AVISORY VISIT TO THE TICKENCOTE SYNDICATE AND GUASH FISHING CLUB WATERS, RIVER GUASH, RUTLAND UNDERTAKEN BY VAUGHAN LEWIS, WINDRUSH AEC. SEPTEMBER 2005

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1.0 Introduction

This report forms the output of site visits undertaken on 6 September 2005 to the River Guash, Rutland on behalf of the Tickencote Syndicate and Guash Fishing Clubs. Information for the report was gathered during the site visit. Additional information was provided by club members. Throughout the report, normal convention is followed, with banks identified as RB (right bank) and LB (left bank) when facing downstream.

The Tickencote Fishery runs for some 4km downstream of Empingham to Tickencote Lodge, Rutland. It is fished by the 6 member Tickencote syndicate.

The Guash Fishing club hold the fishing rights on the River Guash downstream of the Tickencote syndicate.

The river held a self-sustaining stock of both brown trout *Salmo trutta* and grayling *Thymallus thymallus.* No stocking had been undertaken in either fishery for several years. There were also small numbers of coarse fish present including dace *Leuciscus leuciscus*, chub *Leuciscus cephalus a*nd eel *Anguilla Anguilla.*

The Guash ran in a generally south easterly direction through a predominantly limestone geology, before joining the River Welland at Stamford. The habitat of the River Guash had been dramatically affected by the construction of Rutland Water in the mid 1970's. Rutland was constructed on the original course of the Guash, with the dam impounding its flow, and causing flooding of its valley. As a consequence, flows in the Guash downstream of the reservoir have been severely regulated throughout the year. On the day of the site visit, water was apparently being released to supply the Guash-Glen transfer scheme, effectively augmenting flow. Control of winter releases from the reservoir is understood to reduce the periodicity and intensity of spates, with the result that scouring flows are not often experienced in the catchment immediately downstream of the reservoir.

River Guash downstream of outfall from Rutland Water

The regulating impact of Rutland Water also significantly impacts on the sediment and nutrient transport regimes to the downstream Guash. Much of the flow in the Guash downstream of the reservoir is provided by the Northbrook, a groundwater fed tributary**.** This stream has a self-supporting population of brown trout.

Northbrook. Note gauging weir in the background

2.0 Habitat assessment

Tickencote Fishery

The planform of the river was strongly meandering, with developing ox-bows at a number of locations throughout the reach. Land use was dominated by arable agriculture, with wide, well-vegetated buffer strips alongside the river.

The river had been extensively dredged in the past, with the channel moderately to significantly incised over much of its length. The remaining bed was dominated by a mix of clay, sand and fine sediment, with little evidence of clean gravel.

There was an abundance of deep pool habitat in the reach, with some lengths of shallow glide suitable for juvenile brown trout. However, there was a dearth of gravel dominated riffle habitat necessary for trout and grayling spawning. The majority of the small amount of gravel present was covered by a layer of finer sediment. It is quite likely that the lack of good quality spawning gravel in the river may impose a habitat bottleneck on fish stocks, reducing recruitment of both trout and grayling.

There was abundant in-channel vegetation, including milfoil *Myriophyllum* Spp., branched bur-reed *Sparganium emersum,* starwort *Callitriche* Spp., and water mint *Mentha aquatica.* The vegetation growth was especially dense where riparian tree cover was sparse, allowing light penetration into the channel. In sections more heavily treed with species including alder *Alnus glutinosa*, hawthorn *Crateagus monogyna* and ash *Fraxinus excelsior,* shading was controlling weed growth. There was evidence of past coppicing of alder trees, with multi-stemmed stools common. There was also some evidence of *Phytopthora* disease in the alders.

A rare example of flow dependent, gravel bedded riffle/shallow glide habitat. Brown trout redds have been noted at this location. This habitat type is an exemplar for the proposed enhancements to this reach

Woody debris in the channel was relatively rare. However, there were one or two good examples of fallen trees/tree limbs that were having a significantly beneficial impact on instream habitat, with the scouring and sorting of substrate downstream clearly visible.

Large woody debris dam created by fallen tree. Scouring and sorting of the substrate was clear downstream. Note the dense carpet of lesser water-parsnip *Berula erecta* downstream of the dam.

Beat 3 (the bottom beat of the fishery) had a heavy growth of branched bur-reed within the channel, with the submerged leaves of the plant covering much of the surface area of the channel over significant lengths.

Stands of branched bur-reed on the lower reach of the fishery.

There was an abundance of deep holding water in this reach, providing suitable habitat for adult trout sand grayling. There were also sections of shallow glide and riffle, with extensive associated stands of lesser water parsnip and starwort. Despite the presence of this shallow habitat, there was a paucity of gravel substrate suitable for spawning salmonids, with the bed dominated by a mix of larger limestone cobbles and fine sand.

The syndicate had constructed several small stone deflectors in this reach, with the aim of increasing flow velocity locally. The structures had achieved this objective, with considerable beneficial variation in velocity created without the damaging upstream impoundment too often associated with low weirs.

Low stone deflector installed by the syndicate

Short lengths of this reach were overwide, with significant deposits of fine sediment lying on the bed as a consequence.

Guash Fishing Club Fishery

Upstream of Ingthorpe, the river had a similar mix of shallow glide and pool habitat, with riffles rare. Vegetation within the shallow glides was dominated by lesser water parsnip, and starwort, whilst the deeper, slower lengths were heavily occluded with emergent vegetation, including branched bur-reed and marsh woundwort *Stachys palustris*.

The few sections of riffle habitat were located in areas of slightly elevated gradient and where shading was sufficient to prevent significant growth of emergent vegetation. There were some small areas of clean gravel of a size suitable for brown trout spawning, but even here, filamentous algae and fine silt were shrouding some of the potentially best spawning sites.


Shallow glide showing dense growth of lesser water parsnip, starwort and water cress in the margins


Deeper section, heavily occluded by bur-reed, woundwort and mixed marginal species

Downstream of Tolethorpe Mill, there was a section of higher gradient stream, with an extensive associated riffle, providing an indication of the likely quality of the river prior to dredging and the construction of Rutland Water. However, even at this location, the gravel remained relatively unsorted and imbedded, with a considerable volume of entrained fine sand likely to provide relatively poor hatching success for deposited trout eggs.

Section of shallow riffle habitat downstream of Tolethorpe Mill

The reach below the Tolethorpe roadbridge, had a relatively steep gradient, with a wetted channel width of 6m-7m. The gravel substrate was largely covered by fine sediment, and extensive stands of lesser water-parsnip. The fishing club had installed a series of woven hurdles in order to encourage the development of the marginal vegetation and consequent narrowing of the channel. The presence of hemlock water dropwort *Oenanthe fluviatilis,* and large numbers of small brown trout were testament to the success of the work, with the former species not growing in areas of deep silt. Instream habitat within this reach of the river was probably the best of all those visited during the advisory visit.

Dense marginal vegetation growth resulting from narrowing of the channel behind installed hurdles

In contrast, the reach downstream of White Post Bridge was heavily incised following past dredging, with the channel occluded by emergent vegetation, to the point of being totally blocked in places. As a result the river was virtually unfishable, with an almost total absence of any shallow glide and riffle habitat that would allow recruitment of brown trout and grayling.

Heavily vegetated channel downstream of White Post Bridge

3.0 Recommendations for future management

Large-scale structural changes

There is little doubt that the instream habitat of the River Quash has been significantly compromised, both by past dredging and the construction and operation of Rutland Water. Dredging has over-widened and over-deepened much of the channel, encouraging sediment deposition and the growth of emergent vegetation. Rutland Water has altered the flow regime of the river, reducing scouring flows. As a consequence, sediment entering the channel, probably from agricultural or road run-off, is likely to accumulate in the channel and encourage more vegetative growth, rather than being regularly re-mobilised by high flows. In addition, the lack of high flows has and will continue to, reduce sorting of substrate, with the result that much of the bed of the river is uniform, and dominated by fine sediment. The issue of Rutland Water's impact on the Guash has been recognised by the Environment Agency in past catchment documents including the LEAP for the catchment.

If the status quo is maintained with respect to river flows, then in order to maintain and develop the salmonid stocks of the river, physical intervention is required. This must focus on a reduction in the wetted cross-sectional area of the channel.

In combination with channel narrowing, bed raising would reduce the cross-sectional area of the channel, thus increasing water velocity. The creation of gravel dominated riffles would also increase the availability of this valuable and under-represented habitat type. A range of species are associated with gravel riffles, including spawning/juvenile brown trout and white clawed crayfish *Austropotomobius pallipes.*

In general, it is recommended that riffles should be constructed to be a minimum of 15m in length. Each riffle would increase the retained head, probably by between 15cm-30cm, with the extent of this backwater effect being assessed as part of the detailed design process. By a combination of careful placement of riffles and judicious channel narrowing, the hydrological continuity between river channel and floodplain meadows could also be increased.

Optimum conservation benefit is obtained if the depth of gravel in each riffle exceeds 50cm, with a range of macroinvertebrate species requiring a hyporheic zone of this depth to reproduce successfully. In order to optimise spawning conditions for brown trout, water velocity should be between 25cm/sec – 75cm/sec, with a water depth of between 25cm and 60cm. Some large stone has been piled near to the river by the farmer which may be used in riffle construction. However, the bulk of the gravel and stone will need to be imported onto the site from the nearest quarry, with the price likely to be in the region of £10-15/tonne delivered. A large hydraulic excavator will be required to place the stone in the river, at a cost of around £250/day for a machine and driver.

Narrowing of the channel is recommended along key sections of both fisheries. The physical extent of the narrowing will be dependent on changes in depth resulting from associated bed raising (see above), with the combined effect of these two prescriptions achieving an agreed cross-sectional area for the reach (probably around 3-4m^2). The narrowing may take the form of a simple extension of the present bank into the channel, the creation of a two-stage channel within the current bank line, the construction of mid-channel islands or a combination of these. Whichever option is pursued, careful profiling of the new banks will ensure suitable conditions for a range of species of conservation interest, including water vole *Arvicola terrestris.*.

All materials used should, wherever possible, be biodegradable with a combination of chestnut/hazel/willow faggots and spiling, coir fibre revetment products and locally derived backfill key constituents of the narrowing. Any requirement for significant backfill material may present an additional opportunity for enhancement through the excavation of shallow marginal berms (se below) for donor material

Past dredging activity has significantly raised sections of both banks of these reaches. This has reduced the length of low level flood berms present, with an adverse impact on a range of wetland plant and animal species. Typically, present bank levels could be reduced to no more than 10-20cm above mean summer water over selected lengths of at least 15m. In many cases, these would be sited alongside sections of bed raising, providing an element of flood compensation, provided that the excavated material is transported out of the flood plain, most likely onto the adjacent arable fields where it could be incorporated by subsequent ploughing in.

The cost and detailed planning required for the implementation of the recommended enhancements should not be underestimated. A sum in excess of £20,000 will be required in order to have a significant impact on even a single river reach. Given this, it is recommended that a partnership project should be promulgated, with likely participants including the Environment Agency, the Wild Trout Trust, landowners, and Anglian water. Funding may be available from any of the potential partners, and Landfill Tax, Aggregates Levy, or agri-environment schemes. Such a scheme would potentially provide a platform for the Wild Trout Trust to promote its advisory scheme system and associated benefits, perhaps through the pages of Trout and Salmon.

Smaller scale management prescriptions

The extensive growth of lesser water parsnip and to a lesser extent, branched bur-reed, were covering potential trout spawning areas, and retaining fine sediment. It would be prudent to selectively hand cut stands of weed on riffle areas in order to both expose gravel substrate and to 'train' flow through narrow channels, increasing water velocity, and scouring away fine sediment. Ideally, submerged weed should be cut either in a 'chequerboard pattern' or in 'bars' across the river.

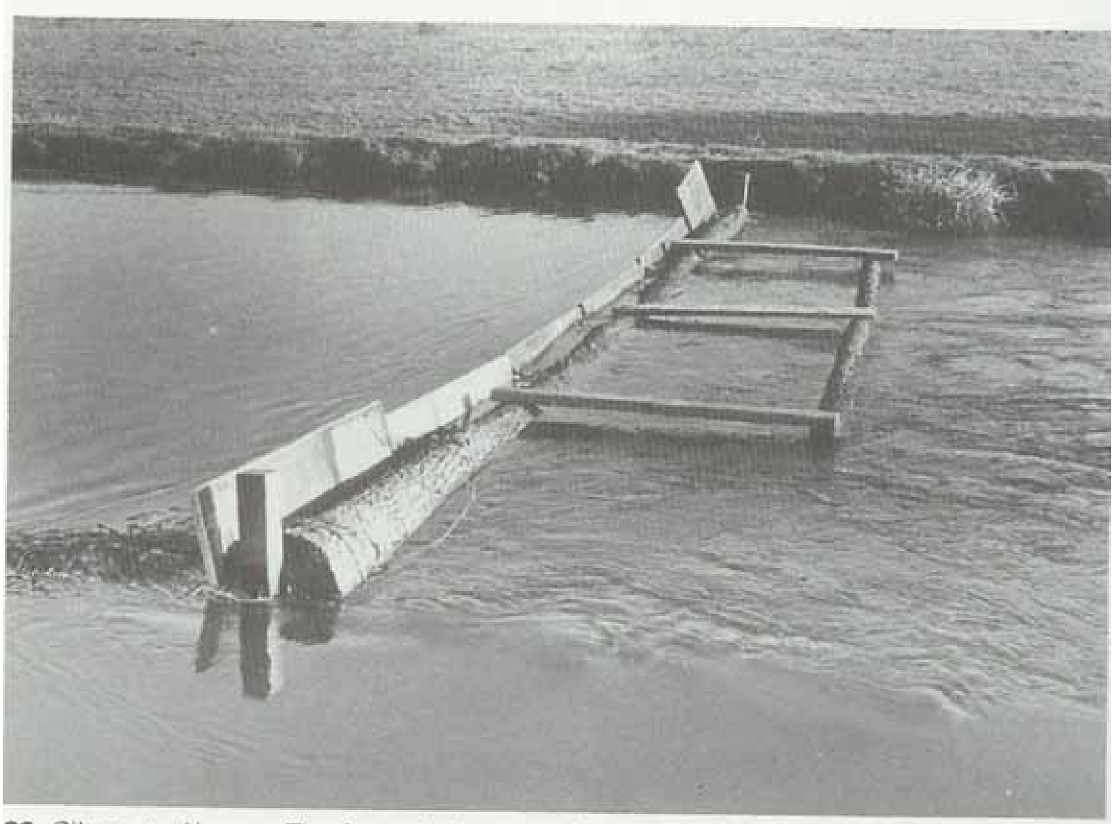
The few areas of gravel riffle present could be improved by sorting of the substrate in order to increase bed diversity and improve spawning conditions. There are a number of ways of doing this, with perhaps the best being the use of paired 'v' shaped wooden groynes. These are simple structures that can be constructed by staking a pair of large wooden logs to the bed in a 'v' shape, in the centre of the riffle, with the apex of the 'v' facing upstream. The upstream face of the paired groynes should be filled with large stone and gravel in order to reduce flow under them; the intention is to force water over the groynes, scouring the bed downstream.

Wooden 'v' shaped groyne installed on gravel riffle. Note gravel backfill upstream of groyne and pool scoured downstream

The sorting of bed material and in particular spawning gravel could also be further improved by strategic positioning of Large Woody Debris (LWD), in the form of tree trunks and limbs. These will from time to time naturally fall into the river. Unless flood defence requirements dictate, they should not be removed. Rather, they should be stabilised and trimmed to allow angling access whilst retaining the bulk of the woody debris in the river. LWD has a significantly beneficial role to play in increasing variation in bed profile, providing cover for a range of invertebrates and fish, and detaining leaf litter for subsequent consumption by shredding macroinvertebrates.

LWD can actively be encouraged into the river in strategic locations (generally on riffles or shallow glide areas) by selective felling of trees. Leaving a 'hinge' at the base of the trees during felling will allow control of the placement of the timber, and will also act to stabilise the tree by keeping the tree butt attached to the bank. Ideally, the top of the fallen tree would be angled in an upstream direction in order to reduce the risk of bankside erosion.

The cleaning of spawning gravel and scouring of patches of sediment can also be achieved by the use of a mud engine. This is a simple device (pictured below) that harnesses the rivers flow to create localised high water velocity. Operation is simple, with the engine being moved regularly in a downstream direction in order to clean short river lengths.



29 Silt control boom. The far tethering rope is visible below the bank; the near rope is

Mud engine

The growth of the emergent weed is very extensive during the summer months. Removal of all weed is not practical or desirable. However, it is possible to manage the weed in order to maintain sections of open water. This can be achieved by either manual cutting (chain scythes), mechanical cutting (hydraulic powered cutter mounted on 360 excavator) or by the use of herbicide. Of these options, the best in terms of its cost, lack of environmental disturbance and practicality is probably the herbicide.

The only appropriate herbicide cleared for use near to and in water is glyphosate (sold as ‘Roundup’, Roundup Pro Biactiv etc). It is a selective, translocated herbicide that is used to treat the actively growing plant once its leaves have emerged from the water. Glyphosate offers a cheap and environmentally sensitive option (it is inactivated on contact with water and sediment) for the treatment of emergent vegetation.

Glyphosate can be used to selectively remove small stands of emergent vegetation, creating runs and sections of clear water where required. It can be also be used prudently to shift sediment from strategic locations by training the river’s flow to scour these areas.

Detailed advice on the use of herbicides can be obtained from the Centre for Aquatic Plant Management capm.org.uk. The written consent of the Environment Agency is required for the use of glyphosate.

The bankside tree cover can also be utilised to promote or retard instream and marginal vegetation growth. Judicious cutting of trees, particularly on the south bank, can be used to reduce shading, promoting plant growth, whilst planting of trees in open areas will, in time, increase shading reducing plant growth. It may also be necessary to plant additional trees to replace alders likely to die from *Phytopthora* disease

In order to monitor trout spawning activity it is recommended that an annual count of spawning redds is undertaken by the clubs. Key spawning areas should be walked during November- January and observed redds logged and counted.

Note that all works to bed or banks of the river or within 8m of its banks requires 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.

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