to the spawning season. In addition to running the incubation box, the estate stocks 500 12”+ brown trout annually. Small but significant numbers of rainbow trout are also present in the fishery, probably originating from upstream fisheries or from escaped fish from Bibury Fish Farm.



Deep substrate incubation box located in side channel

The status of grayling in the river is of great concern. Surveys in the late 1980's and early 1990's showed reasonable numbers of this species in the river. However, succeeding surveys have charted the decline of grayling. This pattern appears to have been mirrored at other fisheries on the Coln.

5.0 Recommendations

- The potential benefits of the enhancement work undertaken in the early 1990's are not being optimised, due to grazing pressure on the river banks. It is recommended that a fence (permanent or temporary) should be erected alongside the enhanced reach, and at other locations on the river where intensive grazing takes place, in order to allow the regeneration of valuable emergent vegetation. It is understood that most of the river meadows are registered under the Countryside Stewardship scheme, making them eligible for a fencing grant.

If the presently eroded sections of bank are fenced, it would be of great benefit to carefully re-sculpt the field within the fenced area (using a hydraulic excavator), and use the resulting soil to infill the eroded margins. These could then be planted with sedge *Carex* spp. and reed sweet grass *Glyceria maxima*, transferred from elsewhere on the river.

- The present limit of the enhancement should be extended downstream in order to address the over-wide nature of the channel. This would be a significant undertaking, with costs running into several tens of thousands of pounds. It would

therefore be necessary to establish a partnership project, probably with the Environment Agency and DEFRA as joint funders of the work. The benefits to the river of an initiative of this nature would be significant.

- There was a lack of Large Woody Debris (LWD) in the river. Fallen branches and tree trunks are important components of river systems, helping to provide cover and trap fine sediments. Of particular importance to the Williamstrip fishery is its part in shaping and forming bed profile. Fallen timber act as groynes, helping to scour out the bed, and sort substrate, removing fine sediment from spawning gravel.

In order to benefit from LWD, it is recommended that a policy of retaining and stabilising fallen trees and branches is adopted by the estate, provided that this does not pose an increased risk of flooding of property. The EA should be contacted to agree a maintenance schedule within the estate's boundaries that reflects this change in policy.

- The poor growth of water crowfoot and other submerged weed is of concern. This pattern has been found elsewhere on the Coln and indeed other Cotswold rivers. There is little the estate can do on an individual basis other than to contact the EA, asking for assistance and offering support to the basic empirical research they are undertaking regarding this issue.
- The incubation box has proved successful at producing large numbers of alevins that have self-stocked to the system. It is likely that the number of fry produced far exceeds the carrying capacity of the downstream juvenile habitat, with consequent density dependent mortality likely. In order to optimise recruitment of fry, it is recommended that a simple catch trap is installed on the incubation box, and retained fry distributed into suitable habitat elsewhere in the fishery. This is best carried out using a watering can.
- The benefits of the spawning weir have been established. It is recommended that its annual maintenance should be continued.
- The installed groynes have had some local impact. However, they are generally too small to create any wider benefits. It is therefore recommended that a larger scale project should be considered for the construction of larger, more numerous deflectors. These should be constructed from local stone or timber, and should ideally consist of upstream facing groynes or triangular shaped groynes. Indicative designs are provided in the attached Wild Trout Trust guide. Significant work of this nature should be planned carefully in consultation with the EA.
- The decline in numbers of grayling is of great concern. It is important that the EA should be contacted regarding this issue, that may have a catchment wide origin.
- It should be noted that no work should be undertaken to the bed of the channel or its banks within 8m of the channel without the consent of the Environment Agency under the Land Drainage legislation.