Advisory Visit for Knaresborough Angling Club

River Nidd

Date 16/04/12

1.0 Introduction

This report is the output of a site visit undertaken by Gareth Pedley of the Wild Trout Trust to the River Nidd, on 16 April 2012. Comments in this report are based on observations on the day of the site visit and discussions with Knaresborough Angling Club (KAC) members, Peter Chambers (Chairman), Charles Jesper (Vice President) and Ian Smith (Committee Member).

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. Location coordinates are given using the Ordnance Survey National Grid Reference system.

2.0 Catchment / Fishery Overview

The River Nidd rises on the moors of Great Whernside in the Nidderdale Area of Outstanding Natural Beauty (AONB). The predominant geology in the upper catchment is Millstone Grit, which combined with the peaty moorland produces an acidic pH and brown stain to the water. The resulting low light penetration and relatively low nutrient content of the water are likely to limit aquatic plant growth, particularly in the upper river, but this is also the case in the middle catchment where KAC waters are located. Further south and east in the catchment the river and tributaries become buffered by areas of Magnesian Limestone, and species like water crowfoot (*Ranunculus spp*) increase in abundance (http://www.naturalareas.naturalengland.org.uk/Science/natural/NA_search.asp).

The River Nidd lies within the Humber River Basin District (under the Water Framework Directive - WFD) and KAC's waters are contained within the WFD waterbody *River Nidd from Birstwith to Crimple Beck (GB104027068291)*, which is currently classified as being of moderate status, but good status for Overall Biological Quality, including fish and invertebrates.

The section of river inspected was approximately 3.5km in length, between Hampsthwaite Bridge and Old Killinghall Bridge, of which KAC has double bank fishing rights to the downstream half and RB rights for the upper. This has influenced the selection of current fish stocking locations, which are

predominantly in the lower half of the section, below the sewage works. In the past, some fish have been stocked in the upper part of the section, but this was estimated to have in three of the last twelve seasons.

The annual stocking regime consists of around 1300 28-33cm, and 80 much larger, infertile (triploid) brown trout (*Salmo trutta*). The smaller fish are stocked in four batches of approximately 330 fish each in March, April, May and June, with the larger fish mixed in, although this is currently under review.

Discussions with members of the club suggest that there is a concern as to whether the current levels of stocking could be impacting on the abundance of wild trout and grayling (*Thymallus thymallus*) in the river. Anecdotal evidence suggests that there may have been a drop in the number of larger grayling caught in the lower sections, where stocking takes place, with most of the larger fish now caught in the upper un-stocked section.

Current catch data is anecdotal; with no real handle on what proportion of catches are wild or stocked fish, so it is hard to assess the stocked fish are making to the fishery. Likewise, the rate of catch and release can not be assessed, which would be useful data to have when considering the protection and enhancement of wild fish stocks.

3.0 Habitat Assessment

Physical habitat on the river is generally of a high quality for salmonids, although some issues are present. The river bed is predominantly coarse gravel and cobbles, with some boulders, finer sands and silt. Channel width appeared natural in most areas; however, the depth appeared subject to some human modification in certain areas where historical dredging may have been undertaken. The character of the river can be described as predominantly pool and riffle sequence, with some areas of glide water, providing a range of habitats suitable for both juvenile and adult fish.

Fry emerge from the gravels, initially inhabiting the river margins and shallower riffled areas, before gradually working out into the main flow as they develop into parr. As they become larger, less susceptible to predators and more capable of holding a territory, they will start to exploit deeper

glides and pools, from which they will forage into the shallower areas to feed.

Investigation of the river bed on several riffles did suggest higher than expected levels of sediment were present, although few areas of spawning substrate were occurring locally. Slightly higher than expected levels of algal growth were also observed and both of these factors could indicate that runoff (possibly from arable farmland) is entering the river further upstream.

Major siltation issues were identified on the Cockhill Beck (SE2693958934) where much of the bed was smothered by fine silt (Picture 1), particularly in the lower reaches where the Beck is likely to be backed up from the main river in high flows. Sedimentation within the Beck not only creates a large input to the River Nidd, but is also likely to limit successful utilisation of the Beck as a spawning tributary for trout. For this reason, it is recommended that the Cockhill Beck catchment is walked in an attempt to identify potential sources of sediment. Once identified, it would be worthwhile contacting local Environment Agency (EA) fisheries staff, as there may be money available for projects to address this issue.

Picture 1. High levels of silt on the bed of Cockhill Beck. While siltation of the bed is exacerbated where the Beck backs up from the River Nidd, it highlights the issue of high sediment supply within the Beck.

As stated, the substrate (bed material) in which trout and grayling spawn was limited, primarily due to the dynamic nature of the River Nidd in this area of the catchment. Both species require relatively loose substrate of around 5-50mm diameter (grayling and smaller trout favouring the lower end of this range), with low levels of silt. Consequently, the sedimentation issues identified, although not catastrophic, are likely to further limit the utilisation of gravels, and hatching rate of any eggs laid in them. Some suitable spawning areas were present, particularly on the lower velocity riffles and side channels, but these are also more susceptible to sedimentation.

The good numbers of smaller trout and grayling appearing in angler catches and EA surveys however, would suggest that some suitable spawning habitat is available within the immediate catchment. This is likely to be supplied by a range of locations within the main river channel, side channels, tributaries or other areas upstream in the catchment.

A significant increase in algal growth downstream of the sewage works was observed, which suggests additional nutrient enrichment of the river towards the downstream end of the section (Picture 2). The associated reduction in water quality could also be one factor affecting the prevalence of larger grayling in the middle and lower areas of this section of river. This is because grayling are one of the more susceptible freshwater species to poor water quality, particularly larger fish.

In addition, recent studies have shown impacts from nutrient enrichment on spring spawning species, particularly grayling (Hübner, et al, 2009). This is primarily attributed to the associated increased growth of brown algae on the river bed which occurs as river temperatures increase in the spring (when grayling, barbel and other riverine species are spawning).

Evidence from studies undertaken downstream of a sewage works suggest that the algal growth directly reduces oxygen flow to eggs within the gravel and causes major fluctuations in oxygen levels between night and day, which typically fall to a minimum at dawn. Algal growth was also associated with increased ammonia levels in the gravel and can cause large increases in water pH around the river bed, sometimes in excess of pH9. The high pH also results in a higher proportion of the ammonia being in the more toxic unionised form.

In these studies egg mortality within the gravel was greatly increased downstream of the sewage works, and the mortality was total in the actual outflow plume.

Picture 2. Excessive algal growth on vegetation downstream of the sewage works.

The predominant land use in the immediate catchment area is arable farming, which can contribute to the sedimentation and nutrient issues described through surface runoff and drainage carrying fine sediment and nutrients in to the watercourse. Similar issues can be encountered where livestock have unrestricted access to the riverbanks. They can remove much of the vegetation and trample the banks, making them more susceptible to erosion.

In general this was not the case on the section walked, as riverside fencing provided a reasonable buffer zone in most areas. These buffer zones create a valuable area of un-grazed/reduced grazing, and un-cultivated land that is less susceptible to erosion due to greater levels of vegetation. They also act as a sink for sediment and nutrients that would otherwise run from the fields into the watercourse, and for this reason it is suspected that much of the sediment is originating further upstream in the catchment.

Where sheep had access to the riverbank, increased erosion was observed (Picture 3) but at the current rate and stock density, this was not considered

to be a major problem as it was limited to a relatively short section. It is advised that the rate of erosion and impact on marginal vegetation is monitored, and if an increase is observed, it may be worth excluding livestock completely from the riverbank, or greatly decreasing stock densities in fields adjacent to the river.

Picture 3. Areas of damaged bank resulting from livestock access and grazing (SE2726959684).

Around the confluence of the Cockhill Beck and the River Nidd a large stand of Himalayan balsam (*Impatiens glandulifera*, Picture 4) was present, which is likely to increase winter erosion rates and should be removed. Himalayan balsam can be dealt with through spraying (more information can be found at http://www.environment-agency.gov.uk/homeandleisure/wildlife/31350.aspx), or by pulling and strimming, which can be undertaken by angling club working parties.

If pulling is the preferred option, the waste material should be composted above the flood line, with monitoring undertaken to ensure that the re-growth does not occur. Strimming is a very fast method of treatment, but if undertaken, the plants must be cut before the seeds start to develop and the site should be re-strimmed as necessary throughout the season (several treatments are likely to be required). Equally, hand pulling should be undertaken before the balsam produces seed.

Picture 4. Large area of Himalayan balsam at the confluence of the Cockhill Beck and the River Nidd (SE2693958934) that is beginning to sprout. Balsam can lead to serious erosion issues in the winter as it out-competes other species, then when the balsam dies back in the winter large areas of bare earth are left susceptible to erosion.

In most areas, healthy marginal tree growth was present, providing a good balance of dappled light and shade to the watercourse. Low hanging limbs, trailing branches both on and under the water, tree roots, and large woody debris (LWD) provided by tree trunks and branches also contributed to a good level of in-stream cover for fish.

These features increase flow diversity, creating food lanes within the flow for trout and grayling to inhabit, thereby increasing the number of lies. The structure also facilitates areas in which fish can shelter from high flows and predation. Fish can easily get in and out of the structure, but predators can not. In this way, in-channel structure can be particularly beneficial to protect fish from piscivorous birds (goosander, merganser and cormorants), and from mink and otters.

It is quite possible that cormorant and goosander predation could also be contributing to the decline in grayling (and possibly native trout) numbers, which is another very valid reason for retaining and increasing the level of in-stream cover.

The flow disruption caused around structures, particularly LWD and trailing branches can also increase the range of gravel sizes retained within the channel, particularly those required by trout and grayling for spawning.

Physical structure under the water surface also increases the number of wild trout that an area can hold through creation of smaller pocket water, with no direct line of sight between them. This allows individual fish, which are naturally territorial, to inhabit lies much closer together without having to constantly defend the area from rivals.

This type of habitat can be easily increased with the use of hinging techniques, where young supple tree species such as willow are present. The technique involves partially cutting through the trunk at a low level, then pushing the tree or shrub over, along the rivers edge (as demonstrated in appendix 1). Alternatively, tree kickers could be employed to create similar habitat, by felling the tree into the river and tethering it to its own stump. This retains the trunk in place to increase cover and structure within the channel (as demonstrated in appendix 2).

Tree management has historically been undertaken by the club, both to prune low hanging branches, and to remove fallen trees/limbs, as in picture 5, often in an attempt to improve angler access. While this may seem appropriate to keep the river tidy and allow angling access, these actions have actually reduced the low level cover in some areas, potentially reducing the number of fish that area can support. Picture 6 also shows an area where pruning has resulted in loss of fish habitat, with little remaining low-level cover. In such areas, selective coppicing of some trees would greatly increase low level cover by encouraging low-level re-growth (as demonstrated in the before and after photographs in appendix 3).

For this reason, it is recommended that future tree work is restricted to the enhancements suggested. Tree and branch clearance for angler access should only be undertaken as a last resort, and only then in small areas. With this form of management angler access may be slightly more difficult but with a greater abundance of high quality trout and grayling habitat available, fish abundance and quality of angling should increase. It is also worth bearing in mind that where tree work is undertaken for other than fishery reasons or habitat management, it may be useful to consider incorporating some additional habitat enhancement as mitigation.

Picture 5. The cut limbs to the left of shot were removed to increase angler access. Where work like this is undertaken it is beneficial to mitigate the habitat loss by increasing habitat locally. Here the tree in the centre of shot could be hinged along the bank, so that its branches trail in the water.

Picture 6. A very open pool with no low level cover. Habitat here could be greatly enhanced by coppicing, or creating kickers out of some of the trees to the left of shot.

The quality and availability of habitat could also be greatly increased on sections of open bank like those displayed in pictures 7 and 8. Bundles of willow branches can be staked into the margin of the river to increase flow diversity and cover. Bundles should be located so they are partially submerged at summer water level. This creates an area where sediment will accumulate and the willow will start to root. Where this is undertaken in faster flowing areas it is likely to benefit larger fish, but if also undertaken in lower flow areas can also increase the shelter available for fry and juvenile fish in the river margins.

While such measures may not be initially popular with all anglers, they are likely to come round to the idea as fish begin to utilise the "new" habitats created. In this way the carrying capacity of the reach will be enhanced and more fish can be naturally supported within a reach.

Picture 7. Looking upstream along a section of open bank on the inside of a bend (RB), where fry and juvenile habitat could be greatly increased by the installation of living willow bundles (SE2759559593).

Picture 8. Looking across to the outer side of a bend on the LB, with greater flow present, where adult trout habitat could be enhanced through the installation of living willow bundles (SE2762359565).

Planting of willow could also be employed in these areas by driving willow whips or stakes into the river bank, just above the waterline. Ideally, half to two thirds of the stake should be submerged is below water level, with no more than 60cm (24”) above the ground. In the majority of cases these will take root and grow into new trees/shrubs. These shrubs will require maintenance over time, but periodic coppicing or hinging would further enhance their benefit and increase the value of the new structure created.

4.0 Conclusions and Recommendations

Overall habitat on the River Nidd between Hampsthwaite Bridge and Killinghall Bridge was of a high quality, particularly for adult and juvenile trout and grayling. Spawning habitat was less abundant, but observations on the day, along with angling, and EA data Water Framework Directive data on the fish status (http://maps.environment-agency.gov.uk/wiyby/queryController?topic=wfd_rivers&ep=2ndtierquery&lang=_e&layerGroups=1&x=430529.0&y=456737.501&extraClause=EA_WB_ID~'GB104027068291'&textonly=off&latestValue=&latestField) would

suggest there is sufficient within the local catchment to support natural fish stocks.

It is very hard to assess whether concerns about the impact of current trout stocking levels on the wild fish stocks are valid, but the reduced abundance of larger grayling in the stocked section could be an indication of an impact. The decline could also be in part, due to the reduction in water quality from the sewage works outfall, which could be affecting egg and juvenile survival, and suitability of the area for adult grayling. Piscivorous birds are also likely to be playing a part, and the deeper pools of the affected section do leave fish more susceptible to predation. This is another good reason to increase in-stream cover and structure offering fish more places to hide.

The current level of trout stocking, at 1380 fish per season seems excessive for the size and length of river and depending on the survival of the fish could be having an impact on native fish stocks through increased competition. In addition the 80 larger fish are not considered appropriate to be introduced to a river. These larger fish have a greater food requirement than smaller native fish. They are also likely to predate upon juvenile trout and grayling, and the other smaller fish. The further detriment being that due to their higher energy requirement they are not likely to remain where stocked for long, either dying from malnutrition or leaving in search of an easier living, but not before they have cause significant potential damage.

With this in mind it is recommended that at least as a trial the total number of fish stocked be greatly reduced, and that stocking undertaken with a maximum of 28-30cm (11-13”) fish. This will limit the potential impact on native fish stocks and the ecology of the river. The 80 larger fish would be more appropriately stocked into the stillwater fishery that the club also runs.

If stocked trout were physically marked, they could be easily distinguished from wild fish, allowing anglers to return wild fish and retain stocked fish, reducing the impact of angling on wild fish stocks. Fish farmers can be averse to marking fish as it often highlights poor returns, but as a buyer you are well within your rights to require marked fish and if one supplier will not oblige, another certainly will. An additional measure would be to encourage anglers to keep catch returns, where they could be asked to record the number of fish caught, and whether marked or wild fish. The data gathered on trout & grayling could be used to inform subsequent stocking levels, locations and how the fish stocked contribute to angler catches.

Many angling clubs who keep catch records find they can drastically reduce the number of fish stocked with little or no impact on total catch, as many of the stocked fish die, or leave the clubs waters without contributing. By reducing the stocking level a club can often save time and money. That money can then be directed at improving habitat that will increase the numbers of wild fish the river supports, actually enhancing the fishing.

The recommendations for the future management of this reach of river are:

- Hinging of small pliable shrubs, such as willow, down into the river to increase structure and cover within the channel.
- Possible use of tree kickers, where trees can be felled into the river and retained to the stump with cable.
- Planting of willow whips and stakes into the bank in any areas with a lack of cover. The more, the better!
- Selective coppicing of trees, particularly in areas where the canopy has been raised and low level cover lost through prior pruning activity. This method is also highly suitable where plenty of tree trunks are present and the impact of losing the occasional one will be minimal. Locations such as the areas around the sewage outfall and around the main parking on the LB are prime areas for this action.
- Retention of woody debris and branches that naturally occur in the river.
- Contact the local area EA to investigate the increased algal growth, and perceived reduction in grayling numbers downstream of the sewage works outfall.
- Cessation of tree management for improved angling access.
- Reduction in the number of fish stocked annually, with all fish stocked to be marked to aid catch records.
- Cessation of stocking with the 80 larger fish.
- Adoption of an angler catch return scheme to aid in assessment of wild trout and grayling stocks, and the contribution stocked fish make.

Many of the techniques described in this report can also be found on the Wild Trout Trust website, so please visit for further information and guidance.

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

It is important to note that works to the river and riverbank require written Environment Agency (EA) consent prior to undertaking any works, either in-channel or within 8 metres of the bank. This includes the techniques suggested in this report. It is recommended that your local area Environment Agency is contacted before any work is undertaken.

5.0 Making it Happen

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

- WTT Project Proposal
  - Further to this report, WTT can devise a more detailed project proposal report, which would include more detail on the actions required to implement the recommendations of the advisory report. This would usually detail the next steps to take and highlighting specific areas for work, with the report forming part of a land drainage consent application.
- WTT Practical Visit
  - Where clubs are in need of assistance to carry out the kind of improvements highlighted in an advisory visit report, there is the possibility of WTT staff conducting a practical day for a club. This would consist of 1-3 days work with a WTT Conservation Officer teaming up with interested club members to demonstrate the habitat enhancement methods described above. Knaresborough Angling Club would be asked to contribute only to reasonable travel and subsistence costs of the WTT Officer/Officers involved.
- WTT Fundraising advice

  Help and advice on how to raise funds for habitat improvement work can be found on the WTT website - http://www.wildtrout.org/content/project-funding

  The WTT officer responsible for fundraising advice is Denise Ashton: dashton@wildtrout.org

6.0 References

Hübner, D., Borchardt, D. & Fischer, J (2009) Cascading effects of eutrophication on intragravel life stages of European Grayling. Advances in Limnology. 61, 205-224.

7.0 Acknowledgement

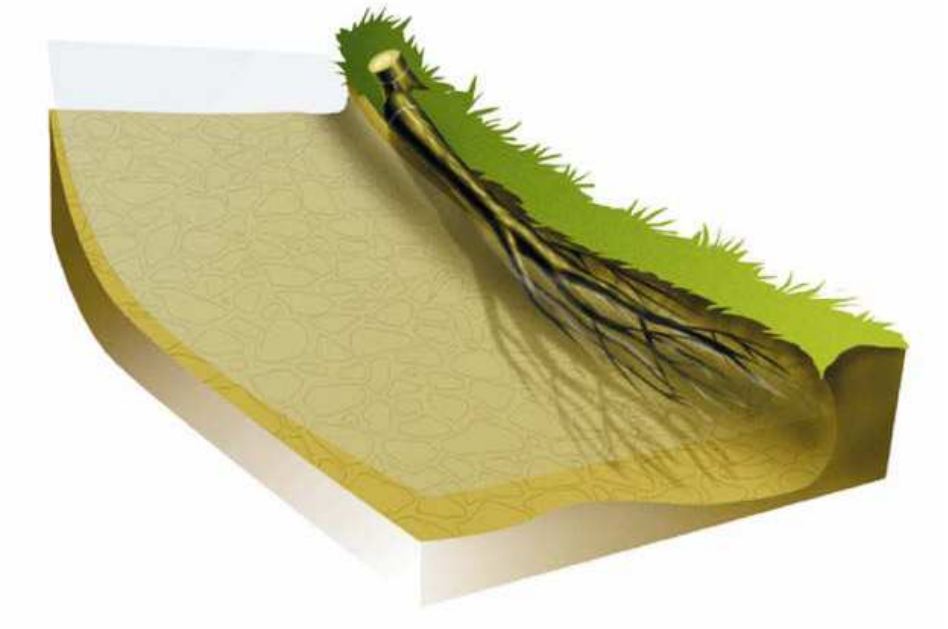
The Wild Trout Trust would like to thank the Grayling Society for their collaboration and technical input on this report. We would also like to thank Environment Agency for the support that made this visit possible.

8.0 Disclaimer

Appendix 1

Partial cutting and hinging/laying of willow (like hedge laying) is a quick way of creating low cover which is firmly fixed to the bank. The willow should root along its length.

Appendix 2



Cut-away diagram, looking upstream at a tree kicker installed along a river bank.

Detail of cable fixing for a tree kicker.

Appendix 3

Coppicing trees produces bushy re-growth which creates excellent low cover over the water. This method should be used sparingly, ideally only on a few trees in a section/year. It is important to protect the re-growth from livestock, where grazing occurs. (Picture represents 4 years re-growth)