



Sampling Fish for the Water Framework Directive

Lakes 2012

Lough Alewnaghta



Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Lough Alewnaghta, August 2012

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1.1 Introduction

Lough Alewnaghta is located north of the town of Whitegate, Co. Clare, close to the western shore of Lough Derg (Plate 1.1, Fig 1.1). It has a surface area of 54ha, a mean depth of <4m and a maximum depth of approximately 4.5m. The Derrainy River is the main stream flowing into the lake. Lough Alewnaghta is connected to Lough Derg by its outflow, which discharges into Lough Derg close to Rinbarra Point on the western shore of the lake (Fig. 1.1).

Lough Alewnaghta is categorised as typology class 6 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. shallow (<4m), greater than 50ha and moderate alkalinity (20-100mg/l CaCO₃). The geology in the area consists of sandstone and limestone.

The lake was previously surveyed in August 2009 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al.*, 2010). During this survey, perch were found to be the dominant species present in the lake. Roach, roach x bream hybrids, pike and eels were also captured during the survey.



Plate 1.1. Lough Alewnaghta

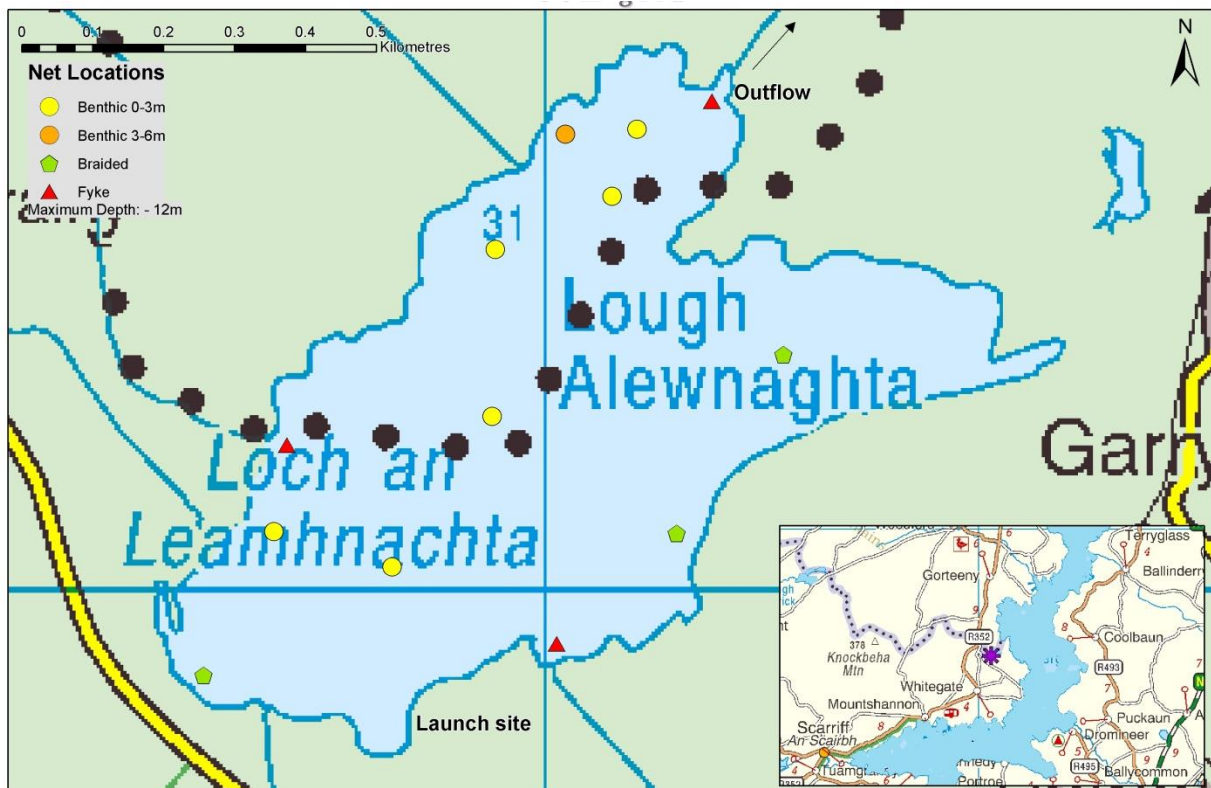


Fig. 1.1. Location map of Lough Alewnaghta showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

Lough Alewnaghta was surveyed over one night on the 20th of August 2012. 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 (6 @ 0-2.9m and 1 @ 3-5.9m) were deployed in the lake (10 sites). The netting effort was supplemented using three benthic braided (62.5mm mesh knot to knot) survey gill nets at three additional sites. Nets were deployed in the same locations as were randomly selected in the previous survey in 2009. 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 apart from perch were measured and weighed on site and scales were removed from all roach, pike, bream and roach x bream hybrids. 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 five fish species and one type of hybrid were recorded on Lough Alewnaghta in August 2012, with 553 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Perch was the most abundant fish species recorded, followed by roach, roach x bream hybrids, bream pike and eels. During the previous survey in 2009 the same species composition was recorded with the exception of bream, which were present during the 2012 survey but were not captured in 2009 (Kelly *et al.*, 2010).

Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Alewnaghta, August 2012

Scientific name	Common name	Number of fish captured			Total
		Benthic mono multimesh gill nets	Benthic braided gill nets	Fyke nets	
<i>Perca fluviatilis</i>	Perch	377	0	0	377
<i>Rutilus rutilus</i>	Roach	93	0	31	124
<i>Rutilus rutilus x Abramis brama</i>	Roach x Bream hybrid	30	6	0	36
<i>Abramis brama</i>	Bream	4	3	1	8
<i>Esox lucius</i>	Pike	2	1	1	4
<i>Anguilla anguilla</i>	European eel	0	0	4	4

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 2009 and 2012 are summarised in Table 1.2. Mean CPUE and BPUE for all fish species is illustrated in Figures 1.2 and 1.3.

Although the mean perch CPUE and BPUE appeared slightly lower in 2012 than in 2009, these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3).

The differences in the mean perch CPUE and BPUE between Lough Alewnaghta and two similar lakes were assessed, with no overall significant differences being found (Fig. 1.4 and 1.5). However, Independent-Samples Mann-Whitney U tests between each lake showed that Lough Alewnaghta had a significantly lower mean perch BPUE than White Lough ($P < 0.05$).

Although the mean roach CPUE and BPUE appeared slightly higher in 2012 than in 2009, these differences were also not statistically significant (Table 1.2; Fig 1.2 and 1.3).

The differences in the mean roach CPUE and BPUE between Lough Alewnaghta and two similar lakes were assessed, with no overall significant differences being found (Fig. 1.6 and 1.7).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Alewnaghta, 2009 and 2012

Scientific name	Common name	2009	2012
Mean CPUE			
<i>Perca fluviatilis</i>	Perch	1.059 (0.325)	0.967 (0.341)
<i>Rutilus rutilus</i>	Roach	0.140 (0.056)	0.318 (0.126)
<i>Rutilus rutilus x Abramis brama</i>	Roach x Bream hybrid	0.099 (0.298)	0.092 (0.022)
<i>Abramis brama</i>	Bream	-	0.021 (0.009)
<i>Esox lucius</i>	Pike	0.001 (0.001)	0.010 (0.004)
<i>Anguilla anguilla</i>	European eel	0.006 (0.006)	0.044 (0.294)
Mean BPUE			
<i>Perca fluviatilis</i>	Perch	16.831 (5.676)	15.370 (4.756)
<i>Rutilus rutilus</i>	Roach	11.482 (4.915)	23.718 (8.328)
<i>Rutilus rutilus x Abramis brama</i>	Roach x Bream hybrid	62.003 (27.460)	47.666 (12.822)
<i>Abramis brama</i>	Bream	-	19.085 (8.338)
<i>Esox lucius</i>	Pike	30.245 (27.143)	30.245 (27.143)
<i>Anguilla anguilla</i>	European eel	4.211 (2.415)	4.211 (2.415)

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

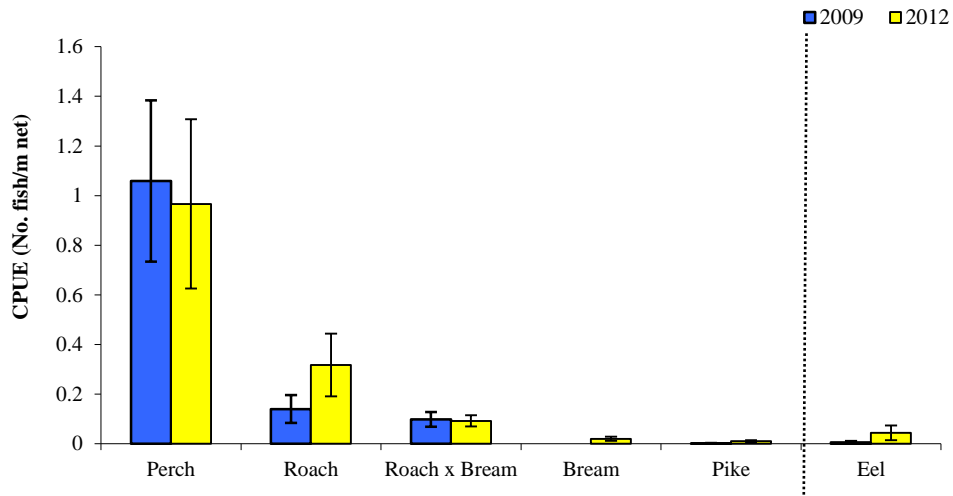


Fig. 1.2. Mean (\pm S.E.) CPUE for all fish species captured in Lough Alewnaghta (Eel CPUE based on fyke nets only), 2009 and 2012

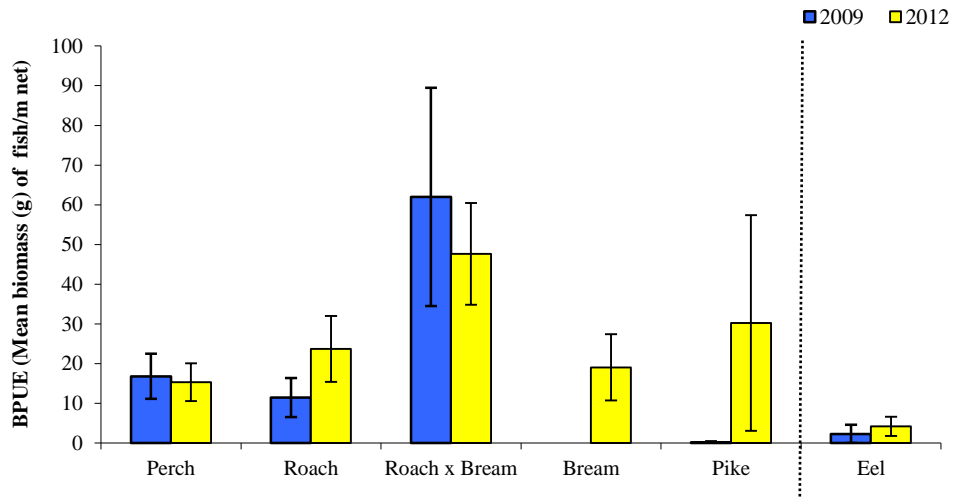


Fig. 1.3. Mean (\pm S.E.) BPUE for all fish species captured in Lough Alewnaghta (Eel BPUE based on fyke nets only), 2009 and 2012

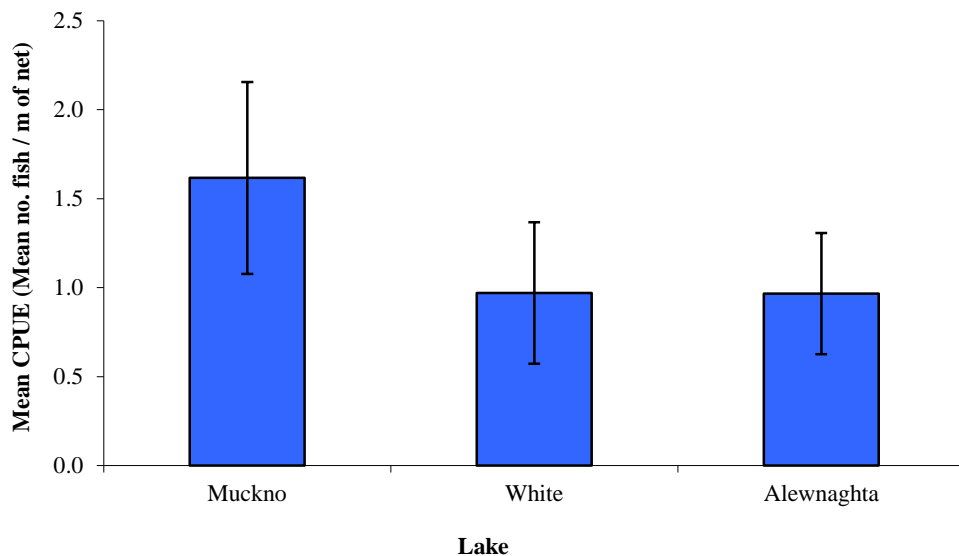


Fig. 1.4. Mean (\pm S.E.) perch CPUE in three lakes surveyed during 2012

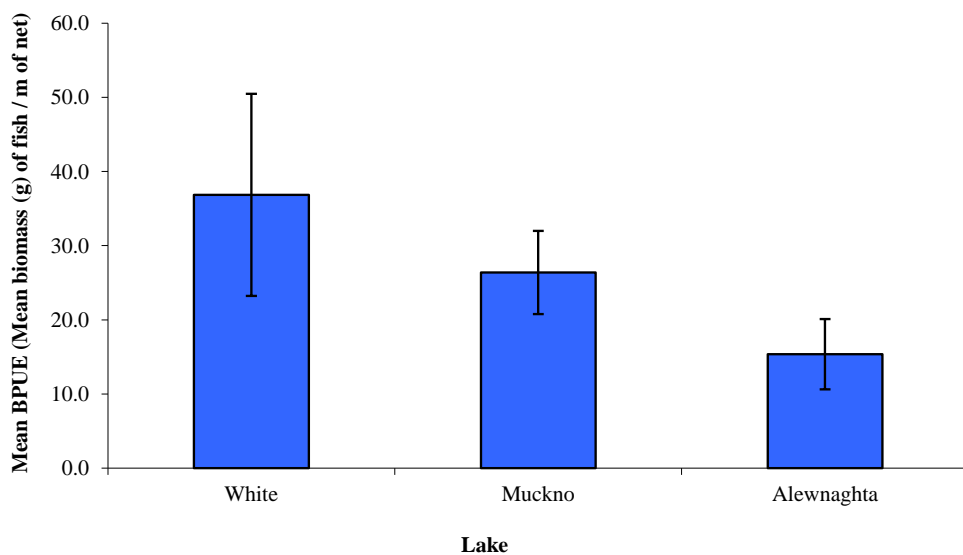


Fig. 1.5. Mean (\pm S.E.) perch BPUE in three lakes surveyed during 2012

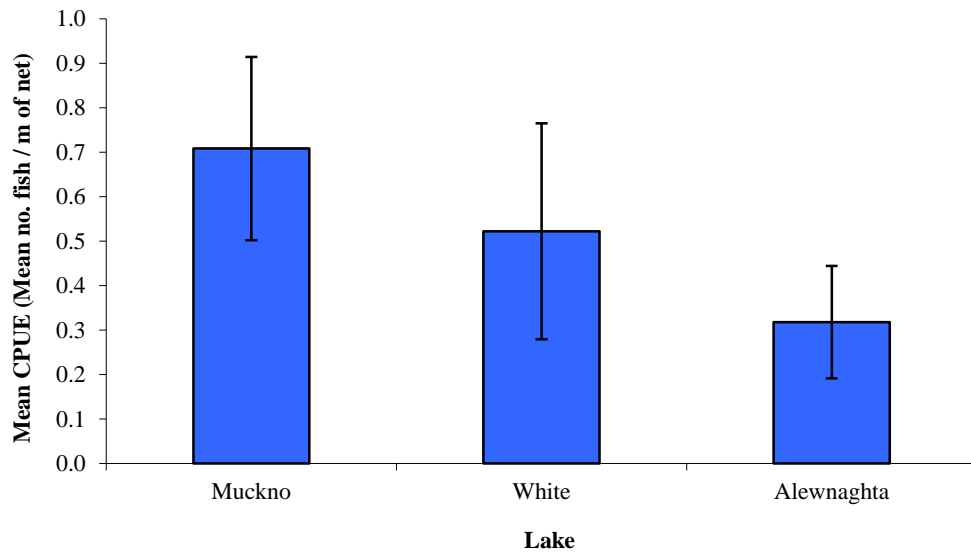


Fig. 1.6. Mean (\pm S.E.) roach CPUE in three lakes surveyed during 2012

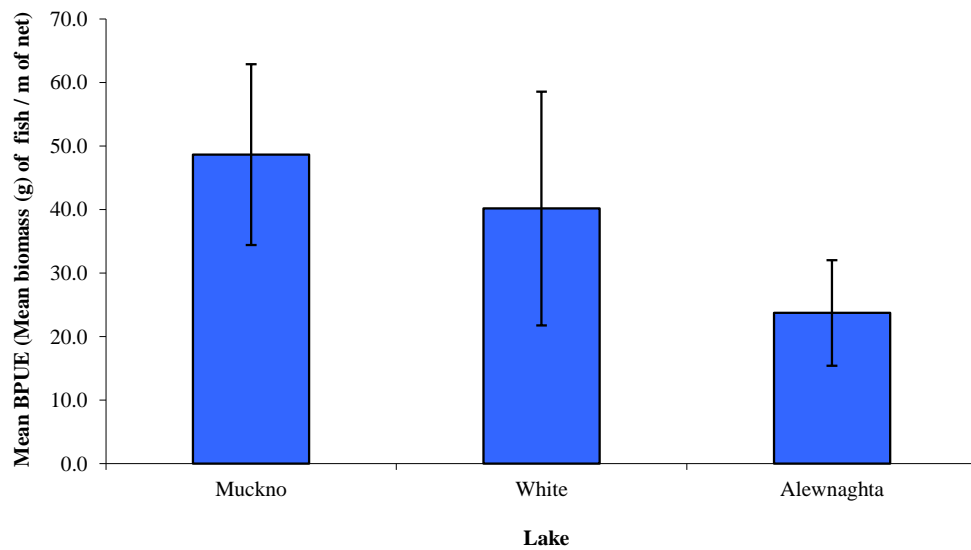


Fig. 1.7. Mean (\pm S.E.) roach BPUE in three lakes surveyed during 2012

1.3.3 Length frequency distributions

Perch captured during the 2012 survey ranged in length from 3.8cm to 28.6cm (mean = 7.3cm) (Fig. 1.6).

Perch captured during the 2009 survey ranged in length from 4.5cm to 24.9cm (Fig. 1.6).

Roach captured during the 2012 survey ranged in length from 8.0cm to 35.9cm (mean = 14.5cm) (Fig. 1.7). Roach captured during the 2009 survey ranged in length from 6.5cm to 34.2cm (Fig. 1.7).

Eels captured during the 2012 survey ranged in length from 33.6cm to 54.8cm. Pike captured had lengths ranging from 15.2cm to 106.0cm, bream ranged in length from 28.2cm to 38.7cm and roach x bream hybrids ranged in length from 12.5cm to 41.9cm.

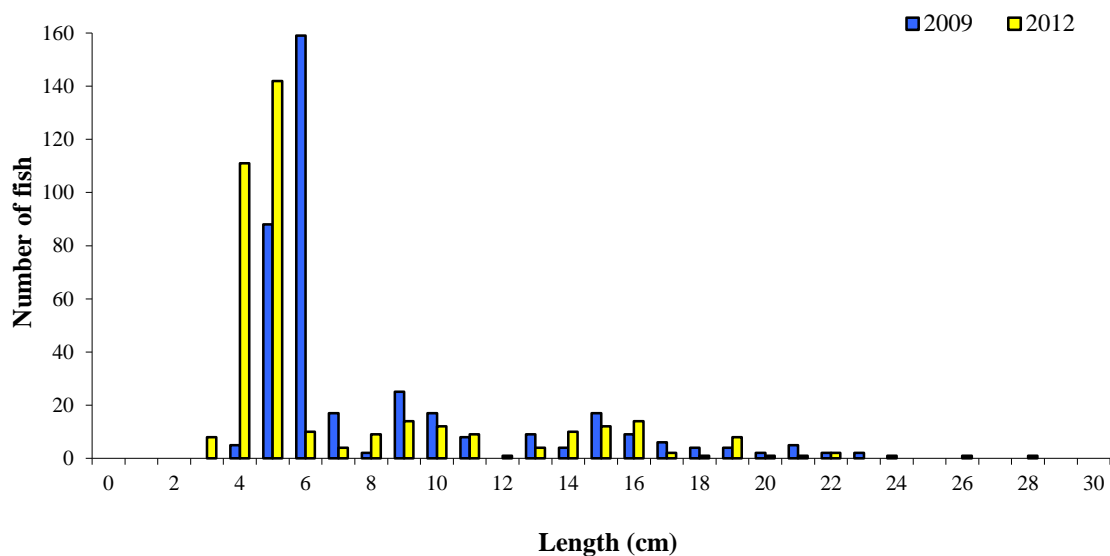


Fig. 1.6. Length frequency of perch captured on Lough Alewnaghta, 2009 and 2012

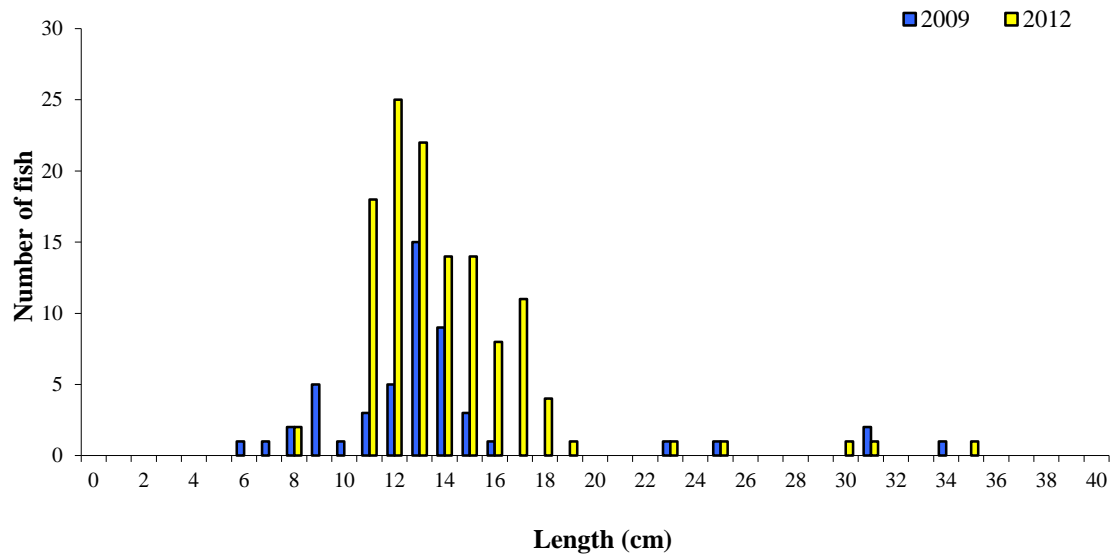


Fig. 1.7. Length frequency of roach captured on Lough Alewnaghta, 2009 and 2012

1.3.4 Fish age and growth

Seven age classes of perch were present, ranging from 0+ to 6+, with a mean L1 of 6.0cm (Table 1.3). The dominant age class was 0+ (Fig 1.6). In the 2009 survey, perch ranged from 0+ to 5+ with a mean L1 of 5.7cm.

Seven age classes of roach were present, ranging from 1+ to 9+, with a mean L1 of 2.8cm (Table 1.4). The dominant age class was 2+ (Fig 1.7). In the 2009 survey, roach ranged from 1+ to 12+ with a mean L1 of 3.7cm.

Roach bream hybrids ranged in age from 2+ to 13+. Bream ranged in age from 6+ to 10+ and pike from 1+ to 9+.

Table 1.3. Mean (\pm SE) perch length (cm) at age for Lough Alewnaghta, August 2012

	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆
Mean	6.0 (0.1)	10.7 (0.2)	15.6 (0.4)	19.2 (0.7)	21.8 (1.0)	26.6 (1.1)
N	67	38	19	6	4	2
Range	4.6-9.8	8.7-15.4	12.6-19.4	17.3-21.6	18.9-23.4	25.5-27.7

Table 1.4. Mean (\pm SE) roach length (cm) at age for Lough Alewnaghta, August 2012

	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	L ₈	L ₉
Mean	2.8 (0.1)	7.1 (0.2)	12.1 (0.3)	16.4 (0.9)	21.6 (0.9)	26.2 (1.8)	29.2 (2.2)	29.1	30.2
N	47	46	27	5	4	2	2	1	1
Range	1.8-4.0	4.7-10.5	8.5-15.7	13.7-19.2	19.6-23.9	24.4-28.1	27.0-31.4	29.1-29.1	30.2-30.2

1.4 Summary

Perch was the dominant species in terms of abundance (CPUE) and roach x bream hybrids were the dominant species in terms of biomass (BPUE) captured in the survey gill nets.

Although the mean perch CPUE and BPUE appeared slightly lower in 2012 than in 2009, these differences were not statistically significant. The mean perch CPUE in Lough Alewnaghta was similar to the other lakes assessed during 2012, with no statistically significant differences being found between lakes. However, the mean perch BPUE in Lough Alewnaghta was significantly lower than White Lough, another similar lake surveyed. Perch ranged in age from 0+ to 6+, indicating reproductive success in the previous seven years. The dominant age class of perch was 0+.

Although the mean roach CPUE and BPUE appeared slightly higher in 2012 than in 2009, these differences were not statistically significant. The mean roach CPUE and BPUE in Lough Alewnaghta was similar to the other lakes assessed during 2012, with no statistically significant differences being found between lakes. Roach ranged in age from 1+ to 9+, indicating reproductive success in seven of the previous ten years. The dominant age class of roach was 2+.

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, Lough Alewnaghta has been assigned an ecological status of Bad based on the fish populations present in 2012. The ecological status assigned to the lake based on the 2009 survey data was Poor.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Lough Alewnaghta an overall ecological status of Moderate, 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

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