Cornwell brook – Cornwell Manor

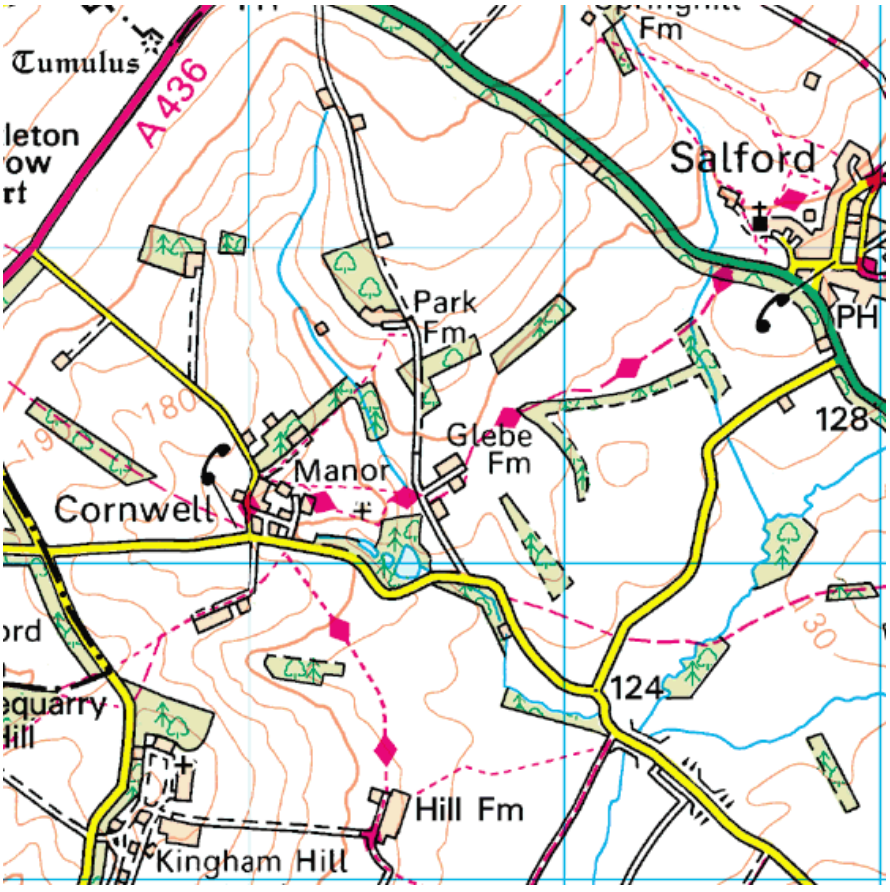
An Advisory Visit by the Wild Trout Trust – February 2014

1. Introduction

This report is the output of a Wild Trout Trust visit to a tributary of the Cornwell Brook at Cornwell Manor in West Oxfordshire. The request for the visit came from Mr. Alexander Ward, who owns the Cornwell Manor Estate. Mr Ward is keen to explore options for restoring a native brown trout *Salmo trutta* population to the section of Cornwell Brook tributary that runs into the lower of the chain of three lakes that form the fishery at Cornwell.

There is anecdotal evidence that the bottom lake and feeder stream once supported wild trout. This population is thought to have died out following physical changes to the stream channel and degradation in the water quality emanating from an old dairy unit which historically drained into the system but which has now been closed.

Currently the lakes are managed as stocked trout fisheries and although there is recognition that stocking will still be required to maintain the fishery, it is hoped that potentially the addition of a wild component to the stock will enhance the angling experience, as well as contributing to the wider ecological value of the Cornwell brook as a whole.



Cornwell Manor Location Map

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.

The contents of this report covers a 500m section of stream running down from National Grid Reference SP273250 to just below the outlet of the main lake at SP276269.

2. Catchment and fishery overview

The Cornwell Brook rises from a series of springs bubbling up from the Cotswold limestone aquifer to the west and north of Chipping Norton. The local geology is made up from layers of clay soils overlying Cotswold limestone. The main Cornwell Brook receives waste water effluent from Chipping Norton but the 2km branch of side tributary feeding into the bottom lake at Cornwell drains a small rural valley, with a parcel of woodland at the head and arable fields flanking the valley sides.

The main Cornwell Brook is known to support a wild brown trout population and this stream, along with a handful of other small tributaries will be the major trout spawning tributaries of the River Evenlode system. The Cornwell Brook and tributaries have been assessed as being in "moderate" ecological condition under the Water Framework Directive (Waterbody ID GB108043015750). Fish populations in the main river Evenlode are currently in poor health. This is thought to be due to a combination of poor in-channel habitat and intensive local agriculture which has increased sediment loads and impacted on water quality. These physical and chemical impacts have been compounded by an infestation of non native crayfish.

3. Fishery potential and habitat assessment

Habitat quality for trout in the main Cornwell Brook immediately downstream of the lakes appears to be good, with the stream flowing down a comparatively steep gradient over a bed of mainly limestone cobbles and chips. Brown trout are known to inhabit this section of stream and are highly likely to use this shallow, fast flowing section as a spawning and nursery site. Unfortunately the dam and outlet channel (Figure 1) of the bottom lake represents a major block for any further upstream migration.

Modifying the outlet structure and channel to facilitate trout migration is possible but would undoubtedly be very expensive and only provide access to approximately 1km of viable channel. If a wild trout population could be established in the reach running up above the lake then there is every chance that some fish will drop back out of the stream and take up residence in the lake and possibly even drop back into the main Cornwell Brook. This would represent the most cost effective method for establishing wild stocks within the lake.

At present, the feeder stream running into the lake has been placed in a long culvert. For wild fish to be able to freely navigate both up and out of the lake for spawning and for juveniles to actively drop back, it will be necessary to take the stream out of the culvert (photo 2) and back into a naturalistic channel.

Figure 1. Outlet channel from the bottom lake.

Figure 2. Inlet channel lost in a culvert.

The culverted section of the channel (Figure 3) is also causing problems by backing up the flow, causing local flooding issues and adversely impacting on upstream habitat quality. It is likely the upstream flooding was in part due to some blockage in the culvert. Unless resolved, this issue could lead to the loss of grazing and possibly even some trees if the flooding persists for any significant length of time. Placing the stream back into an open, gently meandering channel will resolve all of these issues and provide an attractive and biologically valuable resource and a suitable access for migrating fish.

Figure 3. Local flooding exacerbated by the partial blocking of the culvert.

Any new channel should be based on the shape and size of sections of functioning channel found further upstream. Ideally any new channel should be designed with a two staged bed profile to allow a self cleansing flow to maintain high quality habitat, even under low flow conditions and also to provide additional capacity via a second stage to accommodate higher flow scenarios. A gently meandering plan form will help to moderate water velocities down what is a relatively steep gradient.

This section will be most valuable as a spawning and nursery site and designing the channel to ensure that there is a variety of depths and channel widths will allow good quality habitat to form. If there is little or no natural gravel available then it is possible to import limestone chips in the 10 to 40mm size range to provide a spawning medium.

The provision of in-channel cover will also be important and riparian tree planting with low, bushy trees such as thorns and sallows will be hugely beneficial for trout.

Further upstream above the copse the stream meanders through a grazing meadow. The high flows made an accurate assessment of habitat quality difficult but the shape of the channel looked to be good with the stream flowing through shallow pools interspersed with glides and occasional broken riffles. Here the channel was lacking scrubby cover, possibly due to intensive grazing.

Figure 4. Grazing meadow above the copse. A natural form but lacking in-channel cover.

A short distance upstream, the stream passes through another short section of culvert (Figure 5) installed as a crossing point. Again the culvert was partially blocked and was causing the river to back-up. To compound the problem, this culvert appears to be set in on a slope, rendering fish migration even more problematic.

Even modest sized culverts can cause problems for habitat quality as well as fish migration and replacing this crossing with a free spanning sleeper bridge, or a box culvert would protect upstream habitat and ensure free access for migrating fish. If a box culvert is to be considered then it is essential that the invert of the box is buried well below the downstream bed level and then back filled to existing bed level with natural river bed gravels.

It would be important to consider improving fish passage at this location in combination with removing the inlet culvert. Investing in providing improved fish passage out of the lake without also addressing this issue could be a missed limit the extent of available spawning habitat.

A short distance upstream the stream flows through some arable meadows. A narrow, uncultivated buffer strip had been left and in places the stream has been fenced. This has enabled some scrub to develop which has potentially provides some valuable low level riparian cover (Figure 6).

Figure 5 partially blocked culvert causing upstream flooding and sediment deposition.

Figure 6. A fenced section has enabled some low scrubby cover to develop. Ideal for a trout spawning and nursery stream.

4. Conclusions

The stream flowing into the bottom lake at Cornwell has potential to support wild brown trout and if a population were to establish some fish would inevitably drop back and populate the lake. For this concept to have any chance of working, several actions are required.

It may not be practicable to provide access for migrating fish from the lower Cornwell Brook, up and through the lake to potential spawning sites upstream. It would be desirable but is likely to be very expensive with no guarantee of success.

A cost effective option for potentially populating the lake with some wild trout is to concentrate efforts on improving fish passage upstream of the lake and ensuring that there is suitable spawning and nursery habitat available. It was not possible on the day of the visit to fully evaluate the quality of spawning and nursery habitat due to the turbidity of the water; however, even if the habitat is sub-optimal, it could easily be improved.

Providing good quality habitat is essential but the full potential of the stream can only be unlocked by facilitating improved access. This will involve the creation of a new channel running up and out of the lake and improving access at the culvert crossing approximately 300m further upstream. Even without any development of a wild trout population, these measures will reduce flood risk, maintenance requirements and provide a biologically rich and aesthetically pleasing environment. This could provide a full justification for any investment even without the potential for establishing a wild trout population.

With the upstream dairy units no longer causing pollution, there is every chance the water quality will sustain trout. Best practice land management will be required for the stream to achieve optimum condition. Wider buffer strips adjacent to the stream and contour planting with belts of hardwood trees and bushes is recommended to help improve infiltration and reduce sediment run-off, particularly down gradient from any arable meadow..

It is assumed that the inflowing stream and lake does not currently support any viable wild trout population. This is of course an assumption and before making any plans for kick starting the population via stocking, it is strongly recommended to carry out an investigation. A simple back-pack electric fishing survey will determine the presence or absence of any fish population in the stream. If a population does exist then it can be developed and if you want the satisfaction of measuring the success of any project work then it is essential to establish some base line data.

In the absence of any wild trout population and following work to improve migration and provide optimal habitat, it might be possible to kick start a population via stocking. Very occasionally some wild production can be started when introduced hatchery derived stock spawn naturally. This usually relies upon the presence of excellent habitat and no competition and very few predators and even then may not produce any viable offspring. Undoubtedly the best fish for this upper Cornwell Brook tributary will be wild Cornwell Brook

broodstock. Information about the issues surrounding trout stocking can be found on our website at http://www.wildtrout.org/content/trout-stocking

Any wild trout born in the Cornwell Brook will have inherited genetic traits providing it with the ideal "tool-kit" necessary to thrive and reproduce in the local Cornwell Brook environment. An early discussion with the local Environment Agency Fisheries Officer is recommended to explore the possibility of securing a modest number of wild trout thinned out from productive sections of the Cornwell Brook. This would not require the removal of adult wild trout but simply stocking a cross section of year classes into the very best sections of upstream habitat.

This scheme obviously needs to be planned to avoid any impact on local stocks but if carried out carefully and with the consent of the EA and the local fishery owners, it could potentially help to provide a valuable "ark" population in the tributary above the Cronwell lake and could potentially be a valuable source of fish if the main Cornwell Brook were ever damaged by a serious pollution incident.

5. Recommendations

- Commission a simple electric fishing survey to establish whether or not the stream supports any trout.
- Take the lake inlet stream out of culvert and back into a naturalistic, gently meandering channel.
- When creating the new channel, use a section of optimum upstream channel to help with design.
- Replace the culvert crossing with a clear span bridge or sunken box culvert.
- Ensure the stream bed is gravel rich and the margins planted with low scrubby cover.
- Consider stock fencing in the reach running upstream to allow the stream margins to develop improved riparian cover.
- Ensure water and habitat quality is protected from arable field run-off.
- If a new vacant habitat can be created, then open up a dialogue with neighbours and the EA and investigate the possibility of kick starting the trout population by stocking the stream (not the lake) with small wild trout thinned from productive sections of the Cornwell Brook.
- Seek support for your project from the Cotswold Rivers Trust www.cotswoldriverstrust.org and the local Environment Agency.

Note: All work within 8m of the top of the bank will require a consultation with the EA and may require a formal written Flood Defence Consent prior to any work being carried out.

Acknowledgement

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

Disclaimer

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