

# Sampling Fish for the Water Framework Directive

*Lakes 2013*

## Aughrusbeg Lough



Iascach Intíre Éireann  
Inland Fisheries Ireland

## Water Framework Directive Fish Stock Survey of Aughrusbeg Lough, July/August 2013

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Cover photo: Netting survey on Glen Lough © Inland Fisheries Ireland

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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, 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. Aughrusbeg Lough was previously surveyed in 2007 and 2010 as part of the WFD surveillance monitoring programme (Kelly and Connor, 2007 & Kelly *et al.*, 2011). During the 2010 survey, rudd was found to be the dominant species present in the lake. Brown trout, three-spined stickleback and eels were also captured during the survey.





Plate 1.1 Aughrusbeg Lough

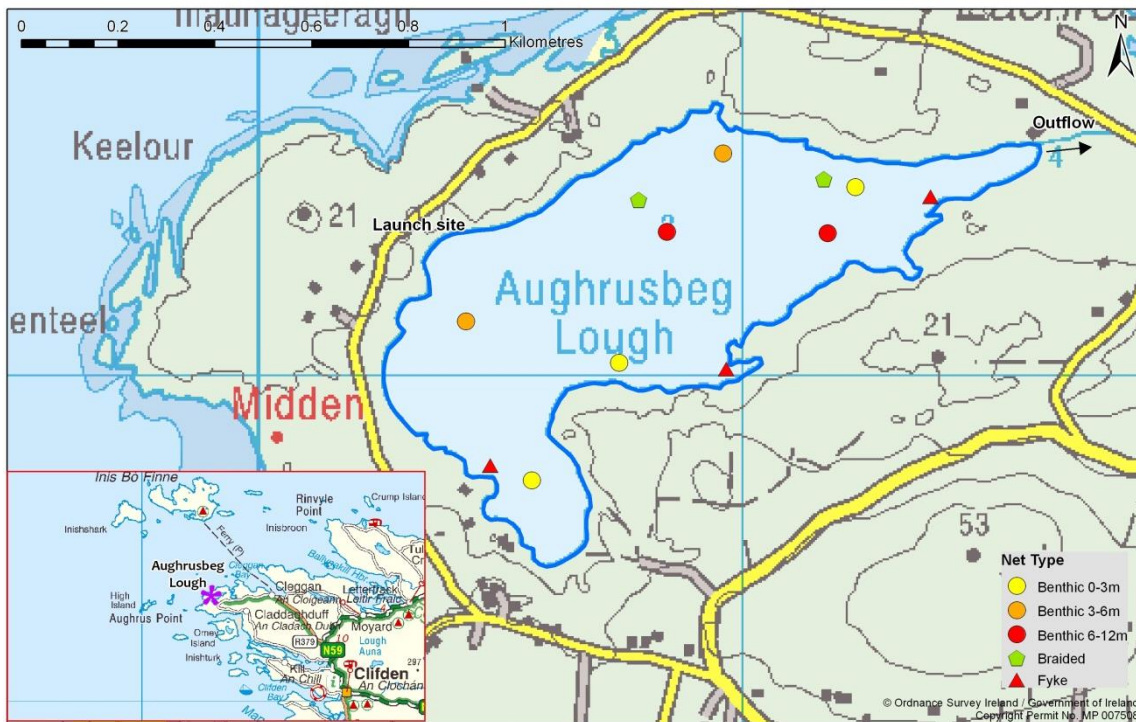


Fig. 1.1. Location map of Aughrusbeg Lough showing net locations and depths of each net (outflow is indicated on map)

## 1.2 Methods

Aughrusbeg Lough was surveyed from the 30<sup>th</sup> of July to the 1<sup>st</sup> August 2013. 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 July/August 2013, with 285 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Three-spined stickleback was the most abundant fish species recorded, followed by rudd, brown trout and eels. During the previous survey in 2010 and 2007 the same species composition was recorded with the exception of brown trout, which were not recorded during the 2007 survey but were captured in 2010 and 2013.

**Table 1.1. Number of each fish species captured by each gear type during the survey on Aughrusbeg Lough, July/August 2013**

Scientific name	Common name	Number of fish captured			Total
		Benthic mono multimesh gill nets	Braided gill net	Fyke nets	
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	149	0	0	149
<i>Scardinius erythrophthalmus</i>	Rudd	95	0	10	105
<i>Salmo trutta</i>	Brown trout	3	0	0	3
<i>Anguilla anguilla</i>	European eel	0	0	28	28

### ***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 the 2010 and 2013 surveys are summarised in Table 1.2. Mean CPUE and BPUE for all species is illustrated in Figure 1.2 and 1.3.

Three-spined stickleback was the dominant species in terms of abundance (CPUE) and rudd was the dominant species in terms of biomass (BPUE).

The mean three-spined stickleback CPUE increased from 2010 and 2007 to 2013, however, only the 2013 mean three-spined stickleback CPUE was significantly higher than 2010 (Mann-Whitney,  $P < 0.05$ ) (Table 1.2; Figs 1.2 and 1.3).

Although the mean rudd CPUE and BPUE fluctuated slightly over the three sampling years, these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3).

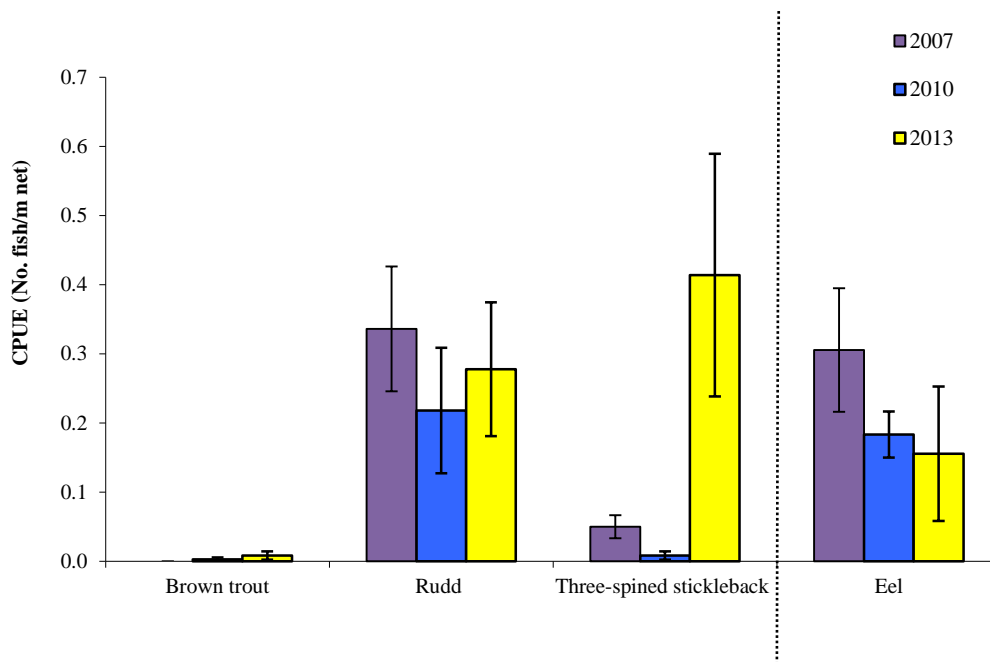
No brown trout were recorded in 2007. Although the mean brown trout CPUE and BPUE was higher in 2013 than in 2010, these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3).

**Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Aughrusbeg Lough, 2007, 2010 and 2013**

Scientific name	Common name	2007	2010	2013
<b>Mean CPUE</b>				
<i>Salmo trutta</i>	Brown trout	-	0.003 (0.003)	0.008 (0.006)
<i>Scardinius erythrophthalmus</i>	Rudd	0.336 (0.090)	0.218 (0.091)	0.278 (0.097)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	0.050 (0.166)	0.008 (0.006)	0.414 (0.156)
<i>Anguilla anguilla</i>	European eel*	0.305 (0.089)	0.183 (0.033)	0.157 (0.097)
<b>Mean BPUE</b>				
<i>Salmo trutta</i>	Brown trout	-	0.544 (0.544)	4.825 (3.328)
<i>Scardinius erythrophthalmus</i>	Rudd	15.781 (5.609)	14.919 (6.330)	16.086 (5.996)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	0.200 (0.066)	0.019 (0.013)	0.725 (0.318)
<i>Anguilla anguilla</i>	European eel*	55.322 (16.594)	32.925 (1.291)	15.994 (10.137)

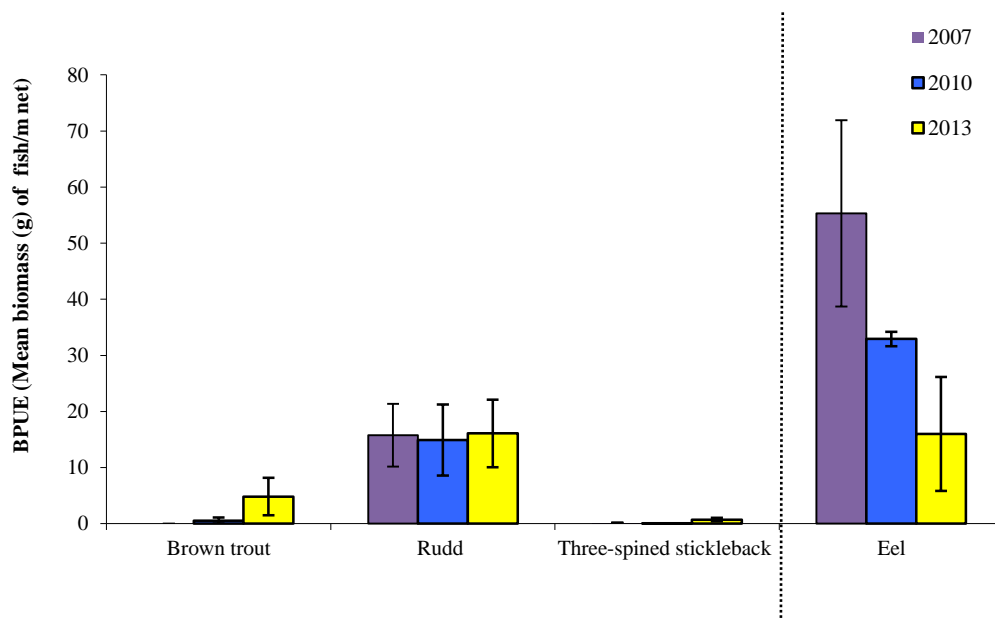
Note: On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species.

\*Eel CPUE and BPUE based on fyke nets only



**Fig. 1.2. Mean ( $\pm$ S.E.) CPUE for all fish species captured in Aughrusbeg Lough (Eel BPUE based on fyke nets only), 2007, 2010 and 2013**





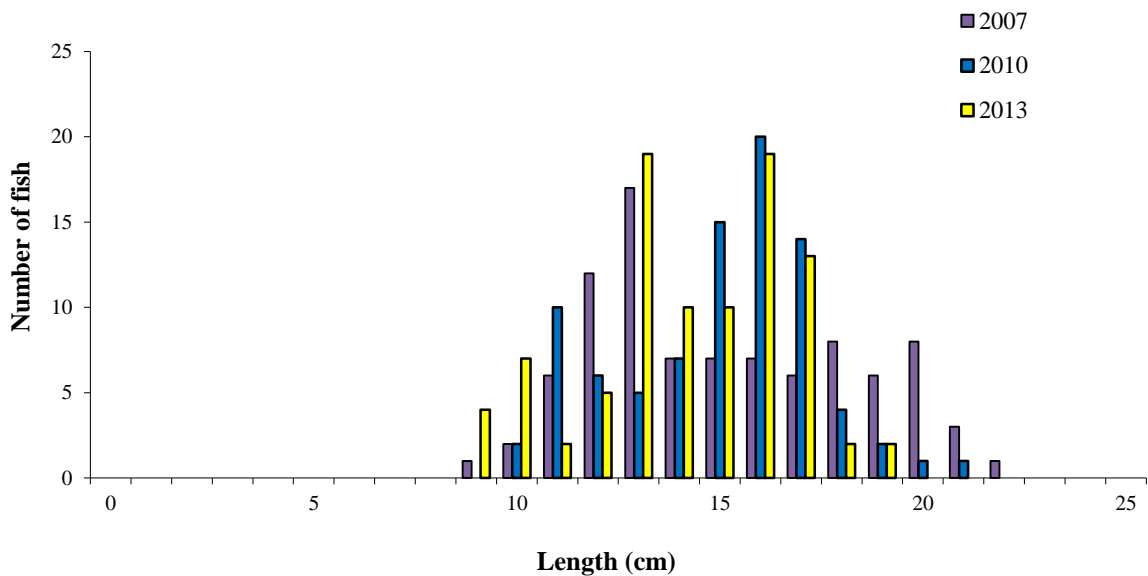
**Fig. 1.3. Mean ( $\pm$ S.E.) BPUE for all fish species captured in Aughrusbeg Lough (Eel BPUE based on fyke nets only), 2007, 2010 and 2013**

### 1.3.3 Length frequency distributions and growth

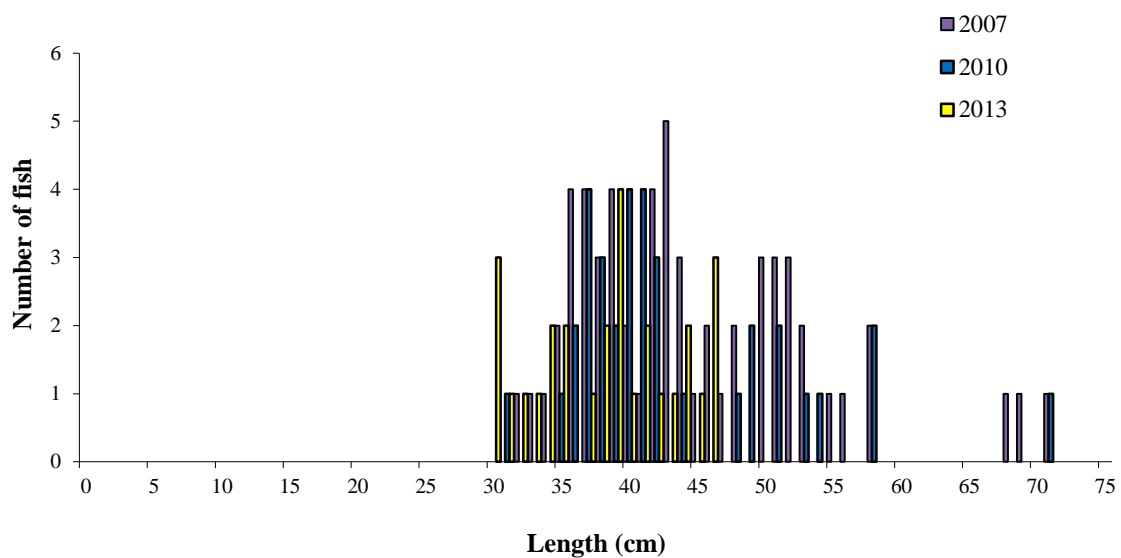
Rudd captured during the 2013 survey ranged in length from 9.0cm to 19.5cm (mean = 14.6cm) (Fig. 1.4) with nine age classes present, ranging from 1+ to 10+, with a mean L1 of 1.7cm (Table 1.3). The dominant age class was 6+ (Fig. 1.4). Rudd captured during the 2010 and 2007 had a similar length range and dominant age class to 2013 (Fig. 1.4) and they ranged in age from 3+ to 7+ and 3+ to 10+ in 2010 and 2007 respectively.

Brown trout captured during the 2013 survey ranged in length from 29.0cm to 44.3cm (mean = 14.6cm) with three age classes present, ranging from 3+ to 6+ (Table 1.4). The dominant age class was 1+. Mean brown trout L4 in 2013 was 28.1cm indicating a slow rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971). In 2010 one brown trout was recorded measuring 25.3cm in length and no brown trout were recorded in 2007.

Eels captured during the 2013 survey had lengths ranging from 30.0cm to 46.5cm (mean = 38.5cm) (Fig.1.5). Eels captured during the 2010 survey ranged in length from 31.3cm to 71.0cm and they ranged from 32.0cm to 71.0cm during the 2007 survey (Fig.1.5). Three-spined stickleback captured during the 2013 survey ranged in length from 3.5cm to 6.5cm.



**Fig. 1.4. Length frequency of rudd captured on Aughrusbeg Lough, 2007, 2010 and 2013**



**Fig. 1.5. Length frequency of eels captured on Aughrusbeg Lough, 2007, 2010 and 2013**

**Table 1.3. Mean ( $\pm$ SE) rudd length (cm) at age for Aughrusbeg Lough, August 2013**

	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>	L <sub>8</sub>	L <sub>9</sub>	L <sub>10</sub>
Mean	1.7 (0.1)	4.2 (0.2)	7.2 (0.2)	10.2 (0.3)	12.3 (0.3)	13.8 (0.3)	14.8 (0.3)	15.5 (0.3)	16.1 (0.5)	17.1 (0.3)
N	37	36	36	33	28	22	15	10	4	2
Range	1.1-4.3	2.2-7.1	4.4- 10.2	6.1- 13.8	8.6- 14.9	11.8- 16.9	13.2- 16.2	14.3- 17.6	15.3- 17.7	16.8- 17.3

**Table 1.4. Mean ( $\pm$ SE) brown trout length (cm) at age for Aughrusbeg Lough, August 2013**

	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	L <sub>6</sub>
Mean	5.2 (0.8)	10.4 (0.9)	20.8 (0.2)	28.1	38.5	42.0
N	3	3	3	1	1	1
Range	3.8-6.7	8.8-11.9	20.4-21.0	28.1-28.1	38.5-38.5	42.0-42.0

#### 1.4 Summary

Three-spined stickleback was the dominant species in terms of abundance (CPUE) and rudd was the dominant species in terms of biomass (BPUE).

Although the mean rudd CPUE and BPUE fluctuated slightly over the three sampling years, these differences were not statistically significant. Rudd ranged in age from 1+ to 10+ indicating reproductive success in ten of the previous eleven years. The dominant age class was 6+.

No brown trout were recorded in 2007. Although the mean brown trout CPUE and BPUE was higher in 2013 than in 2010, these differences were not statistically significant. Brown trout were aged 3+ and 6+.

The mean three-spined stickleback CPUE increased from 2010 and 2007 to 2013, however, only the 2013 mean three-spined stickleback CPUE was significantly higher than in 2010.

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 (Kelly *et al.*, 2012). Using the FIL2 classification tool, Aughrusbeg Lough has been assigned an ecological status of Poor

based on the fish populations present in 2013. The ecological status assigned to the lake based on the 2007 and 2010 survey data was Bad.

In the 2010 to 2012 surveillance monitoring reporting period, the EPA assigned Aughrusbeg Lough an overall draft ecological status of Bad, based on all monitored physico-chemical and biological elements, including fish.

## 1.5 References

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A dark blue geometric shape, resembling a stylized wave or a folded piece of paper, occupies the lower half of the page. It has a white dashed line pattern that flows across its width. The shape is set against a white background.

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