HABITAT ADVISORY VISIT, PARK FARM TROUT FISHERY, RIVER DARENT, KENT.

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1.0 Introduction

This report is the output of a site visit undertaken by Vaughan Lewis, Windrush AEC to Park Farm Trout Fishery, River Darent, Kent. The visit was sponsored by English Nature, as part of its commitment to support the biodiversity of chalk rivers through the offices of the Wild Trout Trust.

Comments in the report are based on observations on the day of the site visit and discussions with club officials. Throughout the report, normal convention is followed with respect to bank identification i.e. banks are designated Left Hand Bank (LHB) or Right Hand Bank (RHB) whilst looking downstream.

2.0 Habitat Assessment

Habitat in the River Darent has been severely compromised in the past by long periods of low flow, due in part to borehole abstraction for potable supply. However, negotiations with water undertakers in the Darent valley have secured a significant reduction in the volume of water abstracted, with an associated partial restoration of flows in the river. The first wild spawned trout in the Park Farm Fishery in recent years were noted some 5 years ago. Other fish present in the fishery include chub, perch, common carp and gudgeon.

The fishery is stocked monthly during the fishing season with 100 30cm/35cm brown trout to provide fishing for the 40 members of the club. Members regularly take and kill small numbers of fish from the river.

The lower section of the fishery (approximately 400m) is single bank only and has not been managed to any great extent. It has been lightly fished, with the intention of creating something of a sanctuary area for trout.

The LHB was in the process of being fenced to exclude stock, as part of a water meadow recreation scheme being undertaken by the riparian farmer in conjunction with the Environment Agency. A number of small brick sluices had been restored in an old water carrier system, whilst the carrier itself had been dredged along its original line. An off-take had been constructed in the bank of the River Darent and water was being abstracted into the carrier. A pipe (diameter unclear) had been installed in the sluice, ensuring a feed of water to the carrier system at all discharges. A fixed crest weir was present, enabling larger volumes of water to be passed into the carrier during higher discharge events.

The club has installed a screen at this point on the main river, in order to prevent downstream movement of stocked fish. The lower 30cm of the screen was covered by wooden boards, raising the water level of the upstream reach. The screen was heavily coated in river borne detritus, partially blocking it and raising the upstream water level still further. The screen is removed at the end of the fishing season, allowing free access to fish migrating to spawn.

The LHB was heavily shaded in places by alders. The roots of these trees provided extensive cover for trout. Additional instream cover was provided by deeper pools.

There were sections of relatively un-imbedded gravel, with a moderate loading of fine sediment. These offered potentially excellent spawning and juvenile areas for brown trout. Some small stands of milfoil *Myriophyllum spicatum,* grazed (by swans?) water crowfoot *Ranunculus spp* and willow moss *Fontinalis antipyretica* were present in the shallow areas.

The river bed gravels were extensively covered with a brick red film that could be removed by rubbing. It is believed that this film is comprised of rhodonite, a member of the pyroxene group of minerals. It primary chemical constituent is manganese sulphate, with some substitution of the manganese by calcium and iron.

Simple stone turning and examination of submerged weed revealed a diverse and abundant macroinvertebrate fauna including cased caddis, freshwater shrimp *Gammarus pulex,* freshwater limpet *Ancylus fluviatilus* and Baetid nymphs.

Further upstream where the fishery had control of both banks, significant coppicing of riparian trees had taken place. This had dramatically reduced shading, allowing good growth of marginal vegetation, narrowing of the channel and associated sorting of bed substrate. However, there were some sections, particularly under the shade of the horse chestnut trees, where the river was substantially overwide (8m+ rather than 3m+). As a consequence, potentially good spawning gravel in this location had an accumulated layer of fine sediment, reducing its value for recruitment of trout. Unconsolidated sediment had also built up on the inside of a number of bends, in some cases as the result of an overwide channel caused by heavy shading.

A considerable length of the middle fishery was heavily dredged by the (then) National Rivers Authority some 7 years ago, leaving it overwide and overdeep.

There was evidence of *Phytopthora* infection of alder trees alongside the river, with a number of individual trees already dead. Significant amounts of woody debris has been cut and removed from the fishery during club working parties.

Most fishing is undertaken from the RHB, where an access path has been strimmed with care some 2m back from the river, in order to maintain a wide marginal fringe, dominated by reed sweet-grass *Glyceria maxima*. Other species present included un-branched bur-reed *Sparganium erectum,* water-cress *Rorippa nasturtium-aquaticum,* reed canary-grass *Phalaris arundinacea,* water pepper *Polygonum hydropiper* and gipsywort *Lycopus europaeus.*

The club has installed a number of small weirs and groynes in the past. These had a low physical profile and were not having any significant impact on habitat quality. The club also introduced clumps of milfoil *Myriophyllum spicatum* that have established well, providing a degree of instream cover.

The corpse of a brown trout (approximate 0.8 kg weight) was found on the bank. This appeared to have been eaten by a mink or possibly an otter; the skin of the fish has been pushed back and the flesh eaten, leaving just the head, tail and connecting skeleton. The club had installed cage traps in order to control mink numbers. A single individual had been caught up to the date of the site visit.

Approximately 6 other dead fish were observed on the bed of the river. There was no obvious reason for the mortality of these fish.

4.0 Recommendations

- The restoration of the water meadow system is an initiative that should be supported because of its positive benefits to the wetland ecology of the Darent floodplain. However, there is a concern that abstraction into the water meadow could reduce the quality and availability of instream habitat, particularly at times of low flow. It is strongly recommended that urgent discussions are held with the riparian owner and the Environment Agency to ascertain the proposed licensed abstraction regime for the meadow system. Assurances should be sought regarding the safeguarding of river flows during low flow periods.

- Whilst the screen at the downstream end of the fishery has some value for preventing the loss of stocked trout, it has raised the upstream water level, with associated deleterious impacts on the quality of habitat, particularly for spawning and juvenile fish. It is recommended that the club consider removing the screen for a season and monitoring both the movements of stocked fish and impacts on upstream habitat quality.

- If the creation of a head of water is required in order to drive the discharge into the water meadow carrier, it is recommended that a small riffle should be constructed upstream of the location of the current fish screen, in order to create the required backwater effect.

- Feeding of fish should continue during the close season in order to maximise the chances of successful over-wintering of stocked trout.

- Overshading of the channel restricts the growth of marginal vegetation, with associated damaging impacts on the rate of erosion, the provision of marginal cover for fry, and water flow velocity. In order to reduce overshading in sections noted in the report, whilst retaining the valuable erosion protection provided by tree root systems, thinning of the riparian tree canopy is recommended. This can best be achieved by establishing a regime of rotational coppicing to create an overall dappled shade over the river. The conservation value of the existing trees should not be under-estimated and great care should be exercised in the selection of trees to be cut. The coppiced areas will require fencing to prevent stock grazing and allow regeneration of the coppice stools.

- In the over-wide sections of the fishery, narrowing should be undertaken using faggot bundles retained by wooden stakes. This would be of particular benefit on the inside of bends where excess shading has been removed. The reduced channel cross section should be sized by reference to the free flowing and self-maintaining sections

of the river. The arisings from the coppicing of riparian trees should be used to create faggots, roughly 2m long with a diameter of approximately 300mm. Once manufactured, the faggots can be used to narrow the channel. They should be pinned in place using wooden stakes and backfilled with secured brashings. Alternatively, a number of small faggot islands could be constructed in order to narrow the channel and increase flow diversity.

The top of the faggots should be set at approximately 100-150mm above mean summer water level. Details of faggot techniques can be found in the Wild Trout Trust guide provided to the fishery.

- Given the incidence of *Phytopthora* infection, it is likely that a number of alder trees will die in the near future. In order to compensate for these likely losses, it is recommended that a programme of planting of alternative species should be undertaken during the next 2 winters. Suitable species include hawthorn *Crateagus monogyna* and ash *Fraximus excelsior*.

- Where possible Large Woody Debris (LWD) should be retained in the channel. Large woody debris (LWD) is an integral component of stream ecology. The benefits for retaining it are clearly laid out in the recent EA R&D document, "Large Woody Debris in British Headwater Rivers". Key conclusions of the report include:

  - An increase in both mean flow depth and velocity and variability of both parameters.
  - The development of high physical habitat diversity both in-channel and in the floodplain. Removal of LWD reduces both habitat quality and availability for juvenile and adult brown trout.
  - Although active LWD dams may impair upstream migration of fish at low flows, they rarely do so at high flows.
  - LWD have significant benefits to the control of run-off at the catchment scale.
  - River and riparian management has important effects on the distribution and character of dead wood accumulation within the river system.

The report also provides recommendations for the management of LWD, the most important of which is "although there are certain situations that may require wood removal to eliminate stream blockage, the wisest management is no management". Building on this simple truism, it is recommended that before any future work to remove LWD from river channels is undertaken, the wider implications of the proposal on the whole river system are considered, rather than just the potential (in many cases unproven) benefits to salmonid populations. In addition, the impact of planned riparian tree work on the supply of LWD to the river should be considered. In some circumstances, it may be beneficial to allow trees to fall into the channel, provided the risk of increased flooding is acceptable.

- Stocked trout were noted shoaling in the deeper pools, indicating a general dearth of instream cover for adult fish throughout much of the fishery, emphasising the need to retain woody debris and encourage the growth of submerged weed.

- Throughout much of the fishery the availability and quality of spawning gravel was limited. This in turn is likely to be limiting trout recruitment. It would be possible to

construct riffles using imported flint reject gravel**.** This is a very effective but relatively expensive operation. Typically, a 15m riffle would cost in the region of £1,000-£1,500 to construct and might be expected to produce perhaps 50 parr annually, hence reducing overall stocking costs. Riffle construction requires some experience in order to avoid some common pitfalls. It should not be undertaken without detailed advice from the Environment Agency or other competent fishery advisor**.**

- In order to optimise the production of wild spawning brown trout in the river, it is recommended that sections of the shallow gravel riffles in the river are cleaned during mid-September. This can be done in a variety of ways. A tractor mounted cultivator, high pressure water jet and hand digging are all acceptable ways of cleaning sediment from the gravel prior to the trout spawning season (mid October - January). All areas of gravel should not be cleaned in one season, as this could prove disruptive to macroinvertebrate populations. Work should progress downstream so that disturbed silt does not settle on previously cleaned sections. Disturbed silt should not be allowed to adversely affect downstream neighbour's interests.

- In order to further assist in the build up of brown trout stocks, it is recommended that a deep substrate incubation box should be installed on the fishery. These are gravel filled boxes, approximately 0.6m in each dimension that are filled with suitably sized gravel and seeded with 10,000 - 20,000 trout eggs. A water feed at the bottom of the box (using a head difference created by a sluice or riffle) allows the eggs to incubate and hatch. A box could usefully be located at the site of the existing fish screen or at the head of the water meadow carrier, which would make an ideal nursery stream.

Once they reach the swim-up fry stage, fish leave the box via the overspill pipes, where they could be collected in a small trap box and transferred into the river or allowed to enter the river unaided and disperse. In effect, these are naturally reared fish without the unhelpful behavioural modifications associated with hatcheries. More details on incubation boxes can be found on the Wild Trout Trust web site www.wildtrout.org or in Volume 2 of the Trust's magazine, *Salmo trutta*.

- If steps are taken to increase the recruitment of brown trout, it is recommended that a reduction in the number of stock fish introduced is made and that catch and release of brown trout should be encouraged.

- Note that the installation of faggots, any other work to the bed or banks of the river or within 8m of it, the use of herbicides and the introduction of fish or their eggs all require the consent of the EA.