

National Research Survey Programme

Lakes 2023

Lough Derg

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Iascach Intíre Éireann
Inland Fisheries Ireland

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Fish Stock Survey of Lough Derg, June 2023



**Iascach Intíre Éireann
Inland Fisheries Ireland**

National Research Survey Programme

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1. Introduction

Lough Derg is the third largest lake in Ireland and the largest and most southerly lake on the Shannon system. A long and relatively narrow lake its character changes significantly as you travel from Portumna, Co. Galway in the north to Killaloe, Co. Clare and Ballina, Co. Tipperary in the south (Figure. 1.1). The lake is categorised as typology class 12 (as designated by the EPA for the purposes of the Water Framework Directive (WFD)), i.e. deep (>4m), greater than 50ha and high alkalinity (>100mg/l CaCO₃). The surface area of the lake is approximately 13,000ha. It is relatively shallow towards the northern end with depths averaging 6m; however it narrows and deepens towards the southern end with depths reaching up to 36m (Flanagan and Toner, 1975). Water levels are regulated by the Electricity Supply Board due to the presence of Ireland's largest hydroelectric power station, Ardnacrusha, which is located at the end of a purpose built channel (the head-race canal) connected to the River Shannon, approximately 8km below the southern end of the lake. The northern end of the lake is bordered by relatively flat, agricultural land, while the lower reaches of the lake are bordered by the Slieve Aughty Mountains in the west and the Arra Mountains in the east (Flanagan and Toner, 1975).

Lough Derg is a mixed fishery, with salmon, trout, pollan, perch, roach, bream, tench, cyprinid hybrids and pike present (O' Reilly, 2007). Historically it was one of the great brown trout fisheries, though angling was mainly concentrated on the mayfly season. In the 1980s the fishing for brown trout dropped off considerably particularly in the northern half of the lake. This was attributed to a deterioration in water clarity and increasing eutrophication (O' Reilly, 1987). Nevertheless, it is still a popular brown trout angling destination, especially during mayfly season, when average trout weights 2lb (0.9kg) and fish in excess of 10lbs are possible (5kg) (O' Reilly, 2007). The lake is also a popular coarse fish and pike angling destination. Pike up to 30lbs (13.6kg) have been reported regularly.

During the mid-1970's the lake was showing signs (e.g. algal blooms) of eutrophication and in the early 1990's Lough Derg was classified as highly eutrophic. The lake has undergone considerable ecological change in the recent past. The presence of zebra mussel was confirmed in the lower lake in 1997 (Minchin *et al.*, 2002). This confirmation of the plankton feeding zebra mussel coincided with a significant increase in water clarity (NPWS, 2014a). A second dreissenid mussel (Quagga mussel, *Dreissena rostriformis bugensis*) has subsequently colonised and has the potential to further influence the ecology of the lake (Baars, 2022). Asian clam (*Corbicula fluminea*) was first recorded in the River Shannon in 2010 (Hayden *et al.*, 2013) and was subsequently recorded in Lough Derg in 2011 (Minchin 2014)

The north-eastern shore of Lough Derg has been designated as a Special Area of Conservation, with six habitats listed on Annex I of the E.U. Habitats Directive. Four of these habitats are regarded as priority habitats - *Cladium fen*, alluvial woodland, limestone pavement and yew woodland (NPWS, 2014b). The lake itself is a Special Protection Area that supports important numbers of wintering wildfowl (NPWS, 2014b). Lough Derg is also of conservation interest for the fish and freshwater invertebrate species present. The lake contains a landlocked population of sea lamprey (*Petromyzon marinus*) and all three species of lamprey are present in the Lower River Shannon catchment. Pollan (*Coregonus autumnalis*), which is listed on Annex V of the EU Habitats Directive is present in Lough Derg; one of only five lakes in Ireland (ROI and NI) (Lough Neagh, Lower Lough Erne, Lough Ree and Lough Derg and Lough Allen) where it is currently known to reside (NPWS, 2014a; Harrison *et al.*, 2010). This limited distribution in tandem with their sensitivity to anthropogenic changes makes them vulnerable to extinction (Harrod *et al.*, 2001). They are considered a pelagic species (i.e. they are typically found mid-water) and are an important part of Ireland's native fish biodiversity. They are completely unique to Ireland and represent the only known lake dwelling Arctic cisco (*Coregonus autumnalis* Pallas) population in the world. They are, therefore, of high conservation value (Maitland, 2004).

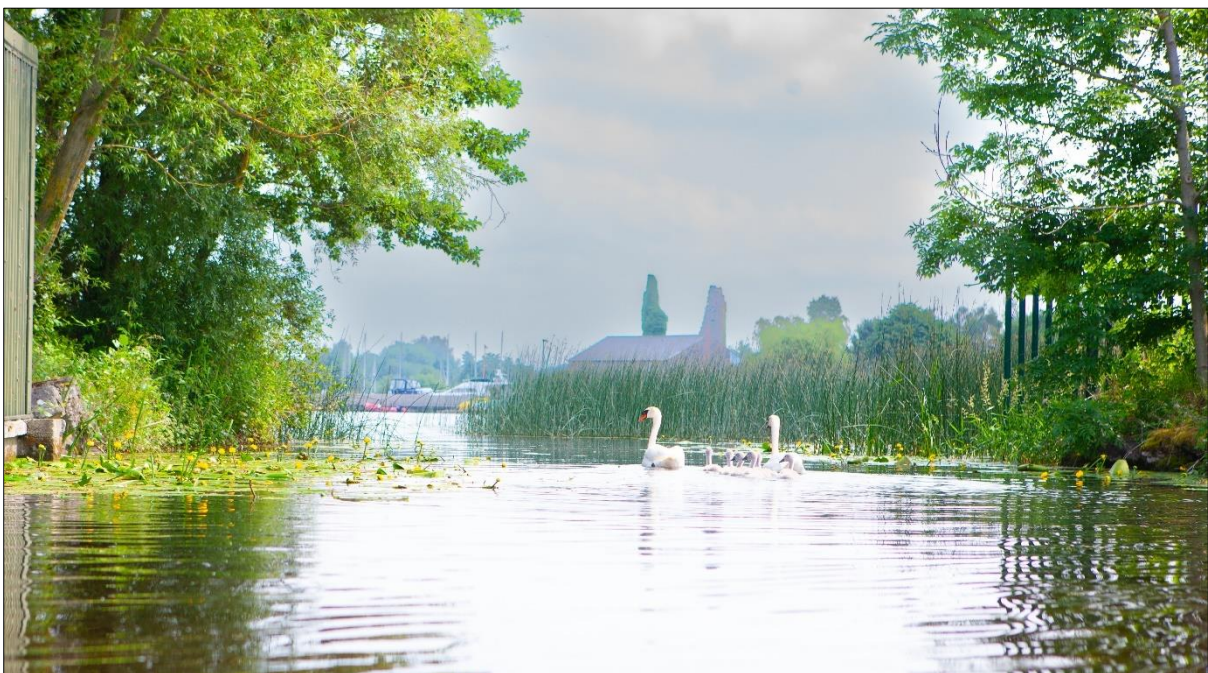


Plate 1.1. Lough Derg, June 2023

The lake was previously surveyed in 2009, 2012 and 2016 by Inland Fisheries Ireland as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al.*, 2010, 2013, 2017).

During these surveys, perch were determined to be the dominant species present in the lake. Roach, roach x bream hybrids, bream, brown trout, tench, pike and eels were also captured.

This report summarises the results of the 2023 fish stock survey carried out on the lake using Inland Fisheries Ireland's fish in lakes monitoring protocol. The protocol is WFD compliant and provides insight into fish stock status in the lake.

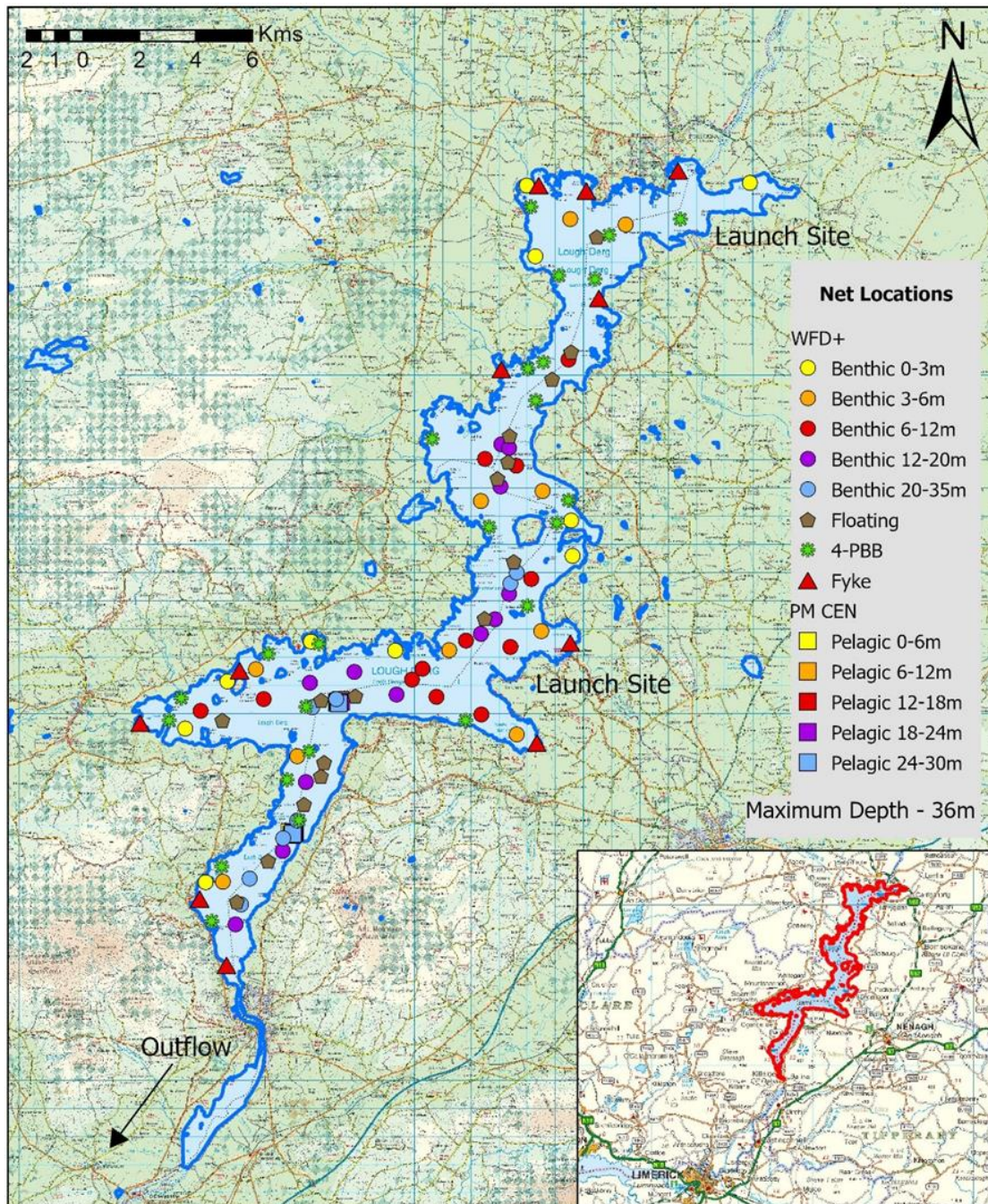


Figure 1.1. Location map of Lough Derg showing net locations and depths of each net (outflow is indicated on map).

2. Methods

2.1. Netting methods

Lough Derg was surveyed over seven nights from the 12th to the 22nd of June 2023. A total of twelve sets of Dutch fyke nets, 51 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (BM CEN) (10 @ 0-2.9m, 10 @ 3-5.9m, 12 @ 6-11.9m, 11 @ 12-19.9m and 8 @ 20-34.9m) and seventeen floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (FM CEN) were deployed in the lake. The netting effort was supplemented using four-panel benthic braided survey gill nets (4-PBB) at twenty-five additional sites. The four-panel survey gill nets are composed of four 27.5m long panels each a different mesh size (55mm, 60mm, 70mm and 90mm knot to knot). Survey nets were deployed in the same locations as were randomly selected in the previous surveys (105 sites). 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.

An additional 10 pelagic monofilament multi-mesh (12 panel, 6.25-55mm mesh size) CEN standard (PMCEN) survey gill nets were set in the lake over two nights from the 20th to the 22nd of June 2023 (Figure 1.1). PMCEN survey gill nets are 30m long and 6m deep. They are typically deployed at specific depths within the water column in the deeper portions of a lake. Five PMCEN survey gill nets were set at varying depths at one location, creating a net 'curtain' that covered the entire water column (0-32m). A further five PMCEN survey gill nets (1 @ 0-6m, 1 @ 6-12m, 1 @ 12-18m, 1 @ 18-24m and 1 @ 24-30m) were set at random locations within the deeper sections of the lake (Figure 1.1).



Plate 2.1. Survey boat on Lough Derg, June 2023

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. Fish diet

Total stomach contents were inspected, and individual items were identified to the lowest taxonomic level possible. The percentage frequency occurrence (%FO) of prey items were then calculated to identify key prey items (Amundsen *et al.*, 1996).

$$FO_i = \left(\frac{N_i}{N} \right) * 100$$

Where:

FO_i is the percentage frequency of prey item i ,

N_i is the number of fish with prey i in their stomach,

N is total number of fish with stomach contents.

2.3. Biosecurity - disinfection and decontamination procedures

Procedures are required for disinfection of equipment 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.



Plate 2.2 Taking a scale sample on Lough Derg, June 2023.

3. Results

3.1. Species Richness

Eight fish species and one cyprinid hybrid were recorded in Lough Derg in June 2023. A total of 1753 fish were captured (Table 3.1). Perch and roach were the most numerous species captured, representing c. 89% of fish recorded in all net types in the survey. Tench, roach x bream hybrids, brown trout, bream, pike, pollan and European eels were also captured. Similar species compositions were recorded on previous surveys of the lake (e.g. Kelly *et al.*, 2010, 2013 and 2017).

Table 3.1. Number of each fish species captured by each gear type during the survey on Lough Derg

Scientific name	Common name	Number of fish captured					
		BM CEN	FM CEN	PM CEN	4-PBB	Fyke	Total
<i>Perca fluviatilis</i>	Perch	710	28	55	4	0	797
<i>Rutilus rutilus</i>	Roach	650	72	11	25	3	761
<i>Tinca tinca</i>	Tench	2	0	0	79	0	81
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	19	0	0	51	0	70
<i>Salmo trutta</i>	Brown trout	10	13	12	8	0	43
<i>Coregonus pollan</i>	Pollan	1	0	21	0	0	22
<i>Abramis brama</i>	Bream	0	0	0	22	0	22
<i>Esox lucius</i>	Pike	7	0	0	6	2	15
<i>Anguilla anguilla</i>	European eel	1	0	0	0	40	41

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. Roach and perch were the dominant species with respect to abundance (CPUE). Roach had the highest biomass (BPUE) (Table 3.2). In the pelagic nets (which are not used to calculate WFD metrics), perch was the most abundant species; however biomass (BPUE) was higher for the other species captured (i.e. brown trout, pollan and roach).

Table 3.2. Mean (S.E.) CPUE and BPUE for all fish species captured, excluding pelagic nets, on Lough Derg, June 2023

Scientific name	Common name	Mean CPUE (\pm S.E)	Mean BPUE (\pm S.E)
<i>Rutilus rutilus</i>	Roach	0.236 (0.081)	21.055 (3.821)
<i>Perca fluviatilis</i>	Perch	0.239 (0.060)	11.438 (2.527)
<i>Tinca tinca</i>	Tench	0.007 (0.003)	10.937 (5.642)
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	0.010 (0.002)	7.969 (1.731)
<i>Salmo trutta</i>	Brown trout	0.008 (0.002)	2.690 (0.821)
<i>Abramis brama</i>	Bream	0.001 (0.000)	2.014 (1.026)
<i>Esox lucius</i>	Pike	0.003 (0.000)	4.943 (1.989)
<i>Coregonus pollan</i>	Pollan	0.000 (0.000)	0.025 (0.025)
<i>Anguilla anguilla</i> *	European eel	0.060 (0.013)	19.395 (4.357)

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.

Table 3.3. Mean (S.E.) CPUE and BPUE for all fish species captured in pelagic CEN survey nets on Lough Derg, June 2023

Scientific name	Common name	Mean CPUE (\pm S.E)	Mean BPUE (\pm S.E)
<i>Perca fluviatilis</i>	Perch	0.046 (0.037)	0.140 (0.112)
<i>Coregonus pollan</i>	Pollan	0.018 (0.007)	2.614 (1.297)
<i>Salmo trutta</i>	Brown trout	0.010 (0.009)	4.499 (3.083)
<i>Rutilus rutilus</i>	Roach	0.009 (0.006)	1.719 (1.281)

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).

3.3 Species Profiles

Perch

Perch captured during the 2023 survey ranged in length from 3.0cm to 33.4cm (mean = 9.6cm). In 2023, smaller juvenile young of year (YOY) fish (4 - 6cm) were much more prominent than in previous surveys. Perch larger than this size were less abundant than in those earlier surveys (Figure 3.1). In 2023, perch in the sample were aged between 0+ (4-6cm) and 10+ (34cm) (Figure 3.1. Table 3.4). While all age classes between 0+ and 6+ were present, all cohorts, with the exception of 0+ fish were recorded in relatively small numbers. While there are clear differences in the proportion of different size and age cohorts across surveys, no clear trend in population abundance (CPUE) or biomass (BPUE) was apparent (Figure 3.2).

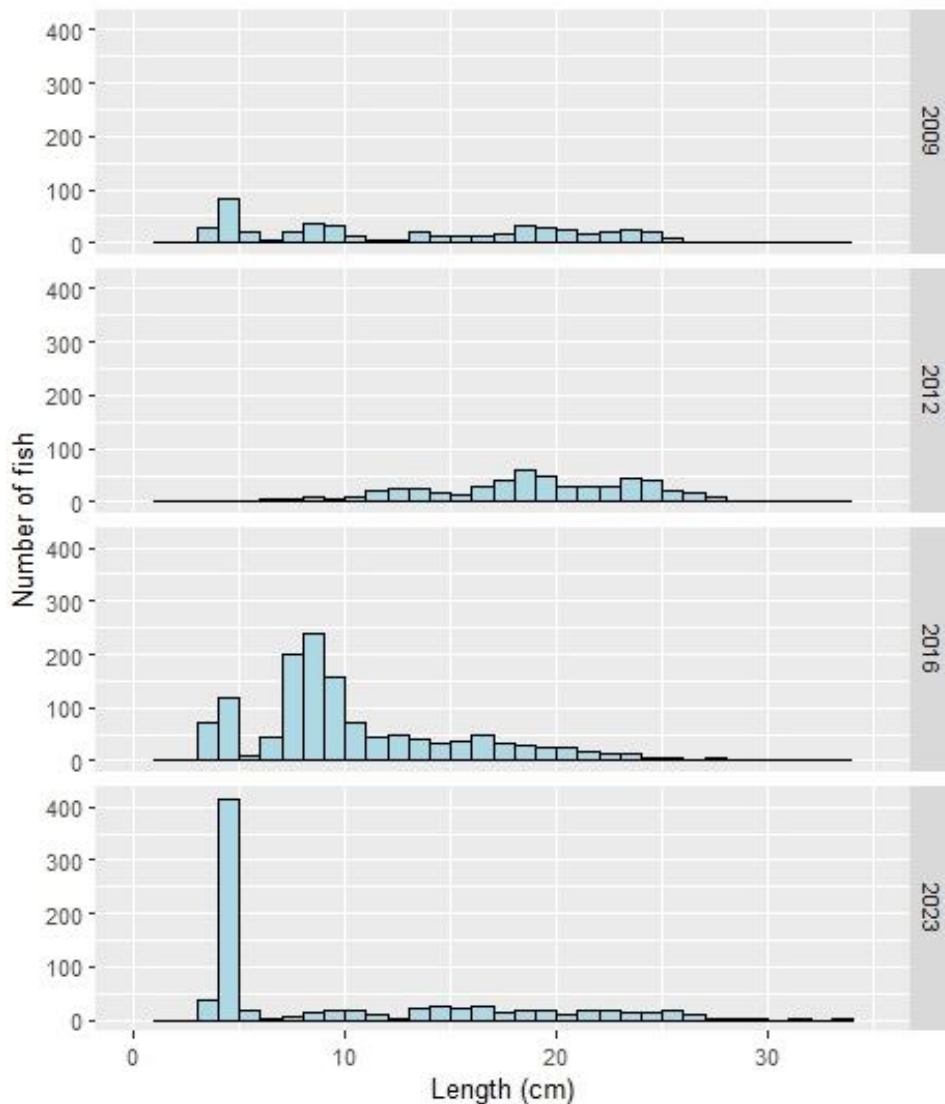


Figure 3.1. Length frequency of perch captured on Lough Derg between 2009 and 2023.

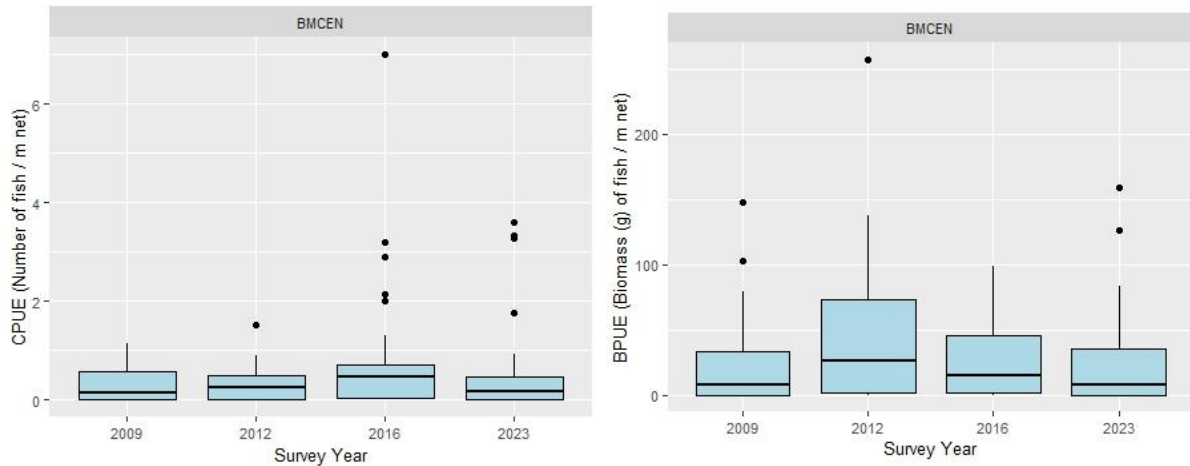


Figure 3.2. CPUE and BPUE of perch captured during surveys of Lough Derg between 2009 and 2023. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots.

Table 3.4. Mean (\pm S.E.) perch length (cm) at age for Lough Derg, June 2023

	L1	L2	L3	L4	L5	L6	L7	L8	L9	L10
Mean	6.0	12.1	17.0	20.4	23.4	25.2	27.2	28.4	-	-
(\pmS.E.)	(0.09)	(0.20)	(0.25)	(0.25)	(0.31)	(0.38)	(1.35)	(2.05)	-	-
N	100	79	51	39	27	13	2	2	1	1
Range	4.2-8.5	8.6-15.7	13.6-20.6	17.1-24.5	19.9-27.1	23.5-27.8	25.9-28.6	26.4-30.5	32.1	32.8

Roach

Roach captured during the 2023 survey ranged in length from 3.5cm to 38.2cm (mean = 14.1cm). While the overall length range has remained relatively constant across all surveys, the population was more heavily dominated by smaller fish (i.e. < 10cm) in 2023 (and to a lesser extent in 2016) than earlier surveys, when these fish were recorded in small numbers (Figure 3.3). Roach were aged between 1+ and 9+ and all intervening age groups were represented in the sample aged (Table 3.5). 1+ (6-8cm) and 2+ (8-15cm) fish were the most abundant cohorts in the population (Figure 3.4, Table 3.5). As with perch, while there were clear differences in the proportion of different size and age cohorts across surveys, no clear trend in population CPUE or BPUE was apparent (Figure 3.4).

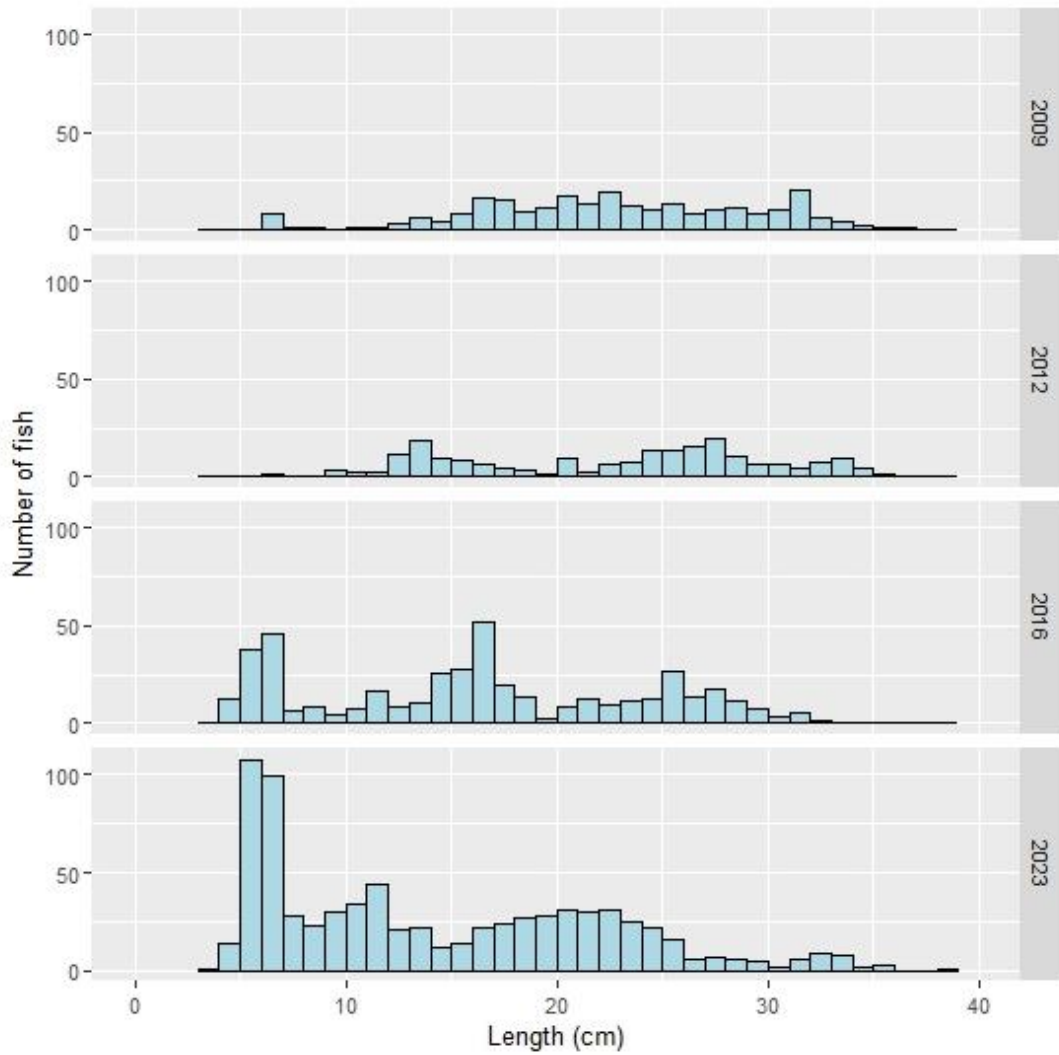


Figure 3.3. Length frequency of roach captured on Lough Derg between 2009 and 2023

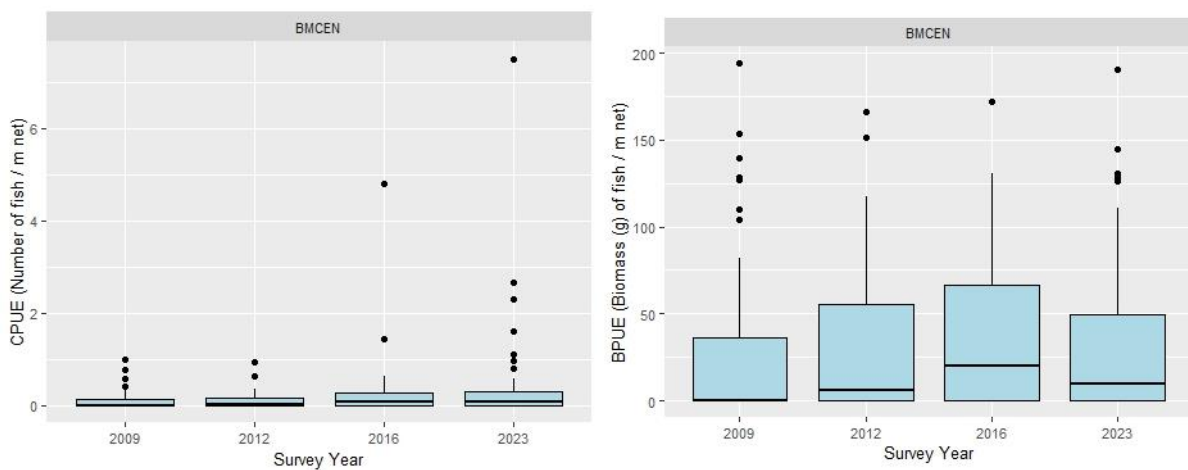


Figure 3.4. CPUE and BPUE of roach captured during surveys of Lough Derg between 2009 and 2023. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots.

Table 3.5. Summary age data from roach captured on Lough Derg, June 2023. Number of fish and length ranges of all fish aged in the sample is presented.

Length (cm)	Age class									
	0+	1+	2+	3+	4+	5+	6+	7+	8+	9+
N	1	4	13	8	6	7	4	2	3	6
Mean	5.5	7.5	11.8	16.7	20.4	22.9	26.0	27.5	29.4	31.4
Min	5.5	6	8.9	14.6	18.8	21.4	24.1	25.7	28.1	26.4
Max	5.5	8.1	15.8	18.2	22.4	24.7	28.6	29.2	31.8	33.1

Tench

Tench captured during the 2023 survey ranged in length from 34.8cm to 54.2cm (mean = 42.7cm). Tench were recorded in only very small numbers on previous sampling occasions (Figure 3.5). In 2023, the majority of tench were captured in the 4PBB nets which were not deployed in previous surveys. However, few tench were recorded in 8PBB nets in 2016 (Kelly *et al.*, 2017) and it is possible that the population of tench has increased. In 2023, tench were aged between 5+ and 9+. Five to seven year old tench dominated the sampled aged (38 - 49cm) (Figure 3.5, Table 3.6).

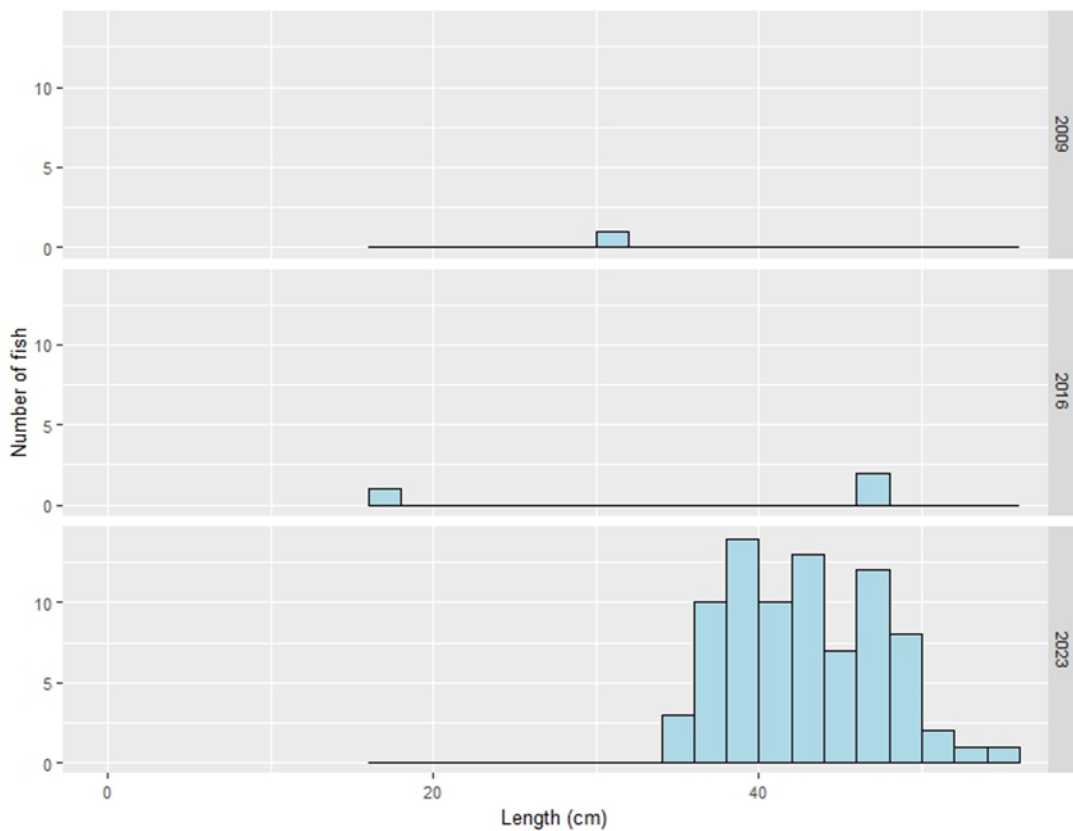


Figure 3.5. Length frequency of tench captured on Lough Derg between 2008 and 2023.

Table 3.6. Summary age data from tench captured on Lough Derg, June 2023. Number of fish and length ranges of all fish aged in the sample is presented.

Length (cm)	Age class									
	0+	1+	2+	3+	4+	5+	6+	7+	8+	9+
N	-	-	-	-	-	9	6	6	-	1
Mean	-	-	-	-	-	38.1	43.1	47.1	-	54.2
Min	-	-	-	-	-	36.3	42	41	-	54.2
Max	-	-	-	-	-	40.8	45.1	49.1	-	54.2



Plate 3.1 Setting a survey gill net on Lough Derg, June 2023

Roach x bream hybrids

Roach x bream hybrids captured during the 2023 survey ranged in length from 15.2cm to 42.3cm (mean = 34.4cm). The overall length range and distribution has remained relatively stable across all sampling occasions, with the population dominated by larger fish (i.e. > 30cm). However, the number of roach x bream hybrids has apparently decreased since the earlier surveys of the lake (Figure 3.6). Roach x bream hybrids were aged between 4+ and 19+. In common with previous surveys the roach x bream population was dominated by older fish. In 2023, all age cohorts from 4+ to 13+ were present in the sample aged in 2023 (Table 3.7). Fish aged between 8+ to 13+ dominated the population.

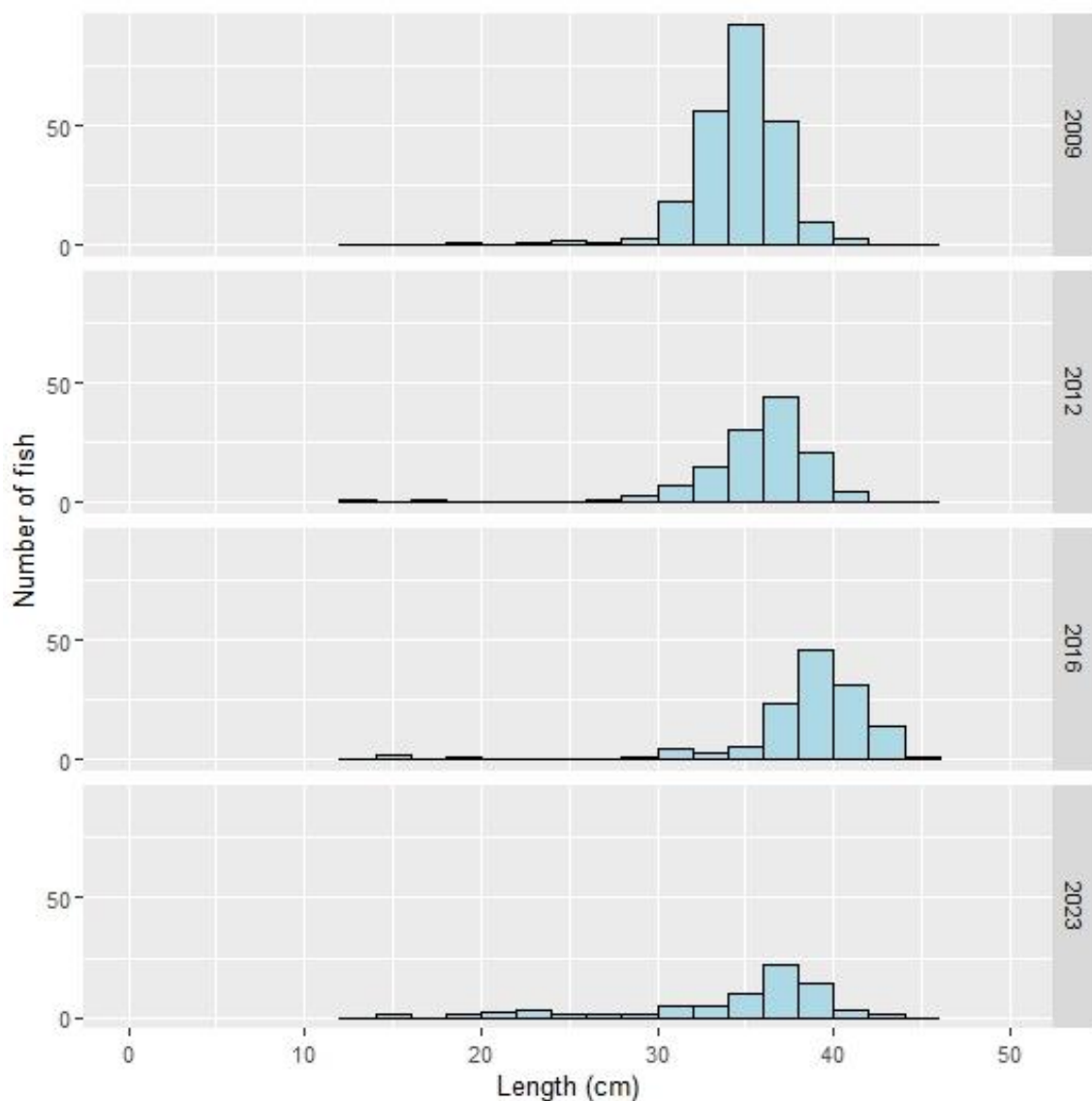


Figure 3.6. Length frequency of roach x bream hybrids captured on Lough Derg between 2009 and 2023.

Table 3.7. Summary age data from roach x bream hybrids captured on Lough Derg, June 2023. Number of fish and length ranges of all fish aged in the sample is presented.

Length (cm)	Age class										
	0+	1+	2+	3+	4+	5+	6+	7+	8+	9+	10+
N	-	-	-	-	1	1	2	4	9	11	4
Mean	-	-	-	-	15.2	20.5	28.5	32.3	34.9	35.1	36.5
Min	-	-	-	-	15.2	20.5	25.3	27.3	29.7	30.2	35.5
Max	-	-	-	-	15.2	20.5	31.6	38.2	38	38.5	38
Length (cm)	Age class										
	11+	12+	13+	14+	15+	16+	17+	18+	19+		
N	7	1	8	-	1	-	-	-	1		
Mean	36.4	37.5	39.7	-	41.2	-	-	-	41.2		
Min	35.3	37.5	38.1	-	41.2	-	-	-	41.2		
Max	37.4	37.5	42.3	-	41.2	-	-	-	41.2		

Brown trout

Brown trout captured during the 2023 survey ranged in length from 15.0cm to 67.1cm (mean = 28.9cm). Brown trout captured in previous surveys had similar length and age ranges. While generally dominated by smaller fish, much larger trout (> 30cm) have been captured regularly (Figure 3.7). Brown trout were aged between 1+ and 9. Mean L1 (i.e. length at the end of the 1st year) was 7.3cm (Table 3.8). All age groups, with the exception of 5+ and 7+ fish were recorded, with good persistence of older and larger individuals (Table 3.8).

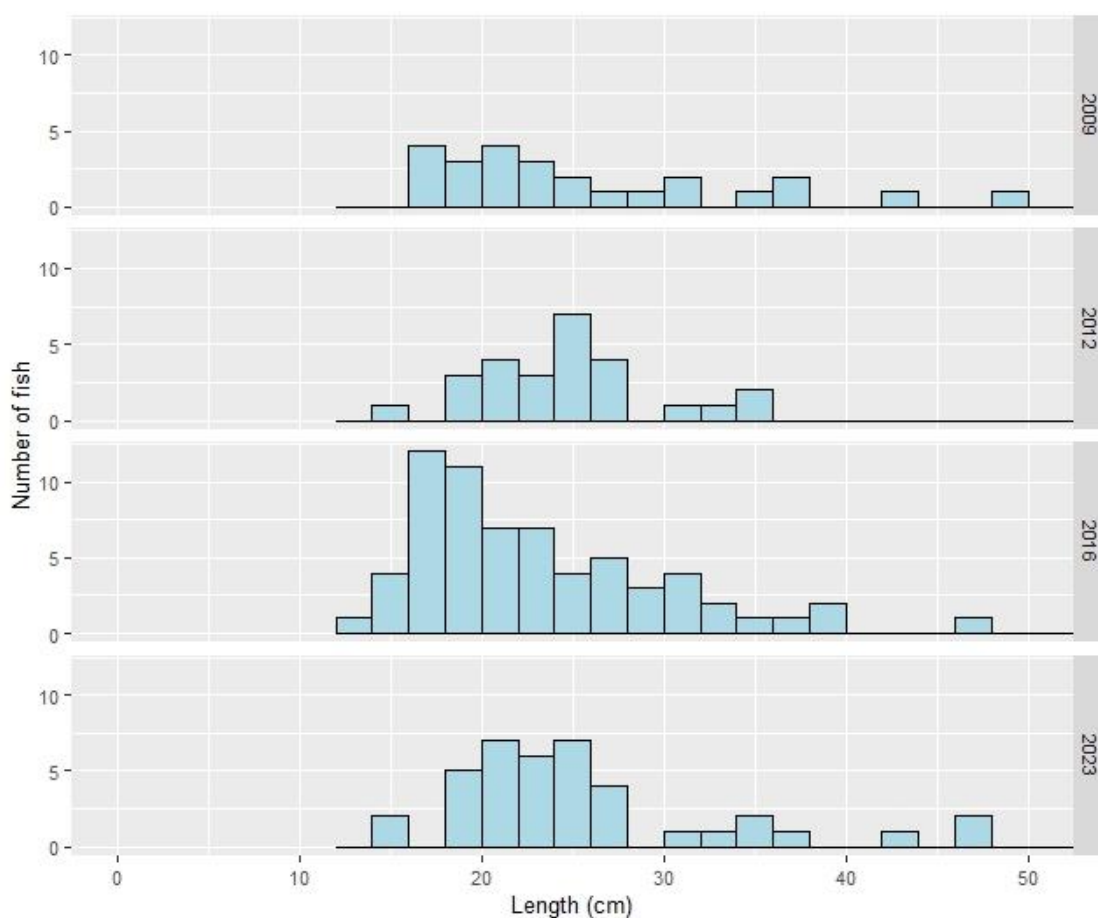


Figure 3.7. Length frequency of brown trout captured on Lough Derg between 2009 and 2023.

Table 3.8. Mean (\pm S.E.) brown trout length (cm) at age for Lough Derg, June 2023

	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	L ₈
Mean (\pmS.E.)	7.3 (0.68)	14.0 (1.01)	21.8 (2.18)	29.8 (2.58)	33.2 (0.43)	40.7 (0.30)	-	-
N	15	15	8	5	2	2	1	1
Range	3.8-14.0	7.6-20.2	14.1-31.1	24.2-37.7	32.8-33.7	40.4-41.0	48.8	56.9

No clear trend in fish population status was apparent, although floating nets typically recorded higher abundance (CPUE) and biomass (BPUE) across all surveys (Figure 3.8a). In an effort to reduce statistical variation, catch data from CEN nets within discrete depth zones were pooled and each depth zone (including floating nets) was treated as a separate sampling unit. This approach also indicates that the brown trout population in the lake is relatively stable. The reduction in median CPUE and BPUE (horizontal line on the box) for 2023 is possibly driven by the restricted depth distribution of brown trout in the lake (i.e. principally in depths of 3-6m, with trout absent from several depth zones) in that year (Figure 3.8ba).

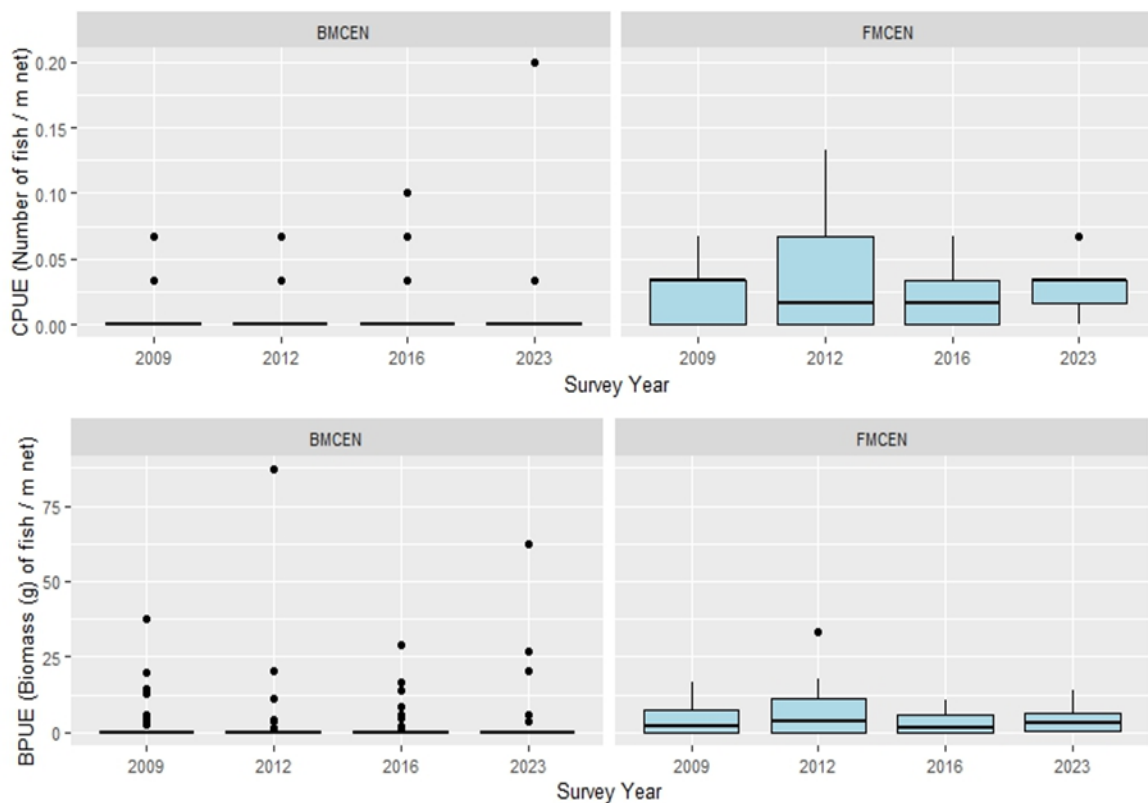


Figure 3.8a. CPUE and BPUE of brown trout captured during surveys of Lough Derg between 2009 and 2023. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots.

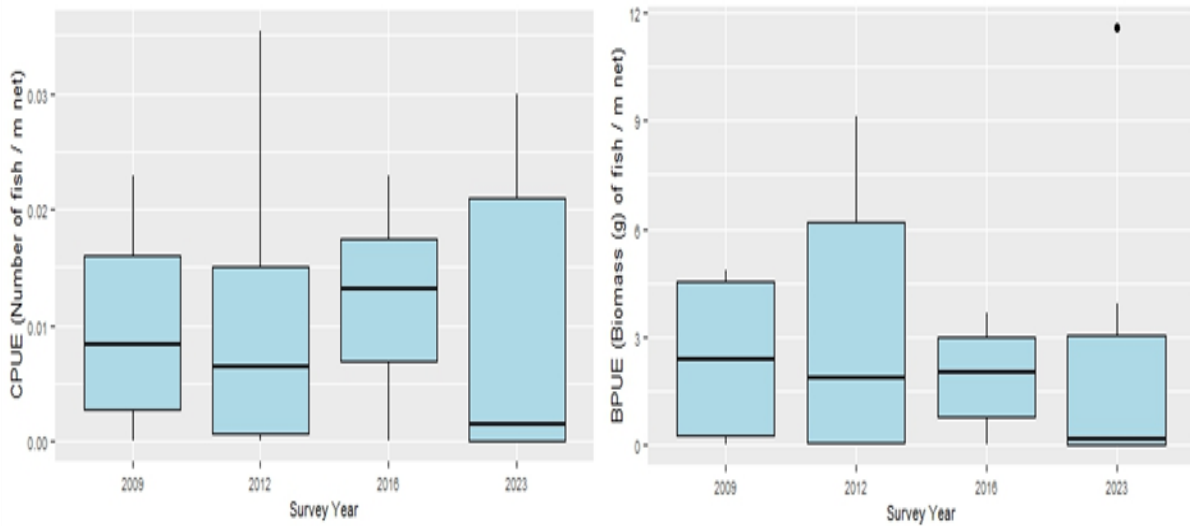


Figure 3.8b. CPUE (number of fish captured per linear meter of net deployed) of brown trout captured in benthic and floating CEN nets during surveys of Lough Derg between 2009 and 2023. Data has been pooled within each depth zone. The horizontal bars represent the median value of the sample, while the 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.

Bream

Bream captured during the 2023 survey ranged in length from 31.1cm to 44.5cm (mean = 37.2cm) (Figure 3.9). . All of the bream were larger and older individuals, and no small or juvenile bream were captured. Bream were aged between 8+ and 14+, and no one age group dominated the population (Table 3.9). Numbers of bream have fluctuated across all surveys, and no clear trend in population status was apparent. In 2023 all of the fish were captured in the 4PBB nets which target larger bodied fish, and no bream have been recorded in BMCEN nets since 2009 (Figure 3.10)

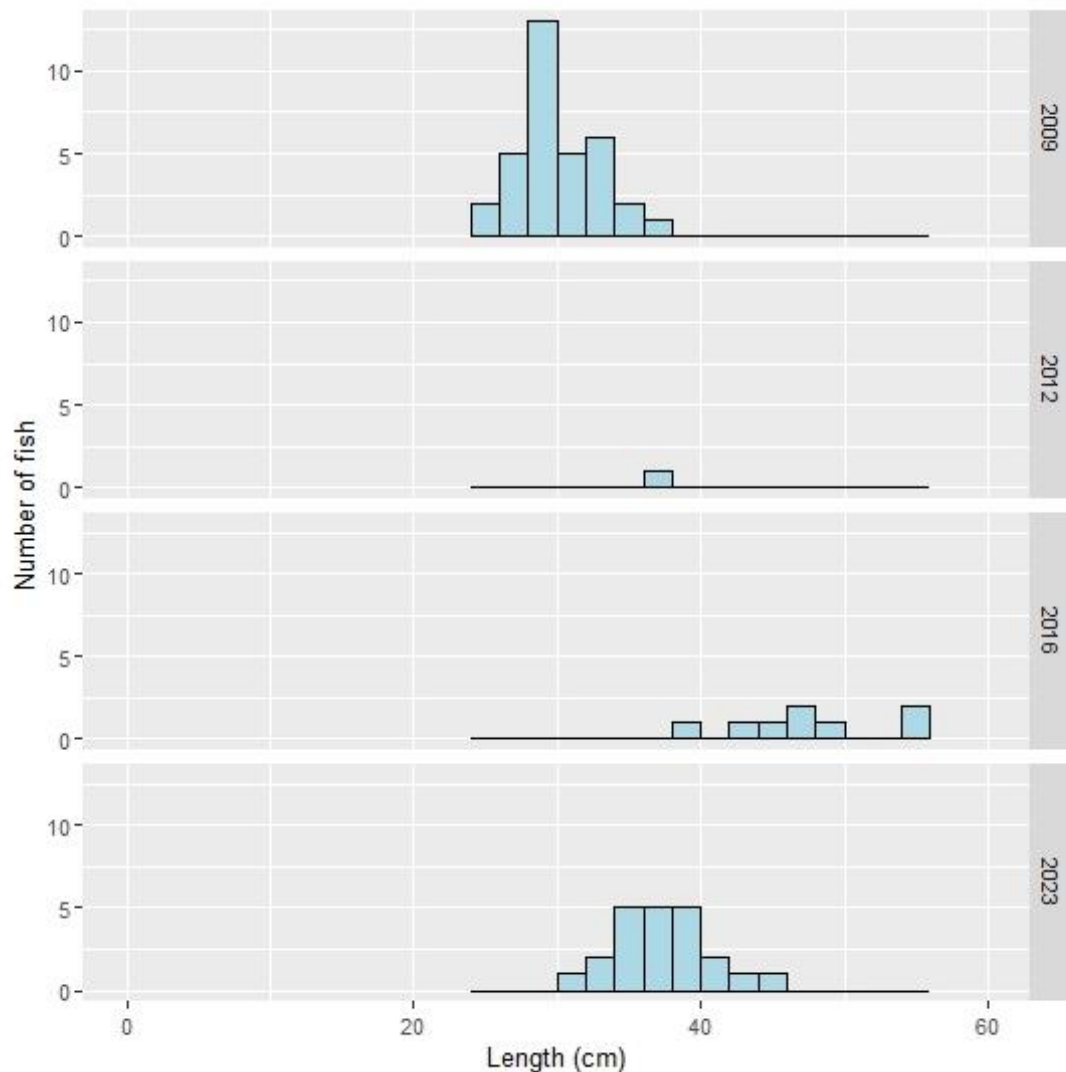


Figure 3.9. Length frequency of bream captured on Lough Derg between 2009 and 2023

Table 3.9. Summary age data from bream captured on Lough Derg, June 2023. Number of fish and length ranges of all fish aged in the sample is presented.

Length (cm)	Age class															
	0+	1+	2+	3+	4+	5+	6+	7+	8+	9+	10+	11+	12+	13+	14+	
N	-	-	-	-	-	-	-	-	3	1	2	4	2	2	1	
Mean	-	-	-	-	-	-	-	-	35.4	35.0	34.3	39.2	43.0	39.4	40.0	
Min	-	-	-	-	-	-	-	-	35	35	31.1	37	41.5	39.3	40	
Max	-	-	-	-	-	-	-	-	36.3	35	37.5	42.6	44.5	39.4	40	

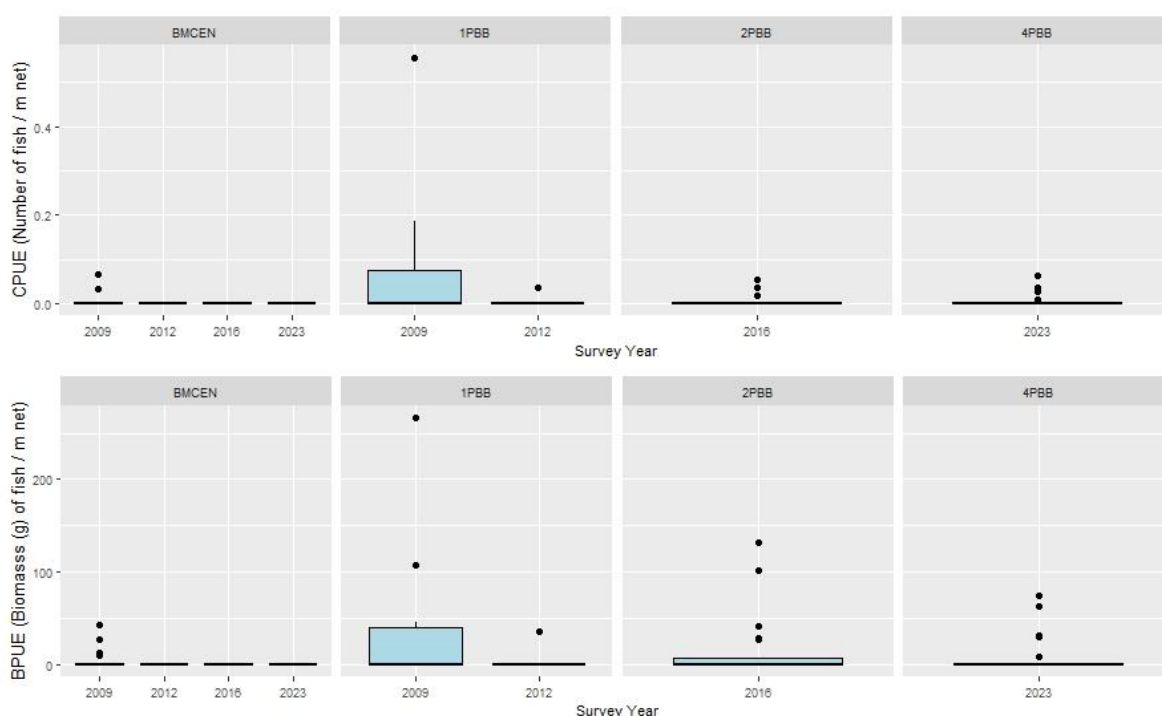


Figure 3.10. CPUE and BPUE of bream captured during surveys of Lough Derg between 2009 and 2023. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots.

Pollan

Pollan captured during the survey ranged from 14.3cm to 29.4 cm (mean = 22.1cm). The majority of these fish (21 of 22) were recorded in the pelagic survey nets. Pelagic sampling differed in 2023 compared to earlier surveys when nets were targeted at areas where pollan were expected to be found following hydroacoustic surveys of the lake. In 2023, pelagic curtains were set randomly at two discrete locations. Therefore no direct comparison of stock size can be inferred. However, the overall length range of pollan captured was similar in 2016 and 2022, although proportionally fewer smaller fish were recorded in 2023 compared to 2016 (Figure 3.11). Pollan in the sample were aged between 1+ and 4+ (Table 3.10). The most abundant age class was 2+ (19-22cm) (Figure 3.11 and Table 3.10).

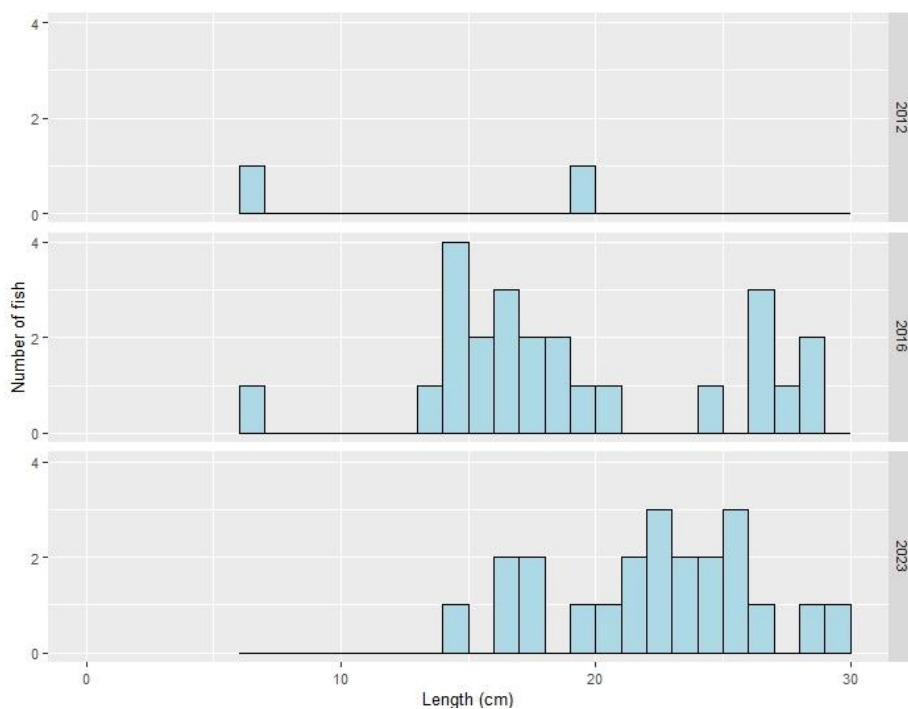


Figure 3.11. Length frequency of pollan captured on Lough Derg between 2009 and 2023. (No pollan were recorded in 2009).

Table 3.10 Summary age data from pollan captured on Lough Derg, June 2023. Number of fish and length ranges of all fish aged in the sample is presented.

Length (cm)	Age class				
	0+	1+	2+	3+	4+
N	-	5	7	4	1
Mean	-	16.3	22.6	25.4	28.2
Min	-	14.3	19.6	25.0	28.2
Max	-	17.4	24.4	26.2	28.2

Pike

Pike captured during the 2023 survey ranged in length from 11.0cm to 87.8cm (mean = 54.0cm). Pike were aged between 2+ and 7+, with considerable variation in the length of fish in each age group (Table 3.11). Five year old fish were not recorded.

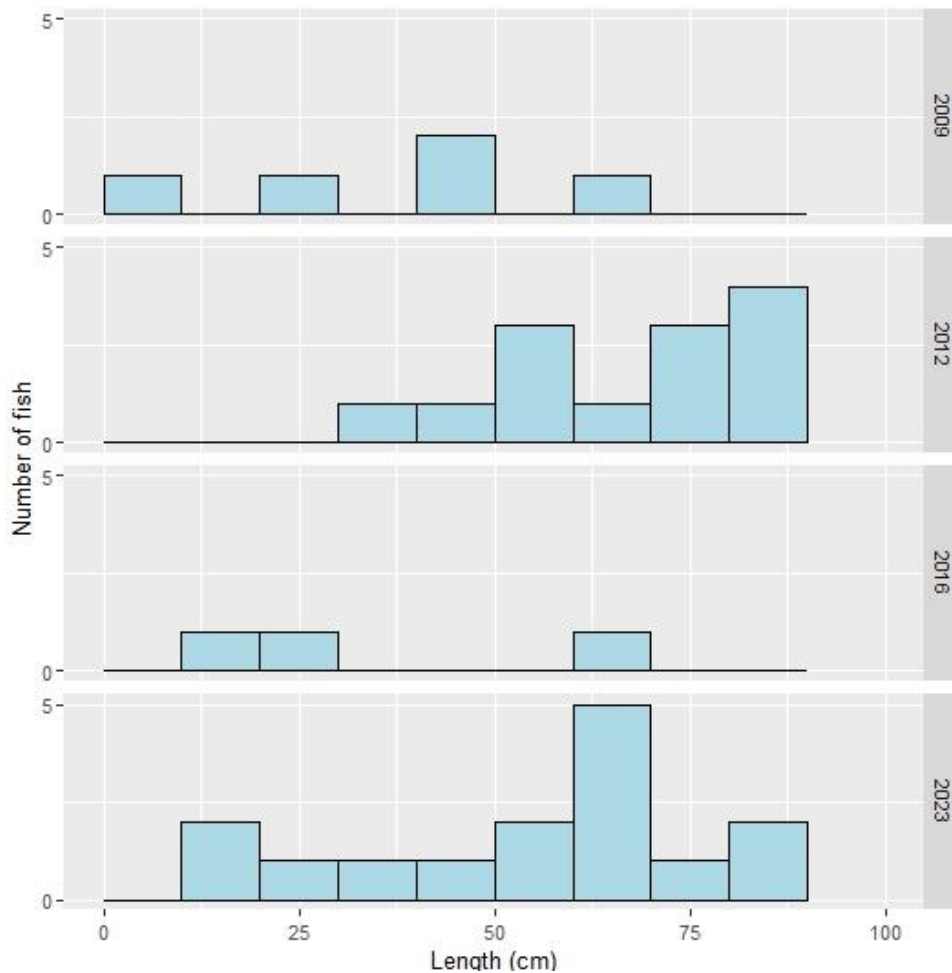


Figure 3.12. Length frequency of pike captured on Lough Derg between 2009 and 2023.

Table 3.11 Summary age data from pike captured on Lough Derg, June 2023. Number of fish and length ranges of all fish aged in the sample is presented.

Length (cm)	Age class							
	0+	1+	2+	3+	4+	5+	6+	7+
N	-	-	2	2	4	-	2	1
Mean	-	-	25.0	36.9	59.8	-	67.7	87.8
Min	-	-	16.4	20.2	40.5	-	65.2	87.8
Max	-	-	33.6	53.6	68.5	-	70.2	87.8

European eel

European eel captured during the 2023 survey ranged in length from 39.6cm to 77.0cm (mean = 55.7cm). While the overall length range has remained relatively stable across all surveys, a greater proportion of larger eels was apparent in 2023 (Figure 3.13). Abundance (CPUE) and biomass (BPUE) of eel were higher in the 2009 compared to all subsequent surveys of the lake (Figure 3.14).

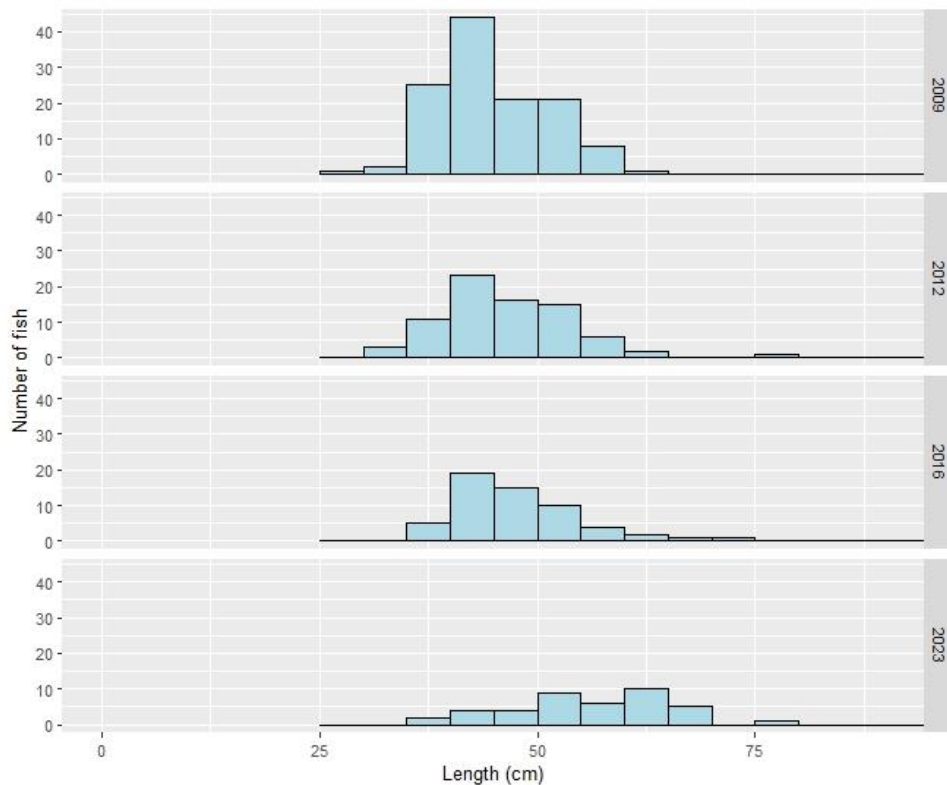


Figure 3.13. Length frequency of European eel captured on Lough Derg between 2009 and 2023

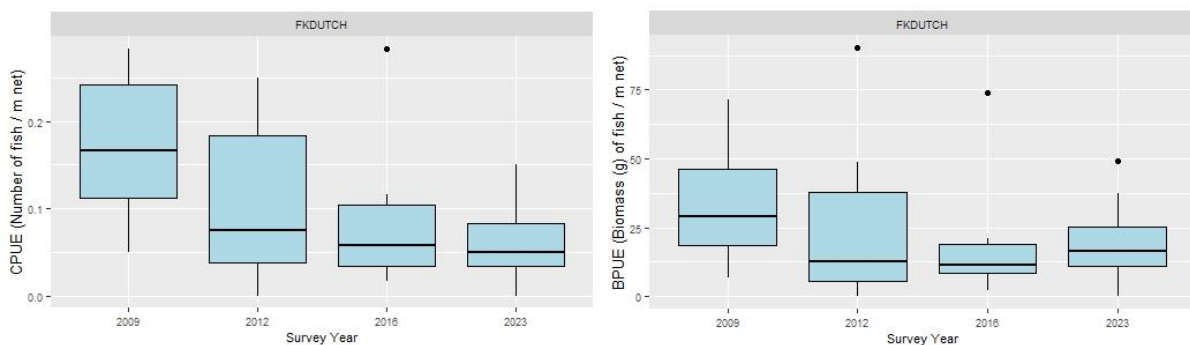


Figure 3.14. CPUE and BPUE of European eel captured during surveys of Lough Derg between 2009 and 2023. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots.

3.4. Stomach and diet analysis

The dietary analysis conducted provides insight to the prey of examined fish immediately prior to capture. Longer term and seasonal studies provide a more robust assessment of fish diet. The stomach contents of a subsample of perch, Brown trout and pike captured during the survey were examined and are presented below.

Perch

A total of 100 perch stomachs were examined. Fifty stomachs contained food. Invertebrates were the sole prey type recorded in thirty (60%) stomachs and were found together with fish in nine stomachs (18%). Fish was the sole prey type recorded in eight (16%) stomachs. Unidentified digested material was recorded in three (6%) fish (Figure 3.15).

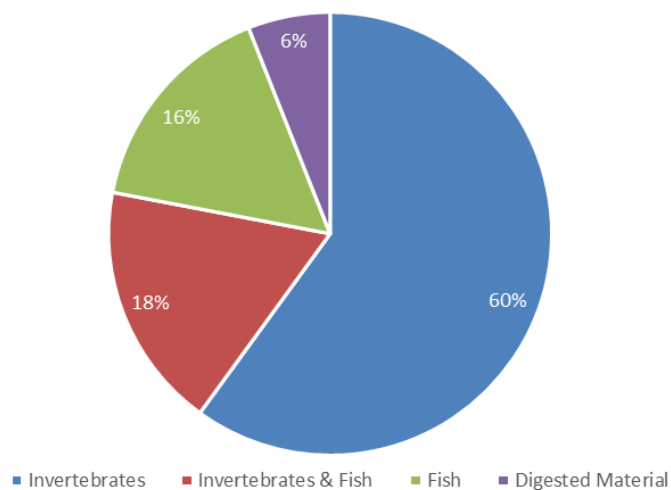


Figure 3.15. Diet of perch (N = 50) captured on Lough Derg, 2023 (% FO).

Brown trout

A total of twenty-eight brown trout stomachs were examined. Of these, twenty-five (89.3%) were empty. Of the brown trout stomachs that contained food, all three contained invertebrates.

Pike

Nine pike stomachs were examined. Of these, four (44%) were empty. Of the five stomachs containing food, fish was the sole prey item recorded in four (80%) stomachs. Both fish and invertebrates were found in the stomach of the fifth pike. Fish species recorded in pike stomach included, perch, roach, stickleback and pollan.

4. Summary and fish ecological status

A total of eight fish species and one cyprinid hybrid were recorded in Lough Derg in June 2023. Perch and roach were the dominant species in terms of abundance (CPUE) while roach had the highest biomass (BPUE) captured in the standard survey gill nets during the 2023 survey. In the pelagic survey, while perch were again the most abundant species captured, biomasses of brown trout, pollan and roach were all higher than perch.

Populations of the two most abundant species (i.e. perch and roach) appear to be relatively stable. While some difference in year class strength is apparent between surveys, recruitment in both species appears to be relatively stable.

Tench were recorded in much greater numbers in 2023 compared to earlier surveys which may indicate that the population of this species is increasing in the lake.

There was an apparent decline in the roach x bream hybrid population. In common with previous surveys of the lake the population was dominated by larger and older individuals. The bream population was also dominated by larger and older fish. Hybridization between roach and bream requires spawning between both parent species (Hayden *et al.*, 2010). The dominance of older cohorts may suggest that recruitment to both bream and hybrid populations may have been limited in recent years. However, roach x bream hybrids were similarly dominated by older individuals in previous surveys and it is possible that recruitment to the lake is supplemented from elsewhere in the catchment.

The brown trout population on the lake appears to be relatively stable. In common with previous surveys of the lake, brown trout were captured in greater numbers in the surface gill nets set in open water habitats.

Pollan are restricted to five lakes on the island of Ireland and Lough Derg is one of three lakes on the Shannon which supports a population of this species (Harrison *et al.*, 2012). While it is difficult to infer change in population size due to differing survey methods, more pollan were recorded in 2023 and 2016 compared to earlier surveys. While recruitment continues (evidenced by the continued presence of several year groups including 1 year old fish) the relative lack of fish smaller than 20cm compared to earlier surveys of the lake may suggest that recruitment has decreased in recent years. Reduced numbers of smaller pollan were also captured in Lough Ree in 2022 compared to earlier surveys of that lake (McLoone *et al.*, 2022).

Classification and assigning lakes with an ecological status is a critical part of the WFD monitoring programme. It allows for the identification and prioritisation of 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 (ecological Quality Ratio) values for each lake and associated confidence in classification (Kelly *et al.*, 2012).

Using the FIL2 classification tool, Lough Derg has been assigned an ecological status of Good for 2023 based on the fish populations present. Lough Derg was previously assigned a status of Poor (2009 and 2012) and Moderate in 2016 (Figure 4.1).

In the 2016 to 2021 surveillance monitoring reporting period, the EPA assigned Lough Derg an overall ecological status of Moderate, based on all monitored physio-chemical and biological elements, including fish (EPA 2021).

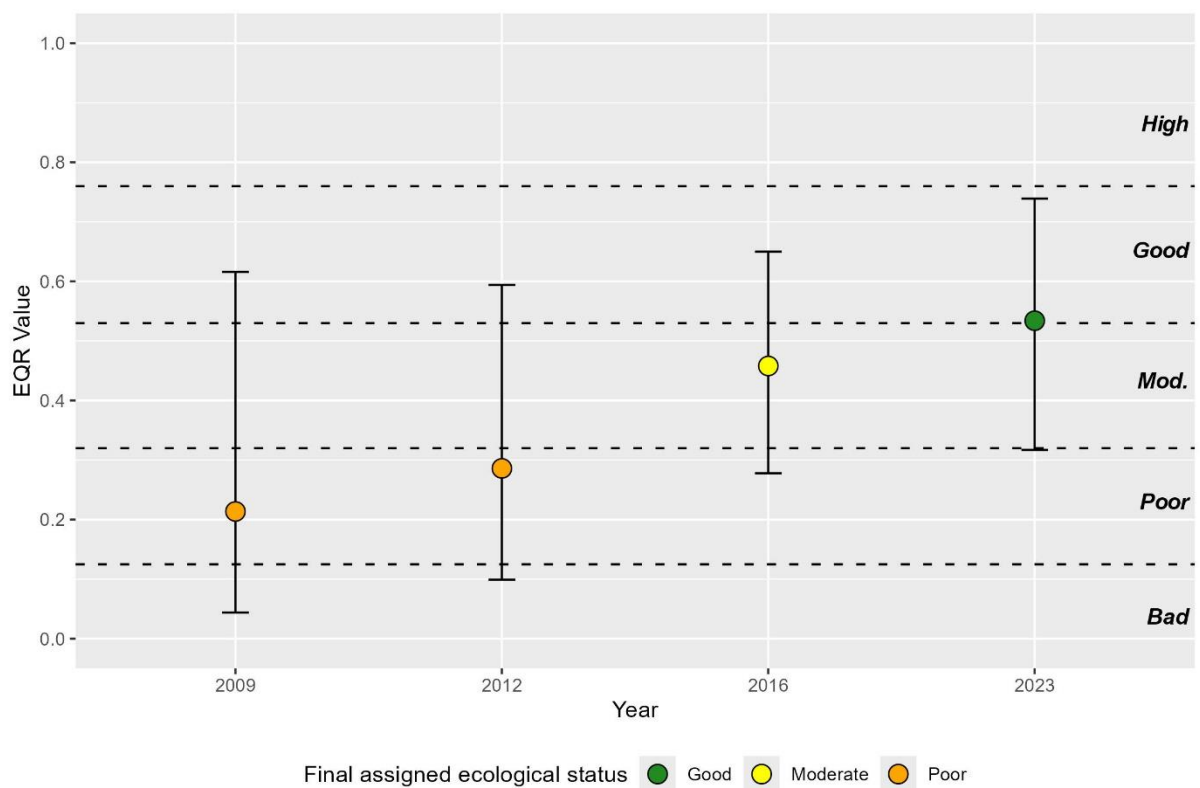


Figure 4.1. Fish ecological status on Lough Derg, between 2009 and 2023 (dashed line indicates EQR status boundaries).

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