

**Habitat Advisory Visit**

**River Arrow, Sernal Park, Warwickshire**

**On behalf of The Sernal Park Sporting Partnership**

**25<sup>th</sup> August 2006**

**Sponsored By**



## 1.0 Introduction

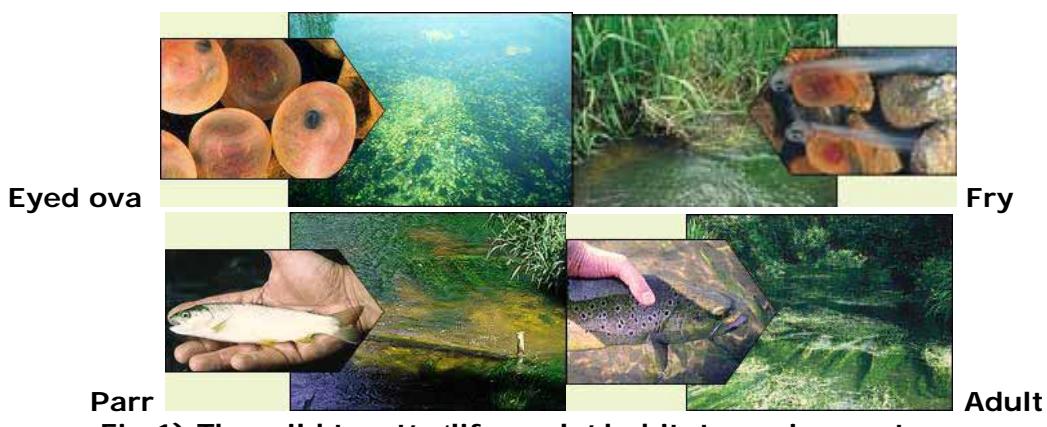
This report is the output of a site visit undertaken by the Wild Trout Trust on the River Arrow, Sernal Park Estate, Warwickshire on 25th<sup>th</sup> August 2006.

Comments in this report are based on observations on the day of the site visit and discussions with Mr James Morley-Cotterell and Mr Granville Stevens

Normal convention is applied throughout the report with respect to bank identification, i.e., the banks are designated left hand bank (LHB) or right hand bank (RHB) whilst looking downstream.

## 2.0 Fishery / Habitat Overview

The River Arrow that runs through the Sernal Estate can best be described as a freestone system with an active geomorphology. The geology of Warwickshire is complicated and for the purposes of this report it will be classified as glacial deposits of sands and gravels. These sands and gravels are extremely friable and are prone to rapid erosion. Erosion is further exacerbated by stock, especially sheep, that in many places have un-hindered access to the river. Over many decades the river has been subjected to over-zealous flood defence works. Typically this has resulted in a channel that has been, over-widened and over deepened. There are several areas of erosion that require urgent attention which are point sources of fine sediment entering the river wide-spread deposition of sands and silts over the original gravel bed (where it remains in tact). This deposition is impacting on the viability of spawning gravels. Added to this run-off from arable fields within the catchment is possibly adding further loading of fine sediment into the channel. In simple terms the river is currently failing to provide the mosaic of habitat types wild trout need to fulfil their 'life-cycle requirements' (Fig 1)



**Fig 1) The wild trout's 'life-cycle' habitat requirements**

Despite these impacts there are remnants of a population of wild trout. During the Arrow visit a handful of trout were spotted. These fish indicate there is some, albeit limited spawning activity in the catchment. However to maintain a viable fishery the current owner stocked 200 triploid browns in 2005. A further 800 diploid brown trout are known to have been stocked 10 years previously.

The problems listed above are not unique to the Arrow and are common to many rivers in the Midlands area. The potential scale and cost of actions to enhance and restore habitat can seem a daunting task. The Sernal Estate have recognised the need to restore the natural heritage of the river and fishery in their care. In 2006 the Estate has started to undertake a wild approach to its sporting activities in both field and stream.

The Estate has formed a 'syndicate,' comprising a dozen shooting and fishing men to help fund a long-term conservation project. Their aim is to restore the biodiversity and wild trout populations of both rivers. There are also possible plans to offer day rods to the general public, once the fishery is established.

While the syndicate is rich with enthusiasm it is poor both in-terms of funding and labour. With this in mind the main emphasis of this report will be to make suggestions for improvements that can be undertaken with low budgets, and a small but willing workforce of volunteers. In a further effort to keep costs down the use of local materials from sustainable sources will be recommended. Most importantly the need for the hire of costly specialist plant (the estate has some plant) should be avoided. It is hoped that this initial 'rough guide' will be developed, refined and used as a model for improvement works on other reaches of the Arrow.

Many of the recommendation in this report are detailed in the WTT's new Wild Trout Survival Guide (WTSG), a copy of which was presented during the site visit. Relevant sections of the WTSG will be highlighted as footnotes.

## **3.0 – Site Visit and Recommendations**

### **3.1 Site Visit**

The site visited comprised a fairly sinuous section of river over approximately 1 mile in length. The substrate comprises a good size range of gravels although there is wide-spread deposition of fine sediment causing siltation of spawning gravels. The active geomorphology of the river has in places created mid-channel islands and point bars. There was some sparse growth of water-crowfoot (*rannuculus spp.*) on riffle areas, however much of this had a coating of fine sediment. In places there appeared to be a moderate growth of Horned Pondweed (*zanichellia palustris*). Riparian fringing and emergent vegetation was limited in its distribution due to steep eroded and grazed banks. Extensive beds of nettles were present indicating nutrient rich deposits of sediment on the bank, an indicator of past dredging activity. Of major concern is the presence of extensive stands of Himalayan Balsam.

Himalayan balsam (*Impatiens glandulifera*) is a relative of the busy Lizzie and is known by a wide variety of common names, including Indian balsam, jumping jack and policeman's helmet. It is a tall, robust, annual producing clusters of purplish pink (or rarely white) helmet-shaped flowers. These are followed by seed pods that open explosively when ripe, shooting their seeds up to 7m (22ft) away. Each plant can produce up to 800 seeds.

Introduced to the UK in 1839, it is now naturalised, especially on riverbanks and increasingly in waste places and has become a problematical weed. Himalayan balsam tolerates low light levels and, in turn, tends to shade out other vegetation, impoverishing habitats.

There are many areas of extensive erosion that need to be targeted to protect the grazing resource. Some of these areas require urgent attention as significant land loss is occurring.



A) Evidence of a good pool: riffle system Note Himalayan Balsam (pink flowers)



B) Major erosion on outside of bend



**C & D) Sheep grazing causing localised bank erosion problems.**



### **3.2 – Recommendations**

**It is a legal requirement that all the works to the river and /or the on-line lake require written Environment Agency consent prior to undertaking any works, either in-channel or within 8 metres of the bank.**

Local EA Fisheries and Development Control staff should be contacted at the earliest opportunity to discuss any recommendations arising from this report the estate may wish to pursue.

## **1.0 Himalayan Balsam**

### **1.1 Physical Control**

The main method of control, and usually the most appropriate, is pulling or cutting plants before they flower and set seed. Conservation authorities regularly organise 'balsam bashing' work parties to clear the weed from marshland and riverbanks.

### **1.2 Chemical Control**

Before using weedkillers alongside waterways it is necessary to contact the Environment Agency (see telephone directory for your local office). It can advise on suitably qualified contractors, as can the National Association of Agricultural and Amenity Contractors (Tel: 01733 362920). Himalayan balsam can be controlled with a weedkiller based on glyphosate, such as Roundup or Tumbleweed. Glyphosate is a non-selective, systemic weedkiller that is applied to the foliage. It is inactivated on contact with the soil, so there is no risk of damage to the roots of nearby ornamentals, but care must be taken that the spray doesn't drift onto their foliage. Glyphosate is most effective when weed growth is vigorous. This usually occurs at flowering stage but before die-back begins; with most weeds, this is not earlier than mid-summer. It may take a couple of seasons to obtain good control due to the germination of more weed seedlings.

## 2.0 Erosion Control & Fencing & Buffer Strips

River banks are constantly on the move, it is a natural part of the river processes of erosion and deposition. In places the banks of the River Arrow are composed of a soft sands and gravels, which are highly susceptible to erosion.

The roots of bank vegetation bind the soil together, making it more resistant to the powerful erosion forces of the river. Livestock overgrazing can result in a loss of river bank vegetation which accelerates river bank erosion. This is a double edged sword for not only is valuable land lost, but the water can also become choked with sediment, which has a devastating effect on the biodiversity of the river.

There are many options for erosion control however the Estate should consider options that also deliver gains to the fishery and local biodiversity.

River banks can re-profiled, seeded and planted with appropriate vegetation and the bank toe (bit next to the water), can be faced off with willow withies to protect it from erosion. 'Green' willow withies are woven through 'green' willow stakes, which continue to grow, putting out root systems and binding the soil together. This will allow over-hanging, fringing vegetation to develop that is important habitat for fry and parr.



L) Use of willow withies, re-profiling and planting  
(Copyright Eden Rivers Trust)

**The use of willow withies and willow stakes has proved to be less costly and more effective than 'hard' forms of river engineering. It is also sustainable and has far less environmental impact than the alternatives.**

In areas where grazing occurs fences should be repaired and installed. It is recommended that all fields running adjacent to the river have buffer strips (5-9m) created to reduce the risk of fine sediment run-off from arable fields. This is of particular importance if maize is ever to be planted. Further to this it is also recommended that fences be installed in areas where stock may gain access to the stream.

Buffer strips adjacent to a watercourse can be treated as non-rotational set aside. The same rules apply as strips adjacent to hedges and woodland edges, further information can be obtained from: -

<http://www.defra.gov.uk/farm/capreform/pubs/pdf/Setaside2006.pdf>

Grass buffer strips can be included as part of an Entry Level Scheme in the Defra environmental stewardship package.

Rules and points for grass margins are detailed in the ELS handbook -  
<http://www.defra.gov.uk/erdp/pdfs/es/els-handbook.pdf>

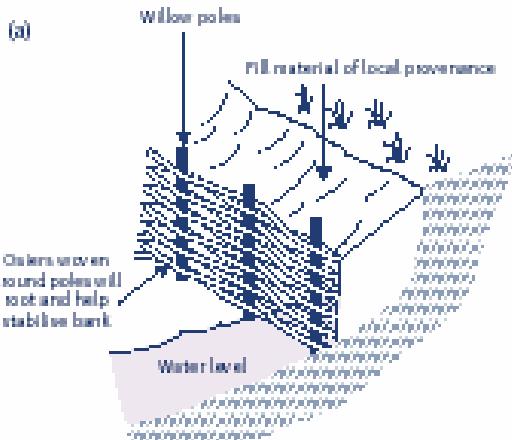
For capital works such as fencing, this would have to be part of a higher level scheme in environmental stewardship or, if there is already a Countryside Stewardship Scheme or an Environmentally Sensitive Area agreement in place this may be able to be added to any existing agreement. Entry to HLS is only available once an ELS scheme has been agreed. Further info on HLS can be found at - <http://www.defra.gov.uk/erdp/pdfs/es/hls-handbook.pdf>

There is one particular area where the river has blown-out on the LHB on the outside of a bend (see picture B). Serious remedial action is required at this location to stop this problem getting even worse than the current situation. It is recommended to re-instate a new bank line using willow osiers woven around poles and fill behind with an appropriate material of local provenance. This material should then be planted with local wetland plants such as sedge and flag iris to stabilise the soil as soon as possible. The eroded cliff face should be terraced and re-profiled, the spoil can be used for the back-fill. (See Diagram below)

Where stock has been excluded form the riverbank special crossing and drinking areas should be created<sup>1</sup>.

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<sup>1</sup> See WTSG pages 32,33,34,35



From Managing River Habitats for Fisheries - SEPA

### 3.0 Pool and spawning habitat

Woody debris<sup>2</sup> in rivers can provide habitat for a variety of animals. Brown trout numbers increase significantly with the presence of woody debris along the banks and in the river as they provide refuge and cover. They may offer lies for otters or perches for kingfishers. Woody debris in the river may also create pools and riffles in sections of the river that would otherwise have a dearth of aquatic habitats. They also retain leaf litter and act as an energy reservoir for the river section.

Fallen timber can be used to create flow deflectors. Deflectors need to be; 1) keyed into the bank to avoid localised erosion and; 2) staked and wired to the bed of the river to avoid being washed-away. During winter flows the deflectors will scour out pools and naturally sort and clean gravels suitable for trout spawning. As a very rough guide deflectors should be set at approximately 30 degrees to the bank with a length of between 40-50% of channel width, or staked in mid channel as paired submerged upstream facing logs. Deflectors key in from the bank should be just at summer water level Scour pools have been shown to be very important habitat for all life stages of brown trout. Deflectors could be particularly useful if placed silted riffle areas.

Throughout the reach ingress of silt appears to be seriously affecting the quality of spawning riffle habitat.

In the interim it is suggested that the gravels are 'jetted' using a high pressure pump to purge the gravel matrix of fine silts to provide suitable conditions for trout eggs and alevins to develop to 'swim-up' fry stages. Riffles should be cleaned on a rotational basis and care should be applied

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<sup>2</sup> See WTSG page 39

to 'clean' less than 25% of each riffle each year. Large stones and cobbles should be left on riffles, as these are important habitat for native crayfish and invertebrates.

A suggested equipment specification, including approximate costs is listed below:

Pump - Honda WH20X water pump - **£475**

15m length 1" clear braided hose (outlet) - **£45**

2m length 22" green PVC suction hose (inlet) - **£25**

1.5m length 25mm steel pipe (attached to outlet and flattened at end to increase pressure) - **£10**

Adaptors 2" BSP swivel x 1" BSP male (to attach pump to outlet) - **£45**

Hose fitting 1" BSP female swivel x 1" tail (to attach outlet to pump) - **£15**



**K) Jetting riffles**

After costing many forms of gravel cleaning, pumps have been found to be the most effective way of cleaning gravel. They are easily transported, relatively light, and efficient.

Gravels need to be cleaned in September, prior to spawning (Dec-Jan) to an approximate depth of 20-30cm. Concreted gravels need to be broken up, by bashing away at them with the steel pipe, they do break up to leave loose gravel, it's just hard work!

It has been found that trout use cleaned areas preferentially over un-cleaned areas, with the trout frequently cutting on an area in the afternoon that has been cleaned in the morning.

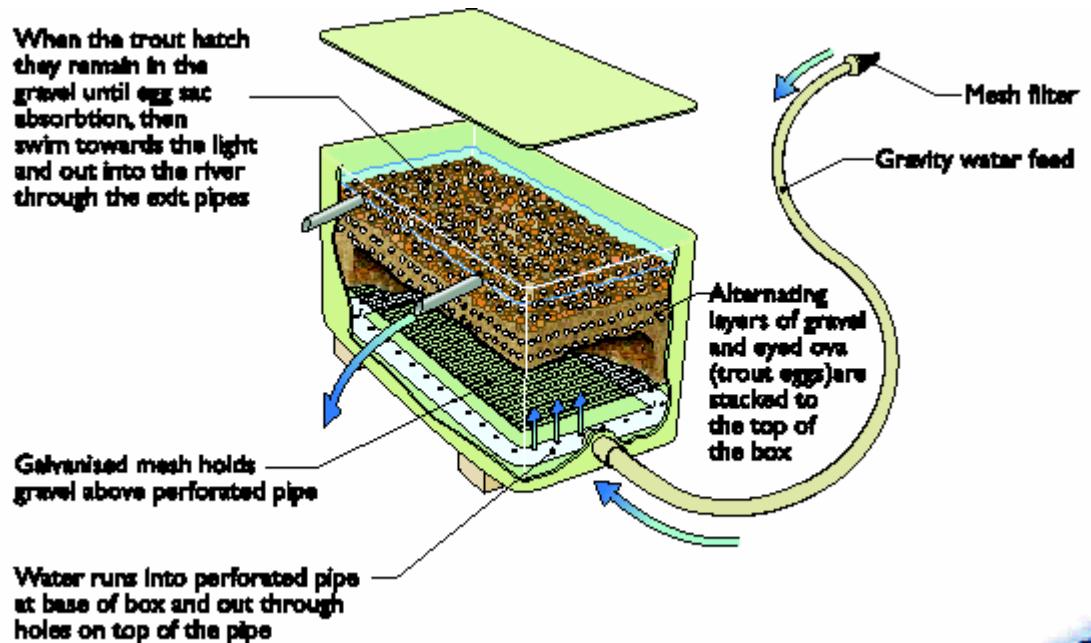
To reduce impacts of silts moving downstream the use of 'Sedimats' in conjunction with cleaning is recommended. These are pinned to the riverbed downstream of the cleaning and collect the silt blown up by the pumps. Being made of hessian they can then be removed from the river planted up and used for any bank work. They cost approximately £42 each.

Local Environment Agency Fisheries staff may own such equipment and be willing to loan it.

#### **4.0 Deep Substrate Spawning Boxes.**

The use of deep substrate incubation boxes on the Arrow could potentially be a useful short to medium term measure to address the apparent spawning habitat 'bottleneck', whilst longer term plans are underway to improve habitat. These are gravel filled boxes, approximately 60cm 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 allows the eggs to incubate and hatch. Once they reach the swim-up fry stage, they leave the box via the overspill pipes, stocking themselves into the river. It is vital however that good quality marginal habitat is available for fry to seek cover and develop into parr. Section 30 Consent, under the Salmon & Freshwater Fisheries Act, 1975, is required from the Environment Agency prior to the introduction, of fish, fry or ova into inland waters. A good head of water is required to get water to feed through the boxes. This may have to be artificially created using a low-level large woody debris weir.



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It will probably not be a viable option to source eggs from local broodstock and advice should be sought from local EA Fisheries Officers on the appropriate type of eggs (Diploid – Fertile / Triploid – Sterile).

#### **4.0 – What next? – Making it all happen!**

This report makes a series of recommendations that aim to improve both the biodiversity and status of the wild trout populations in the Arrow. Recommendations are low tech, low cost and can hopefully be undertaken by a band of willing volunteers and the Estate whose greatest commodity is their enthusiasm!

However, the syndicate should very carefully consider its goals. The Arrow has great potential but it is unlikely to achieve pristine trout stream status. That said the Estate could go a long way into creating and restoring a very interesting fishery containing both wild trout and coarse fish.

However before this happens it strongly recommended that the Estate make contact with the Fisheries, Conservation and Development Control functions of the local Environment Agency to arrange a 'pre-application meeting'. Pre-application meetings are extremely useful to help scope out design work and to take into consideration any issues that could affect proposed works. The worked-up proposal should allow the syndicate to complete a land drainage application. This legal consent from the Environment Agency must be obtained in writing before works can commence. Consents can take up to two months to process.

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<sup>3</sup> See WTSG page 53

Works could be yet further 'kick-started' with the assistance of a WTT 'Practical Visit' (PV). Each year WTT funds several PV's which include the cost of labour (two man team) and materials. Recipients will be expected to cover travel and accommodation expenses of the contractor. The use of specialist plant will be by separate negotiation.

Wet-work advisers will demonstrate one or more of the following techniques that are appropriate to the site.

- Tree management (coppice, pollard, sky-lighting)
- Tree Planting
- Fencing (Installation & Repair)
- Stream Narrowing (Faggots, Coir Rolls, Spilling)
- Flow Deflectors
- Introduction of spawning substrate
- Gravel Jetting
- Introduction / Management of Woody Debris

*Note: Recipients of the programme must have received a WTT AV and have obtained the appropriate consents from the Environment Agency, English Nature, SEPA, CCW , Rivers Agency,etc, prior to arrangements being made to undertake the PV.*

Applications for all the above should be made via [projects@wildtrout.org](mailto:projects@wildtrout.org)

## **6.0 Disclaimer**

This report is produced for guidance only and should not be used as a substitute for full professional advice. Accordingly, 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 comments made in this report.