Advisory Visit

Shimna River, Co. Down

15th and 16th May, 2012

1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to the Shimna River, Newcastle, Co. Down, Northern Ireland on 15th and 16th May, 2012. Comments in this report are based on observations on the day of the site visit and discussions with Shimna Angling Club (SAC) members, Ed Kilgore MBE (Chairman), Harry Rafferty, David Torney (Treasurer), Norman Patmore and Ian Watts, and with Dr. Richard Kennedy of the Agri-Food and Biosciences Institute, Northern Ireland (AFBI).

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. Grid references are given using the Irish Grid Reference System.

2.0 Catchment / Fishery Overview

The Shimna River rises on the north side of the Mourne Mountains (J 287272) and flows in an easterly direction for about 14 km, joining the Irish Sea at Newcastle (J 378312). The Shimna is a steep spate river and is known for sea trout and salmon; the Irish rod-caught record sea trout of over 16lb was caught from the Shimna. The Burren River is a tributary which joins the Shimna close to the coast at Newcastle; it rises near Castlewellan and flows for approximately 8km through a more lowland area than the Shimna catchment. The Burren is regarded as an important spawning tributary for sea trout.

The Shimna River and its tributary, the Trassey River, are designated as an Area of Special Scientific Interest (ASSI) for their physical features and associated flora and fauna. It is one of the best examples in Northern Ireland of an upland, oligotrophic (base poor) river in a natural state, unaltered by human impact. The aquatic flora reflects the nutrient-poor, acidic water quality and is dominated by mosses and liverworts (NIEA, 2009a).

Despite the ASSI designation described above, the Shimna is classified as a heavily modified waterbody in the River Basin Management Plan (Water Framework Directive) (NIEA, 2009b), currently reaching only moderate ecological potential. The reasons for not reaching good ecological potential

are pH (moderate), zinc and copper concentrations (failing to achieve good) and hydrological regime (bad). The heavily modified classification and the bad hydrological regime are because of the Fofanny Dam and further information on the classification is given in NIEA (2009c).

The Shimna is an index river for monitoring of salmonids by AFBI. Juvenile electric fishing surveys and habitat assessment has been carried out since 2003. Semi-quantitative electric fishing (5-minute timed sample) is carried out annually at 15 sites on the Shimna and 9 sites on the Burren and quantitative surveys have been carried out at one site on the Shimna (Scout Camp) and 3 sites on the lower Burren (Kennedy & Lynch, 2011).

The survey results indicate very good trout production (annual fry index of between 3.8 and 10.2 fry per 5-minute sample; 1+ parr densities of approximately 15 to >40 fish per 100m^2 at Scout Camp site). The numbers of 2+ and older trout are low, reflecting the typical smolt age and migration to sea. The salmon fry index is more variable (0.79 to 14.0 fry/5-min) and ≥1+ parr densities varying from approximately 4 to 28 fish per 100m^2 at Scout Camp site (Kennedy & Lynch, 2011).

Electric fishing survey data show highest densities of juvenile fish tend to occur at sites in the lower catchment, moderate densities in mid-catchment and fewest fish at upstream sites. This is probably a reflection of the location of optimum spawning habitat (more gravel in the lower catchment), the annual variation in adult fish numbers and their opportunity to reach more upstream sites (flow conditions). Richard Kennedy reported that juveniles caught during surveys were often associated with woody debris and low overhead cover, with fry in shallow water and parr in deeper water.

In 2009/10 a fish counter was constructed to assess adult fish migration. Provisional estimates (during counter calibration) from July 2010 indicated a net upstream migration of 100 salmon and 128 trout; 217 salmonids were counted moving upstream between June and December 2011 (most activity in November), plus large numbers of downstream movements in November and December (probably kelts) (Kennedy & Lynch, 2011).

Shimna Angling Club was founded in 1960 and has 125 members. Most of the angling takes place on the lower river downstream of Mile Bridge to the estuary, although fishing also takes place further upstream into Tollymore Forest Park. The club ran a hatchery on the Trassey River for a period of

about seven years, until the premises became unavailable around 2002. More recently, brood fish (salmon and sea trout) have been sent to Bushmills hatchery and their offspring stocked back into the river. The most recent introduction was 5000 swim-up salmon fry around Parnell's Bridge (J 327320) in spring 2010, to compensate for a pollution incident emanating from the Fofanny Water Treatment Works in September 2009. Currently, the club is reviewing the practice of stocking of hatchery fish.

Previously, salmon originating from the River Bush have been stocked into the Shimna, but recent genetic analysis has not detected any fish of this origin. The river is part of the SALSEA-Merge project (www.nasco.int/sas/salseamerge) and is one of the baseline rivers, providing a genetic signature for which post-smolts caught at sea are being screened. The Club are also participating in the Celtic Sea Trout Project (www.celticseatrout.com) by supplying scale samples from fish caught in the Shimna.

3.0 Habitat Assessment

The Shimna is dammed close to its source by the Fofanny Dam, a public water supply reservoir managed by Northern Ireland Water (NIW). The Fofanny Water Treatment Works (WTW) is located a short distance below the dam and was built in 2008, replacing an existing WTW and allowing water to be supplied for treatment by gravity rather than pumping. The dam was constructed in the 1920s and enlarged in the 1950s and there is reportedly a release of compensation water 2.28 Ml/D (about 26 litres per second) into the Shimna (NIEA 2009c); hence the river reach downstream of the reservoir has severely depleted flows until the confluences of tributaries draining Slieve Meelmore (J 293298) and the Trassey River (J 309313). The in-stream habitat within the depleted reach is reasonably good but the densities of fish are likely to be very low, limited by the low baseline flows (Photos 1 - 3). Sediment supply may also be limited by the dam, restricting the availability of suitable salmonid spawning substrate.

The depletion of flows in the upper Shimna is at odds with its designation as an ASSI and a reason for the failure of the waterbody to reach good ecological potential. The situation warrants study to determine the impact upon the ecology of the river, including its salmonid fish community. There

are aids available to assist decision making on issues of water resources and in-stream flows, such as the Instream Flow Incremental Methodology and models such as pHabsim.

Land use in the upper catchment is rough grazing (on higher ground), commercial forestry and livestock grazing on improved pasture. Manure spreading was observed on pasture in the vicinity of the ford and footbridge (J 301305), but it had been carried out sensitively in accordance with good agricultural practice, leaving a 10-metre buffer alongside the watercourse. The club used to have a hatchery on the Trassey River and experienced some low pH events, probably associated with the forestry in that catchment.

Downstream of the Trassey River confluence, the Shimna continues to have excellent in-stream habitat, with a bed comprised of well-sorted substrate from boulder size downwards, plus bedrock outcrops (Photo 4). There is a good variety of depths with cascades, pools and shallow runs providing very good habitat for salmonid fry and parr. There is a healthy riparian zone which is populated with deciduous trees and bushes, providing dappled shade over the channel. This section of river contains a cascade known as Salmon Leap which is a natural barrier to upstream migration, passable only under certain flow conditions.

Downstream of Salmon Leap the river enters Tollymore Forest Park, a recreational area. The river here is joined by the Spinkwee River on the right bank, increasing flows. The latter tributary was not inspected but it was reported that there are impassable natural barriers a short distance upstream from the confluence.

Within the forest park the Shimna is an exceptionally beautiful, natural, upland river with good in-stream habitat for salmonids. The overall gradient of the river is steep, but varies between reaches. In the lower gradient sections the river tends to be shallow with a mixed substrate of bedrock outcrops, boulders and finer bed materials (cobbles – gravel)(Photo 5); in the steeper sections there are spectacular bedrock cascades and gorges, with deep pools ideal for holding adult salmonids (Photo 6).

The tails of the deep pools tend to have accumulations of gravel which looks ideal spawning medium for salmon and sea trout (Photo 7). The river is reported to move a great deal of its bed load downstream during spates, and

large accumulations of gravel were observed in the lower river (e.g. downstream of Mile Bridge). Club members reported that overcutting of redds takes place in the Tollymore Park section of the river, indicating spawning habitat may be a limiting factor here. The transport of large volumes of bed load material is a natural function of the steep gradient and spate nature of the river; however the hydrology is likely to be influenced by land use practices and associated drainage (e.g. commercial forestry) which can increase peak flows. It is recommended that dialogue is started with the forestry authority to determine the extent of this effect and possible mitigation measures (for example Pont Bren project, WTT Upland Habitat Manual – supplied during visit). Reduction in peak flows is also of benefit for flood risk management.

There are three stepping stone weirs across the river within Tollymore Park (Photo 8), one of which was breached. The two structures in good repair are barriers to upstream migration of adult salmon and sea trout (in all but high flows) because of the shallow spread of water across the crest and lack of deep water downstream to assist leaping. A deeper notch between one or two of the stepping stones, with a laminar (non-turbulent) flow into the downstream pool would be adequate to allow fish to use burst-speed swimming to cross the weir.

The forest park contains a mixture of stands of coniferous trees and mixed deciduous woodland. Some of the conifers have been recently felled, but there are some areas where stands are sited immediately alongside the river (Photo 9). It is recommended that the club talk to the forestry authority to find out about the management plan for the forest. From the perspective of river management, this should ideally be replacement of coniferous forestry with mixed native deciduous tree species. If coniferous forestry is continued it should be according to best practice and have a buffer zone of native deciduous species alongside watercourses, without through drains to the river.

Downstream of the forest park, past the Enniskeen Hotel, the gradient of the river lessens. The river has excellent in-stream habitat with a pool, riffle and glide sequence, very good bed substrate ranging from small boulders down to gravel and a healthy, wooded riparian zone (Photo 10). Similar conditions persist with progress downstream past the Scout Camp (Photo 11) and fish counter to Mile Bridge. The excellent juvenile salmonid

densities recorded at the Scout Camp survey site (Photo 11) reflect the very good habitat for spawning and juveniles. Some good examples of woody debris and bankside cover were observed (Photos 12, 13).

Downstream of Mile Bridge the river runs through a park and into Newcastle town. It is joined by the Burren River on the left bank and the Tullybranigan River on the right bank before bifurcating to create a boating lake, the outflow of which rejoins the river before it flows under the Main Road bridge and into the sea. This section of river from Mile Bridge to the sea is where the majority of angling takes place. Downstream of Mile Bridge there are several boulder weirs which create scour pools; there is an accumulation of coarse sediment (cobbles, gravel) in this area particularly immediately downstream of Mile Bridge and upstream of the boulder weirs. In the past this has been dug out, but there is some uncertainty over whether this can continue under current regulations.

The banks of the river through the park are reinforced with large boulders (installed in the 1960s) and with progress into the town the banks are hard engineered from concrete. In the urban area the club have concerns over the effect of artificial light from street lamps and properties which could act as a deterrent to migrating salmonids. In Scotland, an angling association took successful action against a tennis club which had installed floodlights (Stonehaven and District Angling Association v Stonehaven Recreation Ground Trustees ([1997] 60 SPEL 36)). Details of the case can be obtained by contacting Stonehaven DAA and further guidance on light pollution can be found in Temple (2006) and Taylor and Hughes (2005).

Photo 1 Fofanny dam in the headwaters of the Shimna River

Photo 2 Very low flows in the river downstream of the dam

Photo 3 The Shimna upstream of the Trassey confluence – good in-stream habitat but possibly still impacted by low flows. Grid reference J301305.

Photo 4 Shimna at Clonachullion Bridge (J313317), with greater flows because of the input from the Trassey River.

Photo 5 Shimna looking upstream from western boundary of Tollymore Forest Park

Photo 6 A cascade and deep pool in the bedrock gorge within Tollymore Forest Park

Photo 7 Accumulation of gravel at the tail of a pool

Photo 8 Stepping stone weir which will impede the migration of salmon and sea trout.

Photo 9 Coniferous forestry close to the river

Photo 10 Shimna at Enniskeen Hotel – excellent in-stream habitat for juvenile salmonids

Photo 11 Electric fishing survey site at Scout Camp. Note the good low cover over the water along the true left bank (right of picture).

Photo 12 Woody debris in the channel and low cover along the bank providing superb in-stream habitat for juvenile salmonids. More of this = more smolts heading to sea.

Photo 13 Low, bushy growth alongside and otherwise open, shallow glide. Managing the margins to encourage this type of cover will improve the carrying capacity for juvenile salmonids in these sections.

Photo 14 Recently constructed resistivity fish counter

Burren River

The Burren River is an important tributary of the Shimna and produces large numbers of trout fry. The river was inspected in its lower reaches from the flow gauging station (J 373329) downstream into Newcastle. Upstream of the gauging station is a bend in the river which is a very important spawning area for sea trout, with many redds observed there each year. Further upstream it is reported that the river is relatively unaltered and has good in-stream habitat and good trout production.

Downstream of the gauging station, the Burren has been straightened and canalised (Photo 16). There is an embankment on the left bank and in 2008 a secondary floodbank was constructed set back from the river; new housing development is ongoing behind the secondary floodbank (Photo 15).

Some habitat enhancement work was carried out on the straightened channel by the Rivers Agency in 2008, including installation of boulder horseshoe weirs, gravel introduction, gravel retaining logs and random boulder placement (Photos 17 – 21). The banks of the channel are well-vegetated and provide reasonably good low cover. Electric fishing results from this part of the Burren show reasonable numbers of fry but relatively poor numbers of parr, probably reflecting the lack of depth variation (pool habitat) in the straightened channel.

There are two options for improving in-stream habitat on this section of the Burren. Firstly, further structures such as flow deflectors and coarse woody debris could be installed to create pool habitat and cover within the straightened channel. Secondly, a more radical scheme to break the channel out of its existing course and re-naturalise the river could be considered. The construction of the new flood bank in 2008 may give sufficient flood protection to allow the introduction of further in-stream structures or the re-naturalisation scheme. Indeed the latter scheme could provide additional flood storage capacity which would reduce flood risk downstream in the town.

Further downstream is a sewage pumping station (Photo 20) which has caused several pollutions and fish kills in recent years when storm tanks have overflowed with inadequate flows in the river to provide dilution. Fish Legal is acting on behalf of the club in negotiations with NIW over this issue

and it is of paramount importance that the risk of future incidents is eliminated.

On the lower Burren (in the park) a new flood wall has been constructed on the left bank and an earth embankment set back from the river on the right bank. The in-river habitat continues to be poor, comprising a trapezoidal cross-section, relatively shallow depth and fine sediment bed; however trout numbers appeared to be reasonably good judging by the numbers of rising fish. The riparian vegetation on the left bank was reasonably good, with overhanging willow, gorse and broom providing some low cover over the water; this has apparently grown since the construction of the flood wall. On the right bank the vegetation appears more frequently managed, although long grass and a few willow shoots have been allowed to develop. The club should liaise with the council over vegetation maintenance alongside the channel to achieve better levels of low cover without compromising the flood capacity. Planting of low growing willow species and cutting on a rotational basis is recommended.

Photo 15 Field on left bank of the Burren downstream of the flow gauging station (J 373329). The new flood bank is on the left of the picture and the river channel follows the line of trees on the right of the picture.

Photo 16 Straightened channel of the Burren

Photo 17 Horseshoe boulder weir, creating pool habitat

Photo 18 Cross-channel log with the intention of retaining gravel.

Photo 19 Boulder placed in mid-channel

Photo 20 Burren alongside the sewage pumping station which has caused numerous pollutions via the storm overflow when the river has been insufficiently high to provide dilution.

Photo 21 Poor quality habitat in the lower Burren – lack of depth variation and accumulated fine sediment. Boulders have been placed as part of habitat improvement scheme.

4.0 Recommendations

Shimna

The Shimna River is a good example of an upland spate river and overall has very good in-stream habitat for juvenile salmon and sea trout. Because of this, there are few opportunities to make physical improvements to in-stream habitat (these would be better targeted on the Burren), but there are a number of other issues that should be considered:

- Fofanny reservoir and compensation flows. As described above, the reservoir impacts upon flows in the upper catchment and is likely to be having a detrimental impact upon numbers of juvenile salmonids in this reach. Further investigation is required into the impact of regulated flows on the availability of in-stream habitat, compared to a natural flow regime.

- Land use and management within the catchment. Further information on the impacts of forestry, drainage, agriculture, etc. is available in the WTT Upland Rivers Habitat Manual (supplied). The Rivers Trust movement has grown rapidly in recent years in England and Wales to tackle such issues and is becoming more established in Northern Ireland. See www.theriverstrust.org for more details.

- Water quality. The club actively pursues polluters with support from Fish Legal and this should continue until the issues are resolved. Water quality monitoring using invertebrate sampling is recommended and the Riverfly Partnership (www.riverflies.org) can provide training for volunteers who are prepared to carry out such monitoring.

- Management of woody debris within the channel. Woody debris in the river channel is a very important habitat for salmonids, providing shelter and food, creating variety in water depth and grading gravel, making it favourable for spawning. Routine removal of woody debris is bad practice for river habitats and should be avoided if at all possible. Further guidance on managing woody debris is given in the WTT Upland Rivers Habitat Manual.

- Fish passage. The stepping stone weirs within the forest park should be modified to facilitate fish migration.

- Stocking. The club are currently reviewing their practice of stocking the river with salmon and sea trout fry. Stocking is often seen as a tangible solution to a perceived lack of fish, for example the reported declines in adult salmon numbers in the river. However, the practice of stocking is fraught with uncertainty over whether it is successful or even whether it may be damaging to fish stocks.

  For stocking of juvenile stages of fish to be justified, there must be adequate habitat available for them which is not already being filled by natural production. The Shimna has a great advantage over most rivers in that it is an index river with good data on juvenile fish densities and more recently, adult counts. This information allows an assessment to be made of egg deposition and juvenile abundance in relation to available habitat.

  Studies using modern genetic techniques have shown a large degree of complexity and variation between populations of trout (and salmon), both between different rivers and within the same river system. This gives rise to the concern that stocking fish bred from a different river (or fish farm line) could at best be futile (with the fish disappearing, as appears to have happened with Bush salmon stocked to the Shimna), or at worst damage native stocks by interbreeding and disrupting local adaptations.

  A logical response to the above concern would be to use local broodstock to produce fish for stocking, and this should always be the choice if stocking is continued. However, there are also concerns over this practice, including

  - Removing wild production from the river to supply the hatchery and risk of loss at the hatchery through human error;
  - The need to use relatively large numbers of adult broodstock to prevent in-breeding depression – this compounds the point above;
  - Inadvertent crossing of broodstock from different within-river populations, disrupting local adaptations;
  - Genetic changes in the fry produced as a result of the hatchery environment, i.e. inadvertent artificial selection of fish which

survive better in a hatchery environment rather than the wild. The survival rate of such fish when released is usually poorer than fish born in the wild.

Given the above concerns, it is recommended that a precautionary approach is adopted and stocking is not continued, and the resources are used to tackle the other issues identified in this report.

Burren

It is recommended that a conceptual design for re-naturalising the course of the straightened section of the Burren is produced by a qualified fluvial geomorphologist. There appears to be adequate space alongside the existing channel downstream of the gauging station to create a meandering channel and restore connectivity between the river and its floodplain. The advantages of such a scheme include:

- Improved flood storage capacity, providing better protection for the town downstream;
- Increased sinuosity of the river channel, creating a sustainable pool and riffle sequence and hence improving in-stream habitat for all life stages of sea-trout and salmon: deeper pools for holding adults and parr, clean gravel riffles for spawning and fry.

This may seem like a radical proposal, but it should be viewed as a long-term aim for restoring the river and the conceptual design would be the basis for consultation and discussion with local interested parties. An example of a similar project can be seen at www.wildtrout.org/content/river-glaven-hunworth .

In the meantime, further enhancements to the existing straight channel could be carried out. These could include:

- Installing log flow deflectors. Figure 1 shows the effects of differently positioned deflectors, with upstream-pointing ones being favoured to avoid bank erosion. However, downstream-pointing deflectors could be considered in appropriate areas to deliberately create erosion and introduce some sinuosity to the channel.

- Create a two-stage channel by constructing a series of low-level, alternating deflectors (Figure 2, Photo 22). These should aim to re-create natural channel width based upon river engineering records or a suitable unaltered reference reach (O'Grady, 2006). The river channel has a relatively low gradient through the section downstream of the flow gauging station and for this reason, further boulder weirs are not recommended because of their impounding effect upstream of the structure.

- Hinge some bankside trees by partially cutting through the trunk and laying the tree in the margins to provide bushy cover (Photo 23)

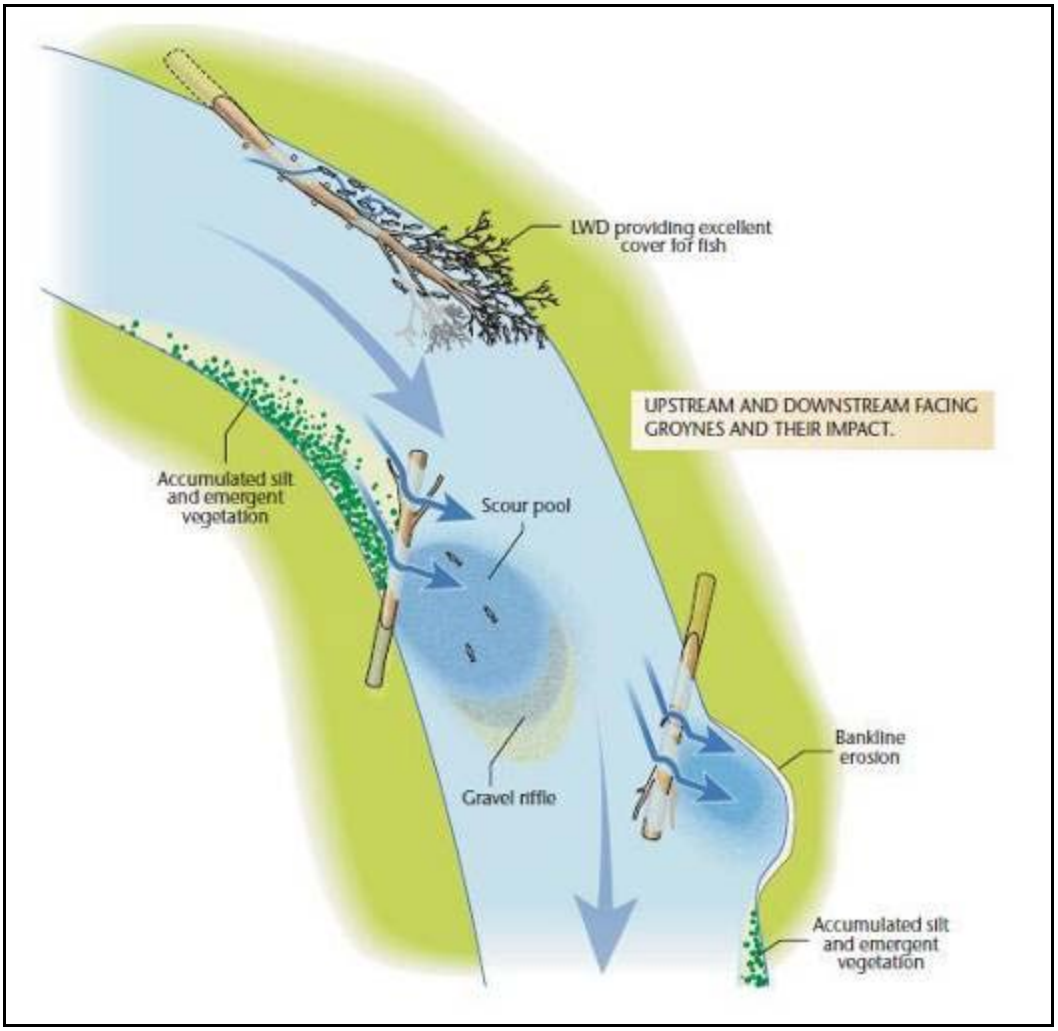

Figure 1

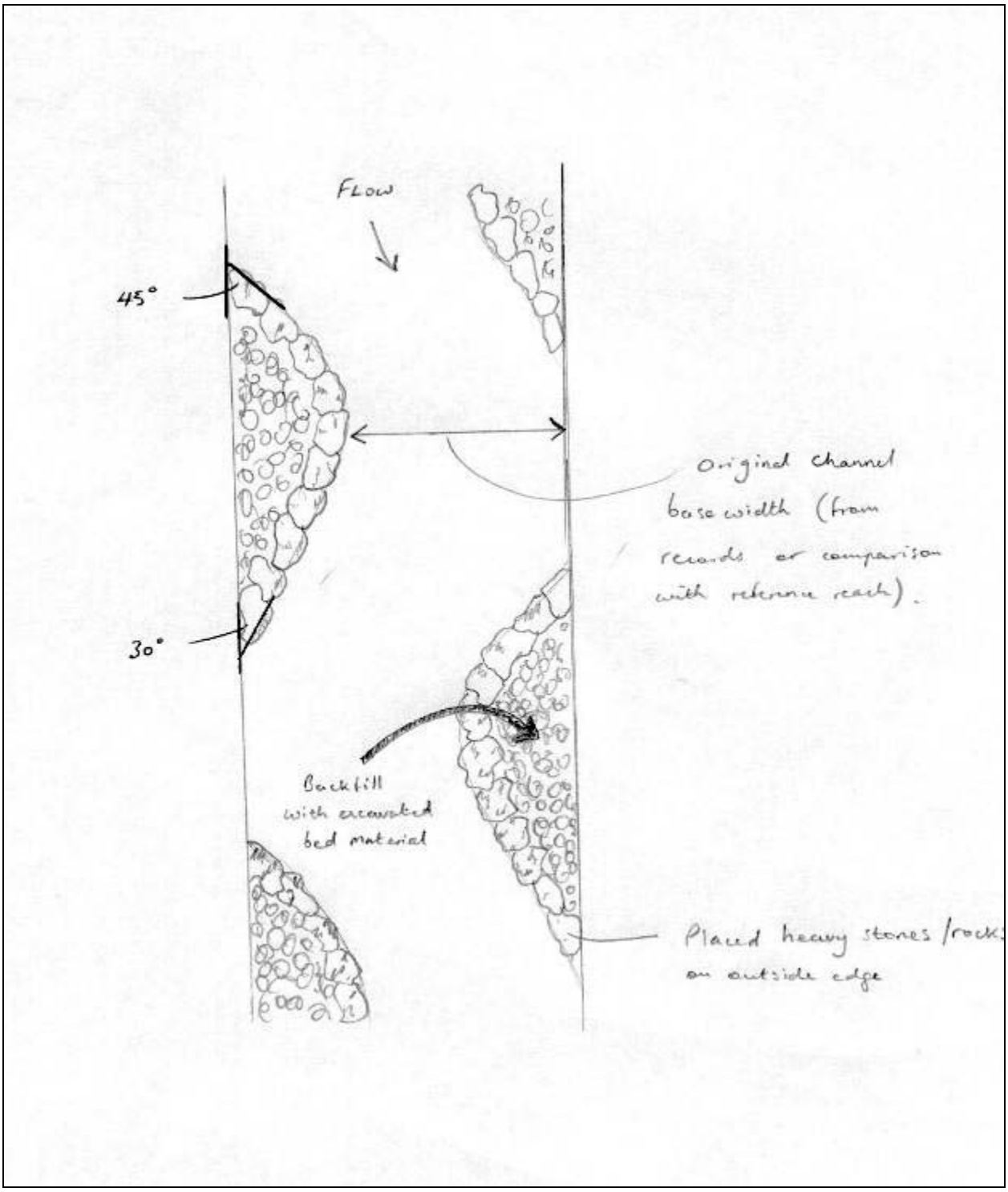

Figure 2 Alternating low-level deflectors to restore natural channel basewidth (from O'Grady, 2006).

Photo 22 Recently completed low-level deflectors in the Dawros River (Co. Galway)

Photo 23 Hinging trees to provide marginal cover.

- Please note that any works within the river channel require the permission of the Rivers Agency and any work within the Shimna ASSI may require permission from the NIEA.

5.0 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.

References

Kennedy, R.J. and Lynch, P. (2011) *Shimna Fisheries Survey Report 2011 – Summary results and recommendations.* AFBI / DCAL Report.

NIEA (2009a) Northern Ireland Environment Agency website http://www.doeni.gov.uk/niea/protected_areas_home/new_assi_landing_page/county_down-2/shimna_river_assi.htm

NIEA (2009b) *River Basin Management Plans SOUTH DOWN Local Management Area – Reasons for Status and Setting of Alternative Objectives. December 2009*. http://www.doeni.gov.uk/niea/classao-southdown_lma-2.pdf

NIEA (2009c) North Eastern River Basin Management Plan - Heavily Modified Water Bodies – North Eastern River Basin District. December 2009. http://www.doeni.gov.uk/niea/hmwb_ne.pdf

O'Grady, M.F. (2006) *Channels and Challenges –Enhancing Salmonid Rivers*. Irish Freshwater Fisheries Ecology & Management Series: No.4, Central Fisheries Board, Dublin.

Taylor, M.M. and Hughes, D. (2005) *Exterior lighting as a statutory nuisance* http://www.britastro.org/dark-skies/pdfs/TaylorHughes.pdf

Temple (2006) *Assessment of the Problem of Light Pollution from Security and Decorative Light - Published Guidance/Standards on Obtrusive Light.* A report by Temple (assisted by NEP Lighting Consultancy) to the Department

for Environment, Food and Rural Affairs
http://archive.defra.gov.uk/environment/quality/local/nuisance/light/documents/lightpollution-templereport.pdf