

Lough Sessiagh



Sampling Fish for the Water Framework Directive - Lakes 2009



The Central and Regional
Fisheries Boards

ACKNOWLEDGEMENTS

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1.1 Introduction

Lough Sessiagh (Plate 1.1, Fig. 1.1) is a small lowland lake situated 3.5km south-east of Dunfanaghy, on the outskirts of Port na Blagh in Co. Donegal. The geology of the area is predominantly quartzite, however on the western side of the lake, the bedrock contains more base-rich units, including units of dolomitic marble (DOEHLG, 2005). The lake is bordered on its northern, western and eastern edge by houses and agricultural lands, with steep cliffs bordering the southern shore (NPWS, 1998). The lake has a stony bottom comprised of metamorphic bedrock and has a barren appearance.

Lough Sessiagh has an area of 20.9ha, a mean depth of 4m and a maximum depth of 22m. The lake is categorised as typology class 7 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. deep (>4m), less than 50ha and moderately alkaline (20-100mg/l CaCO₃). It has been classed as 2a (i.e. expected to meet good status by 2015 pending further investigation) in the WFD Characterization report (EPA, 2005).

Lough Sessiagh has been designated as a Special Area of Conservation (NPWS, 1998). It comprises a habitat listed under Annex I of the EU Habitats Directive, i.e. lowland oligotrophic lake, and also provides suitable habitat for a rare plant species, the slender naiad (*Najas flexilis*), which is a legally protected aquatic plant listed under Annex II of the Habitats Directive (NPWS, 1998).

Brown trout is the dominant fish species in Lough Sessiagh. Arctic char, a rare freshwater fish species listed in the Irish Red Data book of threatened vertebrates as vulnerable (King *et al.*, 2011), is also present. Brown trout spawning is limited to a single narrow inflowing stream on the south-west shore (Fig. 1.1). The water is alkaline and has excellent clarity (O'Reilly, 2007). The lake was previously surveyed in 1995 (Whelan *et al.*, 1996) and in 2006 (Kelly *et al.*, 2007). Brown trout and Arctic char were the dominant fish species recorded during the 2006 survey, with three-spined stickleback and eels also being present.



Plate 1.1. Lough Sessiagh, looking south (A) at the steep heath covered cliffs and the small rocky island within the lough and (B) houses situated along the eastern shoreline

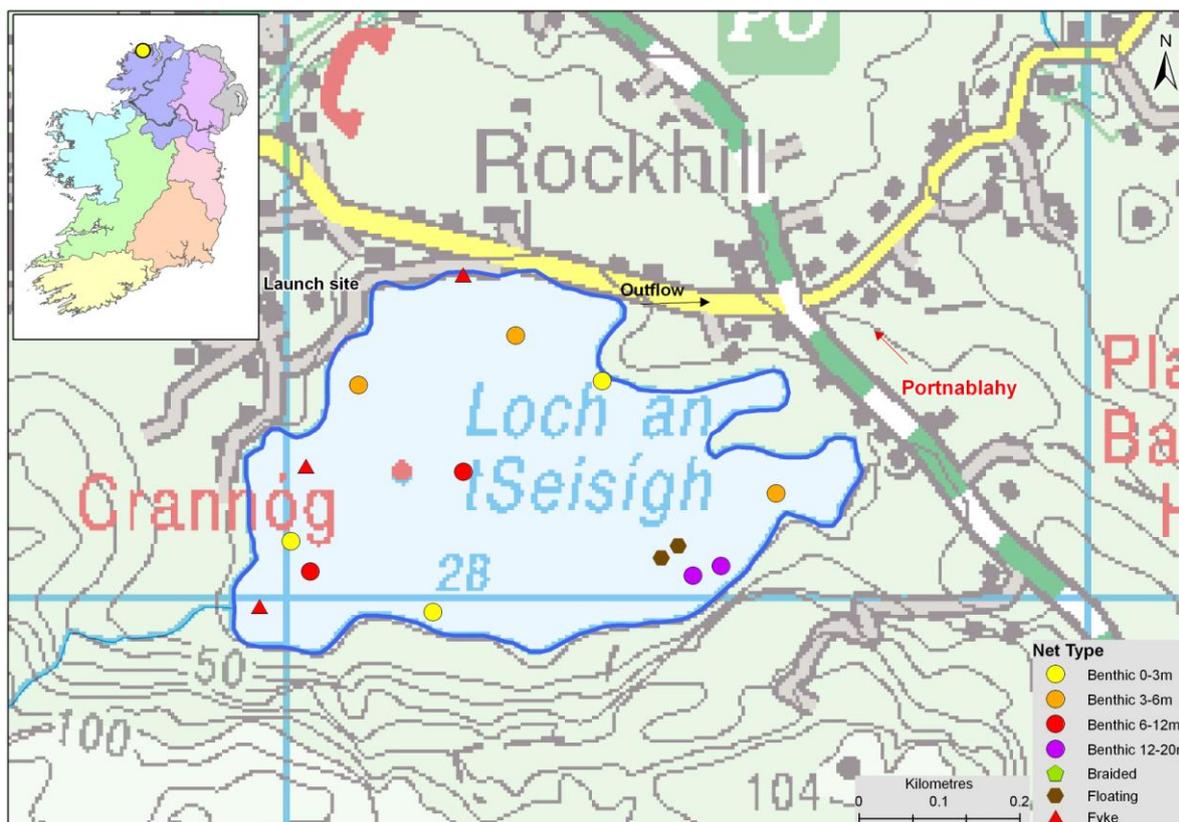


Fig. 1.1. Location map of Lough Sessiagh showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

Lough Sessiagh was surveyed over two nights between the 13th and the 15th of July 2009. A total of three sets of Dutch fyke nets, ten benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (3 @ 0-2.9m, 3 @ 3-5.9m, 2 @ 6-11.9m and 2 @ 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 (15 sites). Nets were deployed in the same locations as were randomly selected in the previous survey. 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 four fish species were recorded in Lough Sessiagh during the survey, with 62 fish being captured. Brown trout was the most abundant fish species recorded. A small number of Arctic char (Plate 1.2) were also captured. Eels and 3-spined stickleback were also recorded. In the 2006 survey (Kelly *et al.*, 2007) the same species composition was recorded.



Plate 1.2. Arctic char captured in Lough Sessiagh

Table 1.1. List of fish species recorded (including numbers captured) during the survey on Lough Sessiagh, July 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	31	0	0	31
<i>Salvelinus alpinus</i>	Arctic char	3	1	0	4
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	10	0	0	10
<i>Anguilla anguilla</i>	European eel	0	0	17	17

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 from 2006 and 2009 are summarised in Table 1.2.

The mean CPUE of Arctic char has decreased significantly between 2006 and 2009 (Fig. 1.2) (Mann Whitney U test, $z = -2.598$, $P < 0.01$). The difference in the mean brown trout CPUE between Lough Sessiagh and Kindrum Lough was also assessed, with no significant difference being found (Fig. 1.3).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Sessiagh, 2006 and 2009

Scientific name	Common name	2006	2009
Mean CPUE			
<i>Salmo trutta</i>	Brown trout	0.076 (0.024)	0.069 (0.022)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	0.036 (0.016)	0.022 (0.012)
<i>Salvelinus alpinus</i>	Arctic char	0.073 (0.032)	0.009 (0.007)
<i>Anguilla anguilla</i>	European eel	0.072 (0.006)	0.094 (0.024)
Mean BPUE			
<i>Salmo trutta</i>	Brown trout	20.466 (6.217)	24.876 (9.404)
<i>Salvelinus alpinus</i>	Arctic char	12.858 (4.622)	1.144 (0.873)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	0.0476 (0.0258)	0.016 (0.009)
<i>Anguilla anguilla</i>	European eel	10.622 (1.234)	13.578 (2.67)

* 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.

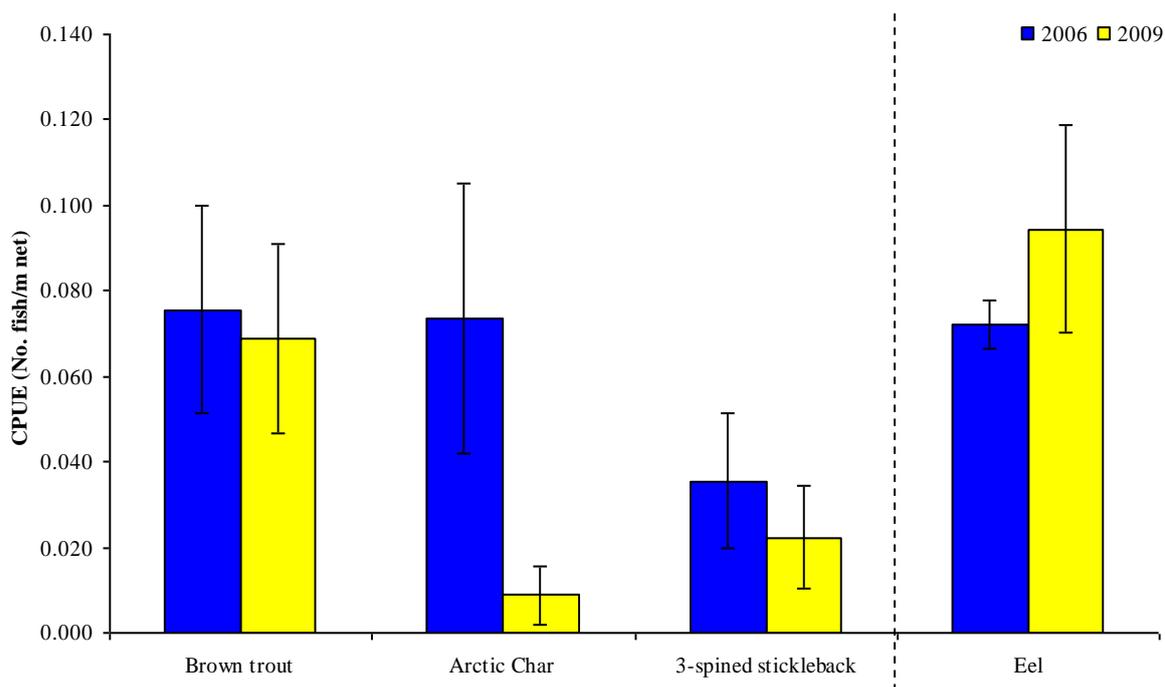


Fig. 1.2. Mean (\pm S.E.) CPUE on Lough Sessiagh (Eel CPUE based on fyke nets only)

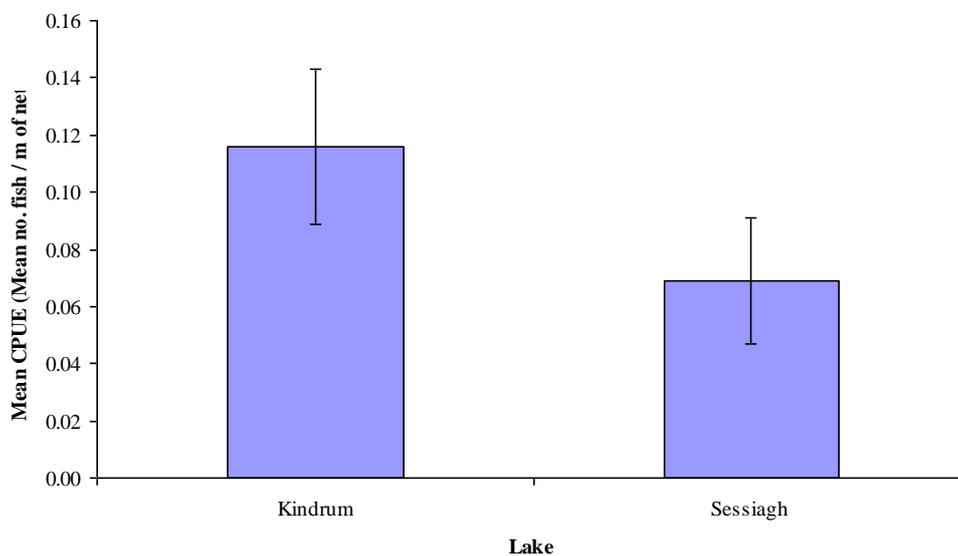


Fig. 1.3. Mean (\pm S.E.) brown trout CPUE in two lakes surveyed during 2009

1.3.3 Length frequency distributions

Brown trout ranged in length from 15.0cm to 42.5cm (mean = 28.4cm) (Fig. 1.4). Brown trout from the 2006 survey had similar lengths, ranging from 17.0cm to 38.0cm (Fig. 1.4) (Kelly *et al.*, 2007). Arctic char ranged in length from 15.4cm to 25.2cm (mean = 21.0cm) (Fig.1.5). Char from the 2006 survey ranged in length from 5.5cm to 31.2cm (Fig. 1.5) (Kelly *et al.*, 2007). Eels ranged in length from 33.0cm to 51.5cm. Ten 3-spined stickleback of approximately 4.0 - 6.0cm in length were also captured.

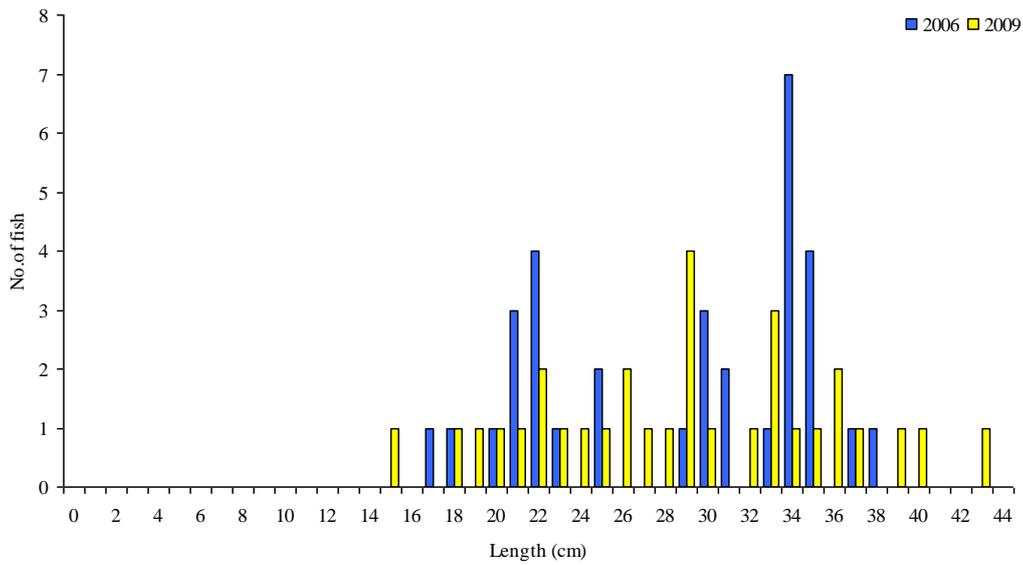


Fig. 1.4. Length frequency of brown trout captured on Lough Sessiagh

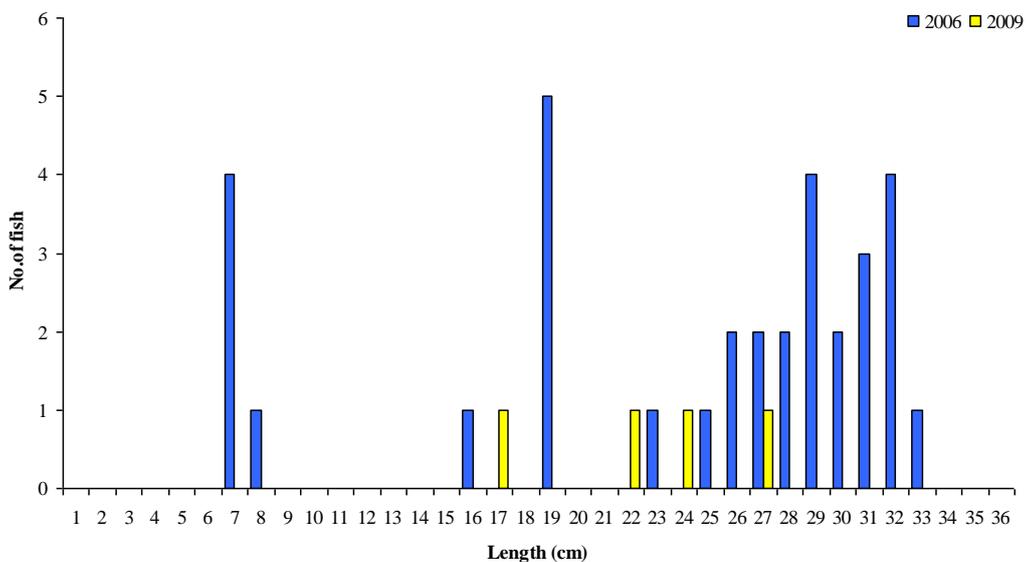


Fig. 1.5. Length frequency of Arctic char captured on Lough Sessiagh

1.3.4 Fish age and growth

Five age classes of brown trout were present, ranging from 1+ to 5+, with a mean L1 of 7.8cm (Table 1.3). Brown trout captured during the 2006 survey ranged from 1+ to 4+, with a mean L1 of 9.9cm (Kelly *et al.*, 2007). Mean brown trout L4 was 33.3cm indicating a fast rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971).

Two age classes of Arctic char were present, ranging from 1+ to 2+. Arctic char captured during the 2006 survey ranged from 0+ to 3+ (Kelly *et al.*, 2007).

Table 1.3. Mean (\pm SE) brown trout length at age for Lough an tSeisigh, July 2009

	L ₁	L ₂	L ₃	L ₄	L ₅
Mean	7.8 (0.3)	17.5 (1.0)	27.1 (0.6)	33.3 (1.5)	37.1 (2.4)
N	31	24	16	5	2
Range	4.5-11.2	9.0-25.4	23.7-31.8	29.4-37.5	34.6-39.5

1.4 Summary

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

The mean brown trout CPUE in Lough Sessiagh was slightly lower than that calculated for Kindrum Lough; however, this was not statistically significant. The brown trout in Lough Sessiagh ranged in age from 1+ to 5+, indicating reproductive success in five of the previous six years. No 0+ fish were captured in the current survey. Length at age analyses revealed that brown trout in the lake exhibit a fast rate of growth according to the classification scheme of Kennedy and Fitzmaurice (1971).

There has been a significant decrease in Arctic char abundance between 2006 and 2009, which gives some cause for alarm and merits further investigation.

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 Sessiagh has been assigned an ecological status classification of High based on the fish populations present.

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

1.5 References

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**The Central Fisheries Board
Swords Business Campus,
Swords,
Co. Dublin,
Ireland.**

**Web: www.wfdfish.ie
www.cfb.ie
Email: info@cfb.ie
Tel: +353 1 8842600
Fax: +353 1 8360060**



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