



Sampling Fish for the Water Framework Directive

Lakes 2010

Lough Atedaun



Iascach Intíre Éireann
Inland Fisheries Ireland

ACKNOWLEDGEMENTS

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1.1 Introduction

Lough Atedaun (Plate 1.1, Fig. 1.1) is situated in the Fergus catchment in Co. Clare, located adjacent to the town of Corrofin. The lake is situated at an altitude of 22m a.s.l., has a surface area of 38.0ha, a mean depth of 2.3m and a maximum depth of 7.0m. The lake falls into typology class 9 (as designated by the EPA for the Water Framework Directive), i.e. shallow (<4m), less than 50ha and high alkalinity (>100mg/l CaCO₃). The underlying geology has been categorized as calcareous. Lough Atedaun is a popular lake for pike fishing (Cleary, M. ShRFB, *pers. comm.*). The lake is highly eutrophic and a thick carpet of submerged macrophytes covers shallow areas of the lake.

Lough Atedaun is located in the “East Burren Complex” Special Area of Conservation. This is a large area that encompasses all of the high ground in the eastern section of the Burren. A total of 12 different habitats listed on Annex I of the EU Habitats Directive are present within the site, including areas of limestone pavement, calcareous grasslands, heath scrub, woodlands and calcareous lakes and turloughs (NPWS, 2001). The site exhibits some of the best and most extensive areas of oligotrophic limestone wetlands found in the Burren and indeed in Europe. Some of the most extensive calcareous swamp fen communities in the country also occur within this complex (NPWS, 2001).

Lough Atedaun was previously surveyed in 2007 as part of the WFD surveillance monitoring programme (Kelly and Connor, 2007). During this survey, perch and eels were found to be the dominant species present on the lake. Rudd and pike were also captured during the survey. There was once a population of brown trout in this lake (Inland Fisheries Trust, unpublished data). A survey in May 1976 yielded brown trout, perch, pike and rudd (Inland Fisheries Trust archival data). In early 2010 a waste water treatment plant was opened in Corrofin town which may help to alleviate the problem of nutrient enrichment in the lake in the future.



Plate 1.1. Lough Atedaun

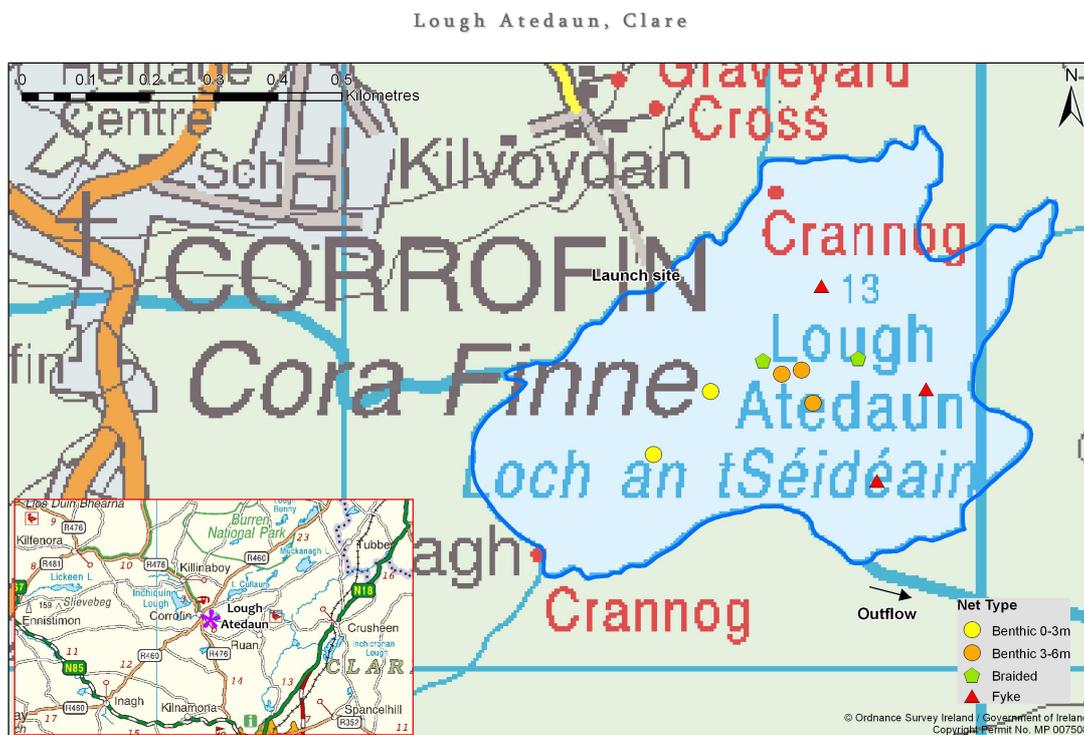


Fig. 1.1. Location map of Lough Atedaun showing net locations and depths of each net (outflow is indicated on map)

1.2 Methods

Lough Atedaun was surveyed over one night on the 27th of September 2010. A total of three sets of Dutch fyke nets and five benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (2 @ 0-2.9m and 3 @ 3-5.9m) were deployed in the lake (8 sites). The netting effort was supplemented using two benthic braided survey 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 apart from perch were measured and weighed on site and scales were removed from all rudd and pike. 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 Lough Atedaun in September 2010, with 131 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 rudd. During the previous survey in 2007 the same fish species composition was recorded.

Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Atedaun, September 2010

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Benthic braided gill nets	Fyke nets	Total
<i>Perca fluviatilis</i>	Perch	115	0	0	115
<i>Scardinius erythrophthalmus</i>	Rudd	8	0	0	8
<i>Esox lucius</i>	Pike	2	2	0	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 2007 and 2010 are summarised in Table 1.2. Mean CPUE for each fish species recorded

in 2007 and 2010 is illustrated in Figure 1.2. Although both the mean rudd CPUE and the mean eel CPUE were lower in 2010 than in 2007, this was not statistically significant.

The differences in the mean perch CPUE between Lough Atedaun and three other similar lakes were assessed with no statistically significant differences being found (Fig. 1.3).

The differences in the mean rudd CPUE between Lough Atedaun and four other similar lakes were assessed and found to be statistically significant (Kruskal-Wallis, $P < 0.001$) (Fig. 1.4). Independent-Samples Mann-Whitney U tests between each lake showed that Lough Atedaun had a significantly lower mean rudd CPUE than Aughrusbeg Lough ($z = -2.358$, $P < 0.05$) and Lough Mushlin ($z = 2.059$, $P < 0.05$).

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

Scientific name	Common name	2007	2010
Mean CPUE			
<i>Perca fluviatilis</i>	Perch	0.408 (0.177)	0.383 (0.021)
<i>Scardinius erythrophthalmus</i>	Rudd	0.083 (0.047)	0.026 (0.017)
<i>Esox lucius</i>	Pike	0.022 (0.010)	0.013 (0.005)
<i>Anguilla anguilla</i>	European eel	0.156 (0.056)	0.011 (0.011)
Mean BPUE			
<i>Perca fluviatilis</i>	Perch	23.150 (12.019)	17.176 (10.799)
<i>Scardinius erythrophthalmus</i>	Rudd	7.830 (4.115)	1.143 (0.708)
<i>Esox lucius</i>	Pike	24.045 (19.958)	14.016 (8.880)
<i>Anguilla anguilla</i>	European eel	76.477 (34.428)	2.638 (2.638)

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

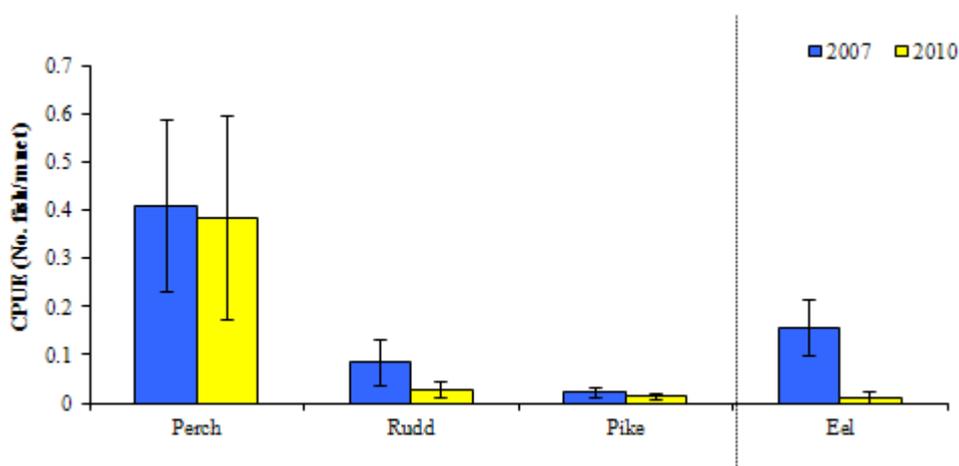


Fig. 1.2. Mean (\pm S.E.) CPUE on Lough Atedaun (Eel CPUE based on fyke nets only), 2007 and 2010

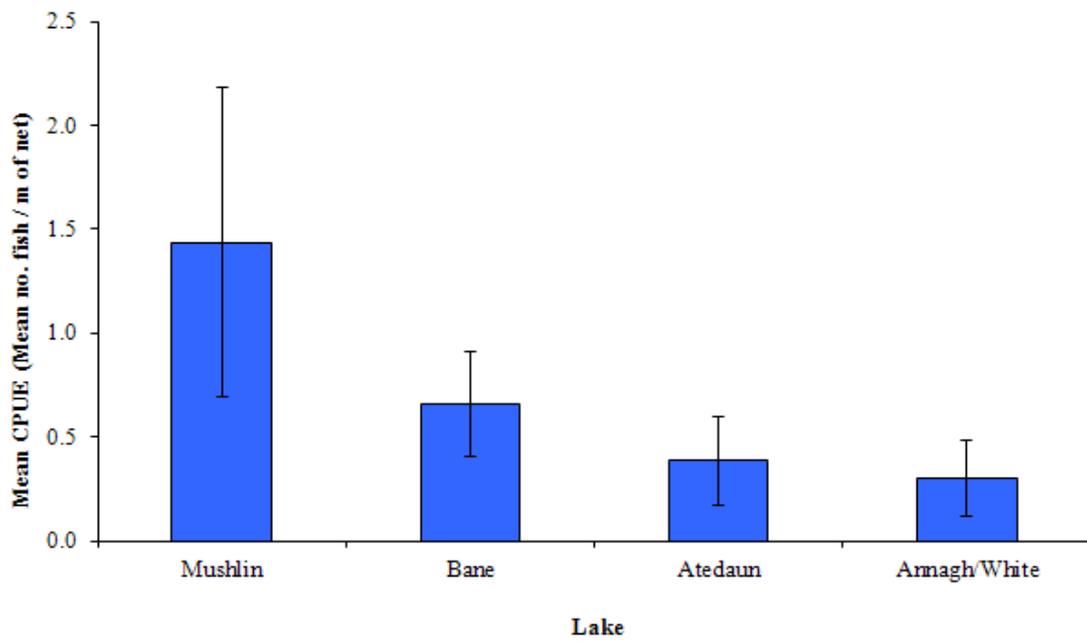


Fig. 1.3. Mean (\pm S.E.) perch CPUE in four lakes surveyed during 2010

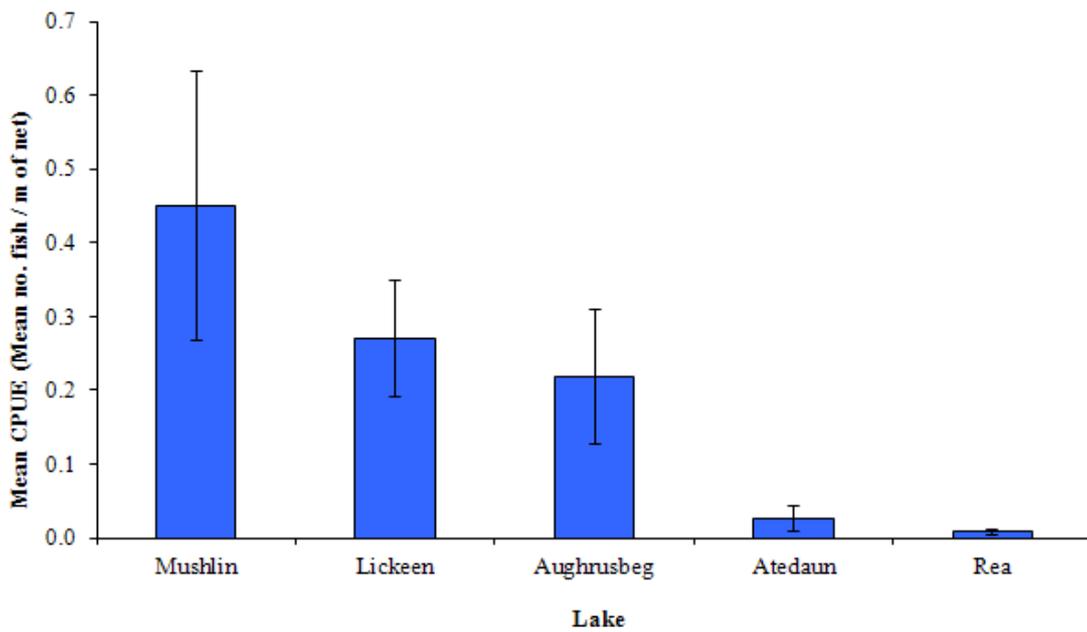


Fig. 1.4. Mean (\pm S.E.) rudd CPUE in five lakes surveyed during 2010

1.3.3 Length frequency distributions

Perch captured during the 2010 survey ranged in length from 6.0cm to 26.8cm (mean = 13.7cm) (Fig. 1.5). Perch captured during the 2007 ranged in length from 6.0 cm to 28.0cm (Fig. 1.5). Rudd captured during the 2010 survey ranged in length from 5.7cm to 21.0cm (mean = 11.5cm) (Fig.1.6). Rudd captured during the 2007 survey ranged in length from 12.5cm to 22.4cm (Fig.1.6). Eels captured during the 2010 survey ranged in length from 45.0cm to 65.0cm and pike ranged in length from 15.9cm to 69.1cm.

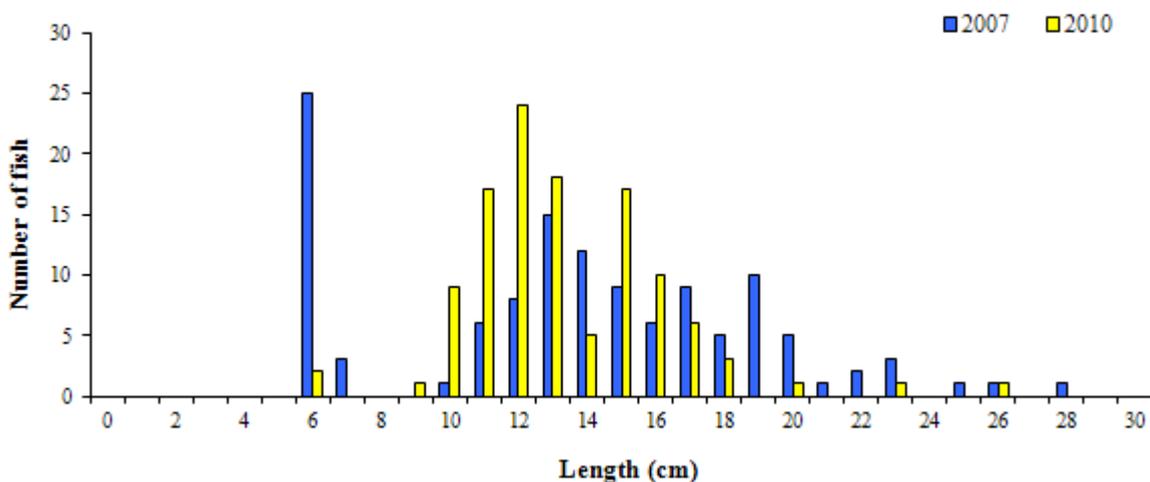


Fig. 1.5. Length frequency of perch captured on Lough Atedaun

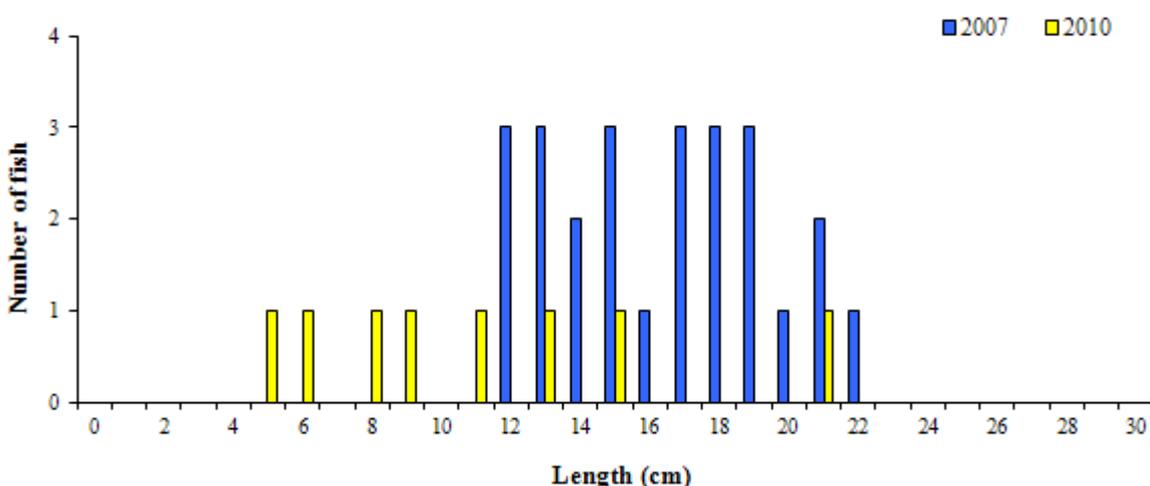


Fig. 1.6. Length frequency of rudd captured on Lough Atedaun

1.3.4 Fish age and growth

Six age classes of perch were present, ranging from 0+ to 5+, with a mean L1 of 6.7cm (Table 1.3). Similar age and growth patterns were observed during the 2007 survey where perch ranged from 0+ to 4+ with a mean L1 of 7.9cm.

Three age classes of rudd were present, ranging from 1+ to 3+, with a mean L1 of 2.0cm (Table 1.4). In the 2007 survey, rudd also ranged in age from 1+ to 3+ with a mean L1 of 3.5cm. Four age classes of pike were present, ranging from 1+ to 6+.

Table 1.3. Mean (\pm SE) perch length (cm) at age for Lough Atedaun, September 2010

	L ₁	L ₂	L ₃	L ₄	L ₅
Mean	6.7 (0.2)	11.5 (0.2)	15.8 (0.6)	19.7 (1.5)	25.0
N	50	32	13	4	1
Range	4.9-10.1	9.3-14.6	13.4-20.3	17.0-22.8	25.0-25.0

Table 1.4. Mean (\pm SE) rudd length (cm) at age for Lough Atedaun, September 2010

	L ₁	L ₂	L ₃
Mean	2.0 (0.2)	5.3 (0.5)	12.9 (0.5)
N	8	5	2
Range	1.3-2.6	4.6-5.9	12.5-13.2

1.4 Summary

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

Although the mean perch CPUE in Lough Atedaun was relatively low when compared to Mushlin Lough and Lough Bane, these differences were not statistically significant. Perch ages ranged from 0+ to 5+ indicating reproductive success in each of the previous five years.

The mean rudd CPUE in Lough Atedaun was significantly lower than Aughrusbeg Lough. Although the mean rudd CPUE in Lough Atedaun was also relatively low when compared to Mushlin Lough and Lickeen Lough, these differences were not statistically significant. Rudd ranged in age from 1+ to 3+, indicating reproductive success in each of the previous three years; however, no young of the year fish 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, Lough Atedaun has been assigned an ecological status of Good for both 2007 and 2010 based on the fish populations present.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Lough Atedaun an overall ecological status of Moderate, based on all monitored physic-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. CFB 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 (2001) *Site synopsis: East Burren Complex. Site code: 001926*. Site Synopsis report, National Parks and Wildlife Service.

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