

National Research Survey Programme

Lakes 2016

Ross Lake

IFI/2017/1-4366



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**Fish Stock Survey of Ross Lake,
September 2016**

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

CITATION: Kelly, F.L., Connor, L., Coyne, J., Morrissey, E., Corcoran, W., Cierpial, D., Delanty, K., McLoone, P., Matson, R., Gordon, P., O' Briain, R., Rocks, K., O' Reilly, S., Puttharee, D., McWeeney, D., Robson S. and Buckley, S. (2017) Fish Stock Survey of Ross Lake, September 2016. National Research Survey Programme, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

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

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ACKNOWLEDGEMENTS

The authors wish to gratefully acknowledge the help and co-operation of all their colleagues in Inland Fisheries Ireland.

The authors would also like to acknowledge the funding provided for the project from the Department of Communications, Climate Action and Environment for 2016.

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1.1 Introduction

Ross Lake is situated in the Corrib catchment, located approximately 1km south-east of Rosscahill and 3km north-west of Moycullen, Co. Galway in a chain of lakes entering Lough Corrib at Moycullen Bay (Plate 1.1, Fig. 1.1). It has a surface area of 139ha, a mean depth of >4m, a maximum depth of 14m and is categorised as typology class 12 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. deep (>4m), greater than 50ha and high alkalinity (>100mg/l CaCO₃). The lake is a coarse fishery and holds stocks of roach, bream, roach x bream hybrids and pike. The presence of zebra mussels was confirmed in Ross Lake in May 2007 (IFI, pers. comm.).

Ross Lake and the surrounding woodlands have been designated as a Special Area of Conservation (SAC) for containing a hard water lake, a habitat listed on Annex I of the EU Habitats Directive (Council Directive 92/43/EEC) (NPWS, 1999). The SAC also contains a breeding colony of the lesser horseshoe bat (*Rhinolophus hipposideros*), a species listed on Annex II of the same Directive. The woodlands and lakeside vegetation on the site provide foraging habitat within a small radius of the roost site (NPWS, 1999). The underlying geology of the area is limestone, with the main habitat in the SAC being Ross Lake, which has a limestone bed covered by deposits of precipitated marl and a shoreline of marl-encrusted limestone boulders. The lake supports communities of *Chara pedunculata* and *Chara curta*, both of which are characteristic of marl lakes. The rocky limestone shore supports mostly fen-type vegetation characterised by Black Bog-rush (*Schoenus nigricans*). The site also contains otter, a species listed on Annex II of the EU Habitats Directive, and a small colony of common gull. The main land-uses within the site are angling, commercial forestry, and grazing of the woodland and wetland areas (NPWS, 1999).

Ross Lake 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 2013 survey perch were found to be the dominant species present in the lake followed by roach and roach x bream hybrids. Bream, eels and pike were also recorded.



Plate 1.1. Ross Lake

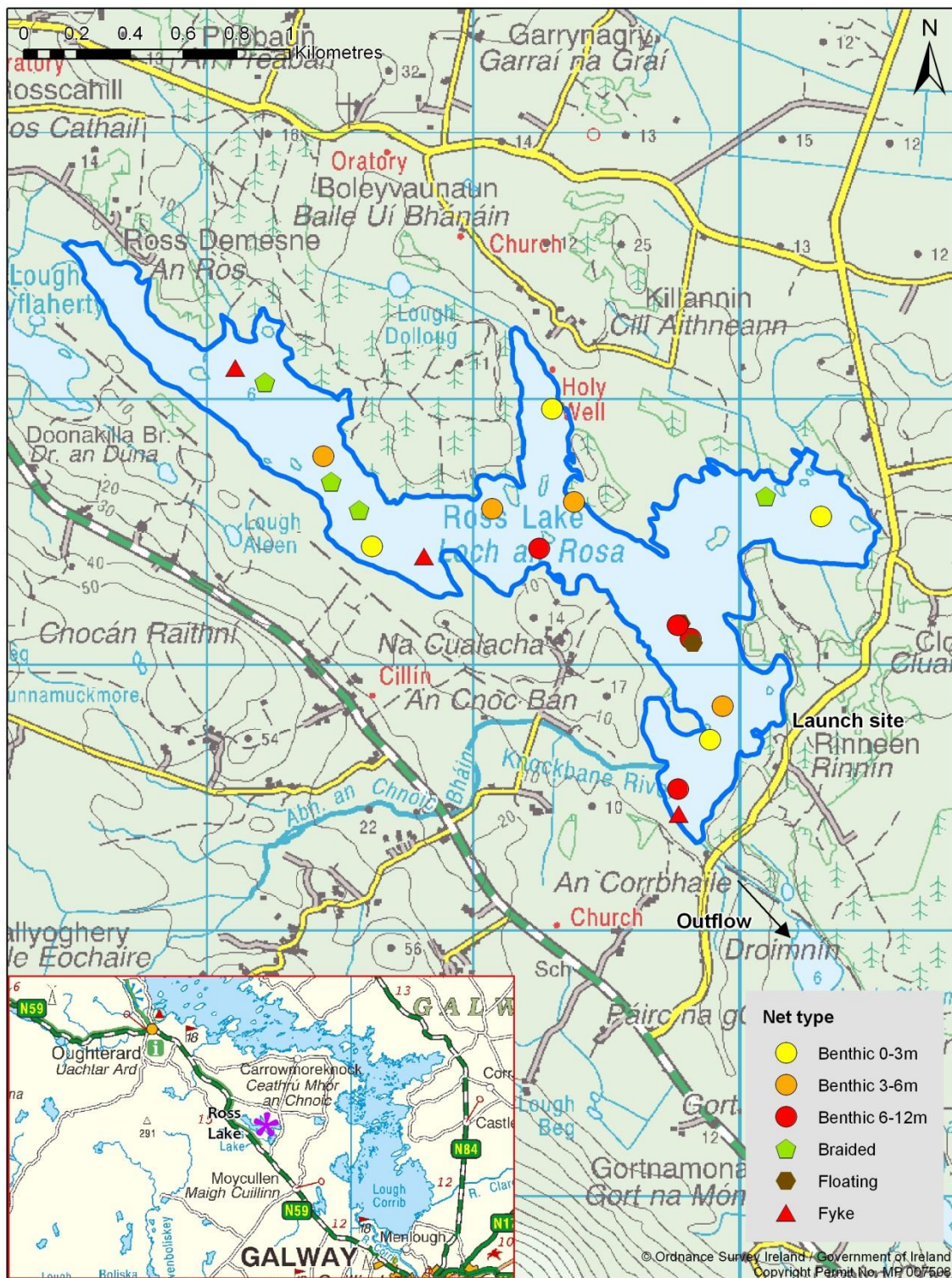


Fig. 1.1. Location map of Ross Lake showing net locations and depths of each net (outflow is indicated on map)



1.2 Methods

1.2.1 Netting methods

Ross Lake was surveyed over two nights from the 13th to the 15th of September 2016. A total of three sets of Dutch fyke nets, 12 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (BM CEN) (4 @ 0-2.9m, 4 @ 3-5.9m and 4 @ 6-11.9m) and two floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (FM CEN) were deployed in the lake (17 sites). The netting effort was supplemented using eight two-panel benthic braided (63.5mm and 88.9mm mesh knot to knot) survey gill nets (2-PBB).

Nets were deployed in the same locations as were randomly selected in the previous survey. A handheld GPS was used to locate 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 bream, roach, roach x bream hybrids 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.

1.2.2 Fish diet

Fish were frozen before being dissected for stomach content analysis in the IFI laboratory. Total stomach contents were inspected and individual items were counted and identified to the lowest taxonomic level possible. The percentage frequency occurrence (%O) of prey items were then calculated to identify key prey items (Amundsen *et al.*, 1996).

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

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 on the IFI NRSP team when moving between water bodies.



1.3 Results

1.3.1 Species Richness

A total of five fish species and one type of hybrid were recorded on Ross Lake in September 2016, with 414 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Roach was the most common fish species recorded, followed by perch and roach x bream hybrids. Bream, pike and eel were also recorded. During the previous surveys in 2007, 2010 and 2013 a similar species composition was recorded (Kelly and Connor, 2007 and Kelly *et al.*, 2011 and 2014).

Table 1.1. Number of each fish species captured by each gear type during the survey on Ross Lake, September 2016

Scientific name	Common name	Number of fish captured				
		2-PBB	BM CEN	FM CEN	Fyke	Total
<i>Rutilus Rutilus</i>	Roach	0	146	24	1	171
<i>Perca fluviatilis</i>	Perch	0	123	0	3	126
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	17	79	3	0	99
<i>Abramis brama</i>	Bream	10	1	0	0	11
<i>Esox lucius</i>	Pike	1	4	0	1	6
<i>Anguilla anguilla</i>	European eel	0	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 2016 survey are summarised in Table 1.2.

The mean CPUE and BPUE (excluding the larger 88.9mm mesh panel) for all species captured in the 2007, 2010, 2013 and 2016 surveys are illustrated in Figure 1.2 and 1.3.

Roach was the dominant fish species in terms of abundance (CPUE) and roach x bream hybrids were the dominant fish species in terms of biomass (BPUE) (Table 1.2).



Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Ross Lake, 2016

Scientific name	Common name	Mean CPUE (\pm S.E) **
<i>Rutilus Rutilus</i>	Roach	0.227 (0.065)
<i>Perca fluviatilis</i>	Perch	0.166 (0.056)
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	0.122 (0.031)
<i>Abramis brama</i>	Bream	0.009 (0.004)
<i>Esox lucius</i>	Pike	0.007 (0.003)
<i>Anguilla anguilla</i> *	European eel*	0.006 (0.006)*
		Mean BPUE (\pm S.E) **
<i>Rutilus Rutilus</i>	Roach	18.769 (6.188)
<i>Perca fluviatilis</i>	Perch	7.010 (2.745)
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	29.333 (7.854)
<i>Abramis brama</i>	Bream	9.216 (4.633)
<i>Esox lucius</i>	Pike	8.670 (3.584)
<i>Anguilla Anguilla</i> *	European eel*	0.018 (0.018) *

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.

*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 an extra panel was added to the 2-PBB to provide additional information on large coarse fish.

Roach

The mean roach CPUE and BPUE fluctuated slightly over the four sampling occasions; however these differences were not statistically significant (Fig 1.2 and 1.3).

Perch

Perch CPUE and BPUE also fluctuated over the four sampling occasions; however these differences were not statistically significant (Fig 1.2 and 1.3).

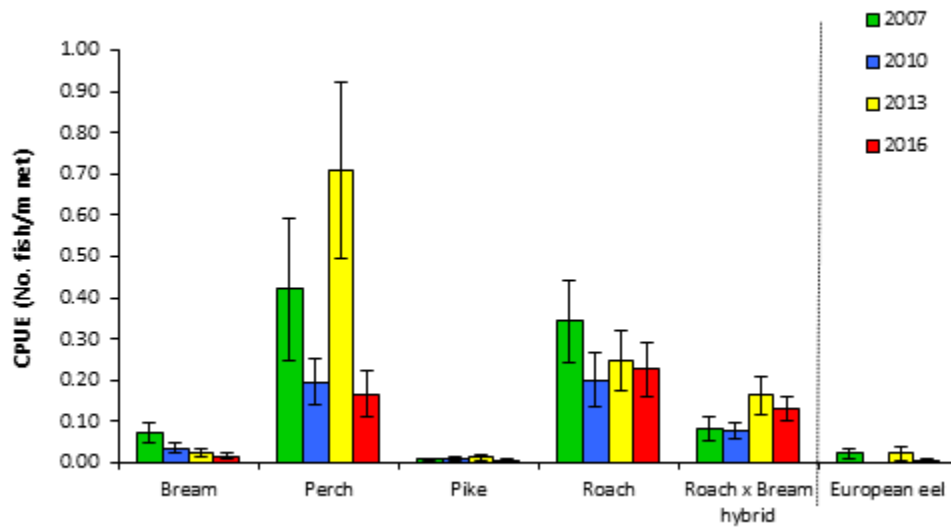


Fig. 1.2. Mean (\pm S.E.) CPUE for all fish species captured in Ross Lake (Eel CPUE based on fyke nets only), 2007, 2010, 2013 and 2016

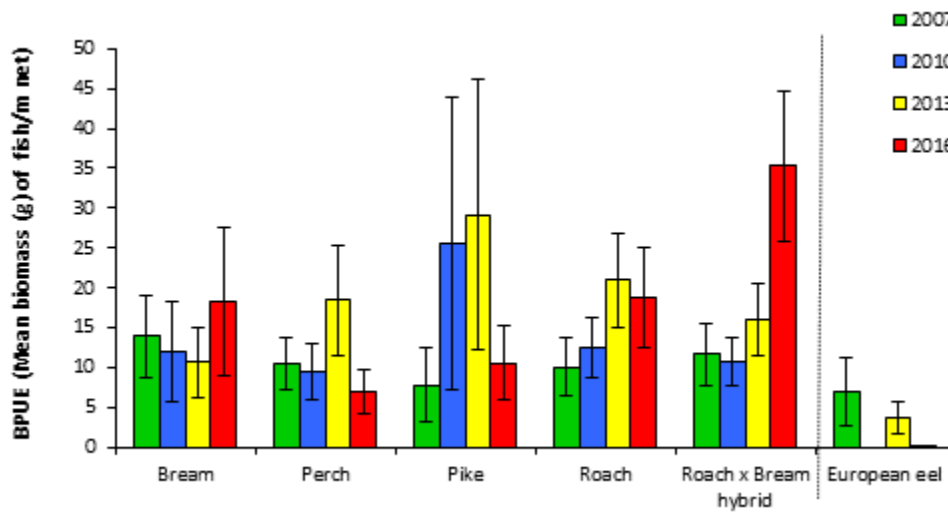


Fig. 1.3. Mean (\pm S.E.) BPUE for all fish species captured in Ross Lake (Eel BPUE based on fyke nets only), 2007, 2010, 2013 and 2016



1.3.3 Length frequency distributions and growth

Roach

Roach captured during the 2016 survey ranged in length from 5.3cm to 30.0cm (mean = 14.9cm) (Fig.1.4) with ten age classes present, ranging from 1+ to 10+ with a mean L1 of 3.1cm (Table 1.3). The dominant age class was 2+ (Fig.1.4). Roach captured during the 2010 and 2013 surveys had a similar length and age range (Fig 1.4).

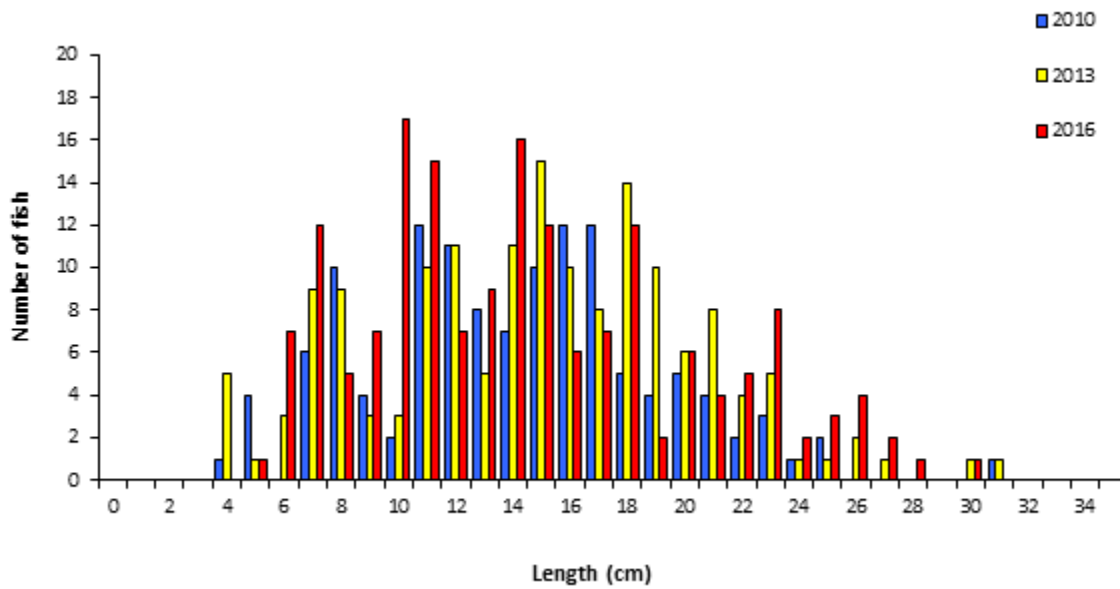


Fig. 1.4. Length frequency of roach captured on Ross Lake, 2010, 2013 and 2016

Table 1.3. Mean (\pm S.E.) roach length (cm) at age for Ross Lake, September 2016

	L ₁	L ₂	L ₃	L ₄	L ₅	L ₆	L ₇	L ₈	L ₉	L ₁₀
Mean	3.1	6.7	10.6	13.7	16.5	18.4	20.2	22.6	24.4	26.0
(\pm S.E.)	(0.1)	(0.2)	(0.2)	(0.3)	(0.4)	(0.5)	(0.4)	(0.6)	(1.1)	
N	63	57	44	32	24	19	16	9	5	1
Range	2.3-4.5	5.4-12.4	8.1-16.8	9.5-16.8	12.2-20.6	14.5-24.0	16.4-22.6	18.5-24.8	20.9-27.4	26.0-26.0



Perch

Perch captured during the 2016 survey ranged in length from 5.0cm to 29.9cm (mean = 12.4cm) (Fig.1.5) with five age classes present, ranging from 0+ to 4+ with a mean L1 of 6.3cm (Table 1.4). The dominant age class was 3+ (Fig. 1.5). Perch captured during the 2010 and 2013 surveys had a similar length, with some larger fish recorded in those years (Fig.1.5); however the age range in the 2010 and 2013 surveys was wider than the 2016 survey (Fig 1.5).

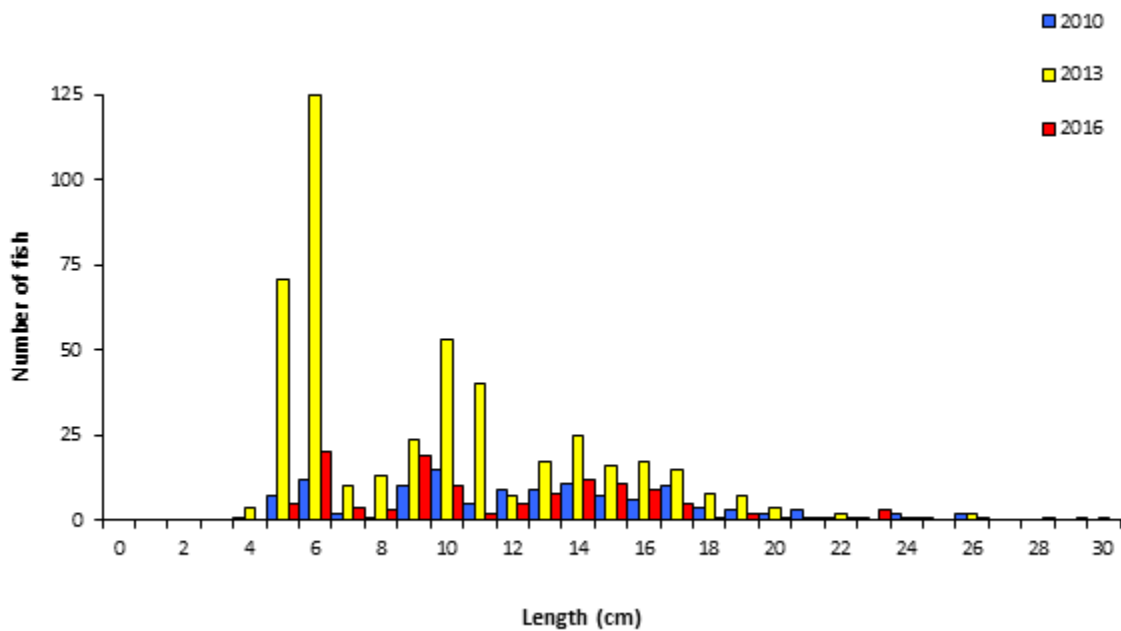


Fig. 1.5. Length frequency of perch captured on Ross Lake, 2010, 2013 and 2016

Table 1.4. Mean (\pm S.E.) perch length (cm) at age for Ross Lake, September 2016

	L ₁	L ₂	L ₃	L ₄
Mean (\pm S.E.)	6.3 (0.2)	11.0 (0.4)	15.2 (0.5)	19.4 (1.4)
N	42	35	26	9
Range	4.7-11.3	8.6-18.1	12.1-22.4	14.5-27.8



Other fish

One eel measuring 70.5cm was captured during the 2016 survey and bream ranged in length from 17.3cm to 49.1cm. Pike ranged from 17.5cm to 67.5cm and roach x bream hybrids ranged from 4.6cm to 49.0cm.

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 begin feeding on benthic resources eventually moving on to feed on fish once they are large enough (Hjelm *et al.*, 2000). A total of 49 stomachs were examined. Of these 18 were found to contain no prey items. Of the remaining 31 stomachs containing food, 48% contained unidentified digested material, 19% fish, 26% zooplankton and 7% invertebrates (Fig. 1.6).

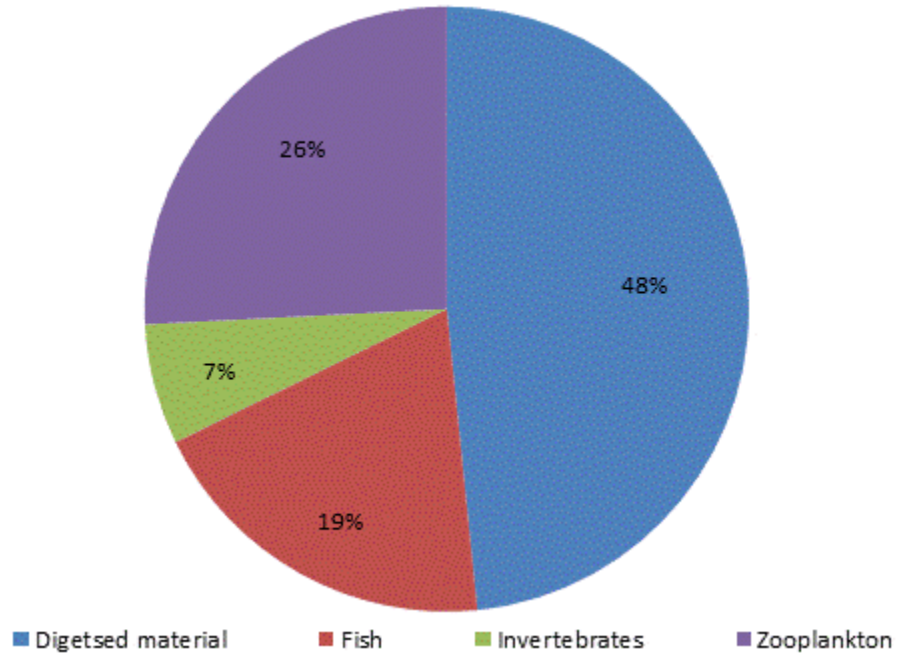


Fig 1.6. Diet of perch (n=31) captured on Ross Lake, 2016 (% occurrence)



1.4 Summary and ecological status

A total of five fish species and one type of hybrid were recorded on Ross Lake in September 2016. Roach was the dominant fish species in terms of abundance (CPUE) and roach x bream hybrids were the dominant fish species in terms of biomass (BPUE) captured in the survey gill nets during the 2016 survey.

The mean roach CPUE and BPUE fluctuated slightly over the four sampling occasions; however, these differences were not statistically significant. Roach ranged in length from 5.3cm to 30.0cm and ranged in age from 1+ to 10+, indicating reproductive success in ten of the previous eleven years. The dominant age class was 2+.

Perch CPUE and BPUE also fluctuated over the four sampling occasions; however, these differences were not statistically significant. Perch ranged in length from 5.0cm to 29.9cm and ranged in age from 0+ to 4+, indicating reproductive success in each of the previous five years. The dominant age class was 3+.

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.*, 2012b). Using the FIL2 classification tool, Ross Lake has been assigned an ecological status of Poor for 2016 based on the fish populations present. The lake was also assigned a fish status of Poor for both 2010 and 2013 and Moderate for 2007.

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



1.5 References

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