



# Sampling Fish for the Water Framework Directive

Lakes 2010

**Aughrusbeg Lough**



Iascach Intíre Éireann  
Inland Fisheries Ireland

## **ACKNOWLEDGEMENTS**

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## 1.1 Introduction

Aughrusbeg Lough is one of the most westerly lakes in the Connemara area of Co. Galway, located approximately 5km west of Cleggan (Plate 1.1 and 1.2, Fig. 1.1). It has a surface area of 50ha, a mean depth of less than 4m and a maximum depth of 14m. The lake falls into typology class 7 (as designated by the EPA for the Water Framework Directive), i.e. deep (>4m), less than 50ha and moderate alkalinity (20-100mg/l CaCO<sub>3</sub>).

Aughrusbeg Lough forms part of the Aughrusbeg Machair and Lake Special Area of Conservation (SAC). The site has been selected as a candidate SAC for containing a lowland oligotrophic lake, a habitat listed on Annex I of the E.U. Habitats Directive. The underlying geology of the region is made up of Omey granite (NPWS, 2003). Species recorded from the shoreline of the lake include six-stamened waterwort (*Elatine exandra*), quillwort (*Isoetes lacustris*) and shoreweed (*Littorella uniflora*) (NPWS, 2003). The majority of Aughrusbeg Lough has gently sloping granite shores, with a well developed sand shelf present on the western shore. At the edge of this sand shelf the lake bed falls off steeply to a depth of 6m (NPWS, 2003).

According to archival Inland Fisheries Trust data and O' Reilly (2003), eels and brown trout were the only species present in the lake. However, a recent survey in 2007 as part of the WFD surveillance monitoring programme (Kelly and Connor, 2007) found rudd and eels to be the dominant species present, with three-spined stickleback also recorded.



**Plate 1.1 and 1.2 Aughrusbeg Lough**





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

## 1.2 Methods

Aughrusbeg Lough was surveyed over one night on the 16<sup>th</sup> of August 2010. A total of three sets of Dutch fyke nets and seven benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (3 @ 0-2.9m, 2 @ 3-5.9m and 2 @ 6-11.9m) were deployed in the lake (ten sites). The netting effort was supplemented using two benthic braided gill nets (62.5mm mesh knot to knot) at two additional 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 rudd and brown 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 retained for further analysis.

## 1.3 Results

### 1.3.1 Species Richness

A total of four fish species were recorded on Aughrusbeg Lough in August 2010, with 126 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Rudd was the most abundant fish species recorded, followed by eels and three-spined stickleback. During the previous survey in 2007 the same species composition was recorded, with the exception of brown trout, which was not present during the 2007 survey but was captured in the current survey.

**Table 1.1. Number of each fish species captured by each gear type during the survey on Aughrusbeg Lough, August 2010**

Scientific name	Common name	Number of fish captured		
		Benthic mono gill nets	multimesh Fyke nets	Total
<i>Salmo trutta</i>	Brown trout	1	0	1
<i>Scardinius erythrophthalmus</i>	Rudd	70	17	87
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	3	0	3
<i>Anguilla anguilla</i>	European eel	2	33	35

### 1.3.2 Fish abundance

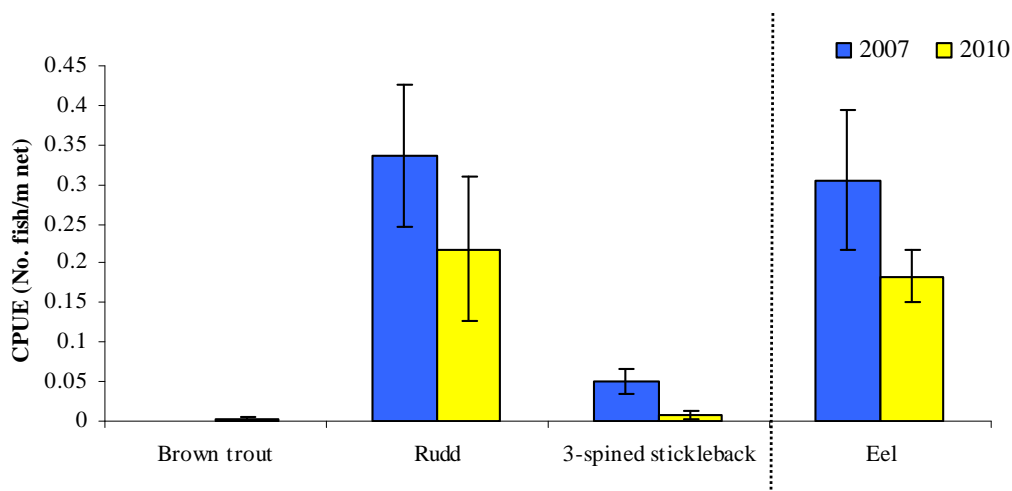
Fish abundance (mean CPUE) and biomass (mean BPUE) were calculated as the mean number/weight of fish caught per metre of net. For all fish species except eel, CPUE/BPUE is based on all nets, whereas eel CPUE/BPUE is based on fyke nets only. Mean CPUE and BPUE for all fish species captured in 2007 and 2010 are summarised in Table 1.2. Mean CPUE for all fish species captured in 2007 and 2010 is illustrated in Figure 1.2.

Although the mean rudd CPUE was lower in 2010 than in 2007 (Fig. 1.2), this was not statistically significant. The differences in the mean rudd CPUE between Aughrusbeg Lough and four other similar lakes were assessed (Fig. 1.3) and found to be statistically significant (Kruskal-Wallis,  $P < 0.001$ ) (Fig. 1.3). Independent-Samples Mann-Whitney U tests between each lake showed that Aughrusbeg Lough had a significantly higher mean rudd CPUE than Lough Rea ( $z = -4.011$ ,  $P < 0.001$ ) and Lough Atedaun ( $z = -2.358$ ,  $P < 0.05$ ).

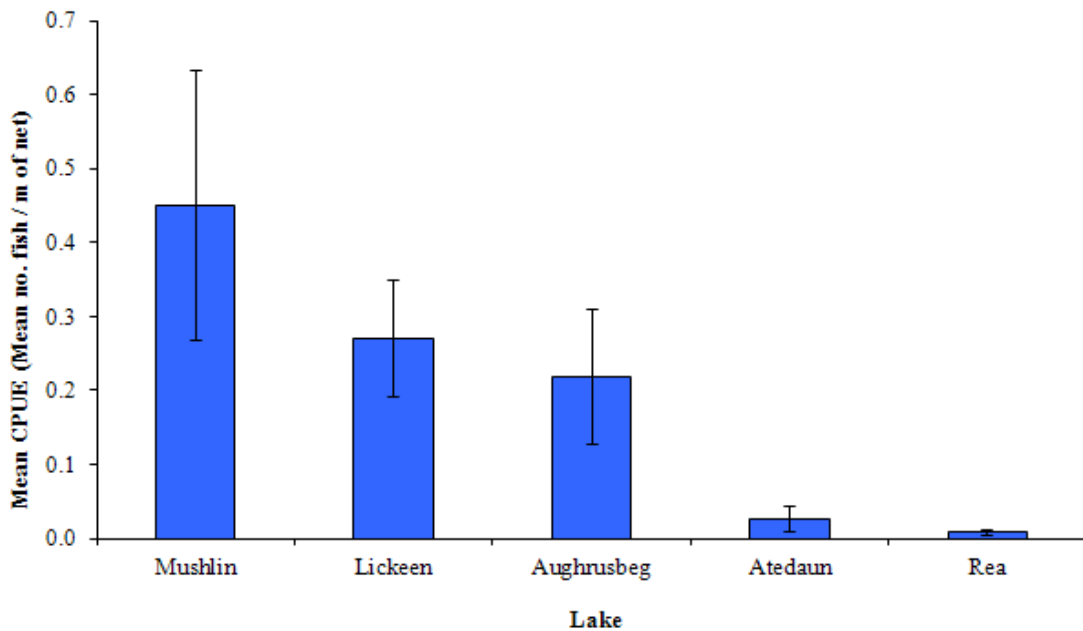
**Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Aughrusbeg Lough, 2007 and 2010**

Scientific name	Common name	2007	2010
<b>Mean CPUE</b>			
<i>Salmo trutta</i>	Brown trout	-	0.003 (0.003)
<i>Scardinius erythrophthalmus</i>	Rudd	0.336 (0.090)	0.218 (0.091)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	0.050 (0.166)	0.008 (0.006)
<i>Anguilla anguilla</i>	European eel	0.305 (0.089)	0.183 (0.033)
<b>Mean BPUE</b>			
<i>Salmo trutta</i>	Brown trout	-	0.544 (0.544)
<i>Scardinius erythrophthalmus</i>	Rudd	15.781 (5.609)	14.919 (6.330)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	0.200 (0.066)	0.019 (0.013)
<i>Anguilla anguilla</i>	European eel	55.322 (16.594)	32.925 (1.291)

\* On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species.



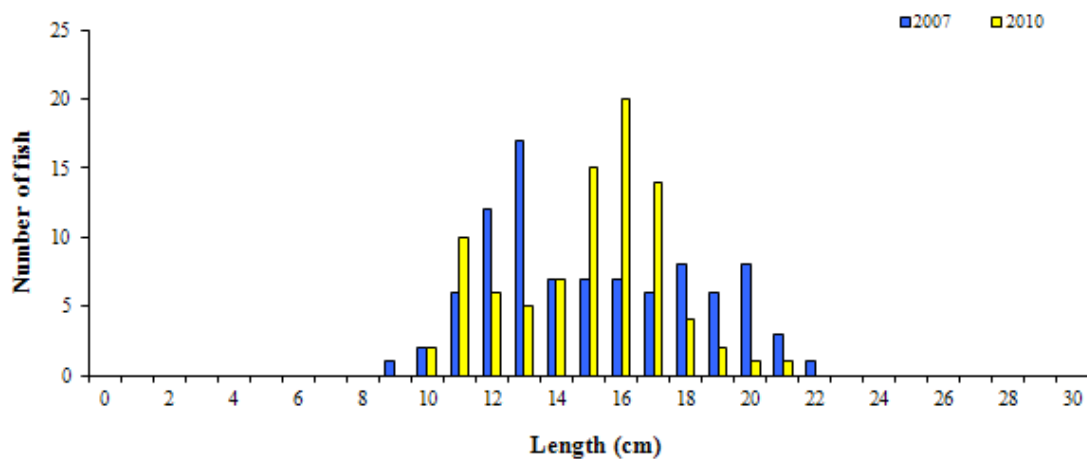
**Fig. 1.2. Mean ( $\pm$ S.E.) CPUE on Aughrusbeg Lough (Eel CPUE based on fyke nets only)**



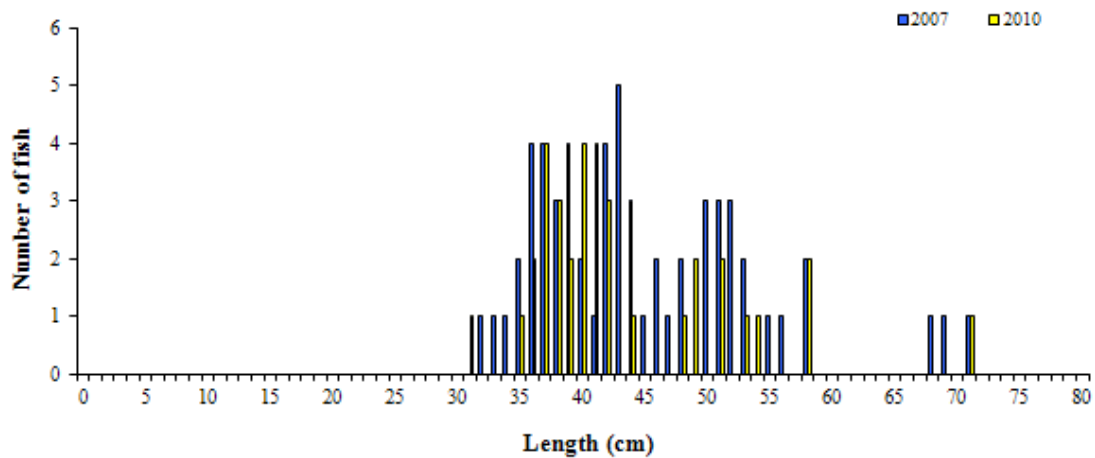
**Fig. 1.3.** Mean ( $\pm$ S.E.) rudd CPUE in five lakes surveyed during 2010

### 1.3.3 Length frequency distributions

Rudd captured during the 2010 survey ranged in length from 10.0cm to 21.2cm (mean = 15.2cm) (Fig. 1.4). Rudd captured during the 2007 ranged in length from 9.0cm to 22.2cm (Fig. 1.4). Eels captured during the 2010 survey ranged in length from 31.3cm to 71.0cm (mean = 43.5cm) (Fig.1.5). Eels captured during the 2007 survey had lengths ranging from 32.0cm to 71.0cm (Fig.1.5). Three-spined stickleback captured during the 2010 survey ranged in length from 4.5cm to 6.5cm and one brown trout was recorded measuring 25.3cm in length.



**Fig. 1.4.** Length frequency of rudd captured on Aughrusbeg Lough, 2007 and 2010



**Fig. 1.5. Length frequency of eels captured on Aughrusbeg Lough, 2007 and 2010**

### 1.3.4 Fish age and growth

Five age classes of rudd were present, ranging from 3+ to 7+, with a mean L1 of 3.0cm (Table 1.3). Similar age and growth patterns were observed during the 2007 survey, where rudd ranged in age from 3+ to 10+, with a mean L1 of 3.9cm.

The single brown trout captured was aged 3+ with a L1 of 8.4cm.

**Table 1.3. Mean ( $\pm$ SE) rudd length (cm) at age for Aughrusbeg Lough, August 2010**

	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	L <sub>6</sub>	L <sub>7</sub>
Mean	3.0 (0.1)	6.3 (0.1)	10.0 (0.1)	12.9 (0.2)	14.9 (0.2)	16.6 (0.3)	16.7 (1.8)
N	56	56	56	43	36	20	2
Range	2.1-4.3	4.5-8.0	7.4-12.8	11.0-15.7	12.6-17.8	13.7-19.5	14.9-18.5

## 1.4 Summary

Rudd was the dominant species in terms of abundance (CPUE) and biomass (BPUE).

The mean rudd CPUE was lower in 2010 than in 2007; however this difference was not statistically significant. The mean rudd CPUE in Aughrusbeg Lough was significantly higher than Lough Rea and Lough Atedaun. In contrast, the mean rudd CPUE in Aughrusbeg Lough was lower than Lough Mushlin and Lickeen Lough, although this was not statistically significant. Rudd ranged in age from 3+ to 7+. No younger age classes were recorded.

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 multimetric fish ecological classification tool (Fish in Lakes – ‘FIL’) was developed for the island of Ireland (Ecoregion 17) using IFI and Agri-Food and Biosciences Institute Northern Ireland (AFBINI) data generated during the NSSHARE Fish in Lakes project (Kelly *et al.*, 2008). This tool was further developed during 2010 (FIL2) in order to make it fully WFD compliant, including producing EQR values for each lake and associated confidence in classification. Using the FIL2 classification tool, Aughrusbeg Lough has been assigned an ecological status of Poor/Bad for both 2007 and 2010 based on the fish populations present.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Aughrusbeg Lough an overall ecological status of Good, based on all monitored physico-chemical and biological elements, including fish. This status classification will be revised at the end of 2012

## 1.5 References

- Kelly, F. and Connor, L. (2007) *WFD Surveillance Monitoring - Fish in Lakes 2007*. Central Fisheries Board report.
- 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.
- NPWS (2003) *Site synopsis: Aughrusbeg Machair and Lake. Site code: 001228*. Site Synopsis report, National Parks and Wildlife Service.
- O’ Reilly, P. (2003) *Loughs of Ireland. A Flyfisher’s Guide*. 3<sup>rd</sup> Edition. Merlin Unwin Books.

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