

National Research Survey Programme

Lakes 2021

Lough Atedaun

IFI/2022/1-4601



Iascach Iníre Éireann
Inland Fisheries Ireland

**Fish Stock Survey of Lough Atedaun,
September 2021**



**Iascach Intíre Éireann
Inland Fisheries Ireland**

National Research Survey Programme

Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

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1. Introduction

Lough Atedaun is situated in the Fergus catchment in Co. Clare, adjacent to the town of Corofin (Plate 1.1, Figure 1.1). 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. former ShRBD, *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, 2018). 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, 2018).

Lough Atedaun was previously surveyed in 2007, 2010 and 2013 as part of the WFD surveillance monitoring programme (Kelly and Connor, 2007 and Kelly *et al.*, 2011 and 2014). During the 2010 survey, perch were found to be the dominant species present. Rudd, pike and eels were also captured during the 2010 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 There was once a population of brown trout in this lake (Inland Fisheries Trust, unpublished data).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)

This report summarises the results of the 2021 fish stock survey carried out on the lake using Inland Fisheries Ireland’s fish in lakes monitoring protocol. The protocol is WFD compliant and also provides insight into fish stock status in the lake.



Plate 1.1. Lough Atedaun, September 2021

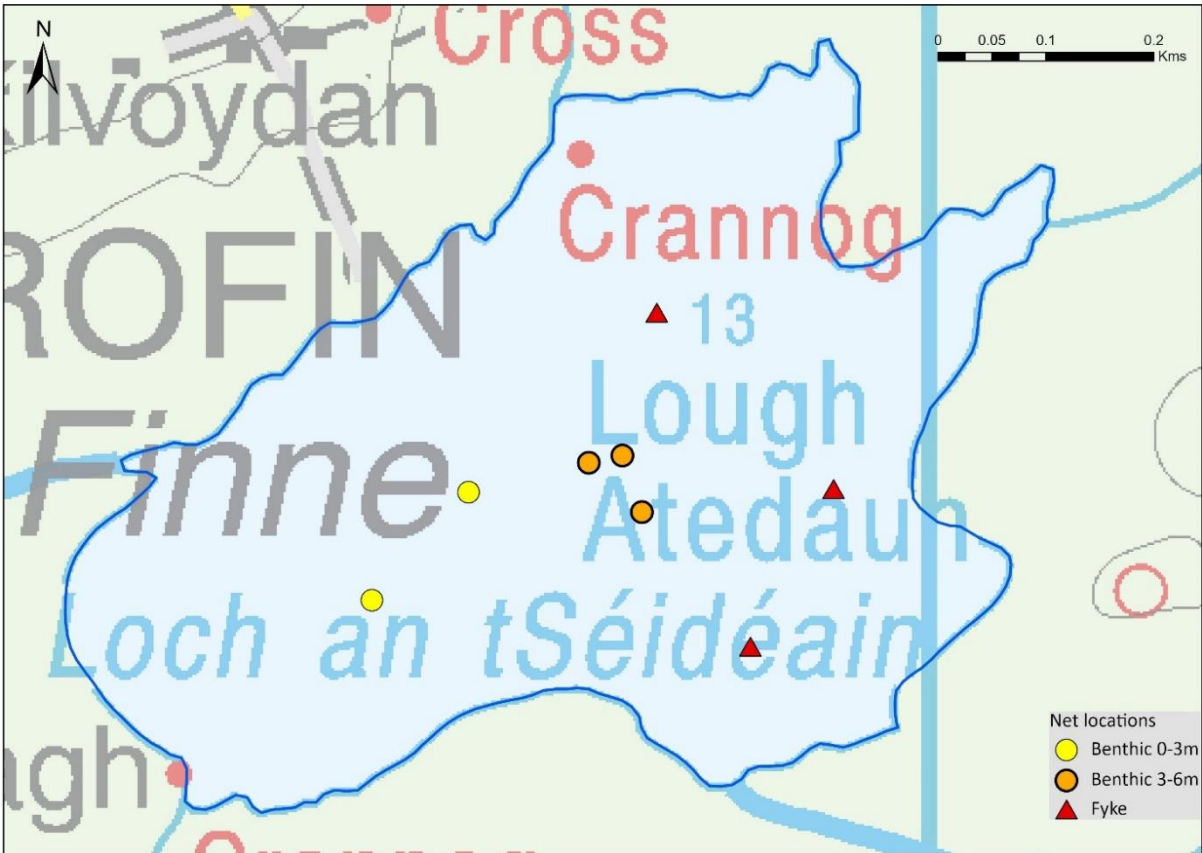


Figure 1.1. Location map of Lough Atedaun showing survey net locations, September 2021.

2. Methods

Lough Atedaun was surveyed over one night on the 13th and 14th of September 2021. 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). It was not possible to set additional one (1-PBB) or four-panel benthic braided survey gill nets (4-PBB) during the survey due to the low water levels that were present at the time. Nets were deployed in the same locations as were randomly selected in the previous surveys. 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 a sub-sample of other species except eels. 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. Fish were frozen immediately after the survey and transported back to the IFI laboratory for later dissection.

2.2. Biosecurity - disinfection and decontamination procedures

Procedures are required for disinfection of equipment in order to prevent dispersal of alien species and other organisms to uninfected waters. A standard operating procedure was compiled by Inland Fisheries Ireland for this purpose (Caffrey, 2010) and is followed by staff in IFI when moving between water bodies.

3. Results

3.1. Species Richness

Five fish species were recorded on Lough Atedaun in September 2021. A total of 194 fish were captured. The number of each species captured by each gear type is shown in Table 3.1. Perch was the most abundant fish species recorded. Rudd were also captured in relatively high numbers. Roach were captured for the first time during the 2021 survey and were not previously known to be present in the lake.

Table 3.1. Number of each fish species captured by each gear type during the survey on Lough Atedaun, September 2021

Scientific name	Common name	Number of fish captured		
		BM CEN	Fyke	Total
<i>Perca fluviatilis</i>	Perch	106	3	109
<i>Scardinius erythrophthalmus</i>	Rudd	67	0	67
<i>Esox lucius</i>	Pike	8	2	10
<i>Rutilus rutilus</i>	Roach	7	0	7
<i>Anguilla anguilla</i>	European eel	0	1	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, mean 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 2021 survey are summarised in Table 3.2. In 2021, perch was the dominant fish species in terms of abundance (CPUE). While pike was the dominant species with respect to biomass (BPUE), this figure was based upon a relatively small number of fish (Table 3.2).

For comparison purposes, box plots of CPUE and BPUE for each species captured per net type in all surveys between 2007 and 2021 are presented in Figures 3.1 and 3.2 respectively and illustrates fish community change over time. While subject to some variation between surveys, both perch and rudd have remained the most abundant species captured in all surveys and no obvious trends in stock size are apparent. Eel CPUE and BPUE were lower in all subsequent surveys compared to 2007.

Table 3.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Atedaun, September 2021

Scientific name	Common name	Mean CPUE (\pm S.E) **	Mean BPUE (\pm S.E) **
<i>Perca fluviatilis</i>	Perch	0.448 (0.316)	14.987 (10.722)
<i>Scardinius erythrophthalmus</i>	Rudd	0.279 (0.149)	17.918 (9.628)
<i>Esox lucius</i>	Pike	0.0375 (0.018)	32.038 (22.621)
<i>Rutilus rutilus</i>	Roach	0.029 (0.0193)	2.796 (2.725)
<i>Anguilla anguilla</i>	European eel	0.006 (0.006)*	2.679 (2.679)*

Note: Where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species (Connor et al., 2017). *Eel CPUE and BPUE based on fyke nets only

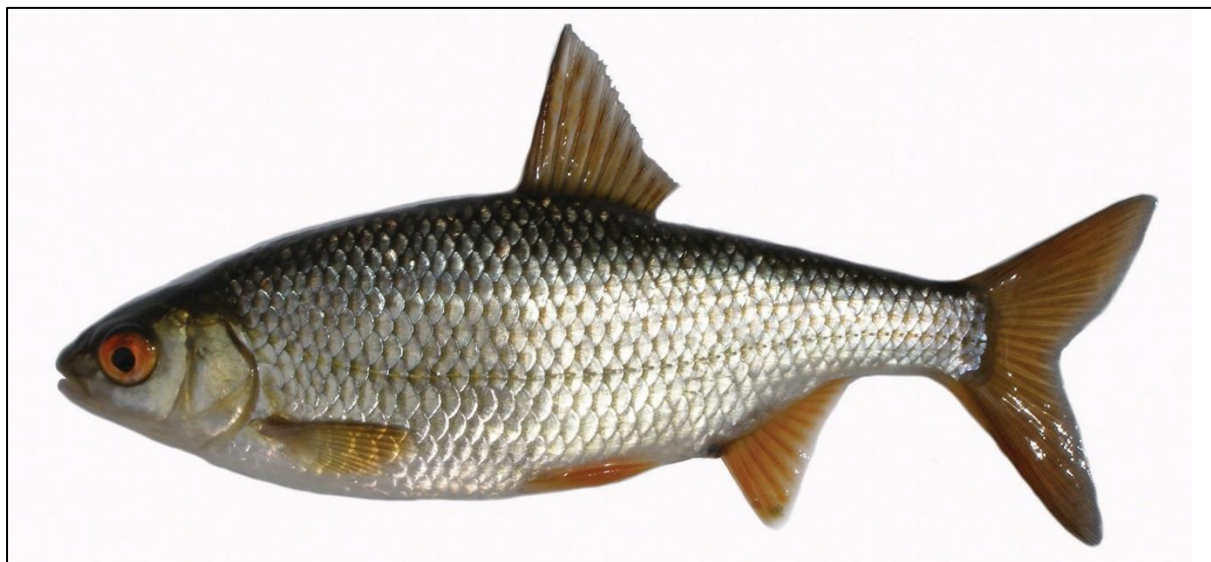


Plate 3.1. Roach were recorded in Lough Atedaun for the first time in 2021

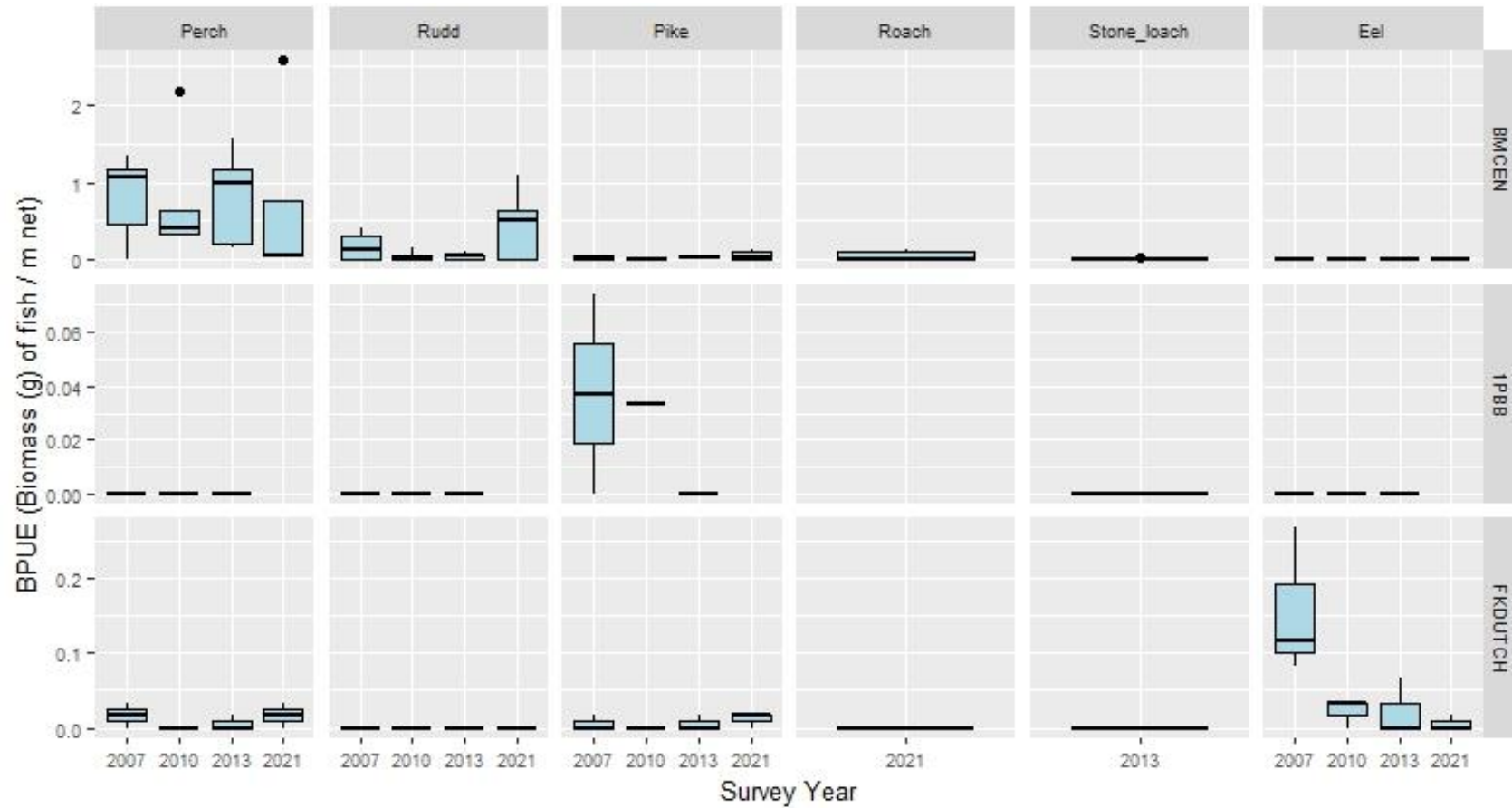


Figure 3.1. CPUE of all fish species captured in each net type during surveys of Lough Atedaun between 2009 and 2021. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots. The y axis (CPUE) is unique for each net type.

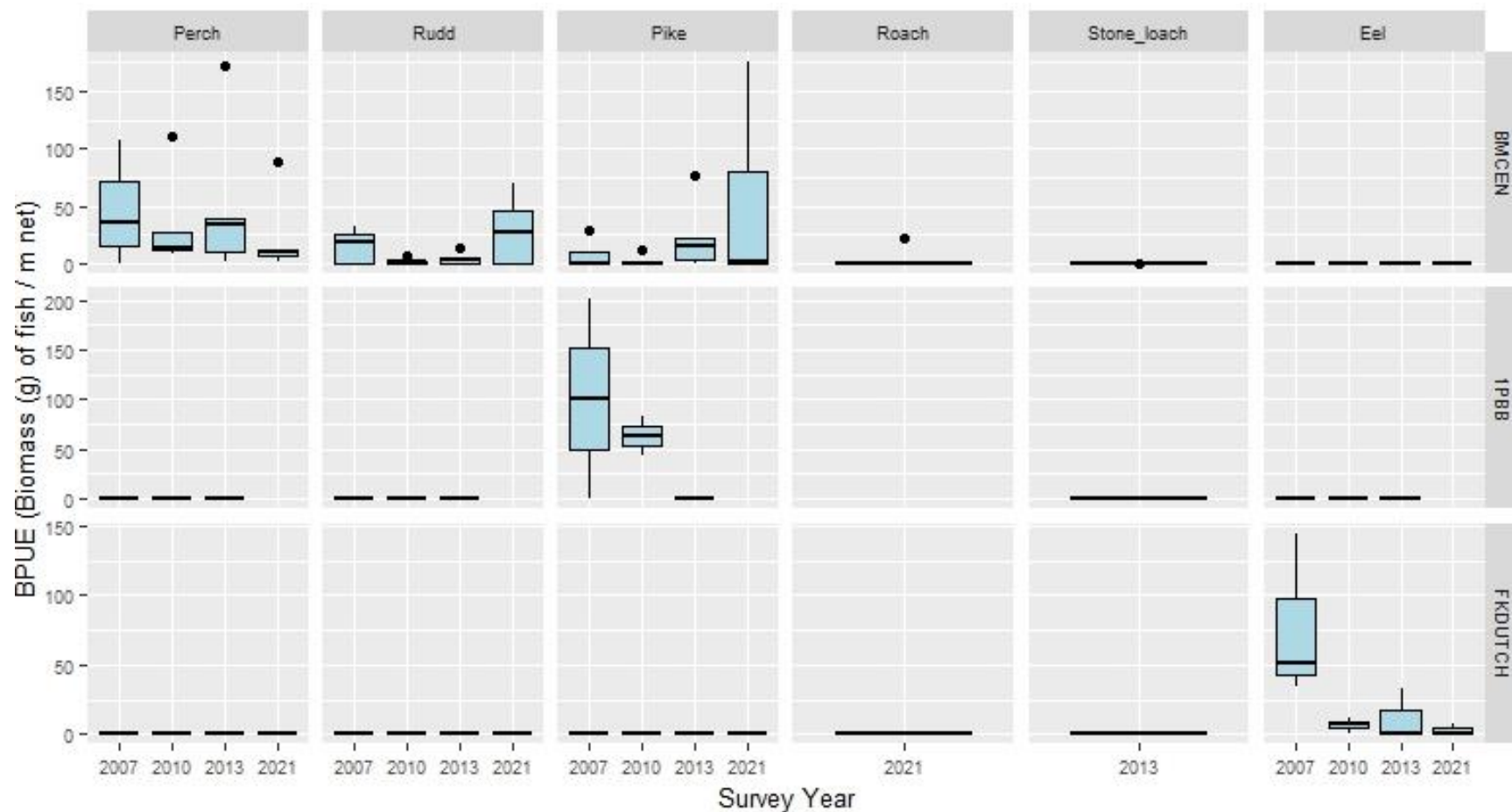


Figure 3.2. BPUE of all fish species captured in each net type during surveys of Lough Atedaun between 2009 and 2021. Figures are expressed as biomass (g) of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots. The y axis (BPUE) is unique for each net type.

3.3. Length frequency distributions and growth

Perch

Perch captured during the 2021 survey ranged in length from 6.1cm to 25.0cm (mean = 11.2cm). Five age classes were present, ranging from 1+ to 5+, and all intervening age classes were present in the sample. Mean L1 (age at 1 year) was 6.5cm (Table 3.3). This corresponds to the large modal peak at 6.0-7.0cm (Figure 3.3), indicating that a large proportion of perch captured were young of year fish at the end of their first growing season. Older cohorts were also captured in relatively large numbers.

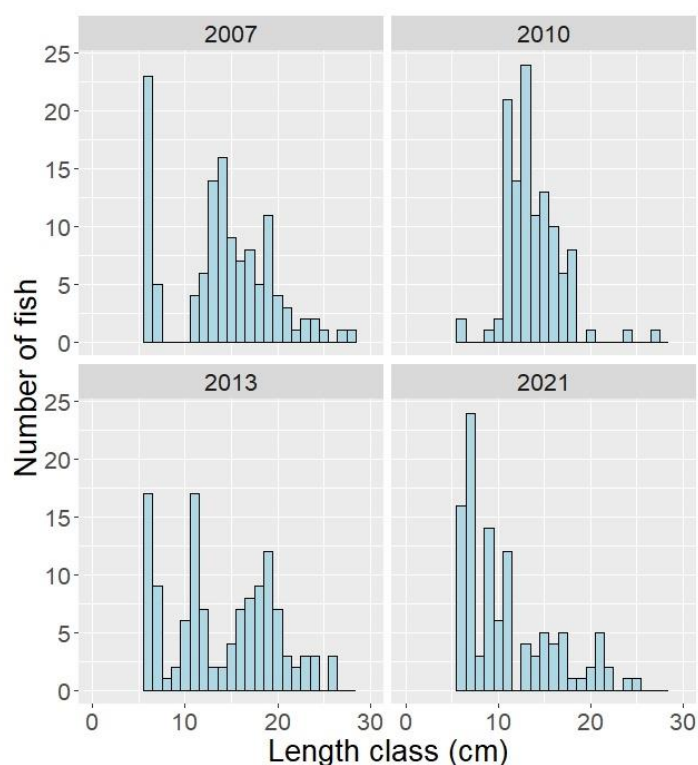


Figure 3.3. Length frequency of perch captured on Lough Atedaun, 2007, 2010, 2013 and 2021

Table 3.3. Mean (\pm SE) perch length (cm) at age for Lough Atedaun, September 2021

	L ₁	L ₂	L ₃	L ₄	L ₅
Mean	6.5 (0.11)	11.2 (0.3)	15.4	19.0	22.9
N	56	41	22	11	2
Range	4.8-8.7	8.1-15.0	11.6-19.7	16.3-23.0	21.4-24.3

Rudd

Rudd captured during the 2021 survey ranged in length from 6.6cm to 23.9cm (mean = 14.0cm) (Figure 3.4). Rudd were aged between 1+ and 6+. All age classes were represented in the sample aged indicating that recruitment has been relatively consistent in recent years, in contrast to previous surveys where few rudd were captured (Figure 3.4). The population was dominated by fish aged between 2+ to 4+ (Table 3.4). Few older fish were captured and no 0+ rudd were recorded in the survey nets. This may reflect their relative unavailability to capture (i.e. because of their size or habitat).

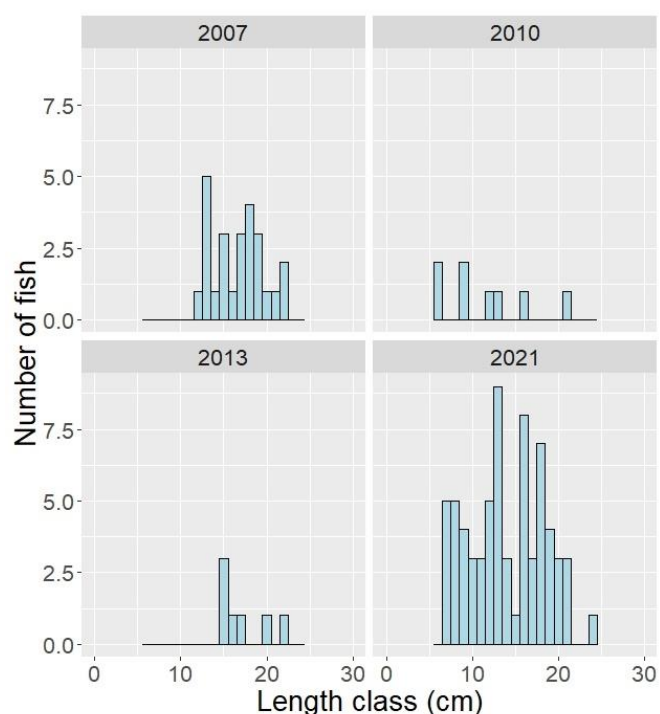


Figure 3.4. Length frequency of rudd captured on Lough Atedaun, 2007, 2010, 2013 and 2021

Table 3.4. Summary age data from rudd captured on Lough Atedaun, September 2021. Number (N) of fish and length ranges of all fish aged in the sample is presented.

	Age Class						
	0+	1+	2+	3+	4+	5+	6+
N	0	6	13	10	10	3	1
Mean L (cm)	-	7.1	15.9	19.4	19.4	19.7	-
Min L (cm)	-	6.6	12.2	17.2	17.2	18.5	21.2
Max L (cm)	-	7.7	18.5	23.9	23.9	21.1	21.2

Other species

Seven roach were captured ranging in length from 6.7cm to 21.9cm and aged at 1+ and 3+. Two size/age groups were apparent. Four fish measuring from 20.7 to 21.9cm were aged 3+. Smaller individuals (6.7cm - 7.3cm) were aged 1+.

Ten pike were captured ranging in length from 10.6cm to 68.1cm. Pike were aged between 0+ and 7+.

One eel was captured during the 2021 survey. It measured 65.5cm.

4. Summary and ecological status

Perch was the dominant fish species in terms of abundance (mean CPUE) captured during the 2021 survey. Rudd were also captured in relatively large numbers (and in greater numbers compared to previous surveys of the lake). While pike dominated biomass (BPUE) this was based upon the capture of a comparatively small number of fish.

Both the most abundant species (i.e. perch and rudd) have each been recruiting regularly in the lake. Populations of both species were dominated by younger fish. This was particularly pronounced in perch, where 0+ fish were the largest cohort captured.

Although no 0+ or 1+ rudd were recorded in 2021, a greater number and greater size range was recorded in 2021 compared to previous surveys.

Roach were captured for the first time in 2021. Two year classes were captured (0+ and 3+). This species is invasive in Ireland (Stokes *et al.*, 2004) and their colonisation typically results in reduced populations of rudd. Its generalist feeding strategy and trophic flexibility may have facilitated invasion of Irish lakes (Hayden *et al.*, 2014a), where it frequently dominates fish stocks (Kelly *et al.*, 2010; Hayden *et al.*, 2014b).

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 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 Atedaun has been assigned an ecological status of Poor for 2021, based on the fish populations present, and driven by an increase in the numbers of rudd captured in 2021 compared to earlier surveys. In previous years the lake was assigned Good fish ecological status (Fig. 4.1).

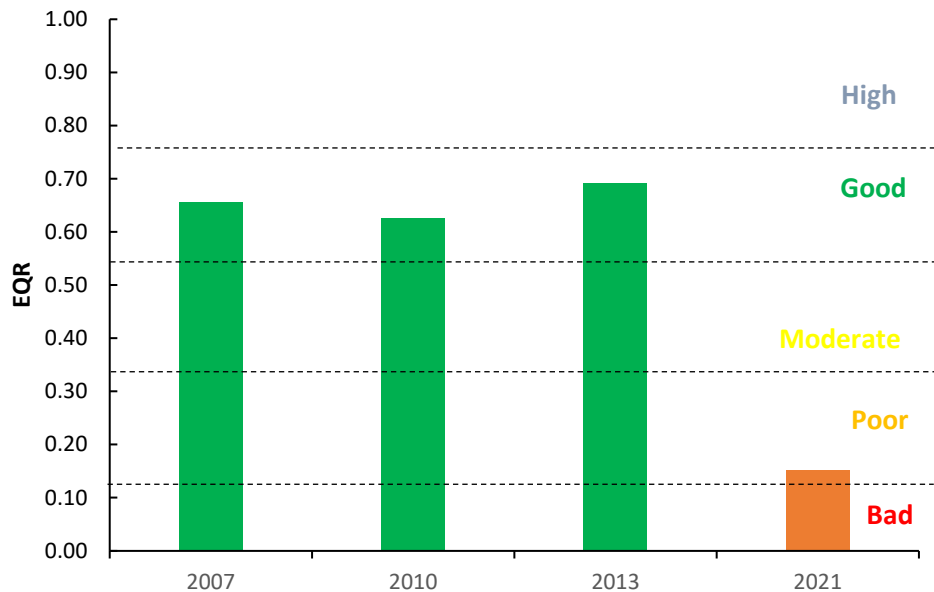


Figure 4.1. Fish ecological status of Atedaun Lough, 2007, 2010, 2013 and 2021

In the 2013 to 2018 surveillance monitoring reporting period, the EPA assigned Lough Atedaun an overall draft ecological status of Moderate, based on all monitored physico-chemical and biological elements, including fish.

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**Inland Fisheries Ireland
3044 Lake Drive,
Citywest Business Campus,
Dublin 24,
Ireland.
D24 CK66**

**www.fisheriesireland.ie
info@fisheriesireland.ie**

+353 1 8842 600

