

# National Research Survey Programme

## Lakes 2017

### Lough Bridget

IFI/2018/1-4425



Iascach Intíre Éireann  
Inland Fisheries Ireland



Inland Fisheries Ireland

National Research Survey Programme – Coarse Fish and Pike

**Fish Stock Survey of Lough Bridget,  
August 2017**

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

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

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## 1.1 Introduction

Lough Bridget, known locally as Silvergrove Lake, is located 5 kms from Tulla on the Scariff road, Co. Clare (Fig. 1.1). It has a surface area of 55ha, a mean depth of <4m and a maximum depth of 18.5m. The lake is categorised as typology class 12 (as designated by the EPA for the Water Framework Directive), i.e. deep (<4m), greater than 50ha and highly alkaline (>100 mg/1 CaCO<sub>3</sub>). Located in the Bunratty sub-catchment in the Shannon River Basin District it is connected to Kilgory Lough *via* the Derryruane River at the southern end of the lake.

Lough Bridget is regarded as an excellent fishery for roach, bream and tench. There is a good stock of pike present and the lake is frequently fished by visiting and local anglers (IFI, 2017). The lake was previously surveyed in 1995 and 2006 by Inland Fisheries Ireland. The latter survey was conducted following reports from local angling interests that stocks of coarse fish in the lake had declined (IFI unpublished data). Species recorded in the surveys included roach, bream, rudd (and hybrids of these species), perch, pike and tench.

This report summarises the results of the 2017 fish stock survey carried out on the lake as part of IFI's national coarse fish and pike research programme.



**Plate 1.1. Lough Bridget, looking north along the lake**





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



## 1.2 Methods

### 1.2.1 Netting methods

Lough Bridget was surveyed over two nights between the 31<sup>st</sup> of July and the 2<sup>nd</sup> of August 2017. A total of three sets of Dutch fyke nets and 12 benthic monofilament multi-mesh (BM CEN) (12 panel, 5-55mm mesh size) CEN standard survey gill nets (4 @ 0-2.9m, 4 @ 3-5.9m and 4 @ 6-11.9m) were deployed in the lake (15 sites). The netting effort was supplemented using four-panel benthic braided survey gill nets (4-PBB) at six 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), tied together randomly. The site locations for the benthic monofilament multi-mesh gill nets (BM CEN) and the four-panel benthic braided survey gill nets (4-PBB) were chosen randomly within fixed depth zones (Fig. 1.1). 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 also randomised.

All fish apart from perch were measured and weighed on site and scales were removed from a representative sample of all other fish species (excluding eels) captured. 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

### 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 (FO) of prey items were 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 pike with prey  $i$  in their stomach,

$N$  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 seven fish species and two hybrids were recorded on Lough Bridget in August 2017. A total of 651 fish were captured. The number of each species captured by each gear type is shown in Table 1.1. Roach and perch were the most common fish species captured. Other species captured were bream, roach x bream hybrids, rudd and rudd x roach hybrids, pike, tench and rudd (Table 1.1).

**Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Bridget, August 2017**

Scientific name	Common name	Number of fish captured			
		BM CEN	4-PBB	Fyke	Total
<i>Rutilus rutilus</i>	Roach	297	0	0	297
<i>Perca fluviatilis</i>	Perch	270	1	1	272
<i>Rutilus rutilus</i> x <i>Abramis brama</i>	Roach x bream hybrid	42	0	0	42
<i>Scardinius erythrophthalmus</i>	Rudd	13	0	0	13
<i>Abramis brama</i>	Bream	8	3	0	11
<i>Esox lucius</i>	Pike	3	0	0	3
<i>Scardinius erythrophthalmus</i> x <i>Rutilus rutilus</i>	Rudd x roach hybrid	2	0	0	2
<i>Tinca tinca</i>	Tench	1	3	0	4
<i>Anguilla anguilla</i>	European eel	0	0	7	7



### 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 2017 survey are summarised in Table 1.2.

Roach had the highest CPUE and BPUE of all fish captured in the survey. Eels, captured exclusively in fyke nets also had a relatively high BPUE.

**Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Bridget, 2017**

Scientific name	Common name	Mean CPUE ( $\pm$ S.E) **	Mean BPUE ( $\pm$ S.E) **
<i>Rutilus rutilus</i>	Roach	0.471 (0.144)	15.915 (5.16)
<i>Perca fluviatilis</i>	Perch	0.430 (0.138)	5.934 (1.811)
<i>Rutilus rutilus x Abramis brama</i>	Roach x bream hybrid	0.067 (0.028)	3.024 (1.498)
<i>Scardinius erythrophthalmus</i>	Rudd	0.021 (0.016)	0.542 (0.455)
<i>Abramis brama</i>	Bream	0.014 (0.007)	2.346 (1.002)
<i>Esox lucius</i>	Pike	0.005 (0.003)	2.540 (1.423)
<i>Scardinius erythrophthalmus x Rutilus rutilus</i>	Rudd x roach hybrid	0.003(0.002)	0.238 (0.164)
<i>Tinca tinca</i>	Tench	0.003 (0.002)	2.538 (1.534)
<i>Anguilla anguilla</i>	European eel	0.039 (0.015)	9.108 (4.770)

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

\*\*CPUE and BPUE data above for all fish species except eels are not directly comparable to earlier surveys as extra panels were added to the 2-PBB to provide additional information on large coarse fish.





### 1.3.3 Length frequency distributions and growth

#### Roach

Roach captured during the 2017 survey ranged in length from 5.7 cm to 27.7 cm (mean = 11.7) (Fig.1.2). Roach were aged between 1+ and 11+ (Table 1.3). Two age classes (3+ and 4+) dominated the population, corresponding to the modal peak at approximately 10-12 cm (Fig.1.2). While two age classes (8+ and 10+) were not represented, there has been regular recruitment in recent years. Mean length at age 1 was estimated as 3.0 cm (Table 1.3).

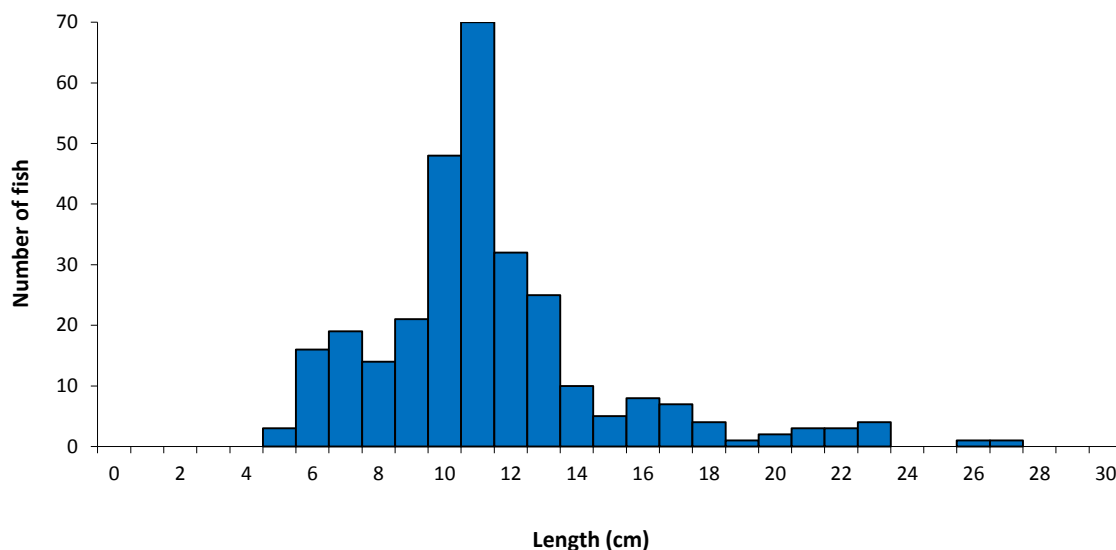


Fig. 1.2. Length frequency of roach captured on Lough Bridget in 2017

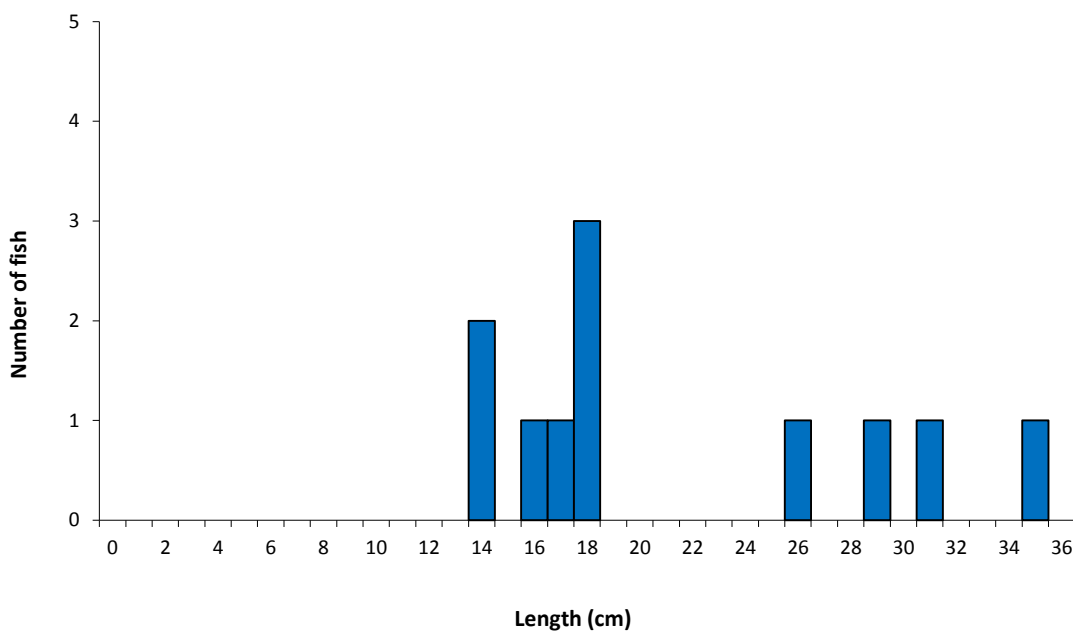
Table 1.3. Mean ( $\pm$ S.E.) roach length (cm) at age for Lough Bridget, August 2017

	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	L <sub>6</sub>	L <sub>7</sub>	L <sub>8</sub>	L <sub>9</sub>	L <sub>10</sub>	L <sub>11</sub>
<b>Mean</b>	3.0	6.1	9.2	12.2	14.5	16.8	18.9	22.1	23.9	26.0	27.2
<b>(<math>\pm</math>S.E.)</b>	0.1	0.1	0.2	0.2	0.3	0.4	0.5	1.14	-	-	-
<b>N</b>	52	46	40	30	21	18	13	3	1	1	1
<b>Min</b>	2.2	4.5	7.0	8.7	11.9	14.4	16.7	20.4	-	-	-
<b>Max</b>	4.9	7.7	11.5	15.5	17.0	19.9	22.1	24.2	-	-	-



## Bream

Bream captured during the survey ranged in length from 14 cm to 35 cm (mean 22.0 cm) (Fig. 1.3). Four ages classes (4+ to-7+) were observed in the sample aged ( $n = 5$ ). The length and age profile of the population indicates that recruitment has been relatively sporadic in recent years. Mean length at age 1 was estimated as 3.4 cm (Table 1.4).



**Fig. 1.3. Length frequency of bream captured on Lough Bridget in 2017**

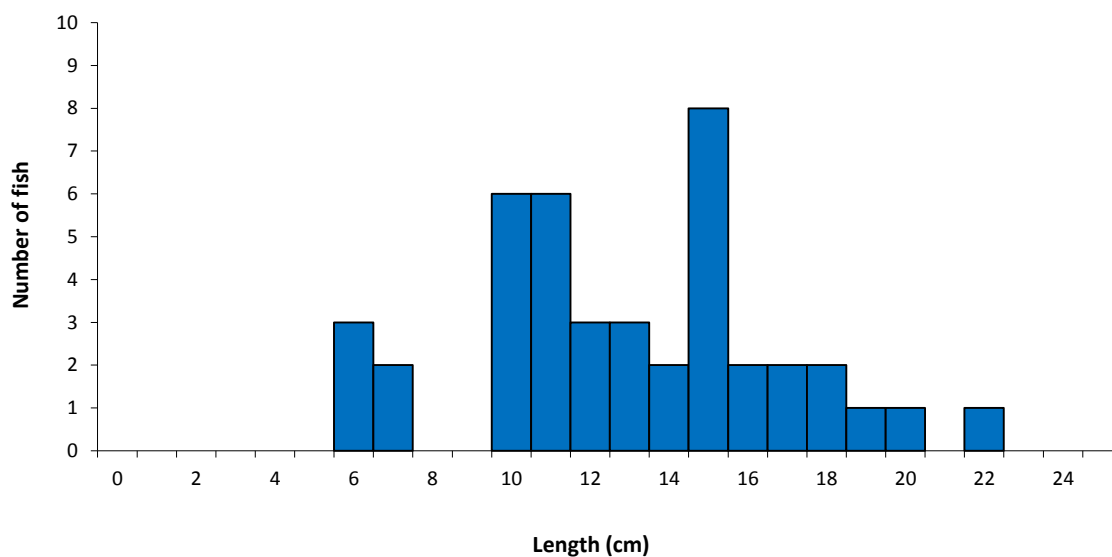
**Table 1.4. Mean ( $\pm$ S.E.) bream length (cm) at age for Lough Bridget, August 2017**

	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	L <sub>6</sub>	L <sub>7</sub>
<b>Mean</b>	3.4	7.3	11.8	16.8	22.9	27.1	30.2
<b>(<math>\pm</math>S.E.)</b>	0.2	0.2	0.4	0.6	0.3	0.3	-
<b>N</b>	5	5	5	5	3	2	1
<b>Min</b>	2.7	7.0	11.3	15.2	22.4	26.8	30.2
<b>Max</b>	3.9	7.8	13.2	18.0	23.2	27.3	30.2



### **Roach x bream hybrids**

Roach x bream hybrids captured ranged in length from 6 to 22.0 cm (mean 13.4 cm) (Fig. 1.4). Roach x bream hybrids were aged between 1+ and 7+ (Table 1.5). Two age classes (3+ and 4+) dominated the population, corresponding to the modal peaks around 10-15 cm (Fig.1.4). The same age classes also dominated the roach population. Mean length at age 1 was estimated as 3.3 cm (Table 1.5).



**Fig. 1.4. Length frequency of roach x bream hybrids captured on Lough Bridget in 2017**

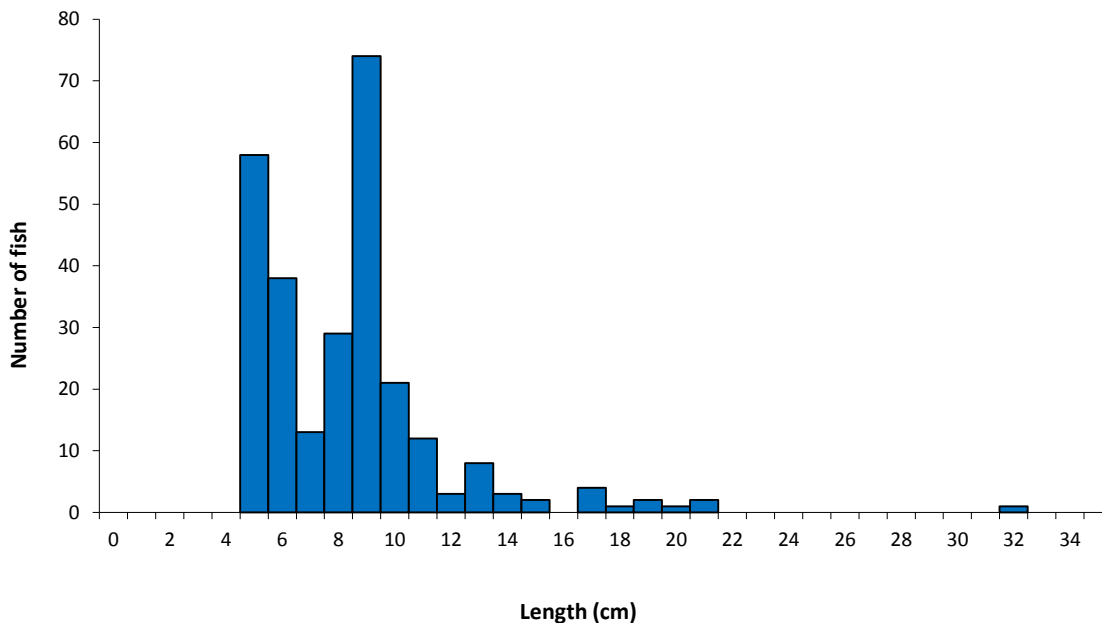
**Table 1.5. Mean ( $\pm$ S.E.) roach x bream hybrid length (cm) at age for Lough Bridget, August 2017**

	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	L <sub>6</sub>	L <sub>7</sub>
<b>Mean</b>	3.3	6.5	9.7	13.2	13.9	16.2	18.3
<b>(<math>\pm</math>S.E.)</b>	0.1	0.2	0.2	0.5	0.9	0.9	0.8
<b>N</b>	29	28	28	17	5	5	3
<b>Min</b>	2.4	5.4	8.1	10.1	12.3	14.5	17.3
<b>Max</b>	4.3	8.6	12.7	16.4	16.8	19.1	19.9



## Perch

Perch captured during the 2017 survey ranged in length from 5 to 32.4 cm (mean = 8.7 cm) (Fig.1.5). The population was dominated by younger, predominantly 1+, fish. With the exception of one 7+ and one 8+ fish all fish in the sample aged, ranged in age from 1+ to 5+. Mean length at L1 was 6.2 cm (Table 1.9).



**Fig. 1.5. Length frequency of perch captured on Lough Bridget in 2017**

**Table 1.9. Mean ( $\pm$ S.E.) perch length (cm) at age for at age for Lough Bridget, August 2017**

	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	L <sub>6</sub>
<b>Mean</b>	6.2	10.3	13.5	15.7	22.1	27.8
<b>(<math>\pm</math>S.E.)</b>	0.2	0.4	0.7	1.3	3.7	5.5
<b>N</b>	34	20	19	14	5	3
<b>Min</b>	4.1	8.2	10.9	11.6	14.6	16.9
<b>Max</b>	10.0	14.2	19.7	28.2	31.9	33.6



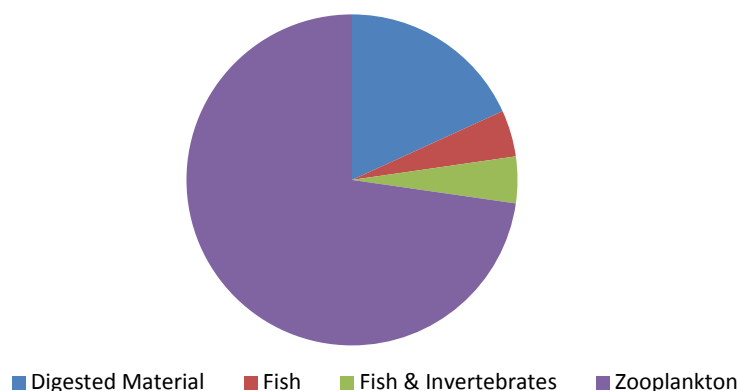
### **Other fish species**

Thirteen rudd were captured during the survey. These ranged in length from 9.6 to 14.7 cm (mean = 11.9 cm). Two age classes, 3+ and 5+, were observed. Eel (n = 7) ranged in length from 30.5 to 60.5 cm (mean = 49.5 cm). Tench (n = 4) ranged in length from 30.8 cm to 44.1 cm (mean = 35.9 cm). Pike (n = 3) ranged in length from 36.8 to 44.7 cm (mean = 41.6 cm). Two rudd x roach hybrids (16.6 cm and 4 +) and (17.3 cm and 5 +) 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 53 perch stomachs were examined. Of these 22 (41.5%) contained food (Fig. 1.6). Sixteen stomachs (73% FO) contained zooplankton and 4 (18% FO) contained unidentified digested material. One perch (5% FO) contained fish and one (%% FO) contained both fish and invertebrates. Ontogenetic differences in perch diet are illustrated in Fig 1.7.

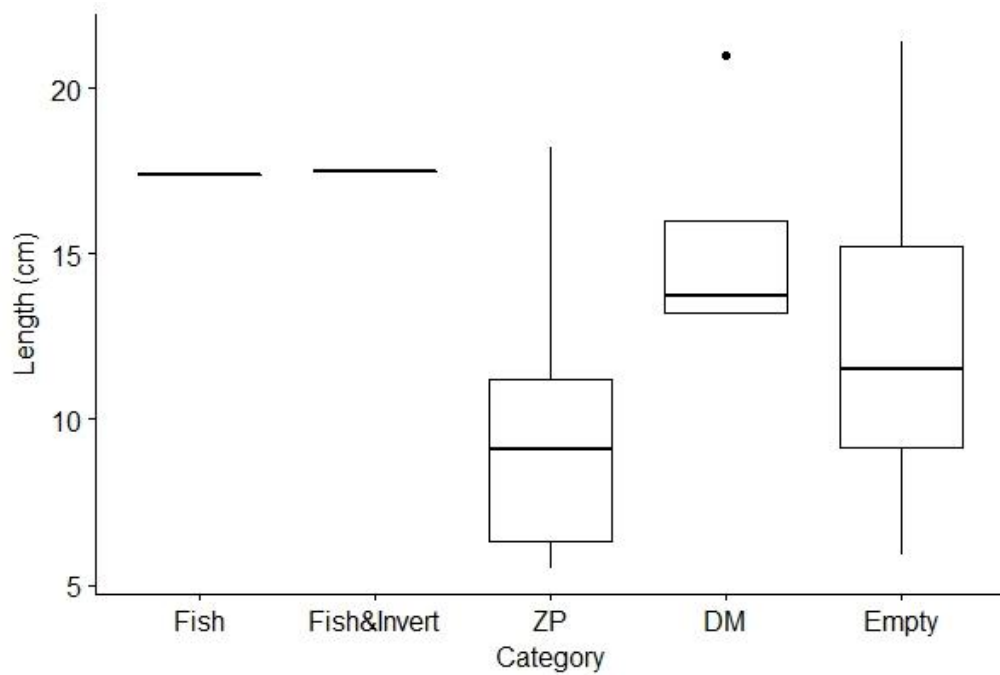


**Fig 1.6. Diet of perch (n=22) captured on Lough Bridget in 2017 (% FO)**

#### **Pike**

Two pike were available for analysis. One stomach was empty, while the second pike stomach contained perch (n = 2) and unidentified fish remains.





**Figure 1.7** Boxplot illustrating ontogenetic differences in diet of perch captured in Lough Bridget in 2017. The horizontal bars represent the median value of the sample, while the 75% and 25% percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots (Fish = Fish; Fish&invert = fish and invertebrates; Invert = Invertebrates; ZP = Zooplankton; DM = unidentified digested material; Empty = no food).



#### 1.4 Summary and ecological status

A total of seven fish species and two hybrids were recorded in the survey of Lough Bridget in 2017. Roach was the dominant species in terms of abundance (CPUE) and biomass (BPUE) captured in the survey gill nets during the 2017 survey.

Previous surveys conducted in 1995 and 2006 utilised different suites of survey net and it is thus difficult to make comparisons between surveys. However, a similar group of species has been captured. The survey in 2006 was conducted on foot of concerns regarding declining fish stocks, particularly of bream in the lake, with some evidence of a reduced (compared to 1995) stock of fish. While the most recent survey confirms that the lake continues to sustain a bream population, recruitment may be limited and irregular in the lake at this time.

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, Lough Bridget has been assigned an ecological status of Good for 2017 based on the fish populations present.

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



## 1.5 References

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