

Lough Caum



Sampling Fish for the Water Framework Directive - Lakes 2009



The Central and Regional
Fisheries Boards

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1.1 Introduction

Lough Caum (Plate 1.1, Fig. 1.1) is a corrie lake situated in the Brandon Mountains in north Co. Kerry. The lake is located in the “Mount Brandon” SAC which occupies the central and north-western parts of the Dingle peninsula. The geology of the area comprises of old red sandstone and Dingle beds (the oldest Devonian rocks in Ireland) (NPWS, 2002).

The lake has a surface area of 8ha, a mean depth of 2.7m and a maximum depth of 15m. Lough Caum is categorised as typology class 1 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. shallow (<4m), less than 50ha and low alkalinity (<20mg/l CaCO₃). The lake holds a population of wild brown trout and rainbow trout are stocked regularly into the lake by the South Western Regional Fisheries Board (O’ Reilly, 2007). Lough Caum is surrounded by extensive coniferous woodland and the outflow has been modified in order to facilitate a forestry track for removing felled trees (Plates 1.1 and 1.2).

Peregrine falcons and chough are resident around the lake – both species feature in Annex I of the EU Habitats Directive (Burke and Witkowska 2009). The otter (*Lutra lutra*), an Annex II species listed on the Habitats Directive, is a common sight along the shores of the lake. The common frog (*Rana temporaria*), also a protected species listed in Annex V of the Habitats Directive (NPWS 2007), is also prevalent in the area.

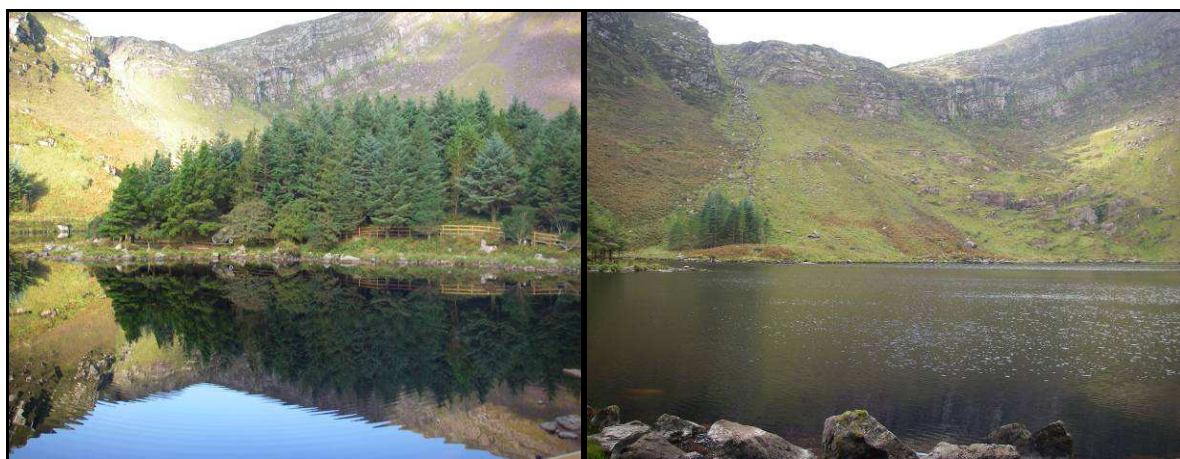


Plate 1.1. Lough Caum

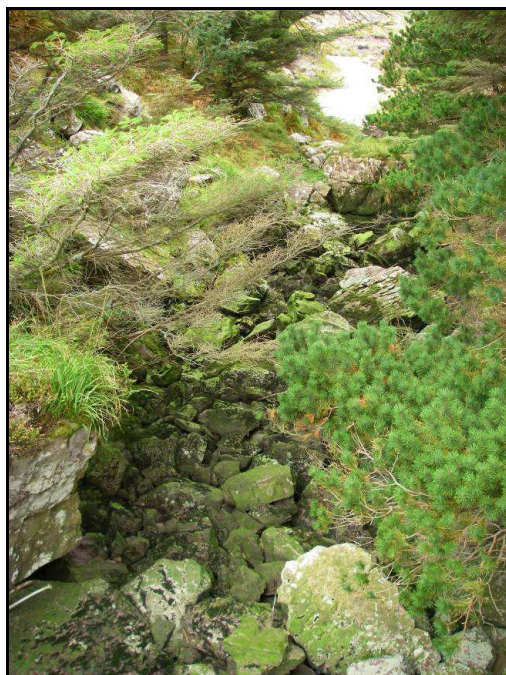


Plate 1.2. Modified outflow of Lough Caum

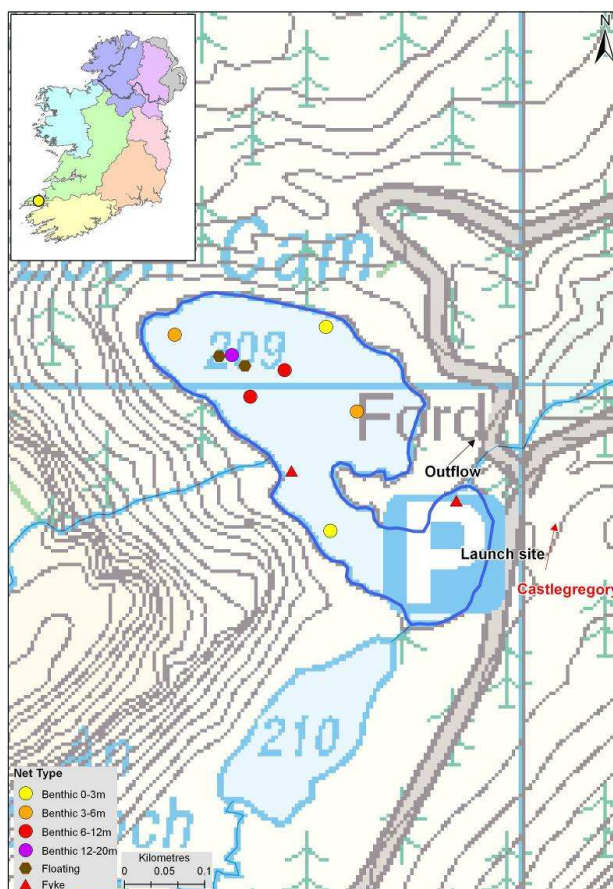


Fig. 1.1. Location map of Lough Caum showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

Lough Caum was surveyed over one night on the 16th of September 2009. A total of two sets of Dutch fyke nets, seven benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (2 @ 0-2.9m, 2 @ 3-5.9m, 2 @ 6-11.9m and 1 @ 12-19.9) and two surface monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed randomly in the lake (11 sites). Survey locations were randomly selected within each depth zone using a grid placed over a map of the lake. A handheld GPS was used to mark the precise location of each net. The angle of each gill net in relation to the shoreline was randomised.

All fish were measured and weighed on site and scales were removed from all trout. Live fish were returned to the water whenever possible (i.e. when the likelihood of their survival was considered to be good). Samples of fish were returned to the laboratory for further analysis.

1.3 Results

1.3.1 Species Richness

A total of three fish species were recorded on Lough Caum in September 2009, with 75 fish being captured (Table 1.1). Brown trout was the most abundant fish species recorded. Small numbers of stocked rainbow trout were also recorded. Eels were recorded in fyke nets only.

Table 1.1. List of fish species recorded (including numbers captured) during the survey on Lough Caum, September 2009

Scientific name	Common name	Number of fish captured			Total
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Fyke nets	
<i>Salmo trutta</i>	Brown trout	50	6	4	60
<i>Oncorhynchus mykiss</i>	Rainbow trout	4	5	0	9
<i>Anguilla anguilla</i>	European eel	0	0	6	6

1.3.2 Fish abundance

Fish abundance (mean CPUE) and biomass (mean BPUE) were calculated as the mean number/weight of fish caught per metre of net. For all fish species except eel, CPUE/BPUE is based on all nets, whereas eel CPUE/BPUE is based on fyke nets only. Mean CPUE and BPUE for all fish species are summarised in Table 1.2. The differences in the mean brown trout CPUE between Lough Caum and three other similar lakes were assessed, with no significant differences being found (Fig. 1.2).

Table 1.2. Mean (S.E.) CPUE and BPUE of all fish species captured on Lough Caum, September 2009

Scientific name	Common name	Mean CPUE
<i>Salmo trutta</i>	Brown trout	0.178 (0.062)
<i>Oncorhynchus mykiss</i>	Rainbow trout	0.029 (0.014)
<i>Anguilla anguilla</i>	European eel	0.050 (0.033)
Mean BPUE		
<i>Salmo trutta</i>	Brown trout	15.598 (5.759)
<i>Oncorhynchus mykiss</i>	Rainbow trout	9.445 (4.209)
<i>Anguilla anguilla</i>	European eel	11.667 (9.633)

* On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species. Standard error is displayed in brackets.

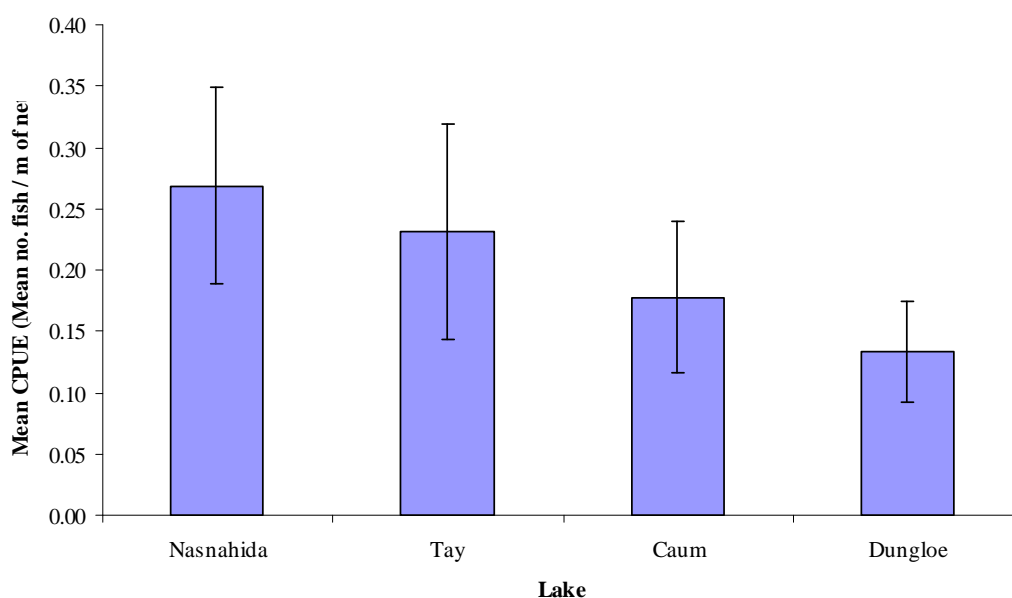


Fig. 1.2. Mean (\pm S.E.) brown trout CPUE in four lakes surveyed during 2009

1.3.3 Length frequency distributions

Brown trout ranged in length from 7.8cm to 25.8cm (mean = 18.9cm) (Fig. 1.3). Rainbow trout ranged in length from 26.0cm to 35.7cm (mean = 30.6cm) (Fig.1.4). Eels ranged from 38.0cm to 66.0cm.

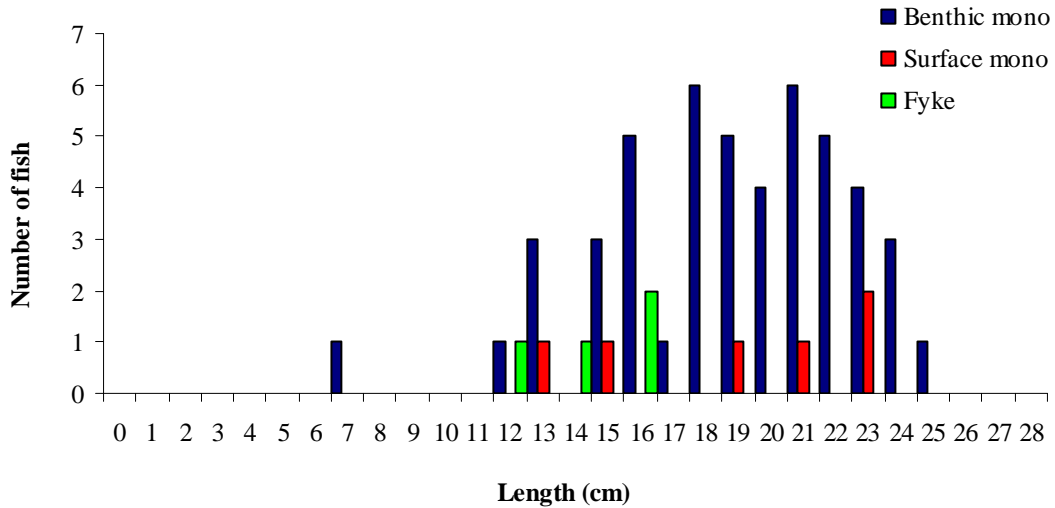


Fig. 1.3. Length frequency of brown trout (n=58) captured on Lough Caum, September 2009

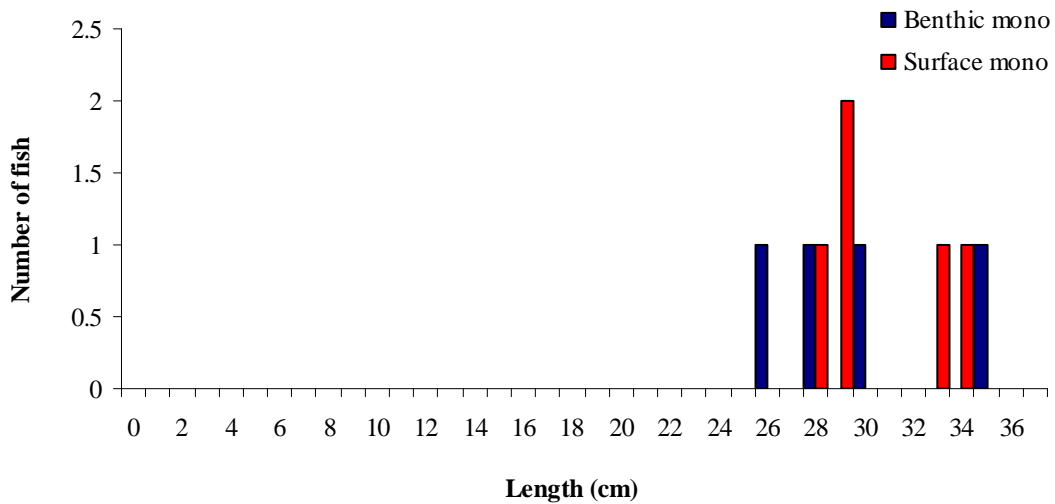


Fig. 1.4. Length frequency of rainbow trout (n=9) captured on Lough Caum, September 2009

1.3.4 Fish age and growth

Five age classes of brown trout were present, ranging from 0+ to 4+, with a mean L1 of 5.9cm. Mean brown trout L4 was 21.9cm indicating a very slow rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971).

Rainbow trout ranged in age from 1+ to 2+.

Table 1.3. Mean (\pm SE) brown trout length at age for Lough Caum, September 2009

	L₁	L₂	L₃	L₄
Mean	6.0 (0.2)	13.2 (0.3)	18.2 (0.4)	21.9 (0.7)
N	53	47	32	2
Range	3.5-9.5	8.2-16.6	13.2-22.0	21.1-22.6

1.4 Summary

Brown trout was the dominant species in terms of both abundance (CPUE) and biomass (BPUE) followed by rainbow trout and eel.

The mean brown trout CPUE in Lough Caum was similar to brown trout populations in three other low alkalinity lakes surveyed during 2009 (e.g. Lough Nasnahida and Dunglow Lough, Co. Donegal and Lough Tay, Co. Wicklow). Brown trout ranged in age from 0+ to 4+ indicating reproductive success in each of the previous three years. Length at age analyses revealed that brown trout in the lake exhibit a very slow rate of growth according to the classification scheme of Kennedy and Fitzmaurice (1971).

Lough Caum is stocked regularly with rainbow trout (a non native species). These hatchery reared fish have been released into the lake to create an angling amenity in the area, as the native brown trout stock are typically small and can not support large fishing pressures. Only a small number of stocked rainbow trout were captured during the present survey. These ranged in age from 1+ to 2+. Research has shown that stocked rainbow trout have a poor survival rate in the wild (e.g. ranging from 15% to 50% in the USA, Canada and Australia) (Bettinger and Bettoli, 2002; Teuscher *et al.*, 2003; High and Meyer, 2009).

Stocking of fish (including non indigenous species such as rainbow trout) has been identified as an action with potential to impact on the quality status of rivers and lakes and is listed as a pressure in the WFD REFCOND guidance document (Wallin *et al.* 2003). In WFD terms, it could impact on the ecological status class scoring system and would serve to drive down the water's quality rating. While this classification may seem arbitrary to some it does reflect the concern of WFD to identify issues that are not appropriate in water resource (in broadest terms) management. Deterioration of ecological status is not permissible under WFD, unless in cases of major public or national importance.

A review of the survival of stocked fish in Lough Caum is recommended, and the stocking policy for the lake should also be reviewed and revised. The stocking programme developed should be consistent with EU legislation (WFD, Habitats Directive and the Fish Health Directive) and national programmes such as the National Biodiversity Plan. The revised stocking policy for the lake should include a review of habitat and spawning potential of the wild brown trout population, choice of

stocked species, triploid versus diploid, timing of stocking events, catch and release policy, bag limits, and fin clipping of stocked fish.

The outflow of the lake has also been modified to allow access for forestry vehicles; the impact of this work on the ecology of the lake, particularly the effect on spawning and migrating fish, should also be reviewed in the context of the WFD.

Classification and assigning lakes with an ecological status is a critical part of the WFD monitoring programme. It allows River Basin District managers to identify and prioritise lakes that currently fall short of the minimum “Good Ecological Status” that is required by 2015 if Ireland is not to incur penalties.

A WFD multimetric fish classification tool has been developed for the island of Ireland (Ecoregion 17) using CFB and Agri-Food and Biosciences Northern Ireland (AFBINI) data generated during the NSSHARE Fish in Lakes project (Kelly *et al.*, 2008). Using this tool, Lough Caum has been assigned an ecological status classification of High based on the fish populations present.

The EPA has assigned an overall status of Moderate to Lough Caum in an interim draft classification. This is based on physico-chemical parameters and biotic elements such as macroinvertebrates, macrophytes and fish.

1.5 References

- Bettinger, J.M. and Bettoli, P.W. (2002) Fate, dispersal and persistence of recently stocked and resident rainbow trout in a Tennessee tailwater. *North American Journal of Fisheries Management*, **22**, 425-432.
- Burke, B. and Witkowska, I. (2009) *Forest Management Plan, Castlegregory Forest (Forest Code: KY07) Period Covered: 2011 to 2015*.
- High, B., and Meyer, K.A. (2009) Survival and Dispersal of Hatchery Triploid Rainbow Trout in an Idaho River. *North American Journal of Fisheries Management*, **29** (6), 1797-1800.
- Kelly, F.L., Harrison, A., Connor, L., Allen, M., Rosell, R. and Champ, T. (2008) *FISH IN LAKES Task 6.9: Classification tool for Fish in Lakes. FINAL REPORT*. Central Fisheries Board, NSSHARE project.
- Kelly, F.L., Harrison, A.J., Connor, L., Matson, R. Morrissey, E., O’Callaghan, R., Feeney, R., Hanna, G., Wogerbauer, C. and Rocks, K. (2010) *Sampling fish for the Water Framework Directive – Summary report 2009*. Central and Regional Fisheries Boards report.
- Kennedy, M. and Fitzmaurice, P. (1971) Growth and Food of Brown Trout *Salmo Trutta* (L.) in Irish Waters. *Proceedings of the Royal Irish Academy*, **71** (B) (18), 269-352.

NPWS (2007) *Conservation Status Assessments of Habitats and Species listed under the Habitats Directive.*

NPWS (2002) *Mount Brandon SAC - Site Synopsis.* Site Synopsis report, National Parks and Wildlife Service.

O'Reilly P. (2007) *Loughs of Ireland. A Flyfisher's Guide 4th* Merlin Unwin Books.

Teuscher, D.M., Schill, D.J., Megargle, D.J. and Dillon, J.C. (2003) Relative Survival and Growth of Triploid and Diploid Rainbow Trout in Two Idaho Reservoirs. *North American Journal of Fisheries Management*, **23 (3)**, 983-988.

Wallin M., Wiederholm T. and Johnson R.K. (2003) *Guidance on Establishing Reference Conditions and Ecological Status Class Boundaries for Inland Surface Waters.* CIS Working Group 2.3-REFCOND 93pp. Final version 7.0, 2003-03-05)

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