National Research Survey Programme

Lakes 2018

Lough Gur

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Fish Stock Survey of Lough Gur, September 2018

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

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Cover photo: Netting survey on Lough Gur © Inland Fisheries Ireland

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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, 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 are internationally and nationally important for migrant wildfowl species and have 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 plants indicative of nutrient enriched waters, i.e. Hornwort sp. (*Ceratophylum* sp.) and Fennel pondweed (*Potamogeton pectinatus)*.

The lake was previously surveyed by the Inland Fisheries Trust in March 1978 (IFT, unpublished data) and by IFI (previously the Central Fisheries Board) between December 1988 and October 1989 (King and O' Grady, 1994).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 surveyed as part of the Water Framework Directive surveillance monitoring programme in 2009, 2012 and 2015 (Kelly *et al*., 2010, 2013 and 2016). During the 2015 survey, rudd was the dominant species present in the lake followed by perch. Pike and eels were also captured during the survey. Perch were captured in the 2012 and 2015 surveys but were not present in the 2009 survey.

This report summarises the results of the 2018 fish stock survey carried out on the lake.

Plate 1.1. Lough Gur

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

1.2 Methods

1.2.1 Netting methods

Lough Gur was surveyed over two nights from the 26th to the 28th of September 2018. A total of three sets of Dutch fyke nets (Fyke), seven benthic monofilament multi-mesh (BM CEN) (12 panel, 5-55mm mesh size) CEN standard survey gill nets (4 @ 0-2.9m and 3 @ 3-5.9m) were deployed in the lake (10 sites). The netting effort was supplemented using four-panel benthic braided survey gill nets (4-PBB) at four additional sites. The 4-PBB nets are composed of four 27.5m long panels each a different mesh size (55mm, 60mm, 70mm and 90mm knot to knot). 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 practical or 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.

1.2.2 Fish diet

Total stomach contents were inspected and individual items were counted and 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).

$$\%FO_i = (N_i / N) \times 100$$

Where:

$\%O_i$ is the percentage frequency of prey item i,
N_i is the number of a particular species with prey i in their stomach,
N is total number of a particular species with stomach contents.

1.2.3 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.

1.3 Results

1.3.1 Species Richness

A total of four fish species were recorded on Lough Gur in September 2018, with 331 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. Pike and eels were also recorded. During the previous surveys in 2009, 2012 and 2015 the same species composition was recorded, with the exception of perch, which were not captured during the 2009 survey but were recorded during the 2012, 2015 and 2018 surveys (Kelly *et al*., 2010, 2013 and 2016).

Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Gur, September 2018

Scientific name	Common name	Number of fish captured			
		BM CEN	4-PBB	Fyke	Total
Perca fluviatilis	Perch	195	0	19	214
Scardinius erythropthalmus	Rudd	108	0	0	108
Esox lucius	Pike	7	0	1	8
Anguilla anguilla	European eel	0	0	1	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, 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 2018 survey are summarised in Table 1.2.

Perch was the dominant fish species in terms of abundance (CPUE) and rudd was the dominant fish species in terms of biomass (BPUE) captured during the 2018 survey (Table 1.2).

The mean CPUE and BPUE (excluding the 55mm, 70mm and 90mm mesh panel of 4-PBB) for all species captured in the 2009, 2012, 2015 and 2018 surveys are illustrated in Figures 1.2 and 1.3.

The mean perch CPUE and BPUE increased over the four sampling occasions. The mean rudd CPUE was similar in all years, except 2015; however, mean BPUE decreased over the four sampling years (Table 1.2; Fig 1.2 and 1.3).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Gur, September 2018

Scientific name	Common name	Mean CPUE (± S.E) **
Perca fluviatilis	Perch	0.487 (0.162)
Scardinius erythropthalmus	Rudd	0.257 (0.089)
Esox lucius	Pike	0.018 (0.007)
Anguilla anguilla	European eel*	0.006 (0.006)
		**Mean BPUE (± S.E) ** **
Perca fluviatilis	Perch	16.562 (5.803)
Scardinius erythropthalmus	Rudd	24.035 (8.516)
Esox lucius	Pike	10.551 (6.441)
Anguilla anguilla	European eel*	2.561 (2.561)

Note: On the rare occasion 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

**CPUE and BPUE data above for all fish species except eels are not comparable to earlier surveys as extra panels were added to the 1-PBB to provide additional information on large fish.

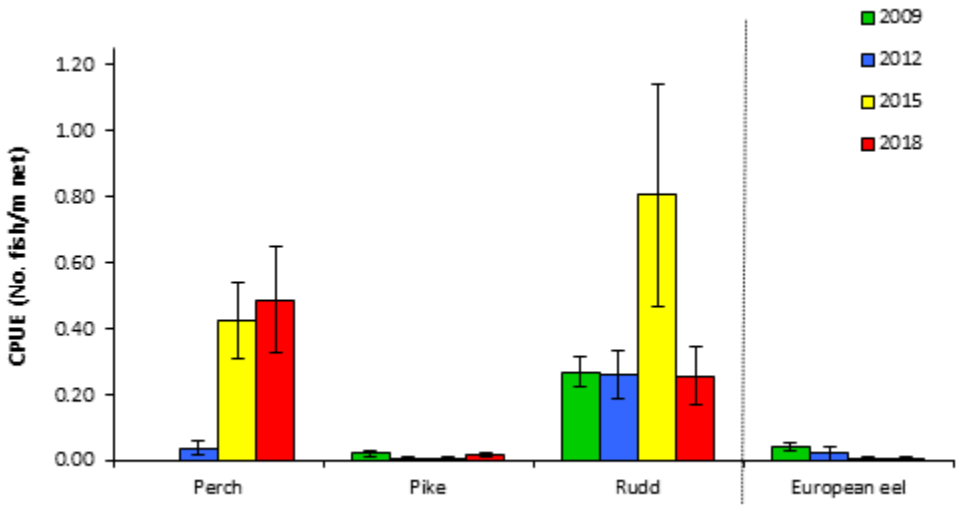

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Lough Gur (Eel CPUE based on fyke nets only), 2009, 2012, 2015 and 2018

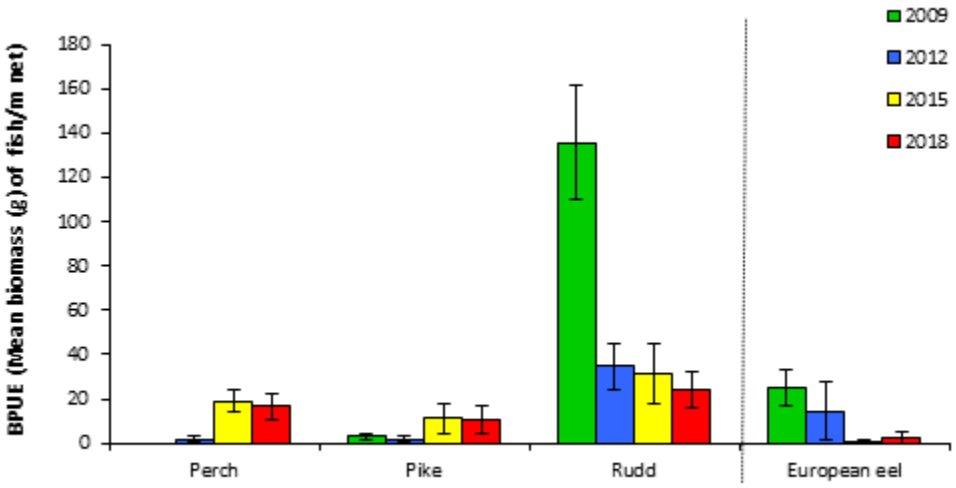

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Lough Gur (Eel BPUE based on fyke nets only), 2009, 2012, 2015 and 2018

1.3.3 Length frequency distributions and growth

Perch

Perch captured during the 2018 survey ranged in length from 5.5cm to 28.0cm (mean = 12.3cm) (Fig.1.4) with seven age classes present, ranging from 0+ to 6+ with a mean L1 of 6.2cm (Table 1.3). Perch captured during the 2015 and 2018 surveys had a smaller length and age range in comparison to fish recorded in the 2012 survey. No perch were recorded in 2009 (Fig.1.4).

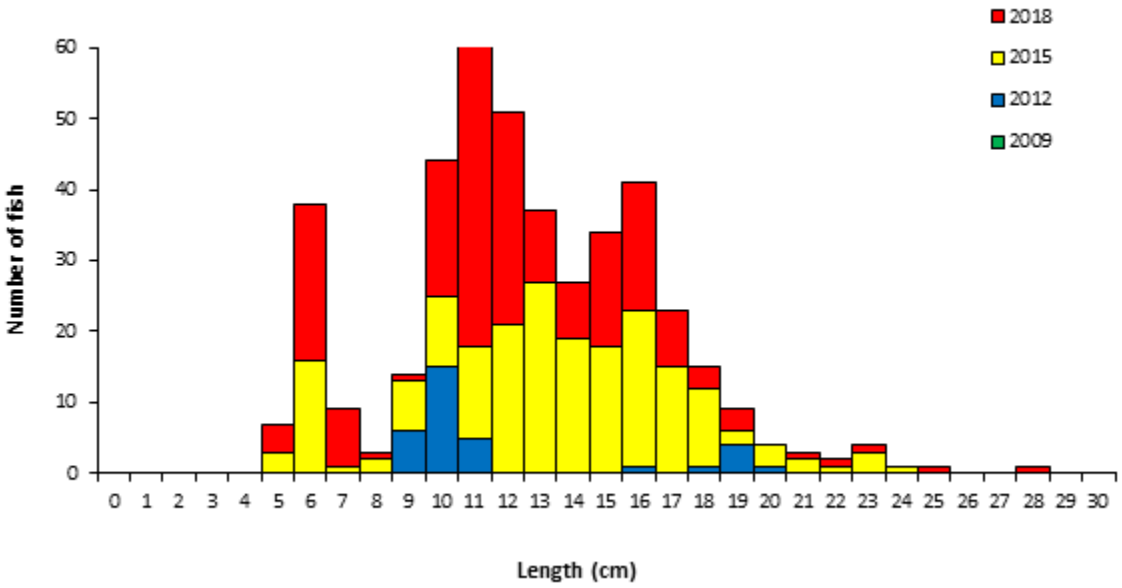

Fig. 1.4. Length frequency of perch captured on Lough Gur, 2009, 2012, 2015 and 2018

Table 1.3. Mean (±S.E.) perch length (cm) at age for Lough Gur, September 2018

	L_1	L_2	L_3	L_4	L_5	L_6
Mean (±S.E.)	6.2 (0.1)	11.5 (0.2)	14.4 (0.5)	17.6 (0.8)	21.2 (1.9)	26.1
N	52	35	7	5	2	1
Range	4.5-8.1	9.2-14.5	12.8-16.9	14.9-19.9	19.3-23.1	26.1-26.1

Rudd

Rudd captured during the 2018 survey ranged in length from 8.6cm to 26.7cm (mean = 15.71cm) (Fig.1.5) with six age classes present, ranging from 1+ to 6+ (Table 1.4). Rudd captured during the 2009, 2012 and 2015 surveys had a similar length and age range, with larger fish captured in the 2009 and 2012 surveys only (Fig.1.5).

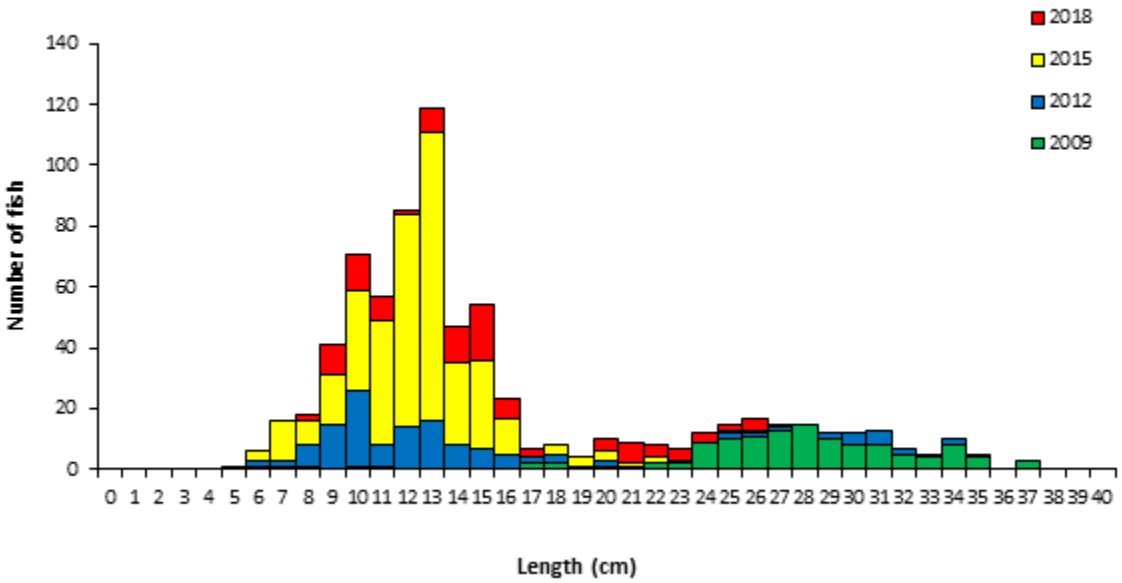

Fig. 1.5. Length frequency of rudd captured on Lough Gur, 2009, 2012, 2015 and 2018

Table 1.4. Summary age data from a sub-sample of rudd captured on Lough Gur, September 2018. Number of fish and length ranges of all fish aged in the sample is presented

	Age class					
	1+	**2+**	**3+**	**4+**	**5+**	**6+**
Mean (cm)	10.2	14.8	15.9	23.2	22.5	24.8
N	16	26	6	1	16	5
Range (cm)	8.6-11.3	12.6-17.2	14.4-17.3	23.2	20.4-25.3	21.8-26.7

Other fish species

One eel was captured during the 2018 survey and was measured at 64.5cm. Pike ranged in length from 12.5cm to 71.2cm.

1.3.4 Stomach and diet analysis

Dietary analysis studies provide a good indication of the availability of food items and the angling methods that are likely to be successful. However, the value of stomach content analysis is limited unless undertaken over a long period as diet may change on a daily basis depending on the availability of food items. The stomach contents of a subsample of perch captured during the survey were examined and are presented below.

Perch

Perch initially start to feed on pelagic zooplankton. Once they reach an intermediate size they start feeding on benthic resources eventually moving on to feed on fish once they are large enough (Hjelm *et al*., 2000). A total of 56 stomachs were examined. Of these 32 were empty. Of the remaining 24 stomachs containing food, 87% contained unidentified digested material and 13% fish (Fig. 1.6).

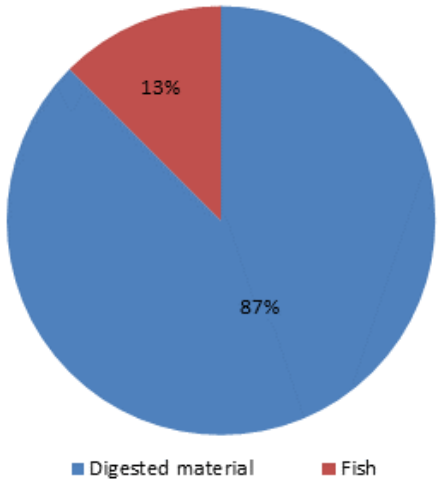

Fig 1.6. Diet of perch (n=24) captured on Lough Gur, 2018 (% FO)

1.4 Summary and ecological status

A total of four fish species were recorded on Lough Gur in September 2018. Perch was the dominant fish species in terms of abundance and rudd was the dominant fish species in terms of biomass captured during the 2018 survey.

Perch captured during the 2018 survey ranged in length from 5.5cm to 28.0cm, with seven age classes present, ranging from 0+ to 6+, indicating reproductive success in each of the previous seven years.

Roach captured during the 2018 survey ranged in length from 8.6cm to 26.7cm, with six age classes present, ranging from 1+ to 6+, indicating reproductive success in six of the previous seven years.

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 Gur has been assigned an ecological status of Moderate for 2018 based on the fish populations present. In previous years the lake was assigned a fish status of Bad for 2009 and Poor for 2012 and 2015.

In the 2010 to 2015 surveillance monitoring reporting period, the EPA assigned Lough Gur an overall ecological status of Poor.

1.5 References

Amundsen, P.A., Gabler H.M., Staldvik F.J. (1996) A new approach to graphical analysis of feeding strategy from stomach contents data—modification of the Costello (1990) method. *Journal of Fish Biology,* **48,** 607–614.

Caffrey, J. (2010) *IFI Biosecurity Protocol for Field Survey Work*. Inland Fisheries Ireland.

Connor, L., Matson R. and Kelly F.L. (2017) Length-weight relationships for common freshwater fish species in Irish lakes and rivers. *Biology and Environment: Proceedings of the Royal Irish Academy,* **117 (2)**, 65-75.

Hjelm, J., Persson, L., and Christensen, B. (2000) Growth, morphological variation and ontogenetic niche shifts in perch (*Perca fluviatilis*) in relation to resource availability. *Oecologia*, **122 (2),** 190-199.

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, NS Share project.

Kelly, F., Harrison A., Connor, L., Matson, R., Morrissey, E., O'Callaghan, R., Wogerbauer, C., Feeney, R., Hanna, G. and Rocks, K. (2010) *Sampling Fish for the Water Framework Directive – Summary Report 2009*. The Central and Regional Fisheries Boards.

Kelly, F.L., Harrison, A.J., Allen, M., Connor, L. and Rosell, R. (2012) Development and application of an ecological classification tool for fish in lakes in Ireland. *Ecological Indicators*, **18**, 608-619.

Kelly, F.L., Connor, L., Morrissey, E., Wogerbauer, C., Matson, R., Feeney, R. and Rocks, K. (2013) *Water Framework Directive Fish Stock Survey of Lough Gur, September 2012*. Inland Fisheries Ireland.

Kelly, F.L., Connor, L., Delanty, K., McLoone, P., Coyne, J., Morrissey, E., Corcoran, W., Cierpial, D., Matson, R., Gordon, P., O' Briain, R., Rocks, K., Walsh, L., O' Reilly, S., O' Callaghan, R., Cooney, R. and Timbs, D. (2016) *Fish Stock Survey of Lough Gur, October 2015*. National Research Survey Programme, Inland Fisheries Ireland.

King, J.J. and O' Grady, M.F. (1994) Aspects of the Limnology of Lough Gur, Co. Limerick. *Irish Fisheries Investigations, Series A (Freshwater)*, **No. 37**, 13pp.

Lough Gur EMS (2009). *Lough Gur Environmental Management Study. Final Report.*

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