



Advisory Visit

Lough Derg, Co. Donegal

November 2010



1.0 Introduction

This report is the output of a site visit undertaken by Tim Jacklin of the Wild Trout Trust to Lough Derg, Co. Donegal on 11th November, 2010 on behalf of Pettigo and District Angling Association (PDAA). Comments in this report are based on observations on the day of the site visit and discussions with Willie Mills, Davy Stinson, Michael Stinson and Hugh Gormley of PDAA and Lionel Knobbs of the Loughs Agency.

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

2.0 Catchment / Fishery Overview

Lough Derg is a 2,200 acre lough located in Co. Donegal (Figure 1), in the upper Foyle catchment. It receives numerous, mainly small, tributaries from the surrounding hills and a single outflow leaves the north-east part of the Lough (Figure 2). The out-flowing river runs for a few hundred metres to a confluence with the Leaghany River, forming the River Derg.

PDAA have leased the fishing on the Lough since 1995. The club has 60 members and sells day tickets to visiting anglers. Fishing is from the bank and four club boats which operate on the lough (no visiting boats are allowed to prevent the spread of invasive species like zebra mussel). PDAA are carrying out a project to identify the reasons for a decline in brown trout fishing which has been documented in angling literature and experienced by local anglers. A description of the project written by PDAA was provided during the visit and this identifies the following factors as potentially contributing to the decline:

- Commercial long-line fishing for eels in the recent past, possibly impacting on trout through by-catch. This practice has now ceased.
- Predation and competition from pike and perch, species which were introduced in the second half of the 20th century. Some limited attempts at pike removal have been carried out, but few were caught. Approximately half of day tickets now sold are to pike anglers.

- Extensive commercial coniferous forestry throughout the catchment of the Lough, with much of the shoreline and tributary streams being forested. The majority of the forestry is administered by Coillte (www.coillte.ie) and a small area by the Forest Service Northern Ireland (www.forestserviceni.gov.uk).

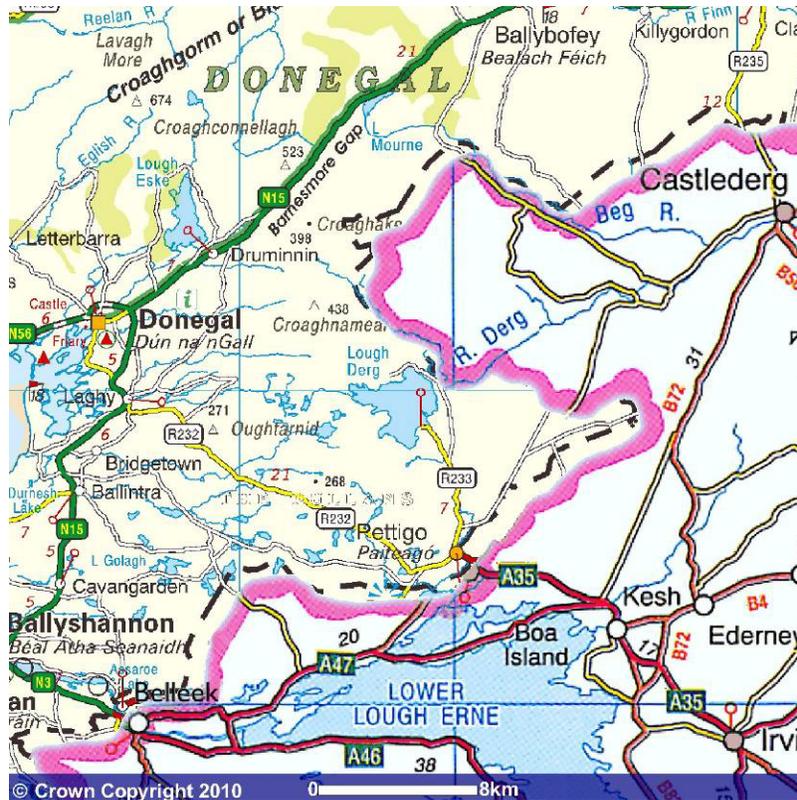


Figure 1 Location of Lough Derg. Image produced from Ordnance Survey's Get-a-map service. Image reproduced with permission of Ordnance Survey and Ordnance Survey of Northern Ireland.

- A dam on the outflow river (recently removed with Loughs Agency assistance) which was a barrier to the free movement of fish between Lough and river. Genetic analysis of Lough Derg trout was carried out by Niall McKeown in 2003 (PhD study, Queens University Belfast) and showed a high proportion (70%) of the fish sampled had a genotype similar to the gillaroo trout of Lough Melvin which are known to be outlet river spawners. The dam could therefore have been disrupting the life cycle of a significant proportion of the trout population of Lough Derg.

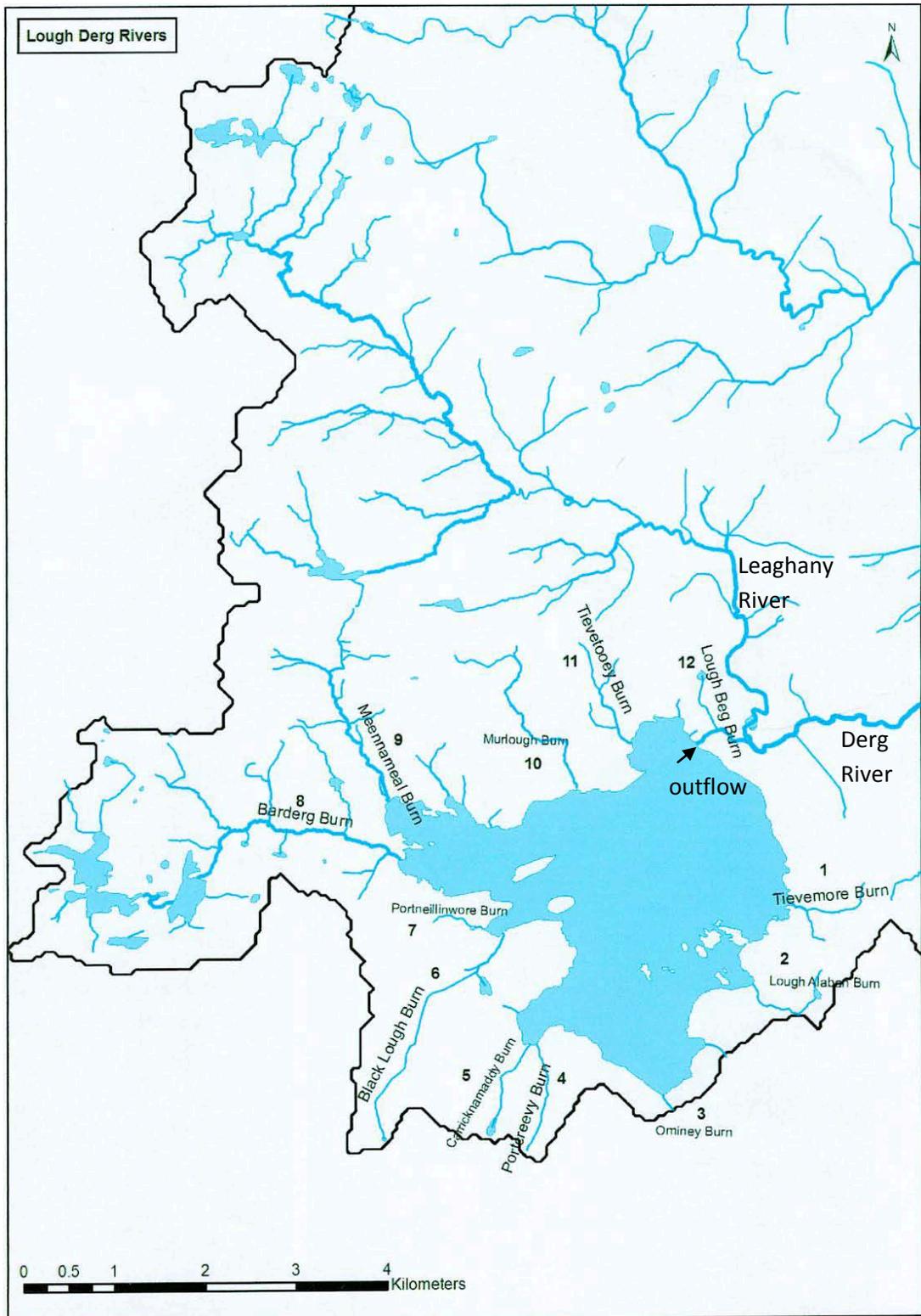


Figure 2 Lough Derg catchment area.

McKeown's study was largely related to Lough Melvin but also looked at samples of juvenile (0+) trout from Derg collected in July 2003 from the out-flowing river and two small inflowing rivers entering the northern side of the Lough (at H076754 & H083758 respectively). It did not include the two main inflowing rivers on the western side or any other smaller tributaries. The figure of 70% outlet spawning therefore relates to the contribution of the out-flowing river relative to the three rivers examined and not to the total recruitment to the Lough (Prof. A. Ferguson, pers.comm.).

McKeown found a high density of juveniles in the outflow river but had difficulty getting samples from the two inflows examined. Another caveat is that the study was based on 39 trout from the Lough and 81, 35 and 67 juveniles from the three rivers, so the confidence limits on the estimates are quite large. Thus, although the outflow is a significant contributor to recruitment relative to the two inflows examined, no indication of its overall importance to the Lough can be given (Prof. A. Ferguson, pers.comm.). Thus it is important not to ignore the inflowing tributaries in favour of the outflow based on these results.

Since 12th October of this year, PDAA and the Loughs Agency have been surveying downstream trout migration on the outlet river using a rotary screw trap (Photo 1). A small number of trout had been caught in the four weeks of its use prior to the Advisory Visit, including some large mature fish in excess of 5lbs weight. The trap was emptied on the morning of the visit and the catch consisted of a 39-cm trout, a large eel, a couple of juvenile trout and some perch fry.

Prof. Ferguson (pers. comm.) reports gillaroo trout spawning within the bay where the Drowes River leaves Lough Melvin to a distance of at least 3km downstream; some years ago over three nights some 470 gillaroo were caught in eel nets situated 300m downstream of the Lough. The parr of outlet spawners have to move upstream, rather than downstream, to get to the Lough and studies have shown that this is genetically determined, with parr exhibiting the correct orientation to water flows in a hatchery situation. This is a precise adaptation to outlet spawning and outlet spawners are thus very vulnerable to anything that limits this upstream parr migration.

PDAA operated fish traps on a number of tributary burns in 2001 and 2002 to catch adult trout migrating upstream to spawn. The most fish were caught from the larger tributary, the Barderg Burn (also called The

Blackwater); 65 trout were caught in a 48-hour period in one trap on this burn in 2001. Success was more limited on two other smaller burns. These results indicate that the tributaries of the Lough are also important spawning and nursery areas for trout.

The largest fish caught came from the Barderg and was in excess of 4lb; other fish to 2lb were caught from Barderg and the other burns. The captured fish were stripped on the bankside and the eggs hatched in the Lough Erne hatchery and the unfed fry returned to the burns.

Hatchery schemes such as this need to be very carefully considered in the light of recent research on brown trout genetics. The presence of different types of trout has been well-documented in Irish loughs (Ferguson & Mason, 1981; Ferguson and Taggart, 1991) and the differences in their behaviour and habits have been shown to be genetically controlled. Unless there is certainty over the types of trout being used as broodstock, there is a risk of hybridisation of the different strains leading to disruption of natural behaviour patterns and reduced survival of the offspring.

Even where the genetic background of the broodstock is known, there are dangers in swamping the natural populations of trout with a disproportionate number of related individuals (if too few broodstock are used). Also, recent studies have shown that even the first generation of offspring of wild broodstock can be genetically very different from those in the wild environment where the broodstock were sourced (Griffiths *et al.*, 2009). This is probably because of the different selection pressures in a hatchery situation compared to those in the wild; again there are implications for the naturally occurring genetic diversity of brown trout and their adaptation to their environment.



Photo 1 Rotary screw trap on the outflow from Lough Derg

3.0 Habitat Assessment

During the current visit, the out-flow river and a small inflowing stream were inspected. The outflow river ran for a few hundred metres before joining the Leaghany River and forming the River Derg. PDAA have fishing on the River Derg and salmon are regularly caught and observed spawning as far up as the Lough. Salmon parr have occasionally been recorded in tributary streams of the Lough, indicating some salmon enter the Lough and run the streams.

In-stream habitat in the Rivers Derg and Leaghany appeared to be good, although some past gravel extraction had occurred (for the construction of forest roads) leaving two or three localised large pools within the channel. The riparian habitat was generally good with a mixture of coarse grasses, rushes and saplings of birch and willow. Extensive coniferous forestry is the predominant land use within the catchment of these rivers.



Photo 2 Derg River below the Lough, showing good riparian habitat. The smolt production unit is visible in the background.



Photo 3 Confluence of the Derg and Leaghany Rivers

A salmon smolt production unit operated by Marine Harvest is present on the left bank of the Derg River just downstream of the Lough.

A small tributary stream, the Murlough Burn, entering the Lough on the northern bank was inspected. This was described as typical of the tributary burns flowing into the Lough. The bed of the stream has been lowered in the past to provide outfall for forest drains which are evident throughout the plantations (Photos 5,6). The stream was heavily shaded by conifer plantations on both banks which were preventing the development of a healthy riparian zone (Photo 4). PDAA have been monitoring water quality in the streams and have recorded acidic conditions with a pH as low as 4.3.

The in-stream habitat in this Burn appeared reasonably good, but high flows prevented a detailed assessment. Gravel of a suitable size for trout spawning was present. There was a lack of large woody debris (LWD) within the stream channel. LWD is a general term referring to all wood naturally occurring in streams including branches, stumps and logs. LWD is sometimes seen as a nuisance and removed from rivers and streams.

However, streams with LWD have greater habitat diversity as it promotes localised scour, depth variation and a natural meandering shape. It is an essential component of a healthy stream's ecology and is beneficial by maintaining the diversity of biological communities and physical habitat. Lack of LWD reduces the amount of retained organic material which supports the aquatic food web, removes vital in-stream habitats that fish will utilise for shelter and spawning and reduces the level of erosion resistance provided against high flows.

LWD could be introduced to the burns feeding Lough Derg in the short term, for example by creating groynes or engineered log jams with root wads. Deciduous native tree species should be encouraged within forestry buffer strips to provide LWD in the future, plus leaf litter to support the productivity of the streams.



Photo 4 Incised stream channel with poor riparian vegetation and excessive shading from commercial forestry



Photo 5 Furrows in conifer plantations immediately adjacent to a stream – still very evident and effective many years after they were first cut. These impact upon the hydrology of the watercourse receiving the drainage.



Photo 6 Drainage from afforested areas entering the stream.

There are a number of effects of coniferous forestry which are detrimental to aquatic habitats and fish stocks and these depend upon the stage in the forestry cycle. These are summarised in Table 1.

Phase	Activity	Potential effect
Planting	Roadway construction	Gravel removal. Damage to spawning habitats
	Drain and furrow cutting	Changes to stream hydrology: higher peak flows reached much earlier than pre-drainage and lower base flows. Washout of eggs and juveniles; changes to bed load transport; reduced availability of suitable spawning gravels; increased suspended solid levels impacting on egg survival; reduced in-stream habitat availability (low flows).
	Herbicide and fertiliser use	Eutrophication and diffuse pollution
Tree growth	Increased canopy	Shading reduces stream productivity. Lack of deciduous leaf litter reduces invertebrate productivity.
		Shading reduces daily and annual fluctuations in stream

		<p>temperature. There is a balance to be struck between moderating temperature extremes and stream productivity.</p> <p>Loss of water yield – increasing evapo-transpiration with tree maturity can reduce dry weather flows and hence in-stream habitat availability.</p> <p>Increased acidification (low pH) and aluminium concentrations (particularly in the form Al^{3+} which is toxic to salmonids at low concentrations)</p>
Felling , extraction and re-planting	Use of heavy machinery, ground disturbance	<p>Sediment mobilisation and increased bed load mobility – washout of gravels and intra-gravel life stages of salmonids.</p> <p>Suspended solids increase impacting survival of intra-gravel life stages of salmonids.</p> <p>Increased concentrations of environmentally harmful form of aluminium</p>

Table 1 Potential effects of forestry activities on watercourses and salmonids

The Loughs Agency and PDAA conducted electric fishing surveys in several Lough tributaries in August of this year.

PDAA have been liaising with Coillte (south) and the Forest Service (north) to find ways of reducing the impact of forestry on the streams. Agreement has been reached with Coillte that buffer zones of 20 metres will be created alongside watercourses. The timescale for this is not clear and it may occur as plantations fall due for harvest, although early intervention may be possible if funding becomes available internally within Coillte. Coillte also has a long term commitment to the restoration of blanket bog along the currently afforested north shore of Lough Derg.

4.0 Conclusions and Recommendations

Of the various issues which could be impacting upon the brown trout stocks of Lough Derg, the most important appears to be the impacts of coniferous forestry within the catchment. Loughs Agency data indicate impoverished fish and invertebrate fauna in the Leaghany and Derg Rivers and recent

surveys on the tributary streams of the Lough also show fish numbers to be lower than would be expected. A review of the data held by the Loughs Agency is recommended to identify what is already known and what gaps there are which may need further work.

Liaison with Coillte has been encouraging with measures such as buffer strips alongside watercourses and the restoration of blanket bog being proposed. However there is no definite timescale for the implementation of these measures. Buffer strips are recommended in forestry industry guidelines

(www.agriculture.gov.ie/forests-service/publications/code-of-best-forestry-practice/ and

www.agriculture.gov.ie/media/migration/forestry/publications/water_quality.pdf), yet uncertainties remain over their effectiveness in addressing the water quality and quantity problems associated with forestry. For example, drainage pathways through and around buffer strips can negate their benefits; it is important that these issues are considered and monitored to ensure protection measures are working.

Recommendations:

- An implementation plan is drawn up with Coillte for buffer strip creation and blanket bog restoration, including a timescale and map. Careful consideration should be given to potential drainage pathways which could bypass the buffer strips. Measures should be implemented such as pond and wetland creation to intercept drainage and then discharge through controlled outlets.
- A partnership project is instigated to carry out an exemplar project of a spawning burn restoration. This should include forestry mitigation measures (early intervention to create buffer strips alongside watercourses and drainage and sediment interception); large woody debris introduction; riparian zone restoration (tree planting with native species). Monitoring (water quality, invertebrates, fish, physical habitat and hydrology) should be carried out and compared with an untreated control tributary catchment. The effectiveness of mitigation measures can then be assessed and the lessons learned applied more widely.

- The data held by the Loughs Agency and PDAA should be reviewed to establish whether there is a suitable baseline against which changes can be measured.

The information on outlet-spawning trout is a fascinating discovery and PDAA and the Loughs Agency have already taken an important step towards their conservation by removing the weir on the outlet river. During the visit, the feasibility of trapping and tracking these fish was discussed, in order to learn more about their behaviour and habitat use. Whilst this would be an interesting and informative study, careful consideration needs to be given to the costs and the potential benefits. Trout now have free access between the Lough and the outlet river, so measures to identify and address the issues facing the Leaghany / Derg Rivers (e.g. generally low fish stocks, potential impacts of forestry) may be more cost-effective.

5.0 Making it Happen

The Wild Trout Trust would be prepared to be a partner in an exemplar project as suggested above and could offer support in the following ways:

- Advice on the preparation of a costed project proposal for the works
- Practical assistance in the physical habitat improvement works (installation of large woody debris) through the WTT Practical Visit programme.
- Seed corn financial support to assist PDAA in leveraging matched funding from other partners such as Coillte, FSNI, Loughs Agency or from grant-making bodies. WTT support could come in the form of an Advisory Visit bursary (up to £1500) and/or the Rods for Conservation scheme (provision of a Hardy or Sage rod to the club as a prize for fund-raising).

WTT funds are hard-won through our fund-raising activities such as the annual auction and the budget available is limited. Recipients of WTT financial help are encouraged to get a gearing of 1:5 from other sources (i.e. every £1 of WTT help should lever £5 of matched

funding). Applications for bursaries or Rods for Conservation should be made to projects@wildtrout.org.

6.0 Acknowledgement

The Wild Trout Trust would like to thank Pettigo and District Angling Association for hosting this visit and Professor Andy Ferguson for comments on trout genetic work previously carried out on Lough Derg.

7.0 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.

8.0 References

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