National Research Survey Programme

Lakes 2018

Drumkeery Lough

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Fish Stock Survey of Drumkeery Lough, 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

Drumkeery Lough is situated in the Blackwater River (Kells) sub-catchment of the River Boyne, near Bailieborough, Co. Cavan (Fig. 1.1). The lake is situated at an altitude of 132 m.a.s.l., has a total surface area of 13ha, mean depth of 3.4m and maximum depth of 9.3m. The lake is categorised as typology class 9 for the purposes of WFD (as designated by the EPA), i.e. shallow (<4m), less than 50ha and high alkalinity (>100mg/l CaCO3). In the 2010 to 2015 surveillance monitoring reporting period, the EPA assigned Drumkeery Lough an overall ecological status of Poor.

The geology of the area is predominantly Lower Carboniferous limestone. The lake is located downstream of Upper Lough Skeagh, to which it is connected *via* a stream which enters at the south western portion of the lake (Fig. 1.1). The lake is formed by two discrete basins, which are separated by thick reed beds. The survey was conducted on the main upper basin of the lake.

The lake supports a coarse fishery and bank fishing is available along the northern shore which is accessed from the road running along that shore. This lake provides angling for bream, roach, bream hybrids, perch and pike (IFI, 2019).

The lake was previously surveyed by the Inland Fisheries Trust in 1968 and 1965 (IFI unpublished archival data). Bream, rudd, rudd x bream hybrids, tench, pike and perch were recorded at that time.

This report summarises the results of the 2018 fish stock survey (e.g. species composition, abundance and age structure) on the lake.

Plate 1.1. Drumkeery Lough, September 2018

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

1.2 Methods

1.2.1 Netting methods

Drumkeery Lough was surveyed over one night from the 20th to the 21st of September 2018. A total of two sets of Dutch fyke nets (Fyke) and six benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) survey gill nets (BM CEN) were deployed with two nets randomly set in each depth zone respectively (i.e. 2 @ 0-2.9m, 2 @ 3-5.9m, 2 @ 6-11.9m). The netting effort was supplemented using 4-panel benthic braided survey gill nets (4-PBB) at three additional random 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). The angle of each survey gill net in relation to the shoreline was randomised. A handheld GPS was used to mark the precise location of each net.

All fish apart from perch were measured and weighed on site and scales were removed from roach, bream, bream hybrids and tench. 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 calculated to identify key prey items (Amundsen *et al.*, 1996).

$$\mathbf{FO}_i = \left(\frac{\boldsymbol{N_i}}{\boldsymbol{N}}\right) * \mathbf{100}$$

Where:

$\mathbf{FO}_i$ is the percentage frequency of prey item i,

$\boldsymbol{N_i}$ is the number of pike with prey i in their stomach,

$\boldsymbol{N}$ is total number of pike 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 six fish species and two types of hybrid were recorded on Drumkeery Lough in September 2018. A total of 240 fish were captured. The number of each species captured by each gear type is shown in Table 1.1. Perch and roach were the two most abundant species recorded respectively. Bream, roach x bream hybrids, tench, pike, rudd x bream hybrid and eel were also recorded.

Table 1.1. Number of each fish species captured by each method during the survey on Drumkeery Lough, September 2018

Scientific name	Common name	Number of fish captured			
		BM CEN	4-PBB	Fyke	Total
Perca fluviatilis	Perch	96	-	2	98
Rutilus rutilus	Roach	67	-	-	67
Rutilus rutilus x Abramis brama	Roach x bream hybrid	36	2	-	38
Abramis brama	Bream	20	8	1	29
Esox lucius	Pike	1	2	1	4
Tinca tinca	Tench	-	1	-	1
Scardinius erythrophthalmus x Abramis brama	Rudd x bream hybrid	-	1	-	1
Anguilla anguilla	European eel			2	2

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 (Fig. 1.2 and 1.3).

Overall perch and roach were the dominant species in terms of CPUE. Bream was the dominant species in terms of biomass (BPUE) (Fig. 1.2 and 1.3).

Table 1.2. Mean (S.E.) CPUE and BPUE (per metre of net) for all fish species captured on Drumkeery Lough, September 2018

Scientific name	Common name	Mean CPUE (± S.E)	Mean BPUE (± S.E)
Perca fluviatilis	Perch	0.294 (0.117)	9.717 (4.155)
Rutilus rutilus	Roach	0.203 (0.101)	5.057 (2.310)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	0.111 (0.041)	4.929 (1.618)
Abramis brama	Bream	0.069 (0.022)	11.705 (5.037)
Esox lucius	Pike	0.006 (0.003)	10.447 (5.447)
Tinca tinca	Tench	0.001 (0.001)	0.673 (0.673)
Scardinius erythrophthalmus x Abramis brama	Rudd x bream hybrid	0.001 (0.001)	1.347 (1.347)
*Anguilla anguilla**	European eel*	0.017 (0.017)*	5.613 (5.613)*

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

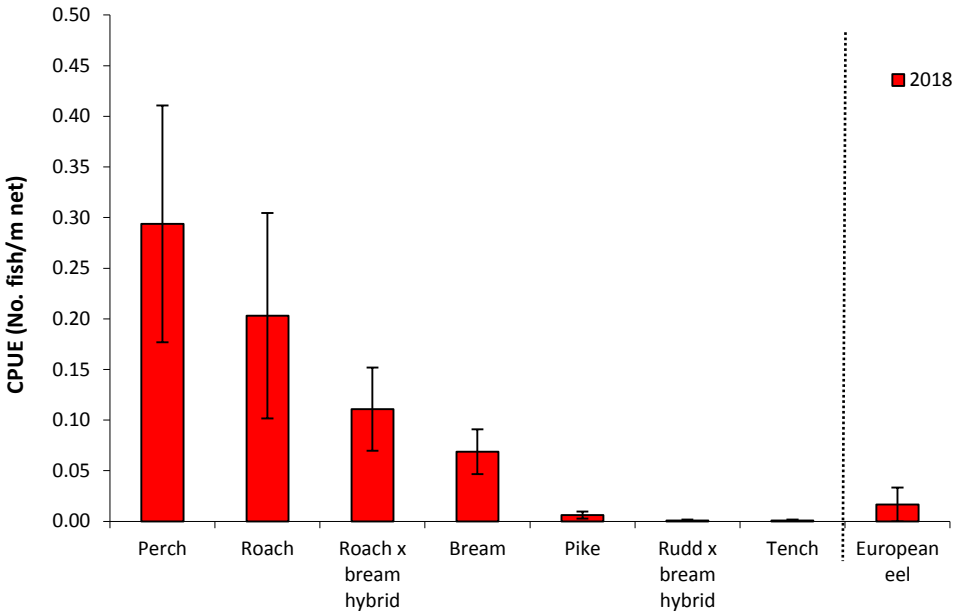

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Drumkeery Lough, (Eel CPUE based on fyke nets only), September 2018

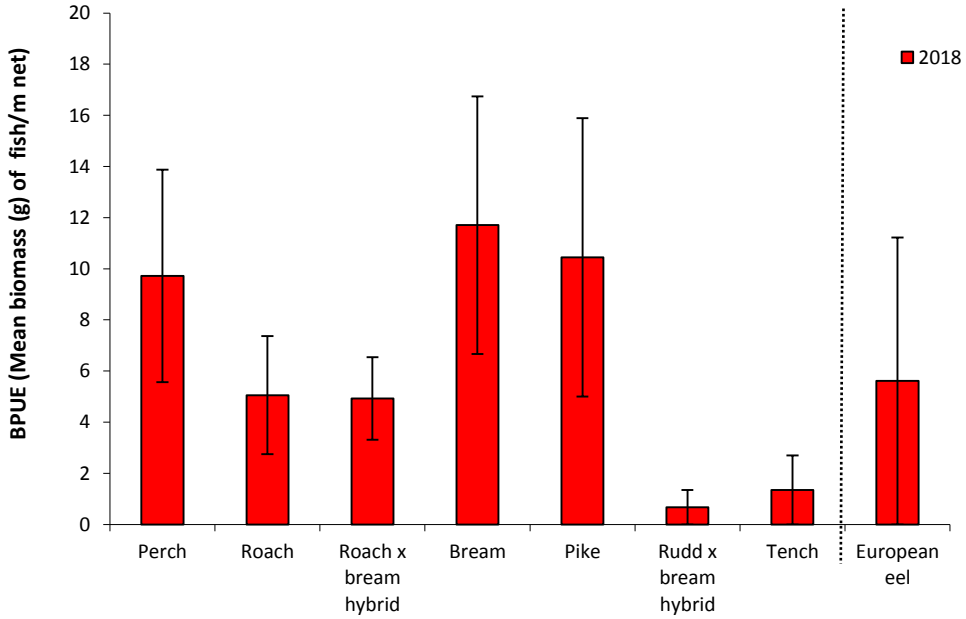

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Drumkeery Lough (Eel BPUE based on fyke nets only), September 2018

1.3.3 Length frequency distributions and growth

Perch

Perch captured during the 2018 survey ranged in length from 4.9cm to 26.1cm (mean = 10.9cm) (Fig.1.4). Eight age classes, ranging from 0+ to 9+ were recorded in the sample. Mean L1 was 5.2cm (Table 1.3). The dominant age class was 0+ (Fig. 1.4).

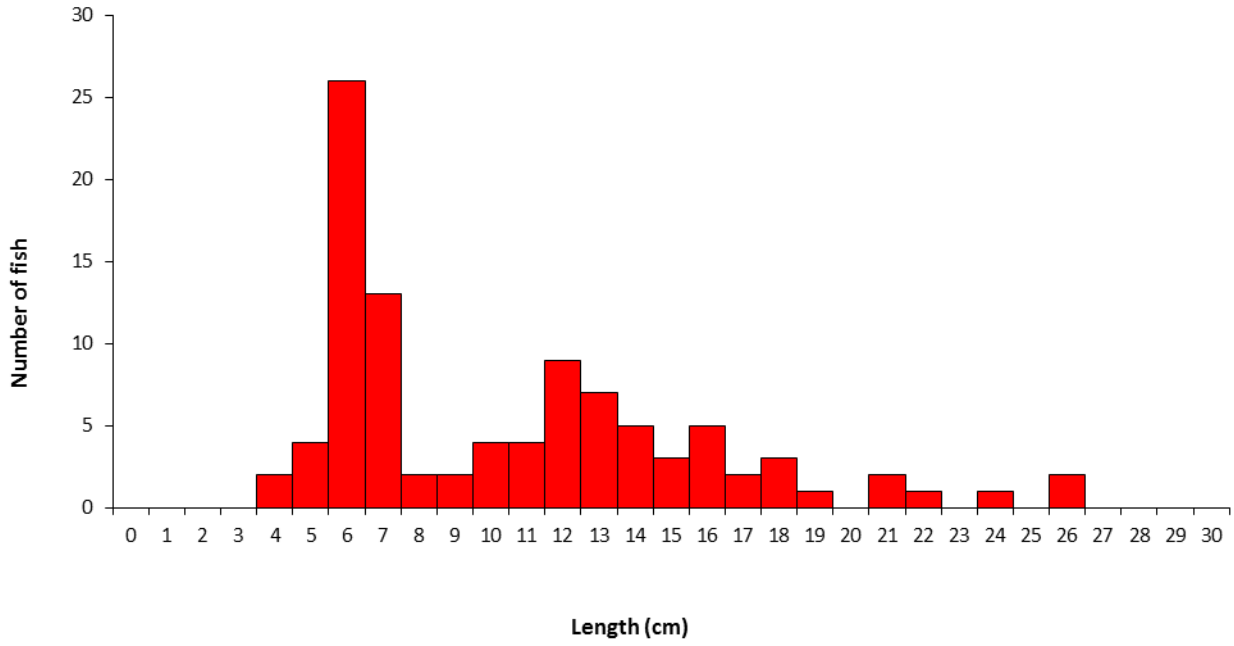

Fig. 1.4. Length frequency of perch captured on Drumkeery Lough, 2018

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

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9
Mean (±S.E.)	5.2 (0.1)	8.5 (0.2)	11.3 (0.3)	13.4 (0.4)	15.0 (0.7)	17.7 (1.3)	18.5	21.8	23.7
N	43	34	17	14	8	4	1	1	1
Range	3.2-7.2	6.8-10.7	9.5-13.7	11.4-16.4	12.5-19.2	15.0-21.3	18.5	21.8	23.7

Roach

Roach captured during the 2018 survey ranged in length from 6.1cm to 21.0cm (mean = 11.1cm) (Fig.1.5). Roach were aged from 1+ to 7+, with all intervening age classes present. The population was dominated by small and relatively young fish. No old or large roach were captured, with just one fish in excess of 20cm recorded (Table 1.4).

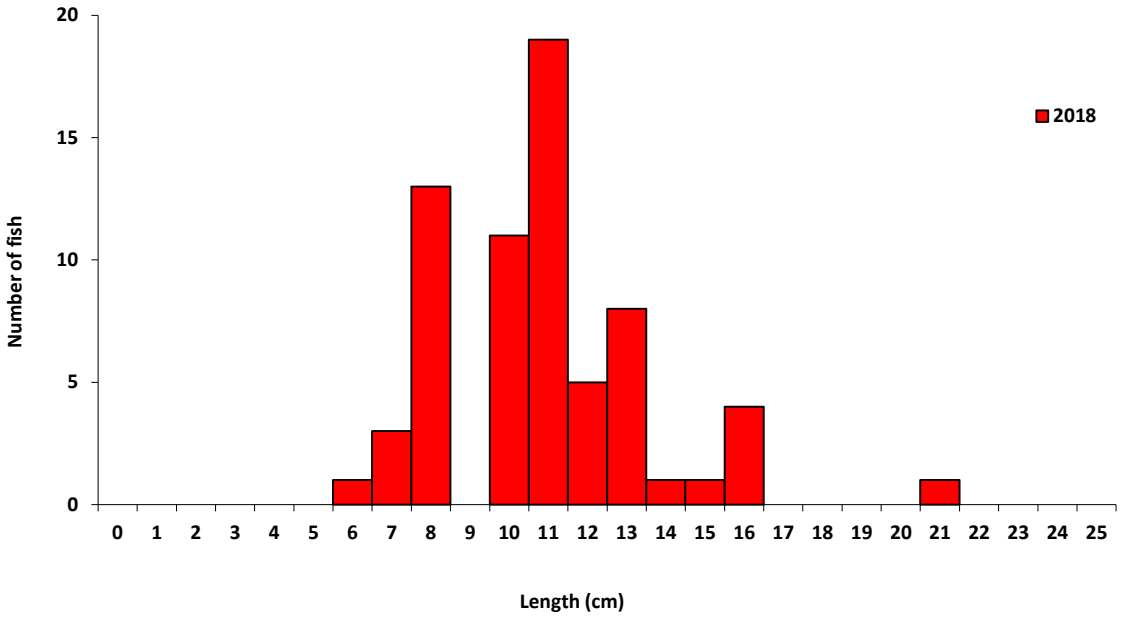

Fig. 1.5. Length frequency of roach captured on Drumkeery Lough, 2018

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

	Age class							
	0+	**1+**	**2+**	**3+**	**4+**	**5+**	**6+**	**7+**
Mean (cm)	-	8.1	9.8	11.4	12.3	13.7	15.2	18.9
N	-	1	6	8	4	6	4	2
Range (cm)	-	8.1	7.9-11.5	10.9-12.1	10.7-13.2	12.2-16.2	13.2-16.7	16.8-21

Roach x bream hybrids

Roach x bream hybrids captured during the 2018 survey ranged in length from 3.8cm to 36.4cm (mean = 13.3cm) (Fig. 1.6). Seven age classes were present, ranging from 1+ to 16+. The population was dominated by younger fish, with all age classes between 1+ and 5 + represented. Two larger, and older roach x bream hybrids (13+ and 16+) were also captured (Table 1.5).

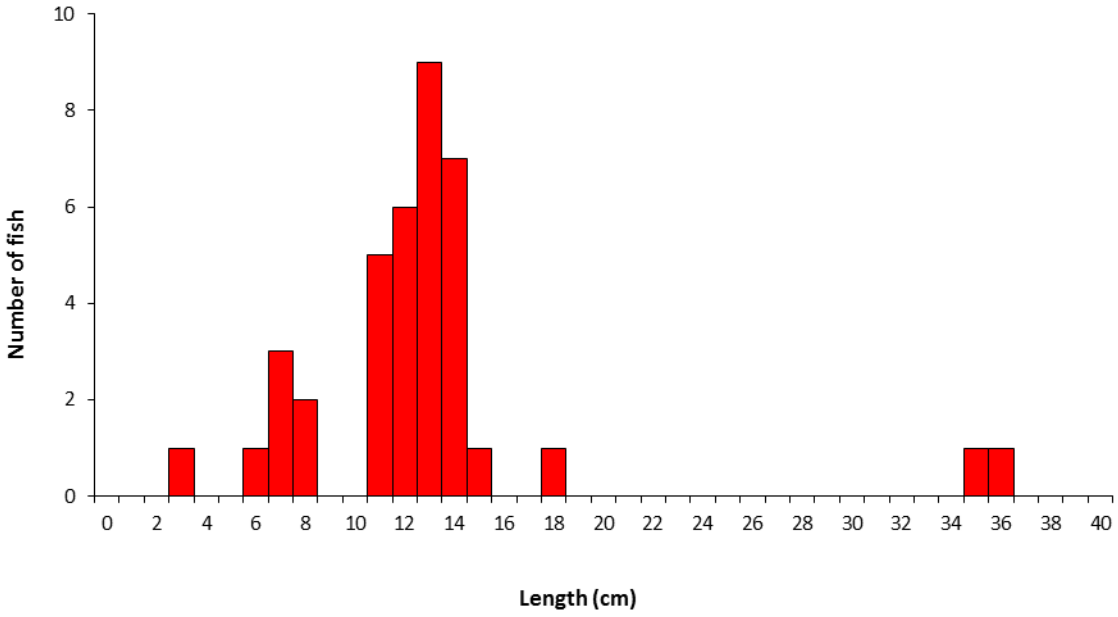

Fig. 1.6. Length frequency of roach x bream hybrids captured on Drumkeery Lough, 2018

Table 1.5. Summary age data from a sub-sample of roach x bream hybrids captured on Drumkeery Lough, September 2018. Number of fish and length ranges of all fish aged in the sample is presented.

	Age class																
	0+	**1+**	**2+**	**3+**	**4+**	**5+**	**6+**	**7+**	**8+**	**9+**	**10+**	**11+**	**12+**	**13+**	**14+**	**15+**	**16+**
Mean (cm)	-	8.2	10	13.3	13.5	16.9	-	-	-	-	-	-	-	35.6	-	-	36.4
N	-	1	5	12	5	2	-	-	-	-	-	-	-	1	-	-	1
Range (cm)	-	8.2	7.7-11.2	11.2-14.5	12.3-14.9	15.8-18.0	-	-	-	-	-	-	-	35.6	-	-	36.4

Bream

Bream captured during the 2018 survey ranged in length from 6.8cm to 38.7cm (mean = 18.9cm) (Fig. 1.7). Ten age classes ranging from 1+ to 13+ were recorded (Table 1.6).

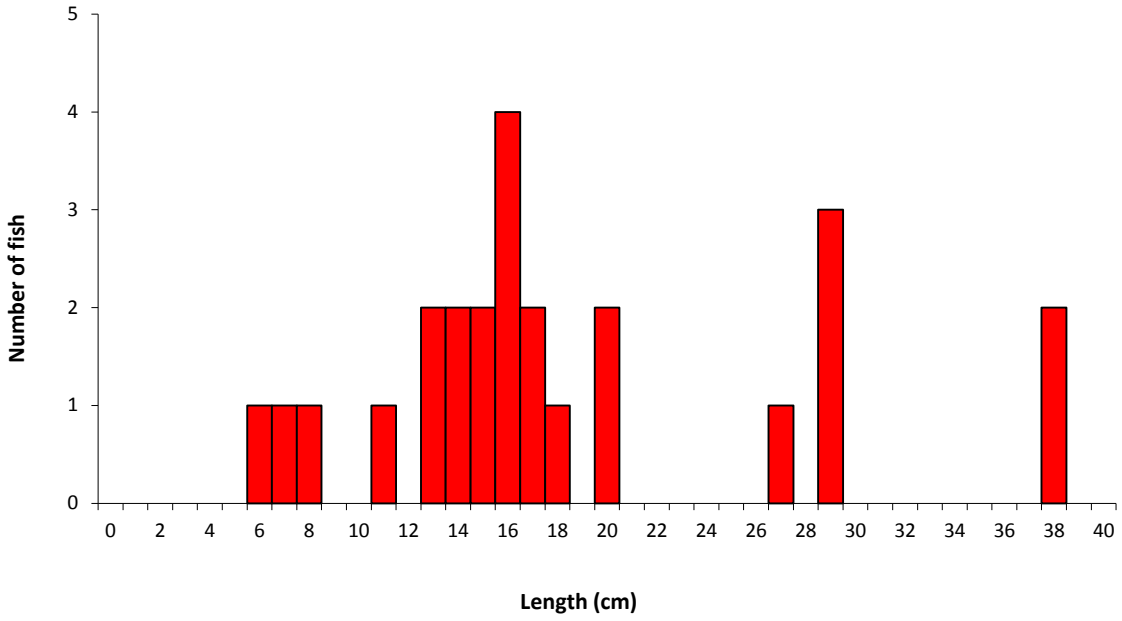

Fig. 1.7. Length frequency of bream captured on Drumkeery Lough, 2018

Table 1.6. Summary age data from bream captured on Drumkeery Lough, September 2018. Number of fish and length ranges of all fish aged in the sample is presented

	Age class													
	0+	**1+**	**2+**	**3+**	**4+**	**5+**	**6+**	**7+**	**8+**	**9+**	**10+**	**11+**	**12+**	**13+**
Mean (cm)	-	7.2	-	11.7	15.4	16.7	22.1	-	-	29.6	32.3	37.3	36.1	38
N	-	2	-	1	8	5	3	-	-	1	3	1	3	1
Range (cm)	-	6.8-7.5	-	11.7	13.5-17.7	14.6-20	18.5-27.8	-	-	29.6	29.3-37.7	37.3	32-38.7	38

Other Fish Species

Pike (n = 4) ranged in length from 53.3cm to 69.3cm (mean = 62.7cm). Two eels were captured measuring 60.5 and 53.5cm respectively. One rudd x bream hybrid aged at 7+, measuring 33.4cm and one tench, measuring 45cm were also captured.

1.3.4 Stomach and diet analysis

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 38 stomachs were examined. Of these 23 were empty. Of the remaining 15 stomachs containing food, 100% contained unidentified digested material (Fig. 1.7).

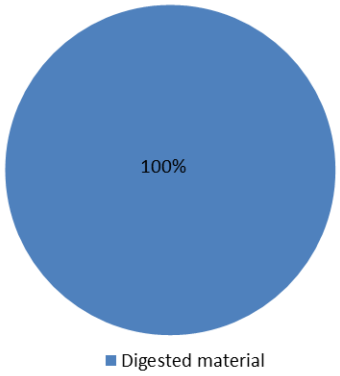

Fig 1.7. Diet of perch (n=28) captured on Drumkeery Lough, 2018 (% FO)

Pike

Stomach contents were available for one pike (all other fish were returned alive to the lake). This stomach contained roach.

1.4 Summary and ecological status

A total of six fish species and two types of hybrid were recorded on Drumkeery Lough in the September 2018 survey. Perch 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 2018 survey.

Perch and roach, which were the two most abundant species captured during the survey recruitment regularly in the lake. There were no year classes missing from either population. Both species were dominated by younger cohorts. Indeed, no very large or old roach were recorded during the survey.

Although several much older and larger specimens were captured, bream and roach x bream hybrid populations are also largely dominated by younger age groups, indicating that successful and recent recruitment of both species occurs in the lake. Indeed, roach x bream hybrids occurred in greater numbers than bream, which is not uncommon in Irish lakes (Hayden *et al*., 2014). This species requires spawning between both parent species (Hayden *et al*. 2014).

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, Drumkeery Lough has been assigned an ecological status of Moderate for 2018 based on the fish populations present.

1.5 References

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