WILD TROUT TRUST

River Arrow

Spernall, Warwickshire

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Contents

Key Findings

- A question remains over whether the water quality of the River Arrow in this reach is good enough to sustain a population of trout. Observation of invertebrates and aquatic macrophytes (plants) indicate chronic organic pollution effects, most likely from the sewage treatment works a short distance upstream.

- In-river habitat is generally good throughout the reach inspected and suitable for all stages of the lifecycle of trout.

- Riparian habitat is also generally good, benefiting from the ongoing establishment of native woodland by the Heart of England Forest on the right bank. Extension of the buffer fencing up to Spernal Lane to exclude livestock from the entire left bank is recommended.

- Potential fish spawning areas on gravel riffles contain a large amount of fine sediment which could reduce egg survival rates. Simple measures to create localised scour and gravel sorting are recommended.

1. Introduction

This advisory visit was undertaken to the River Arrow near Studley, Warwickshire on the 29th of September 2023 by Tim Jacklin of the Wild Trout Trust, accompanied by the landowner.

Normal convention is applied throughout the report with respect to bank identification, i.e. the banks are designated left hand bank (LB) or right hand bank (RB) whilst looking downstream. Specific locations are identified using decimal latitude and longitude (e.g. **56.044896098, -3.16176523829**), which can be pasted straight into Google Maps to identify locations. Green text within the body of the report is hyperlinked, so holding Ctrl and left-clicking on it will navigate you to that content.

2. Background

The River Arrow is a tributary of the Warwickshire Avon, flowing south through Redditch, past Alcester and joining the Avon near Bidford-on-Avon. The catchment is within the low-lying areas of the Midlands Plateau natural area, the underlying geology being soft Mercia Mudstone of the Triassic period; this is overlain with significant glacial deposits of sands, gravels and clays. The reach visited is located at Spernall, near Studley, downstream of Redditch and upstream of Alcester.

Table 1 summarises the most recent environmental data compiled by the Environment Agency for the Water Framework Directive (WFD) assessment of the Arrow waterbody between the Spernall Hall Farm and the Alne confluence. The last assessment was in 2022 and recorded an overall 'moderate' ecological status, with the individual elements for fish and invertebrates rated 'high', but macrophytes and phytobenthos (plants and algae) rated 'moderate'. Water quality elements are rated high or good, apart from phosphate which is 'poor'.

The ecology data which informs the assessment (including location of samples) is available on the Fish & Ecology Data Explorer database (https://environment.data.gov.uk/ecology/explorer).

The fishery survey (electric fishing) results show the closest sampling site to be just upstream of Spernal Lane, downstream of Spernal Ash sewage treatment works (circa 200m upstream of the reach inspected). This site was last sampled for fish in May 2022 and recorded chub, dace, roach, minnow, bullhead and stone loach. Prior to 2022, the site has been sampled for fish sixteen times since 1980, and brown trout have been recorded on two occasions (2006, two individuals; 2002, one individual).

The closest fishery survey sites upstream of Spernal Ash STW are at Ipsley and Arrow Valley Park in Redditch. The fish community at both sites is dominated by coarse fish (dace, roach, chub), but brown trout were present

in the three most recent surveys (Arrow Valley Park 2016, 2018, 2019; Ipsley 2018, 2019, 2022). The closest fishery survey sites downstream of the reach inspected are at Coughton Ford, where no trout have been recorded (in 13 surveys between 1980 – 2006) and Alcester Playing Fields where a total of five trout have been recorded (in surveys in 2001, 2006, 2013 and 2016).

River	River Arrow
Waterbody Name	Arrow - Spernall Hall Fm, Studley to conf R Alne
Waterbody ID	GB109054043780
Management Catchment	Avon Warwickshire – Avon Urban Rivers & Lakes
River Basin District	Severn
Current Ecological Quality	Overall status of **Moderate** ecological status, last assessed in 2022
U/S Grid Ref inspected	SP0857362201
D/S Grid Ref inspected	SP0865661782
Length of river inspected	~560m

Table 1 Summary of Water Framework Directive assessment data from https://environment.data.gov.uk/catchment-planning/WaterBody/GB109054043780

The 'high' rating for benthic invertebrates for the 2022 WFD assessment of this waterbody is based on a sample taken in November 2019 at a site in the centre of Alcester (Site ID 53879). This site is approximately 5km downstream of the reach inspected and 0.3km upstream of the confluence of the River Alne, so may not reflect the water quality throughout the entire length of the waterbody, particularly closer to Spernal Ash STW.

Spernal Ash STW serves Redditch and is operated by Severn Trent Water. It discharges treated sewage effluent under permit number S/15/26260/R. In addition to treated effluent, according to the Rivers Trust sewage map (https://theriverstrust.org/sewage-map), this sewage works spilled untreated sewage via storm overflow 39 times in 2022 for a total of 511.64 hours, discharging into the River Arrow.

3. Habitat Assessment

The stream habitat observed during the visit is generally good. The river channel is moderately incised and disconnected from its flood plain (likely due to past bed lowering for land drainage / flood risk reduction), but it has a meandering planform and pool-riffle sequence, which creates diversity of depth and flow patterns. In turn, this sorts the bed substrate providing a range of habitats from coarse gravel riffles to point bars ('beaches') of sand and fine gravel. This diversity of habitat provides niches for a variety of plants, invertebrates, fish spawning, etc. The gravels present are an ideal size for fish spawning, but they do contain a large proportion of fine sediment which is likely to impact egg survival.

Figure 1 (downstream view; 52.253787, -1.875045). An accumulation of large woody material (LWM) at the downstream end of the reach inspected. These structures enhance stream habitat by creating localised scour which sorts and cleans gravels (improving their quality for fish spawning). They also provide excellent refuge for fish from predators such as cormorants and otters, in addition to trapping leaf litter, aquatic weed, etc. which is food for invertebrates and subsequently fish.

Bankside habitat is also good throughout the reach inspected. The left bank (owned by the advisory visit recipient) is fenced off from livestock, and the riparian zone contains a mix of tall vegetation and a variety of native trees including willow, sallow, alder, hawthorn and field maple. The opposite bank is part of the Heart of England Forest, a charity which has so far created 4,685 acres of new woodland. Such land use has a multitude of benefits for the river environment, including moderation of hydrology (higher baseflow, lower flood peaks), interception of pollutants, terrestrial subsidies (leaf litter

for invertebrates), shade and water cooling; supply of large woody material (LWM) to the channel, etc.

Figure 2 (upstream view; 52.253787, -1.875045). The meandering planform of the river creates deep pools on the outside of bends with steep-sided (or vertical) banks – river cliffs. On the inside of the bend is a shallow gravel point bar. These dynamic processes of erosion and deposition create the natural features and habitat of the river. The rate at which the processes occur depends on a number of factors, one of which is riparian vegetation and its influence on bank stability. Mature trees increase the stability of banks, binding them with their roots, so having native woodland creation as the main land use on the right bank is a big plus.

Different tree species provide differing stability and here shallow-rooted conifers are being undermined by erosion. This is not necessarily a bad thing – it is providing a supply of LWM to the river – but planting more deep-rooted tree species further back from the river would be beneficial in the long-term.

Figure 3. (downstream view; 52.254262, -1.874497) A shallow gravel riffle supporting beds of water crowfoot (Ranunculus sp.). However, this plant was only present in very limited areas, with the majority of rooted aquatic weed observed being fennel pondweed (Potamogeton pectinatus), a species which is characteristic of polluted, oxygen poor waters with high nitrate and/or phosphate levels, but which becomes less competitive at low phosphate levels (Marine Biological Association).

Figure 4 (downstream view; 52.254672, -1.874790). The pool downstream of the footbridge. The meander bend at the downstream end of the pool has been protected with boulder rip-rap. This arrests erosion in the localised area, but can lead to a transfer of energy, shear stress and increased rates of erosion at the boundaries of the reinforcement. Natural approaches to reducing erosion rates are preferable from a river habitat perspective, such as protection with brushwood, establishment of trees on the riverbank and exclusion of livestock.

Figure 5. (upstream view; 52.255660, -1.875571) A wide pool below a steep riffle forms a nice variety of habitats. A large fallen willow was removed from the left side (right of shot) of the channel recently to improve angling access. There is a balance to be struck between access and habitat features – removing features which provide fish cover is often counter-productive, as the fish move elsewhere or are more easily predated.

Note the presence of Himalayan balsam which is common throughout the reach. This non-native invasive annual plant species is detrimental to habitat by shading out native plant species before dying back in winter to leave bare banks more vulnerable to erosion. The invertebrate fauna supported by balsam is impoverished compared to typical native plant assemblages. Ideally, balsam should be controlled by hand pulling or strimming/cutting below the first node of the stem, before it flowers and sets seed in mid to late summer. The seed bank is relatively short-lived (c. 3 years), so the benefit of control measures can be seen within that timescale, although downstream drift of seed will take place from uncontrolled areas higher up the catchment.

Figure 6. (downstream view; 52.256029, -1.875986) Livestock (sheep) access to the bank here has a noticeable impact on riparian vegetation. Grazing prevents tree succession which has long term implications for bank stability and habitat. Ideally, the livestock fencing on the downstream end of the inspected reach should be extended to exclude livestock entirely.

Figure 7 (downstream view; 52.256528, -1.875667) Grazing has restricted trees to the fall of the bank here, making them more vulnerable to wash-out and also restricting access to the river for angling. It appears the trees along this section have been previously coppiced and the re-growth has formed a dense, uniform 'hedge'. A staggered, rotational annual coppice of say 1 in 7 trees (whilst leaving some trees untouched to mature) would produce varied stages and sizes of regrowth and benefit habitat diversity, with larger trees naturally supressing growth in other areas, to return a more naturally balanced canopy. Fencing out a buffer strip would also allow tree succession and improve long term bank stability.

Figure 8. (upstream view; 52.257851, -1.875905). Riffle at the upstream extent of the reach inspected, just downstream of Spernal Lane. The wide river channel here has promoted coarse sediment deposition, creating a riffle and vegetated shoals, with some nice stream habitat features now developing.

A brief inspection of the underside of stones and algae indicated an invertebrate community characteristic of organic pollution, with abundant hog louse (Asellus aquaticus), blackfly larvae (Simulium sp.) and freshwater sponge and an absence of the pollution sensitive taxa that should be dominant in a stream of this character.

The gravels here contained large amounts of fine sediment and would benefit from structures to create localised scour to improve fish spawning potential.

4. Recommendations

Whilst the physical habitat of the reach inspected is good, it is uncertain whether water quality is sufficiently good to support trout. Whilst coarse fish species are present, trout have not been recorded in angling catches and are rare in electric fishing survey results at the nearest adjacent sampling sites. The observations of fennel pondweed and invertebrate taxa point towards the effects of organic pollution and nutrient enrichment, most likely from Spernal STW a short distance upstream

Physical habitat quality along the reach inspected is generally very good and suitable for all life stages of trout and rheophilic (flow-loving) coarse fish. Little intervention is required, other than the following:

- Maintain the livestock fence on the left bank and consider extending it further upstream on the neighbouring landholding. Continue the light-touch maintenance for access with the strimmed path set well back from the river.
- Consider a rotational coppice of the dense tree regrowth on the upper part of the reach inspected, in order to promote a diversity of tree sizes and shading.
- Control Himalayan balsam by hand-pulling or strimming before it sets seed.
- Install some small flow deflectors on the shallow gravel riffle areas to promote localised scour and gravel sorting. This will produce patches of cleaned gravel which fish will seek out for spawning and will hopefully result in increased egg survival rates (*Figure 9* -Figure 11).

Figure 9 A log flow deflector set perpendicular to the flow and secured in place with chestnut posts and wire (bank end) and rebar pinned to the bed. Both overshot and undershot flows will locally scour and clean gravel downstream of the structure.

Figure 10 A willow limb hinged over and pinned in place to create gravel scour; one year after placement.

Figure 11 A felled and secured alder trunk in the River Mimram, Herts., which has attracted trout to cut a redd (spawning 'nest' – the hollow and ramp of clean gravel visible in centre of shot) in the scoured gravels downstream.

5. Further assistance

The WTT may be able to offer further assistance such as:

- WTT Practical Visit
    - Where recipients require assistance to carry out the improvements highlighted in an advisory report, there may be the possibility of WTT staff conducting a practical visit. This would consist of a days' work, with a WTT Conservation Officer(s) teaming up with interested parties to demonstrate habitat enhancement methods (e.g. pinned woody material, willow planting, willow laying, etc.). Please contact your local WTT Conservation Officer for further information.

The WTT website library has a wide range of free materials in video and PDF format on habitat management and improvement:

https://www.wildtrout.org/content/wtt-publications

We have also 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 populations and managing invasive species.

The DVD is available to buy for £10.00 from our website shop www.wildtrout.org/shop/products/rivers-working-for-wild-trout-dvdhttp://www.wildtrout.org/shop/products/rivers-working-for-wild-trout-dvd or by calling the WTT office on 02392 570985.

6. Acknowledgements

The Wild Trout Trust would like to acknowledge the support of the Environment Agency which made this visit possible.

7. 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 such as the Environment Agency, local Council – 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.