



Sampling Fish for the Water Framework Directive

Lakes 2012

Lough Gur



Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Lough Gur, September 2012

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1.1 Introduction

Lough Gur is located within the River Maigue catchment approximately 20km south-east of Limerick city, north of Bruff in Co. Limerick (Plate 1.1, Fig. 1.1). It has a surface area of 78ha, a mean depth of 2.4m and a maximum depth of 5.0m. The lake is categorised as typology class 10 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. shallow (<4m), greater than 50ha and high alkalinity (>100mg/l CaCO₃). The lake catchment is relatively small and limited to surface run-off from surrounding hills. It is described as a eutrophic lake with consistently high levels of phosphorus (King and O' Grady, 1994; Lough Gur EMS, 2009). Lough Gur and the surrounding area is internationally and nationally important for migrant wildfowl species and has been designated as a Natural Heritage Area and a Wildfowl Sanctuary (Lough Gur EMS, 2009).

The lake and the adjoining Red Bog possess a diverse range of terrestrial and aquatic habitats for both flora and fauna. The flora of the lake was surveyed in 1989 (King and O' Grady, 1994) and was composed mainly of Hornwort sp. (*Ceratophyllum* sp.) and Fennel pondweed (*Potamogeton pectinatus*) - indicative of nutrient enriched waters.

The lake was previously surveyed by the Inland Fisheries Trust in March 1978 (IFT, unpublished data) and by IFI (previously the Central Fisheries Board) between December 1988 and October 1989 (King and O' Grady, 1994). These surveys revealed that a relatively large stock of fast growing rudd and pike were present in the lake. The lake was also previously surveyed in September 2009 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al.*, 2010). During this survey, rudd were found to be the dominant species present in the lake. Pike and eels were also captured during the survey.

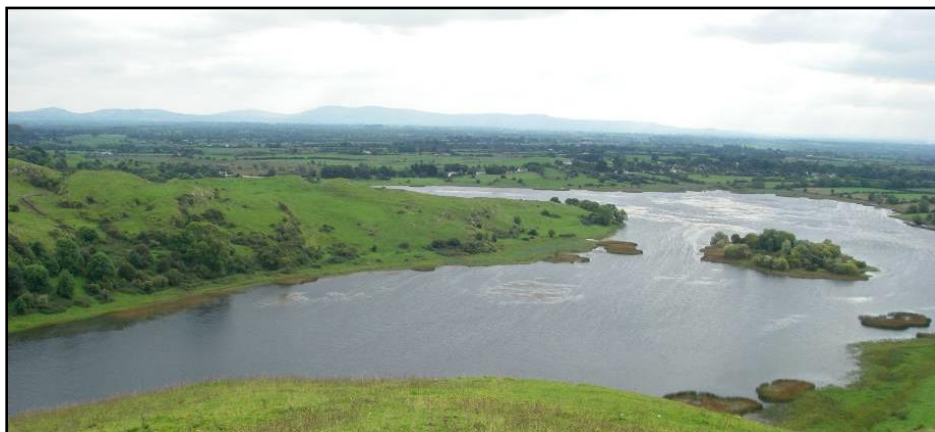


Plate 1.1. Lough Gur

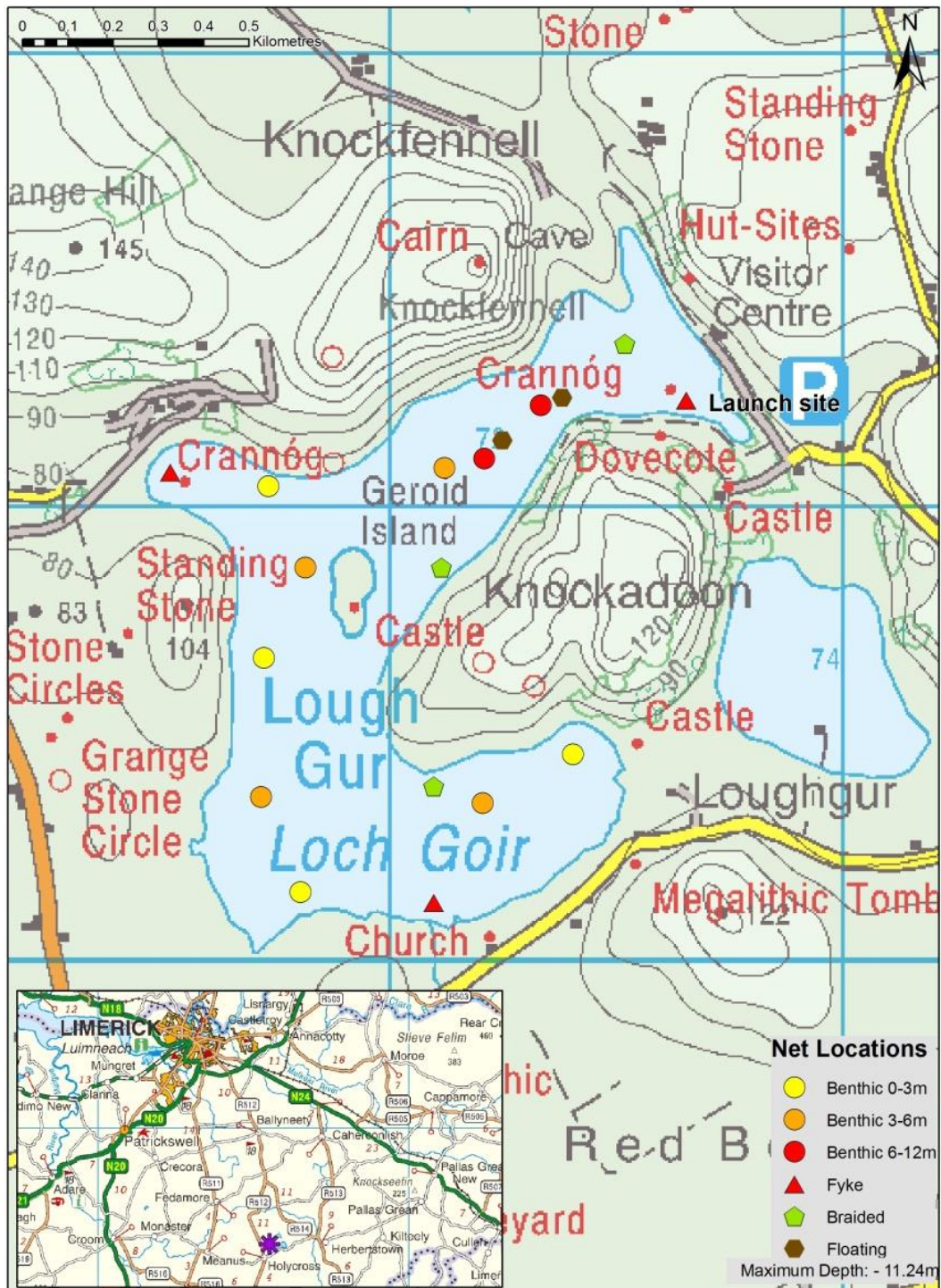


Fig. 1.1. Location map of Lough Gur showing locations and depths of each net

1.2 Methods

Lough Gur was surveyed over two nights between the 17th and the 19th of September 2012. A total of three sets of Dutch fyke nets and ten benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (4 @ 0-2.9m, 4 @ 3-5.9m and 2 @ 6-11.9m) and two surface monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed randomly in the lake (15 sites). The netting effort was supplemented using three benthic braided survey gill nets (62.5mm mesh knot to knot) at three additional sites. Nets were deployed in the same locations as were randomly selected in the previous survey 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 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 returned to the laboratory for further analysis.

1.3 Results

1.3.1 Species Richness

A total of four fish species were recorded on Lough Gur in September 2012, with 180 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Rudd was the most abundant fish species recorded, followed by perch, pike and eels. During the previous survey in 2009 the same species composition was recorded with the exception of perch, 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 Gur, September 2012

Scientific name	Common name	Number of fish captured				Total
		Benthic mono multimesh gill nets	Benthic braided gill nets	Surface mono multimesh gill nets	Fyke nets	
<i>Scardinius erythrophthalmus</i>	Rudd	95	1	41	0	137
<i>Perca fluviatilis</i>	Perch	18	0	12	3	33
<i>Esox lucius</i>	Pike	3	0	1	1	5
<i>Anguilla anguilla</i>	European eel	0	0	1	4	5

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 rudd CPUE was slightly lower in 2012 than in 2009, this difference was not statistically significant (Fig. 1.2).

The differences in the mean rudd CPUE and BPUE between Lough Gur and six similar lakes was assessed, with overall significant differences being found (Kruskal-Wallis, $P < 0.05$) (Fig. 1.4 and Fig. 1.5). Independent-Samples Mann-Whitney U tests between each lake showed that Lough Gur had a significantly higher mean rudd CPUE and BPUE than Lough Arrow ($z = 4.656$, $P < 0.05$ and $z = 4.61$, $P < 0.05$), Lough Bunny ($P < 0.05$), Lough Cullaun ($P < 0.05$), Dromore Lough ($P < 0.05$), Inchicronan Lough ($P < 0.05$) and Muckanagh Lough ($P < 0.05$).

The mean rudd BPUE was considerably lower in 2012 than in 2009 and this difference was statistically significant (Mann-Whitney, $P < 0.05$) (Fig. 1.3).

The differences in the mean perch CPUE and BPUE between Lough Gur and three similar lakes was assessed, with no overall significant differences being found (Fig. 1.6 and Fig. 1.7).

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

Scientific name	Common name	2009	2012
Mean CPUE			
<i>Scardinius erythrophthalmus</i>	Rudd	0.267 (0.045)	0.261 (0.072)
<i>Perca fluviatilis</i>	Perch	-	0.038 (0.021)
<i>Esox lucius</i>	Pike	0.022 (0.006)	0.007 (0.003)
<i>Anguilla anguilla</i>	European eel	0.044 (0.011)	0.024 (0.022)
Mean BPUE			
<i>Scardinius erythrophthalmus</i>	Rudd	135.713 (25.684)	34.838 (10.456)
<i>Perca fluviatilis</i>	Perch	-	1.852 (1.018)
<i>Esox lucius</i>	Pike	3.056 (1.212)	1.718 (1.387)
<i>Anguilla anguilla</i>	European eel	24.755 (8.182)	14.318 (13.069)

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

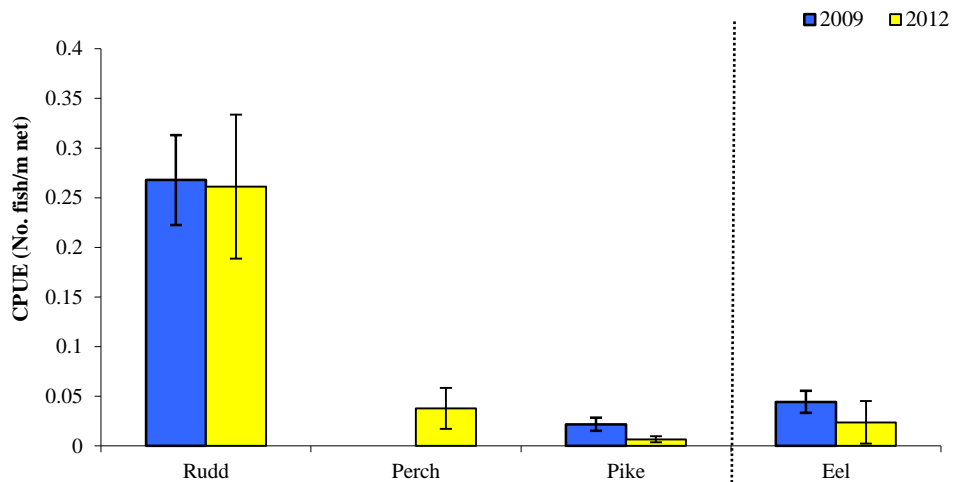


Fig. 1.2. Mean (\pm S.E.) CPUE for all fish species captured in Lough Gur (Eel CPUE based on fyke nets only), 2009 and 2012

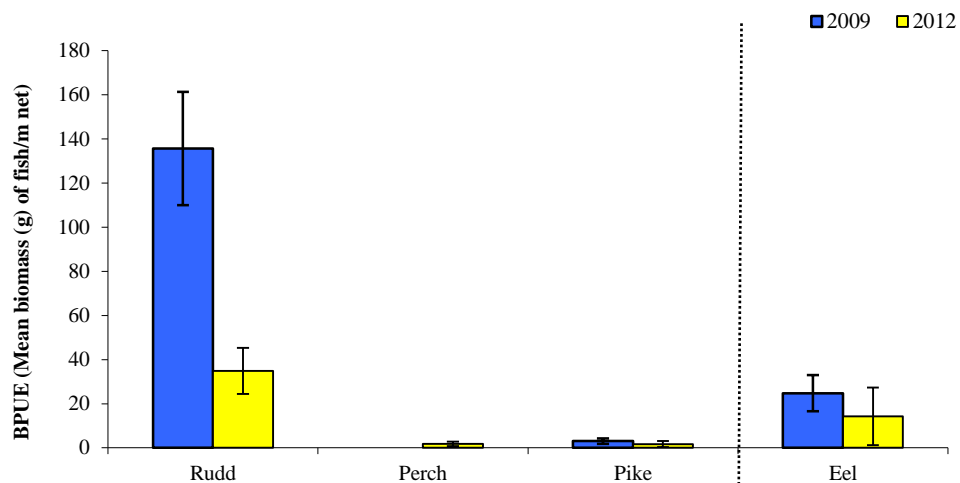


Fig. 1.3. Mean (\pm S.E.) BPUE for all fish species captured in Lough Gur (Eel BPUE based on fyke nets only), 2009 and 2012

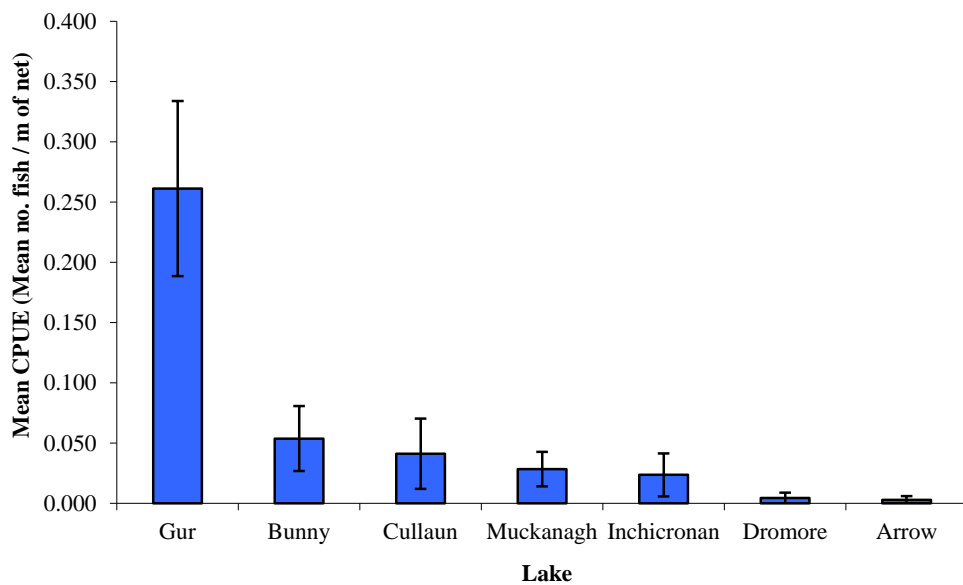


Fig. 1.4. Mean (\pm S.E.) ruddy CPUE in seven lakes surveyed during 2012

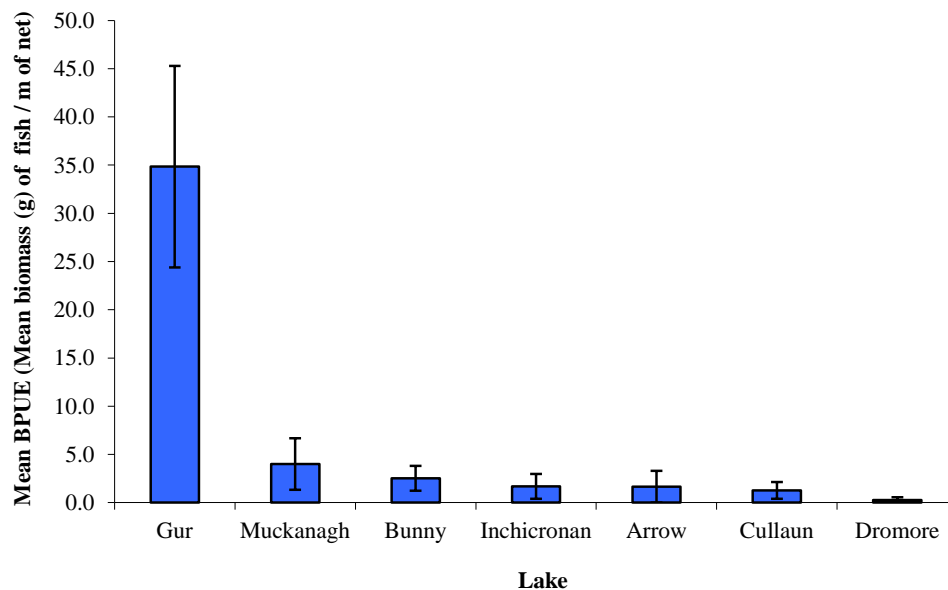


Fig. 1.5. Mean (\pm S.E.) rudd BPUE in seven lakes surveyed during 2012

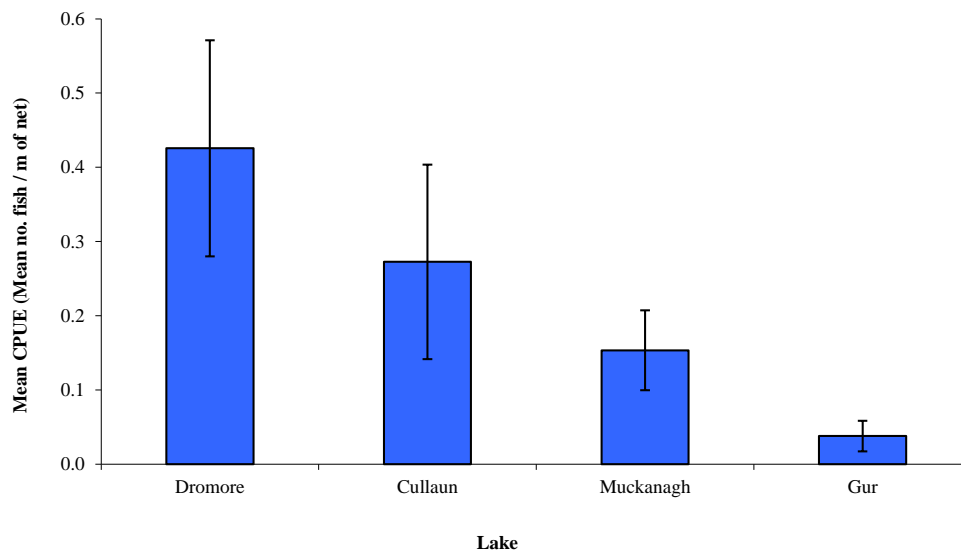


Fig. 1.6. Mean (\pm S.E.) perch CPUE in four lakes surveyed during 2012

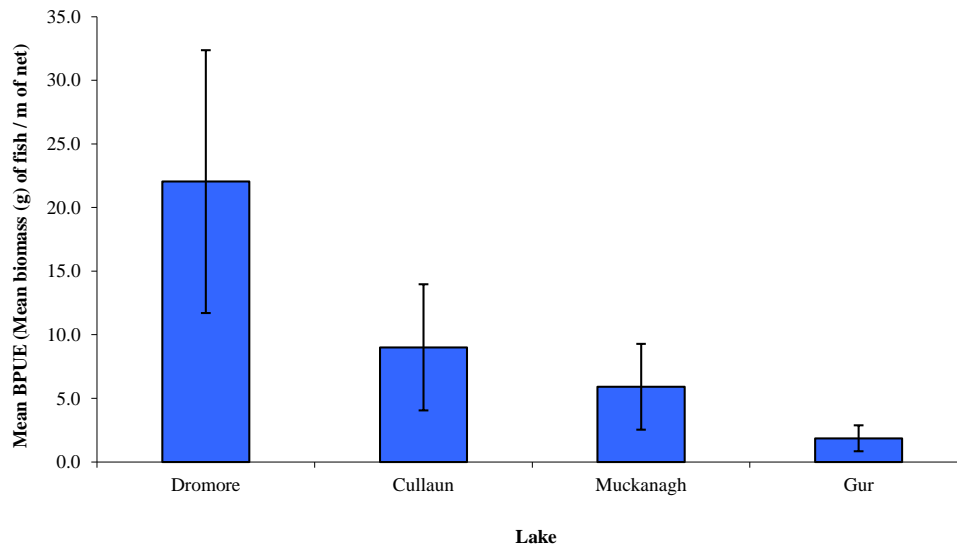


Fig. 1.7. Mean (\pm S.E.) perch BPUE in four lakes surveyed during 2012

1.3.3 Length frequency distributions

Rudd captured during the 2012 survey ranged in length from 5.5cm to 35.9cm (mean = 14.9cm) (Fig. 1.6). Rudd captured during the 2009 survey ranged in length from 6.0cm to 37.5cm (Fig. 1.6).

Perch were captured during the 2012 survey and ranged in length from 9.4cm to 20.6cm (mean = 12.3cm) (Fig. 1.7).

Pike captured during the 2012 survey ranged in length from 18.5cm to 47.0cm and eels ranged in length from 39.1cm to 79.4cm.

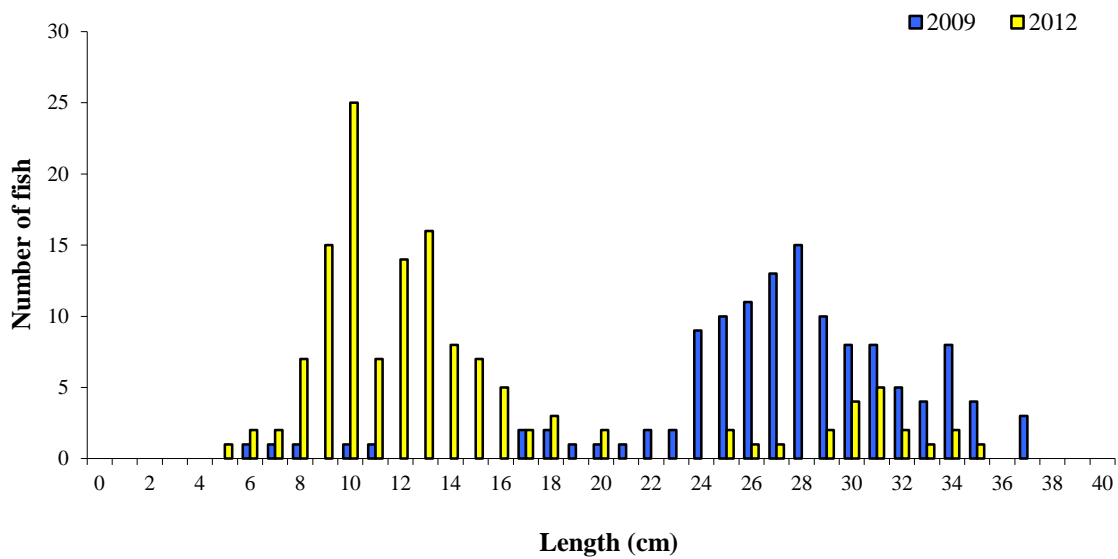


Fig. 1.6. Length frequency of rudd captured on Lough Gur, 2009 and 2012

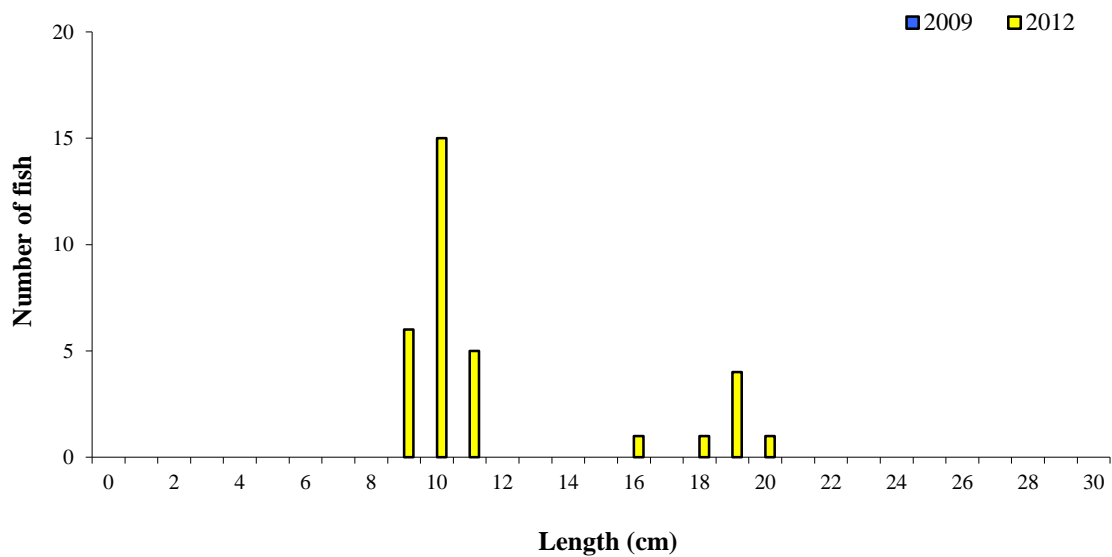


Fig. 1.7. Length frequency of perch captured on Lough Gur, 2009 and 2012

1.3.4 Fish age and growth

Ten age classes of rudd were present, ranging from 0+ to 16+, with a mean L1 of 3.7cm (Table 1.3). The dominant age class was 1+ (Fig. 1.6). In the 2009 survey, rudd ranged from 1+ to 16+ with a mean L1 of 3.6cm.

One age class of perch was present, 1+, with a mean L1 of 8.1cm (Table 1.4). In the 2009 survey, no perch were recorded.

Pike were aged at 0+ and 2+. In the 2009 survey, pike ranged from 0+ to 1+.

Table 1.3. Mean (\pm SE) rudd length (cm) at age for Lough Gur, September 2012

	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀	L ₁₁	L ₁₂	L ₁₃	L ₁₄	L ₁₅	L ₁₆
Mean	3.7 (0.1)	8.4 (0.2)	14.9 (0.7)	20.2 (0.7)	24.8 (0.7)	27.6 (0.7)	29.0 (0.7)	28.6 (1.7)	26.5	29.5	30.9	32.1	33.4	34.3	34.9	35.6
N	73	59	21	18	16	15	14	3	1	1	1	1	1	1	1	1
Range	1.6- 6.1	4.9- 12.6	8.7- 20.5	12.5- 25.0	16.6- 28.8	19.6- 31.4	22.1- 33.3	25.3- 30.7	26.5- 26.5	29.4- 29.4	30.9- 30.9	32.1- 32.1	33.4- 33.4	34.3- 34.3	34.9- 34.9	35.6- 35.6

Table 1.4. Mean (\pm SE) perch length (cm) at age for Lough Gur, September 2012

	L ₁
Mean	8.1 (0.3)
N	24
Range	5.6-10.8

1.4 Summary

Rudd was the dominant species in terms of abundance (CPUE) and biomass (BPUE) captured in the survey gill nets.

Although the mean rudd CPUE in Lough Gur was slightly lower in 2012 than in the 2009 survey, this difference was not statistically significant. However, the mean rudd BPUE was significantly lower in 2012 than in 2009. The mean rudd CPUE and BPUE in Lough Gur was significantly higher than Lough Arrow, Lough Bunny, Lough Cullaun, Dromore Lough, Inchicronan Lough and Muckanagh Lough, other similar lakes surveyed. Rudd ranged in age from 0+ to 16+, indicating reproductive success in ten of the previous seventeen years. The dominant age class was 1+.

The mean perch CPUE and BPUE in Lough Gur was similar to the other lakes assessed during 2012, with no statistically significant differences being found between lakes. Perch were recorded for this first time and were all aged at 1+.

Perch were not recorded in the lake during earlier fish stock surveys carried out by Inland Fisheries Ireland (IFT unpublished data, King and O' Grady, 1994 and Kelly *et al.*, 2010), therefore this is a new record of perch for this lake. The reason for the introduction and source of the perch is unknown. Anglers often transfer fish from water body to water body without any authorisation in the hope of improving their local angling amenity. However the unregulated movement of fish by anglers from one water body to another contravenes current Inland Fisheries Ireland policy and the Fish Health Regulations (S.I. No 261 of 2008). Legislation is also in place preventing the movement of live roach from one water to another (Bye-Law No. 561, 1973, Transfer of Live Roach). Unauthorised movements of fish from water body to water body carry significant risk of disease to resident fish populations in the receiving water. In addition the deliberate spreading of invasive/non-native species by human influence is not consistent with maintaining the natural biodiversity of Irish waters.

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

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Lough Gur 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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