River North Tyne Tributaries

An Advisory Visit by the Wild Trout Trust – April 2014

1. Introduction

This report is the output of a Wild Trout Trust visit to inspect several tributaries, including the Gunnerton and Erring Burns that run into the River North Tyne at Chipchase and Chollerton in Northumberland. Short sections of main river on both estates were also inspected.

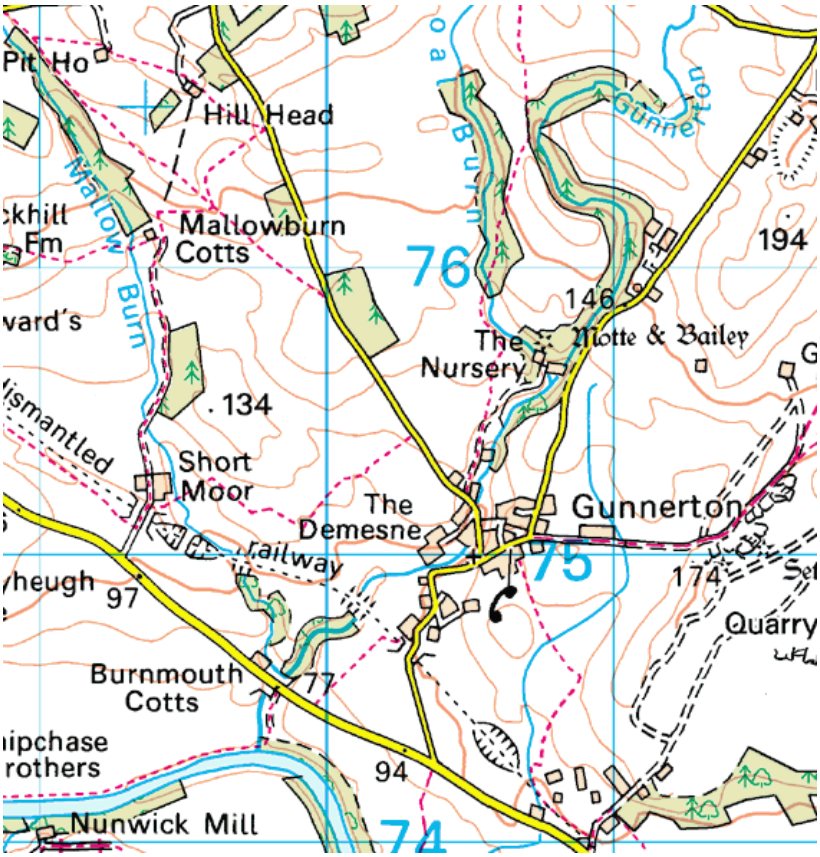
The visit was suggested by WTT Chairman, Edward Twiddy, when in conversation with River Tyne landowners Mr. Jonathan Elkington and Mr. William Browne-Swinburne about ensuring that local tributaries and side streams were contributing towards River Tyne brown and sea trout *Salmo trutta* populations. Mr. Elkington and Mr. Browne-Swinburne are both members of the Tyne Riparian Owners and Occupiers Association (TROOA), a sponsor of and key stakeholder of the Tyne Rivers Trust (TRT). Both riparian owners are keen to improve and protect habitat quality that sustains this nationally important fishery.

Trout stocks in the Tyne system are thought by many to have declined. Fishery survey data collected by the Environment Agency does not seem to suggest that recruitment to the trout population is a problem for the Tyne system as a whole.

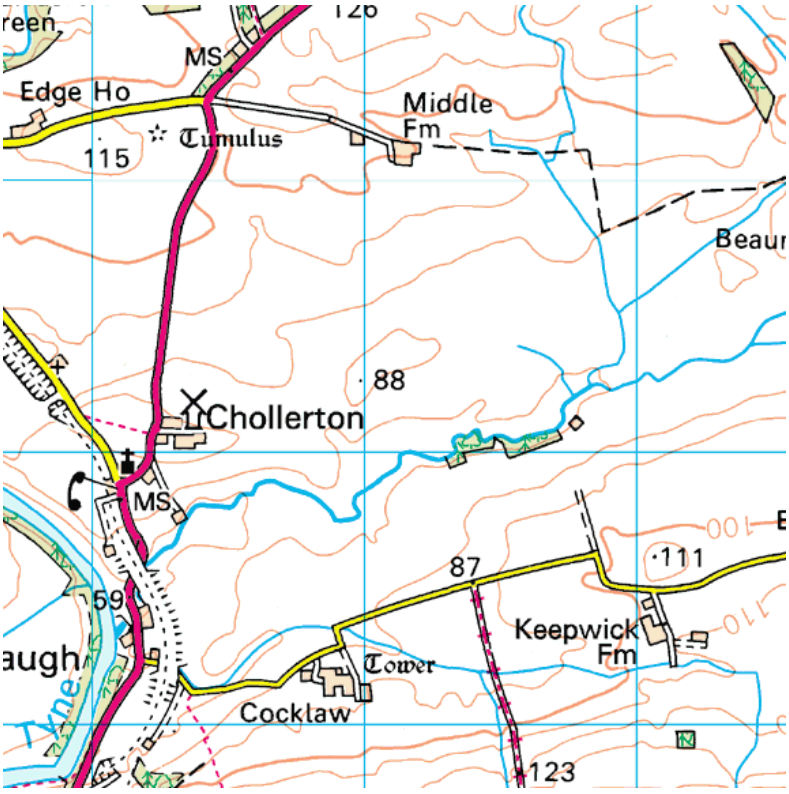
A fishery survey carried out by the EA on the Gunnerton Burn returned a very poor result with no trout captured. Reasons for this failure are not known but the presence of natural falls and a long culvert below Gunnerton make spawning migrations difficult, especially in a low-flow autumns. These issues are identified in a TRT Obstruction Survey Report (Appendix 1.) A resident brown trout population should still be present in all reaches of this system and it is possible that a water quality problem has resulted in damage to the trout population, which may have since struggled to recover without free access for upstream migration.

Exploitation of sea trout in the marine environment is a concern but all the evidence suggests that there is sufficient spawning escapement to ensure sustainable recruitment. The loss of potential broodstock at sea may be more of an issue for the rod fishery than for the overall health of the population. The options for protecting and improving the trout fishery are explored in detail in this report.

The Director of the Tyne Rivers Trust, Susan Mackirdy, also joined the group on sections of the walk-over survey.



Gunnerton Burn and Mallow Burn Map



Erring Burn Map

Throughout the report, normal convention is followed with respect to bank identification, i.e. banks are designated Left Bank (LB) or Right Bank (RB) whilst looking downstream.

The contents of this report covers two separate water bodies as designated under the Water Framework Directive by the Environment Agency. Water Body ID no GB103023074880 takes in the Mallow and Gunnerton Burn and is assessed by the EA as being of "good status". The Erring Burn (GB 103023074879) is classified as a Heavily Modified Waterbody with "Good Potential" as listed on the EA website.

The location of the Gunnerton Burn tributary confluence with the North Tyne is at National Grid Reference NY 897 743 and NY 930 713 for the Erring Burn.

2. Catchment and fishery overview

The natural geology of Northumberland is complex and varied and is largely responsible for the rich and diverse landscapes found in the Tyne Valley. To the north of the county, the Cheviot Hills are the result of ancient volcanic activity and are formed at the core of large outcrops of igneous rock. In the central and eastern half of the county the geology is made up of the Millstone Grit Series consisting of layers of limestones, shales and sandstones. In the southern half of the county, lower and middle coal measures are reflected in a repeat sequence of coal, sandstone and mudstone cycles which have occurred over millennia as a direct result of changes in land, river and sea levels.

The Tyne system is made up of two upper arms, the North Tyne rising near the border with Scotland to the north of Kielder Forest and the South arm from Alston Moor in Cumbria. The two rivers join at Warden Rock near Hexham before flowing east to form the long estuary either side of which sits the conurbations of Newcastle, Wallsend and North Shields to the north, and Gateshead, Jarrow and South Shields on the south side.

The river valley and estuary has a long history of industrial activity with centuries of coal mining and transportation activity as well as the development of one of the world's foremost shipbuilding centres. The industrial revolution took a huge toll on the Tyne in terms of heavily degraded water quality, so much so that for long periods in the first half of the 20th century, the tidal river was grossly polluted and would have acted as a chemical block to fish migration.

In the early 1970s, a £46 million pound waste water treatment works was built on the lower river to help clean up the estuary. Approximately at the same time, the large Kielder Reservoir was commissioned in a plan designed to provide water for the predicted increase in industrial demand, which never materialised. In compensation for cutting off the upper reaches of the North Tyne for migratory salmonids the Kielder hatchery was built and is maintained to this day to mitigate for the loss of natural spawning in the upper catchment.

In the last forty years, the river has recovered and the Tyne now supports the most productive salmon fishery in England. The river also supports a notable trout and coarse fishery and a rare and endangered freshwater pearl mussel

Margeritifera margeritifera population in the North Tyne and the River Rede tributary.

3. Fishery potential

The recovery in salmon and sea trout stocks on the River Tyne system has been attributed by many to the output from the Kielder Hatchery. A review of the Kielder Hatchery contribution towards the Tyne recovery was undertaken by the Environment Agency and the Centre for Fisheries Aquaculture and Science (CEFAS) in 2004. The report concluded that the hatchery had contributed towards an acceleration in the rate of the recovery but also concluded that the start of the recovery significantly predated the contribution made by the hatchery, concluding that investment in improved water quality had been the major factor in the return of the river's migratory salmonid population. It is noteworthy that the improvement of the Tyne's sea trout rod catches followed a very similar path to that of the salmon without any stocking of significant numbers of sea trout.

At the time, the report concluded that the hatchery contributed between 2 and 7% of the fish taken by rod and line and that the average return of all stocked fish to the river was less than 0.4% of the overall run. We can conclude therefore that water quality, water quantity and habitat availability are the three essential pillars that support the salmonid community in the River Tyne system. If the river is to sustain the recovery seen over the last forty years, it will be essential to redouble efforts to support the freshwater phase of the salmonids life cycle to ensure that water quality is protected and where possible improved and that fish can gain access to high quality spawning and nursery habitat.

In the last decade, the number of sea trout recorded by anglers in the Tyne has declined. This trend is in contrast to the declared licensed net returns from fixed engines operating along the Northumberland coastline. Here the number of sea trout taken has risen in recent years. There is obvious concern that the two sets of conflicting catch returns are linked.

In spate river systems such as the River Tyne, even subtle changes in adjacent land use can have huge consequences for the health of the river and the flora and fauna that it supports. The Water Framework Directive and DEFRA's Catchment Based Approach in providing a delivery mechanism potentially equips local groups with the drivers to help improve and protect our rivers. With the Tyne performing so well in the last forty years, it would be easy to miss the current opportunities available to identify poorly performing tributaries and tackle the bottlenecks impacting on them so that they can successfully contribute towards keeping the Tyne as one of the very best in country. The Tyne Rivers Trust, working in partnership with the local landowners and the regulators offers a vehicle for continued improvement.

4. Habitat assessment

4.1 Main river sites

Two short main river sites were walked and the contrast was quite interesting. The section of main river on the Chipchase beat was characterized by much riparian tree cover, with plenty of low, scrubby cover trailing into shallow river margins.

Fishery monitoring programmes undertaken on various rivers have identified how important the marginal zones are for juvenile salmonids, particularly in the very early phases of their life cycles. The provision of a tangled mass of coarse woody brash in the shallow marginal zones provides a safe and secure refuge area for tiny fish before they slowly migrate down and out into what we usually recognize as classic juvenile riffle habitat. As well as providing a secure refuge, areas that are rich with woody debris are also an important primary source of food for grazing invertebrates.

An additional benefit of margins packed with brushwood and brash is the potential for reduced river bank erosion. The second section of main river visited at Chollerton was considerably more open, with the bank tops accessible to grazing sheep. Although by no means serious, there were signs of erosion and bank slumping in some areas. A simple fence and buffer zone to exclude sheep and a relaxed approach to river margin maintenance will allow some low scrub to develop which will help to reduce erosion and critically provide improved habitat for juvenile salmonids. Targeting long reaches adjacent to shallow riffle habitat would be particularly valuable.

Photo 1. A long shallow glide at Chipchase. Potentially an important spawning and nursery area. This reach is well managed with plenty of trees on the bank and woody debris left lying in the margins.

Photo 2. A fallen tree in the Channel at Chollerton. This tree will help to sort and shape river bed material and potentially create a holding pool, as well as promote improved opportunities for spawning downstream.

When large trees collapse into the river channel there is often a temptation to remove them immediately. The value that large fallen trees bring to the river environment cannot be overestimated. Large pieces of woody debris provide natural flow deflectors and promote local river bed scour, carving valuable holding lies for adult salmonids and redistributing cleaned and sorted river bed cobbles and gravels into potentially valuable spawning sites.

When trees fall at right angles to the bank, as in the example seen at Chollerton (photo 2), or if they fall angled slightly upstream, they rarely cause any significant bank erosion. If the root wad is still buried into the bank then these natural flow deflectors can remain in place for several years. During this time they can transform the shape of the river bed. If a tree falls into the river at a vulnerable location, or at an angle where it might promote unacceptable bank erosion, or if the tree risks blocking a weir or narrow bridge, then it can sometimes be winched into a safe orientation and secured with a "catch" cable. If the tree can be secured to another live tree, or sometimes its own root system (example photo 3) then if it does move in a big spate, it will simply swing around and into the margins.

Photo 3. A large sycamore deliberately dropped into a Welsh spate river and cabled to its own stump.

4.2 Gunnerton Burn

The Gunnerton Burn and the Mallow Burn tributaries appear to be hugely important spawning and nursery streams for trout and possibly for salmon. Sea trout in particular often favour small side streams and tributaries for spawning with salmon tending to utilize main river sites as well as key tributaries. The Gunnerton and Mallow Burn potentially provide in excess of 10km of spawning and nursery habitat and should to be putting significant numbers of trout smolts into the Tyne system annually.

It was not possible to view the obstructions identified in the TRT report on the day of the visit and although the photographs in the report quite rightly identify these obstructions as a block to free migration, none of them would appear to be an insurmountable obstacle for large sea trout under favorable flow conditions.

On sites where impassible falls are identified there are often populations of resident trout in the reaches upstream that consistently put a proportion of their off-spring to sea, even though the population might appear to be completely cut-off from returning broodstock. Often when tested, the relationship between the upstream residents and the downstream migratories is far closer than might be expected, which usually suggests the "impassable" falls are sometimes passable – fish do not read fish-pass manuals! Genetic typing can sometimes ascertain that an "upstream" population has indeed been separated from the

downstream stock and collecting DNA samples from Tyne tributary populations may well definitively answer whether or not populations are isolated.

The lack of any trout detected in upstream surveys is worrying. For a population to recover following a water quality incident it will require either downstream drift of juveniles to take up residence in an empty niche, or a recovery via local spawning, which may or may not be possible because of access issues.

Information from the land owner, Mr. Elkington suggests that poor water quality emanating from old mine workings may be the problem. It would be very surprising if the EA's WFD assessment of the Gunnerton could be reaching "good status" if there were a chronic water quality problem associated with mine leechate. A more in-depth analysis of water quality is required.

On the day of the site visit, the Gunnerton Burn was carrying a heavy suspended sediment load (photo 4). The weather conditions on the day of the site visit were reasonably dry and despite an upstream investigation, it was not obvious where the source of the additional colour was coming from but the sediment loading is characteristic of agricultural run-off.

Photo 4 Confluence of the Gunnerton Burn with the main river. Note the heavy discolouration indicating heavy suspended sediment loading.

For spawning and nursery streams to produce the maximum possible yield, it is essential to ensure that water quality is adequately protected. Research by CEFAS has demonstrated how the survival of salmonid eggs is severely compromised by exposure to nutrient rich sediments. A heavy slug of sediment laden water can have a devastating impact on fish populations, particularly at

sensitive times during the winter and early spring, when eggs are developing or freshly hatched alevins are emigrating from the gravels. A cursory look at the river bed suggested an impoverished fauna of invertebrates, possibly indicating chronic water quality issues associated with this Burn. The Burn has been assessed as part of the WFD process as being in good condition. It is not known when the WFD assessments were carried out nor any detail on the data underpinning the classification, but given the comparatively poor numbers and diversity of invertebrates present on the day of our visit and the lack of trout in fishery surveys, it seems that perhaps the Burn is performing well below it's potential.

Photo 5. Gunnerton Burn appears to have excellent habitat suitable for a high quality spawning stream with classic sequences of pool, riffle and glide with plenty of riparian cover.

The shape and the form of the stream was considered to be favourable for salmonids; however, due to the turbid nature of the stream it was not possible to fully inspect the river bed gravels.

The stream was also inspected at the road crossing in Gunnerton village. The river was again very turbid and the river bed substrate sadly lacking in numbers and variety of invertebrate species. Approximately 500m upstream of the village there is a Northumbrian Water Waste Water Treatment Works. There is no evidence to suggest that the apparent lack of invertebrates is associated with the performance of the works, however further investigation via kick/sweep invertebrate monitoring both above and immediately below the works outfall is recommended.

The last site to be inspected on the Gunnerton Burn was approximately 2km upstream of Gunnerton at NGR NY 912 769. The water clarity here was much improved, though the stream still held more colour than might be expected. At this location some sheep fencing was causing a debris dam to form in the channel (Photo 6), backing up the stream flow and potentially creating an issue for free fish migration. This problem has been slowly getting worse because there was evidence that the stream bed has significantly risen over downstream bed levels.

This issue can easily be resolved by cutting away the existing fence line and reconnecting with the field fence lines on either side of the river or building a watergate.

Photo 6. A sheep fence causing a debris dam to form, creating problems for fish migration and also resulting in the river bed levels rising upstream.

The Mallow Burn was also inspected, this being a small tributary that drops into the Gunnerton a short distance upstream from the confluence with the North Tyne.

On the day of the visit, the Mallow Burn (photo 7) was running low and clear and a cursory inspection of the river revealed good numbers of caddis, shrimp and olive nymph species present in the mainly gravel and cobble river bed substrate. The Mallow runs in a deep V-shaped valley down a comparatively steep gradient. In the reach inspected, the adjacent land use was considered to be "river friendly" being mainly deciduous woodland on the steep valley sides.

The Mallow Burn looks to be a superb trout spawning and nursery stream and will undoubtedly be contributing fish stocks for the main river below.

Photo 7. The Mallow Burn. Everything that a small spawning stream should be!

4.4 Erring Burn

The final tributary inspected was the Erring Burn. This North Tyne tributary was very interesting and appeared to have a slightly different chemistry to the other local streams inspected. Groundwater fed springs (Photo 8) rising from very near the access point just south of Chollerton seemed to indicate water emanating from limestone rich deposits. This was reflected in the local aquatic flora, with cress and water moss evident as well water crowfoot (photo 9). These plants are usually but not exclusively associated with alkaline environments. A brief assessment on the day suggested that the Erring Burn may well be slightly more productive in terms of invertebrate biomass than the Gunnerton system.

Any increased productivity will obviously have implications for how the stream performs as a spawning and nursery stream. The lower reaches of the Erring Burn are more akin to a lowland stream, with comparatively deep glide sections interspersed with pools and occasional shallow riffles, all within a meandering planform (photo 10). It is likely that this reach will be very attractive to adult trout and possibly sea trout and this section of stream could make an interesting fishery in its own right.

Sections upstream were not inspected but it is assumed that here the gradient becomes slightly steeper and opportunities for spawning and juvenile fish will be readily available.

Land use on this lower section of the Erring was extremely river friendly, with Mr. Browne-Swinburn actively encouraging a riparian wetland habitat to develop.

Photo 8. What appears to be an alkaline spring source trickling into the Erring Burn. Note the wonderful wet meadows adjacent to the stream.

Photo 9 Tresses of water crowfoot in the Erring Burn, a plant synonymous with productive trout streams.

Photo 10. Low banks, slightly deeper channel and a meandering planform. A fishery as well as a nursery site perhaps?

In conclusion, the Erring Burn is almost certainly a very productive trout stream.

Its value as a spawning and nursery stream may well lie in the reaches located further up the valley. The lower section inspected would be suitable as holding water for pre-spawning adult trout and may well be attractive to small stream fishermen.

It is highly likely that large migratory fish will lie up in the deeper, better covered pools and glides. Some tree planting with low scrubby species such as sallow *Salix caprea*, especially over the outside of bends and pools will help to make this stream even more attractive for adult brood stock. Some additional shade, planted adjacent to the left (south) bank will also help to ensure that marginal reed canary grass (*Phalaris arundinacea*) does not completely dominate the channel.

4. Conclusions

The lack of an identified trout population on the upper reaches of the Gunnerton Burn and what appears to be a very depressed invertebrate community should really be ringing alarm bells. Even without access for sea trout, the upper reaches of this Burn should be teeming with trout, some of which would be contributing towards smolt emigration. The Burn may well have suffered from a significant pollution incident, or may be subject to chronic problems, which should be relatively easy to identify. As a water body that is clearly failing to meet the expected WFD standard, it is reasonable to ask the EA to carry out a detailed investigation.

The River Tyne is widely regarded as the finest salmon river in England. There is no doubt that the river is also a very good sea trout fishery but perhaps could be even better.

The landowners and the local staff and supporters of the TRT are not complacent about how to protect and improve this fabulous resource but there are potential threats to the rivers continued improvement that need careful monitoring and in some cases immediate action. Subtle changes in river valley land use may be amongst them. These issues are far from unique and lessons are still to be learnt in many catchments across the length and breadth of the country. The Herefordshire Wye is a great example of where the salmon fishery has declined in the face of land use change that have transformed the sediment loading of the river in a visibly obvious way.

(see http://www.wyeuskfoundation.org/issues/index.php). The quality of any river (and especially a spate river) is only as healthy as the land that it drains.

With stocks in relatively good order the time is right to make sure that landowners in the Tyne catchment take the necessary action to ensure the long-term health and sustainability of this amazing river. Ensuring that each and every one of the tributaries has a plan for protection, including all of the 2nd and 3rd order side streams, is crucial. Land care, which includes changes to agricultural practices and forestry, is key to how this river system will perform over the next forty years.

Climate change and in particular rain fall patterns will threaten the quality of the fishery. Most fish populations in river systems thrive during an "average" year. Extreme weather events seem to be a recurring pattern which will challenge annual salmonid recruitment. How rainfall events and associated run-off interactions are managed via sensitive land management must be at the top of the agenda going forward.

Having workable plans to tackle these issues will be the key to ensuring the Tyne maintains its reputation as the best salmon fishery in England.

One arable field near Chipchase with a pathway for sediments to run out and onto the road and into a Tyne tributary. Easy options are available to help intercept run-off and are urgently needed in fields like this.

The TRT has already identified issues associated with poor connectivity by flagging up structures where fish passage is compromised. No problem structures or issues were identified during the walk-over that haven't already been flagged up by the TRT, however, it is important that these streams are annually inspected to address issues such as blocked fencing or natural debris dams that might benefit from a slight tweak to ensure that free migration is always possible. Woody debris should always be left in rivers whenever possible.

The West Country Rivers Trust provides a useful guide to the management of natural LWD:

1. Is the debris fixed, if yes then continue to 2, if not continue to 5.

2. Is the debris causing excess erosion by redirecting the current into a vulnerable bank? If yes then go to 5 if not then go to 3.

3. Would fish be able to migrate past it (take into account high river flows). If yes got to 4, if no go to 5.

4. **Retain the woody debris in the river**.

5. **Re-position or extract the debris.**

Developing a network of river water quality monitors on the Gunnerton Burn would be valuable, perhaps as part of the TRT community engagement programme. The River Fly Partnership can offer simple training for volunteers via invertebrate monitoring. This might be particularly import on streams like the Gunnerton Burn, where there is a known waste water discharge. Many problems associated with polluting discharges are now being flagged up by voluntary groups who have received the training and can alert the EA that a problem needs addressing. More information about the initiative can be found at www.riverflies.org

Once the water quality investigations have been completed and any mitigation measures implemented, it will be important to ascertain whether or not there are any wild trout present in the upper river to enable a natural recovery in the population. Usually once a water quality or habitat issue has been resolved, the population recovers rapidly, even when only a very small number of potential broodfish are available to build the stock.

There is often a temptation to run to the hatchery to restock rivers and streams following water quality problems. It is critically important that any possible recovery in a natural population is not compromised by indiscriminate stocking with hatchery derived fish. There is lots of information about the issues associated with stocking and wild broodstock schemes on the WTT website at www.wildtrout.org

It is possible the Gunnerton Burn trout community might be genetically distinct, even from Erring Burn stock. If some kind of "kick-start" stocking is deemed essential because the upstream stock have been completely lost, then it would be much better to seed the upper river with a modest number of wild fish thinned out from the lower reaches of the same river, or from the Mallow Burn tributary. It is assumed there is a viable and healthy trout population downstream and this could easily cope with some light thinning to gather stocks for kick starting the upstream population.

This action should be a last resort and only contemplated if a total loss of the upstream population has been proven. Stocking above impassable falls is not recommended by the EA and a discussion with the local EA fisheries officer will be required prior to making any detailed plans on how best to ensure the Gunnerton is performing well as a spawning and nursery stream.

Most of the Burns inspected in the Chipchase and Chollerton area are in a reasonable, natural state and require very little management or intervention. Some fencing to exclude excessive grazing pressures and some tree planting would be beneficial, especially on the Erring Burn and perhaps on some sections of main river as well.

It is likely that the main sections of the North Tyne at Chollerton and Chipchase also support a largely unexploited sea trout fishery. This could be potentially developed in parallel to the existing salmon fishery and may help to augment fishery income.

Small stream trout fly fishing for wild fish in a wild environment is becoming hugely popular. There might be scope to let the odd day on the Erring Burn to a small group or possibly add the Burn to the Tyne Angling Passport Scheme. It is believed that one beat of the Erring Burn is already available via the scheme.

5. Recommendations

- Despite apparently good quality habitat on the Gunnerton Burn the absence of pollution-tolerant invertebrates, very low returns to historical electro-fishing and the sediment loading in the stream on the day of the visit all suggest that this should be the prime focus of attention on this particular group of tributaries.

- Ask the EA to undertake a water quality investigation with particular emphasis on some invertebrate monitoring on the Gunnerton Burn. Consider trying to build local capability through a voluntary group of monitors.

- Insure that local land care opportunities are thoroughly explored and implemented to avoid the problems that are blighting many watercourses throughout the country.

- Extend the protection of the riparian zone already started on the Erring Burn, potentially with some sensitive tree planting in the catchment. Find some suitable sites on the main North Tyne at Chollerton to improve marginal habitats, especially below glides or known spawning areas.

- Repeat and augment existing surveys to carry annual walk-overs of all the Tyne tributaries to ensure there is free access for migrating fish and no immediate signs of concern on water quality.

- Leave woody debris in the channel whenever possible. Guidance on the management of woody debris can be found in the WTT Upland Fisheries Habitat Manual. This can be downloaded from the WTT website at www.wildtrout.org

- Consider opportunities for developing the trout fishery potential both for resident wild browns on the main river and potentially in some of the Burns, and also for anglers interested in sea trout fishing.

Note: All work within 8m of the top of the bank will require a consultation with the EA and may require a formal written Flood Defence Consent prior to any work being carried out.

Acknowledgement

The WTT would like to thank the Environment Agency for supporting the advisory and practical visit programme.

Disclaimer

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