Habitat Advisory visit to the River Darent, Kent, undertaken on behalf of Kingfisher Angling and Preservation Society, by Vaughan Lewis, Windrush AEC Ltd
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1.0 Introduction

This report forms the output of a site visit to the River Darent, near Eynsford, Kent on 31 March 2005 on behalf of Kingfisher Angling and Preservation Society (KAPS). Information in the report is based on observations on the day of the visit and additional comments provided by members of the club.

This is the third advisory visit undertaken by the Wild Trout Trust (WTT) to the River Darent in this area, with visits previously made to the Park Farm Fishery and Darent Valley Trout Fishers water. Located between these fisheries, this visit to the KAPS fishery compliments management advice given in previous visits to these fisheries.

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.

KAPS has a membership of approximately 110 members, with a mix of stillwater and river fisheries in Kent.

Throughout the report, normal convention is followed, with right bank (RB) and left bank (LB) of the river identified when looking downstream.

2.0 Fishery Description

The KAPS fishery on the River Darent effectively begins at the outlet from their ex. gravel pit fishery at Lullingstone Castle. This is a now a lake of some 15-20ha, stocked with Rainbow trout *Onchorhynchus mykiss*. The outfall dam from the lake acts as an impassable barrier to upstream migration of fish, spatially isolating the downstream reach from the Park Farm fishery and other sections of the River Darent upstream of the lake.

Outfall weir from Lullingstone Castle Lake

The head loss over the outfall dam from the lake (approximately 1m) had been utilised by the Environment Agency in order to install a deep-substrate incubation box. The box was well designed, with 2 pre-filters, inlet flow controls and one-way inlet valves to allow back flushing of the box with no loss of water within it.

Deep substrate incubation box, showing pre-filter and yellow catch net

Some 2,500 eyed ova stripped from ‘wild’ River Darent brown trout had been placed in the box. The swim up fry had just begun to leave the box, with some 90 alevins captured in a catch net on the day of the site visit. These were transferred downstream and stocked into area of the club’s fishery with adequate marginal cover.

Swim up fry that had emerged from the incubation box on the day of the site visit

Downstream of the outfall of the lake, the river was significantly over-wide (15m+). Flows in the river were very low following one of the driest winters on record in the south of England. There was a short section of deep glide water, before the river entered a series of shallow glides and riffles. These were characterised by a poorly sorted substrate with a relatively homogeneous cross-section, with a mean depth of <300mm. The largely gravel and cobble substrate was coated with a layer of organic sediment, particularly leaf litter, and algae. The abundant gravel was also highly imbedded. Both these factors reduce its value for spawning and juvenile brown trout *Salmo trutta.*

A series of small weirs had been previously installed. These were constructed from a variety of materials including timber, sheet metal, breeze blocks and natural stone. These generally had a head loss of 25cm-40cm across them.

Typical small weir installed at the fishery

The river ran through a heavily wooded valley, with large numbers of multi-stemmed alder *Alnus glutinosa* and large sycamore *Acer pseudoplatanus* trees present. These were casting significant shade over the channel, with the result that there was little or no submerged weed in the upper and middle reaches of the fishery. Growth of marginal aquatic weed was also limited, with small stands of reed canary grass *Phalaris arundinacea*, water forget me not *Myosotis scorpioides* and water dropwort *Oenanthe* spp. the dominant species present.

Areas of eroded bed gravel had been deposited in the channel, forming small, subsequently vegetated islands.

Vegetated gravel island

An area of wet woodland was present on the LB, with flow entering a ponded area surrounding the woodland from the river, and being returned to the channel some 100m downstream.

Wet woodland areas showing present entrance

The lower end of the fishery was relatively deep, over-wide and heavily tree-lined. The bed of the channel was coated in a thick layer of sediment. Despite this, there is periodically a good growth of Water crowfoot *Ranunculus* spp. in this section. There was abundant habitat for adult fish in this section, but no habitat suitable for spawning or subsequent recruitment of brown trout. Because of the management difficulties associated with this section, the club do not actively manage it. Angling usage is sporadic, with some good catches of trout taken during the mayfly *Ephemera danica* hatch.

A flow augmentation discharge was located at the lower end of the fishery.

3.0 Fish stocks

The club has introduced some 100 x 12/13" brown trout into the river in past years. Returns from these fish have been poor, despite the club operating a policy of 'catch and release' for brown trout in the river. The recent establishment of the incubation box should hopefully provide a base stock of resident brown trout that can then spawn naturally on the abundant gravel present in the reach.

In addition to brown trout, the river has numbers of rainbow trout that have escaped from the stocked lake upstream. Those caught on rod and line are removed by club members. There are additionally some coarse fish present including pike *Esox lucius*, perch *Perca fluviatilis* and common carp *Cyprinus carpio*.

4.0 Recommendations

- It would theoretically be possible to install a bypass channel or modular fish pass around the outlet weir on Lullingstone Castle Lake in order to allow passage of fish around this obstruction. However, this would be a significant and expensive project that would require the detailed input of the Environment Agency into both design and construction.

- The use of the deep-substrate incubation box should be continued, with emerging fry captured and distributed in suitable lengths of shallow glide/riffle with extensive marginal cover. The installation of faggot bundles in order to narrow the river, as recommended below, will increase the availability of suitable habitat for young fry. If the progeny from the box prove to recruit successfully to the river, it is recommended that stocking with adult hatchery reared brown trout should cease, with the club relying on the incubation box and natural recruitment to populate the river.

- The success of brown trout egg hatching in 'the wild' can be enhanced by establishing a regime of cleaning spawning gravels annually in late September. This can be achieved by either manual raking, or by the use of high-pressure water jets. Care must be taken to clean riffles rotationally, with only short sections being treated annually. It is important that the EA are contacted prior to any cleaning of gravel, due to the possible discoloration of water in the river resulting from the operation. The same concerns dictate that downstream neighbours should also be forewarned of the operation.

In order to gauge spawning success, it would be of great benefit if an annual count of brown trout redds could be made. This should be undertaken over the same length of water annually, during the period November – January, in order to allow inter-year comparisons of spawning success. Examination of the river at night using a torch would also allow numbers and size of individual fish spawning to be recorded

- The river had a paucity of Large Woody Debris (LWD). 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.

There are also significant opportunities to selectively fell trees, reducing channel shading and encouraging marginal vegetation growth. The woody arisings could be used to create faggot bundles (see below) whilst the larger timber could be used to create upstream facing groynes, triangular deflectors and similar features that will encourage scour and sorting of the substrate.

- The river was generally overwide, partly as a result of heavy shading of riparian trees restricting the growth of marginal vegetation, and partly as a result of the installation of the small retaining weirs. It is recommended that the weirs should be removed from the channel, removing their impounding effect, reducing the deposition of fine sediment and helping to narrow the river.

Following their removal, the creation of low level marginal shelves using fallen timber and/or faggot bundles can be used to decrease channel cross section, thus aiding sorting of the bed substrate, whilst increasing marginal cover valuable for swim-up trout fry. 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 overall wetted width of the new channel should be between 6m and 8m, with the top of the faggots set at approximately 100-150mm above mean summer water level. Details and illustrations of faggot techniques can be found in the Wild Trout Trust's 'Guide to Improving Trout Stream' provided to the club.

It is suggested that the removal of the weirs, installation of faggot narrowing, tree pollarding/coppicing and the installation of LWD should be undertaken sequentially in an upstream direction starting from the Bath House. It is likely that it will take several years to effect change over the whole of the middle and upper fishery.

- Whilst it is ecologically desirable to maintain the wet woodland habitat, this could be achieved without reducing flows in the river. The existing entrance to the wet woodland area should be blocked, preventing water flowing through this area. The water level in the existing woodland would be maintained by the backwater effect of the river via the downstream exit from the woodland

- Note that all works to bed or banks of the river or within 8m of its banks require the written consent from the Environment Agency under the Land Drainage legislation. The introduction of any fish or eggs into any inland water requires the consent of the EA under the Salmon and Freshwater Fisheries Act, 1975. It is imperative that all relevant consents are obtained by the club.