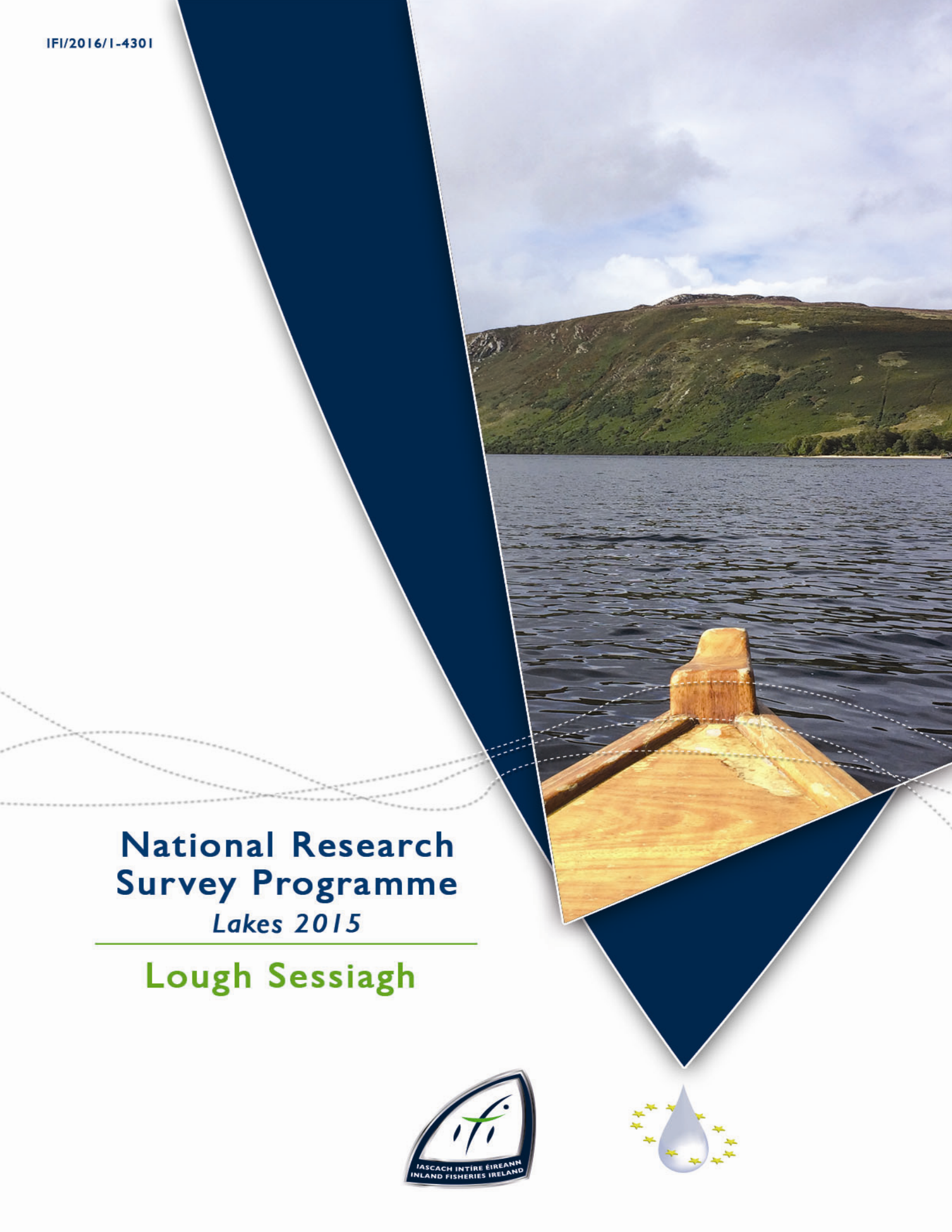


# National Research Survey Programme

*Lakes 2015*

## Lough Sessiagh





Inland Fisheries Ireland

National Research Survey Programme

**Fish Stock Survey of Lough Sessiagh,  
July 2015**

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

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## 1.1 Introduction

Lough Sessiagh is a small lowland lake situated 3.5km south-east of Dunfanaghy, on the outskirts of Port na Blagh in Co. Donegal (Plate 1.1, Fig. 1.1). The geology of the area is predominantly quartzite; however on the western side of the lake, the bedrock contains more base-rich units, including units of dolomitic marble (DOEHLG, 2005). The lake is bordered on its northern, western and eastern edge by houses and agricultural lands, with steep cliffs bordering the southern shore (NPWS, 1998). The lake has a stony bottom comprised of metamorphic bedrock and has a barren appearance.

Lough Sessiagh has an area of 20.9ha, a mean depth of 4m and a maximum depth of 22m. The lake is categorised as typology class 7 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. deep (>4m), less than 50ha and moderately alkaline (20-100mg/l CaCO<sub>3</sub>). It has been classed as 2a (i.e. expected to meet good status by 2015 pending further investigation) in the WFD Characterization report (EPA, 2005).

Lough Sessiagh has been designated as a Special Area of Conservation (NPWS, 1998). It comprises a habitat listed under Annex I of the EU Habitats Directive, i.e. lowland oligotrophic lake, and also provides suitable habitat for a rare plant species, the slender naiad (*Najas flexilis*), which is a legally protected aquatic plant listed under Annex II of the Habitats Directive (NPWS, 1998).

Brown trout is the dominant fish species in Lough Sessiagh. Arctic char, a rare freshwater fish species listed in the Irish Red Data book of threatened vertebrates as vulnerable (King *et al.*, 2011), is also present. Brown trout spawning is limited to a single narrow inflowing stream on the south-west shore (Fig. 1.1). The water is alkaline and has excellent clarity (O' Reilly, 2007).

This lake was surveyed as part of the Water Framework Directive and was also surveyed in 2006 as part of the NSSHARE Fish in Lakes Project (Kelly *et al.*, 2007) and in 2009 and 2012 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al.*, 2010 and 2013). In all previous surveys brown trout was found to be the dominant species, followed by Arctic char, three-spined stickleback and eel.



Plate 1.1. Lough Sessiagh

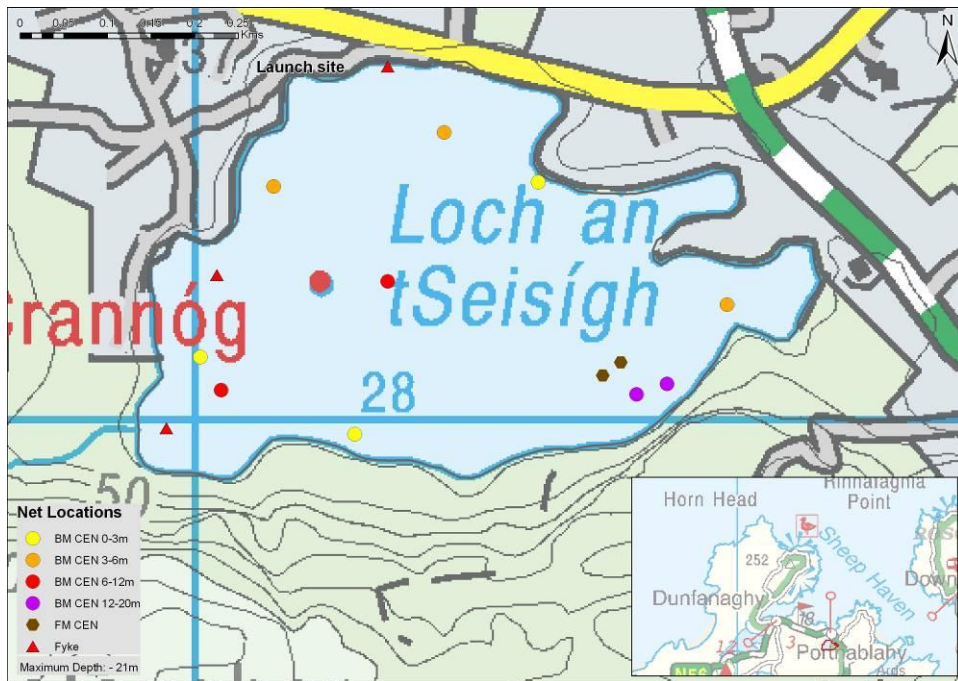


Fig. 1.1. Location map of Lough Sessiagh showing locations and depths of each net (outflow is indicated on map)



## **1.2 Methods**

### ***1.2.2 Netting methods***

Lough Sessiagh was surveyed over one night on the 6<sup>th</sup> of July 2012. A total of three sets of Dutch fyke nets (fyke), 10 benthic monofilament multi-mesh (BM CEN) (12 panel, 5-55mm mesh knot to knot) CEN standard survey gill nets (3 @ 0-2.9m, 3 @ 3-5.9m, 2 @ 6-11.9m and 2 @ 12-19.9m) and two surface monofilament multi-mesh (FM CEN) (12 panel, 5-55mm mesh knot to knot) CEN standard survey gill nets were deployed randomly in the lake (15 sites). Nets were deployed in the same locations as were randomly selected in the previous surveys in 2006, 2009 and 2012. 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 trout and Arctic char. 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.

### ***1.2.2 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 four fish species were recorded on Lough Sessiagh in July 2015, with 625 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Brown trout was the most abundant fish species recorded, followed by three-spined stickleback, Arctic char and eels. During the previous surveys in 2006, 2009 and 2012 the same species composition was recorded (Kelly *et al.*, 2010 and 2013).

**Table 1.1. Number of each fish species captured by each gear type during the survey on Lough Sessiagh, July 2015**

Scientific name	Common name	Number of fish captured			
		BM CEN	FM CEN	Fyke	Total
<i>Salmo trutta</i>	Brown trout	43	0	0	43
<i>Salvelinus alpinus</i>	Arctic char	13	2	0	15
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	561	0	0	561
<i>Anguilla anguilla</i>	European eel	0	0	6	6

### 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 2009, 2012 and 2015 surveys are summarised in Table 1.2. Mean CPUE and BPUE for all species is illustrated in Figure 1.2 and 1.3.

Three-spined stickleback was the dominant species in terms of abundance (CPUE), however, brown trout was the dominant species in terms of and biomass (BPUE). The mean brown trout CPUE and BPUE fluctuated slightly over the three sampling occasions; however these differences were not statistically significant (Table 1.2; Fig 1.2 and 1.3).

The mean Arctic char CPUE and BPUE increased slightly over the three sampling occasions; however, these differences were also not statistically significant (Table 1.2; Fig 1.2 and 1.3).

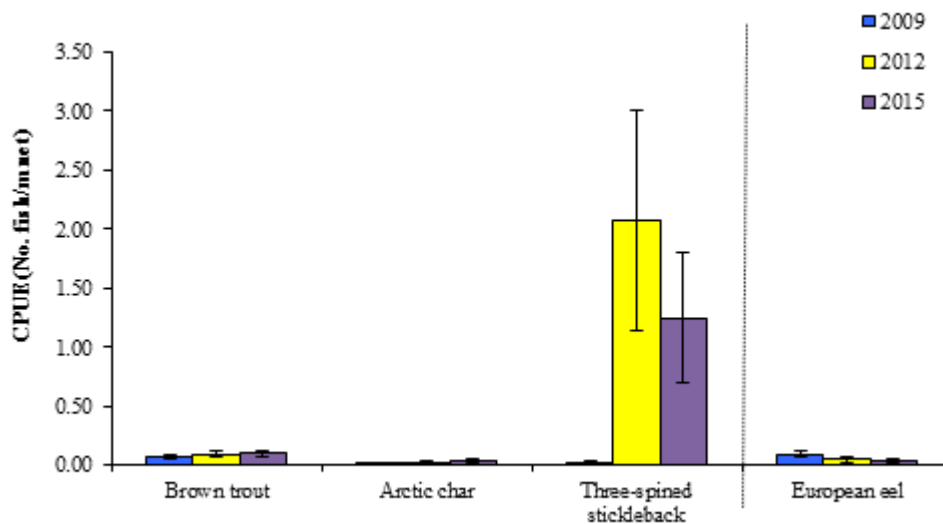


**Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Sessiagh, 2009, 2012 and 2015**

Scientific name	Common name	2009	2012	2015
<b>Mean CPUE</b>				
<i>Salmo trutta</i>	Brown trout	0.069 (0.022)	0.092 (0.028)	0.096 (0.030)
<i>Salvelinus alpinus</i>	Arctic char	0.009 (0.007)	0.018 (0.012)	0.033 (0.0170)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	0.022 (0.012)	2.078 (0.933)	1.247 (0.547)
<i>Anguilla anguilla</i>	European eel	0.094 (0.024)	0.044 (0.294)	0.033 (0.019)
<b>Mean BPUE</b>				
<i>Salmo trutta</i>	Brown trout	24.876 (9.404)	27.668 (8.092)	23.614 (6.090)
<i>Salvelinus alpinus</i>	Arctic char	1.144 (0.872)	2.634 (1.691)	4.338 (2.145)
<i>Gasterosteus aculeatus</i>	Three-spined stickleback	0.015 (0.009)	2.126 (0.973)	1.064 (0.469)
<i>Anguilla anguilla</i>	European eel	13.578 (2.670)	5.778 (3.898)	3.392 (2.419)

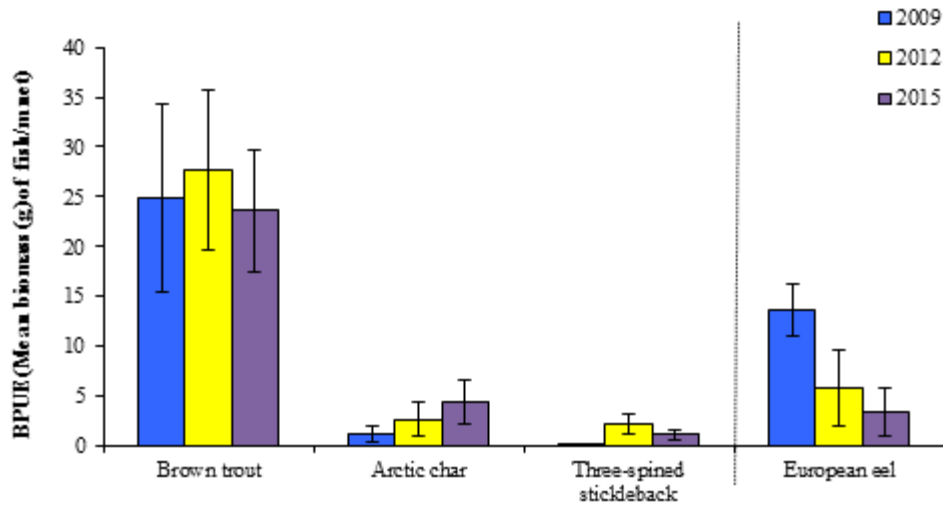
Note: On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species.

\*Eel CPUE and BPUE based on fyke nets only



**Fig. 1.2. Mean ( $\pm$ S.E.) CPUE for all fish species captured in Lough Sessiagh (Eel CPUE based on fyke nets only), 2009, 2012 and 2015**



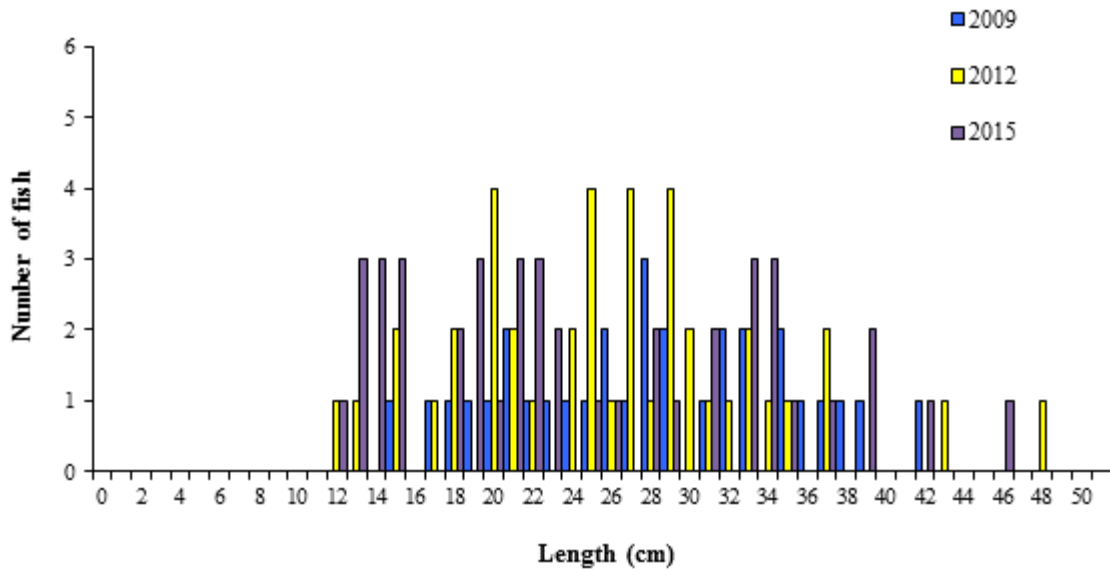


**Fig. 1.3. Mean ( $\pm$ S.E.) BPUE for all fish species captured in Lough Sessiagh (Eel BPUE based on fyke nets only), 2009, 2012 and 2015**

### *1.3.3 Length frequency distributions and growth*

#### **Brown trout:**

Brown trout captured during the 2015 survey ranged in length from 12.5cm to 46.0cm (mean = 25.1cm) (Fig. 1.4). Six age classes were present, ranging from 1+ to 6+, with a mean L1 of 7.6cm (Table 1.3). The dominant age class was 2+ (Fig. 1.4). Mean brown trout L4 in 2015 was 30.1cm indicating a fast rate of growth for brown trout in this lake according to the classification scheme of Kennedy and Fitzmaurice (1971) (Table 1.3). Brown trout captured during the 2009 and 2012 surveys had similar length and age ranges to the 2015 survey (Fig.1.4).



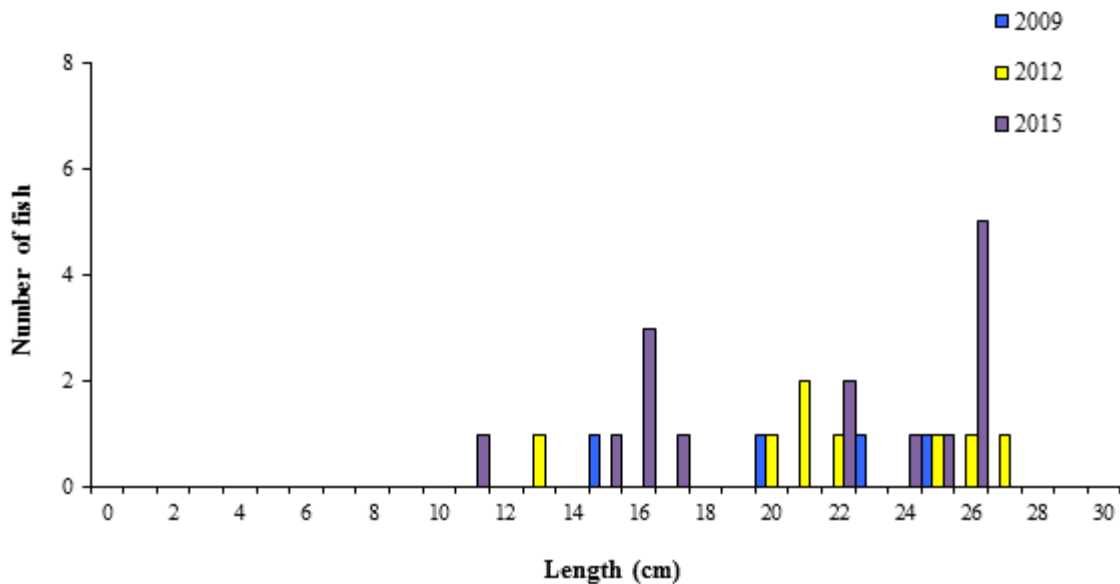
**Fig. 1.4. Length frequency of brown trout captured on Lough Sessiagh, 2015**

**Table 1.3. Mean ( $\pm$ SE) brown trout length (cm) at age for Lough Sessiagh, July 2015**

	L <sub>1</sub>	L <sub>2</sub>	L <sub>3</sub>	L <sub>4</sub>	L <sub>5</sub>	L <sub>6</sub>	Growth Category
Mean	7.6 (0.1)	16.2 (0.2)	24.2 (0.7)	30.1 (1.0)	34.7 (2.4)	36.1 (0.4)	Fast
N	43	33	19	16	7	2	
Range	5.7-8.6	13.4-18.4	20.8-33.7	25.9-42.8	30.4-47.8	35.7-36.5	

**Arctic char:**

Arctic char captured during the 2015 survey ranged in length from 11.6cm to 26.8cm (mean = 21.3cm) (Fig.1.5) with four age classes present, ranging from 2+ to 5+ (Table 1.4). Arctic char captured during the 2009 and 2012 surveys had a similar length and age range, with a slightly larger length and age range exhibited in the 2012 and 2015 surveys (Fig.1.5).



**Fig. 1.5. Length frequency of Arctic char captured on Lough Sessiagh, 2015**

**Other fish:**

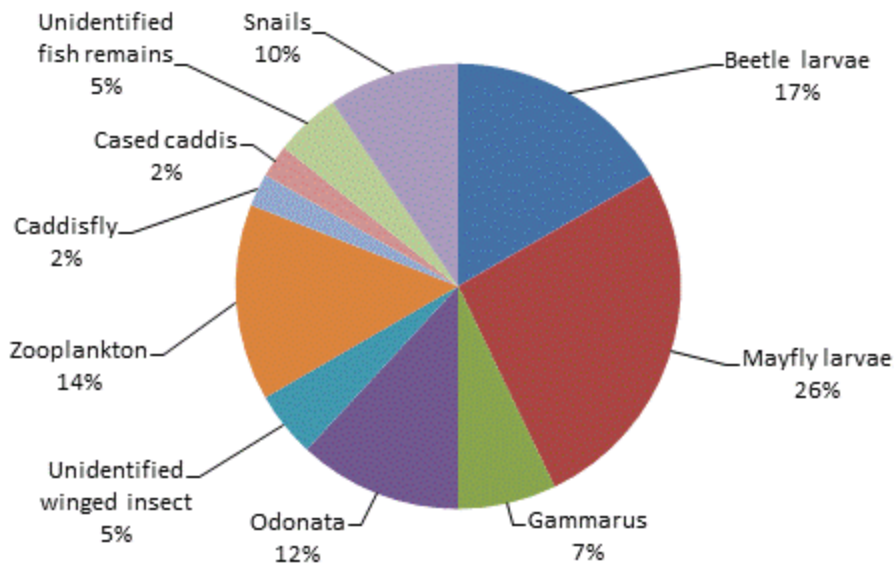
Eels captured during the 2015 survey ranged in length from 32.5cm to 45.0cm. Three-spined stickleback captured ranged in length from 4.0cm to 6.5cm.

***1.3.4 Stomach and diet analysis***

**Brown trout:**

Feeding 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. Adult trout usually feed principally on crustaceans (*Asellus* sp. and *Gammarus* sp.), insects (principally chironomid larvae and pupae) and molluscs (snails) (Kennedy and Fitzmaurice, 1971, O’Grady, 1981).

The food items recorded in a subsample of trout captured during the survey were dominated by mayfly larvae and beetle larvae (Fig 1.6).



**Fig. 1.6.** Diet of perch captured on Lough Sessiagh 2015 (% occurrence) n=24

#### 1.4 Summary and ecological status

Three-spined stickleback was the dominant species in terms of abundance (CPUE); however, brown trout was the dominant species in terms of biomass (BPUE) in the survey gill nets during the 2015 survey.

The mean brown trout CPUE increased slightly over the three sampling occasions; however, these differences were not statistically significant. There were also no significant differences in mean BPUE across the three sampling years. Brown trout ranged in age from 1+ to 6+, indicating reproductive success in six of the previous seven years. The dominant age class was 2+. Length at age analyses revealed that brown trout in the lake exhibit a fast rate of growth according to the classification scheme of Kennedy and Fitzmaurice (1971).

The mean Arctic char CPUE and BPUE increased slightly over the three sampling occasions; however, these differences were not statistically significant. Arctic char ranged in age from 2+ to 5+, with no 0+ or 1+ fish being captured.

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.*, 2012b). Using the FIL2 classification tool, Lough Sessiagh has been assigned an ecological status of Good for 2006 and 2009 and High for 2012 and 2015 based on the fish populations present.

In the 2010 to 2012 surveillance monitoring reporting period, the EPA assigned Lough Sessiagh an overall draft ecological status of Good, based on all monitored physico-chemical and biological elements, including fish. This status classification will be revised during 2016.



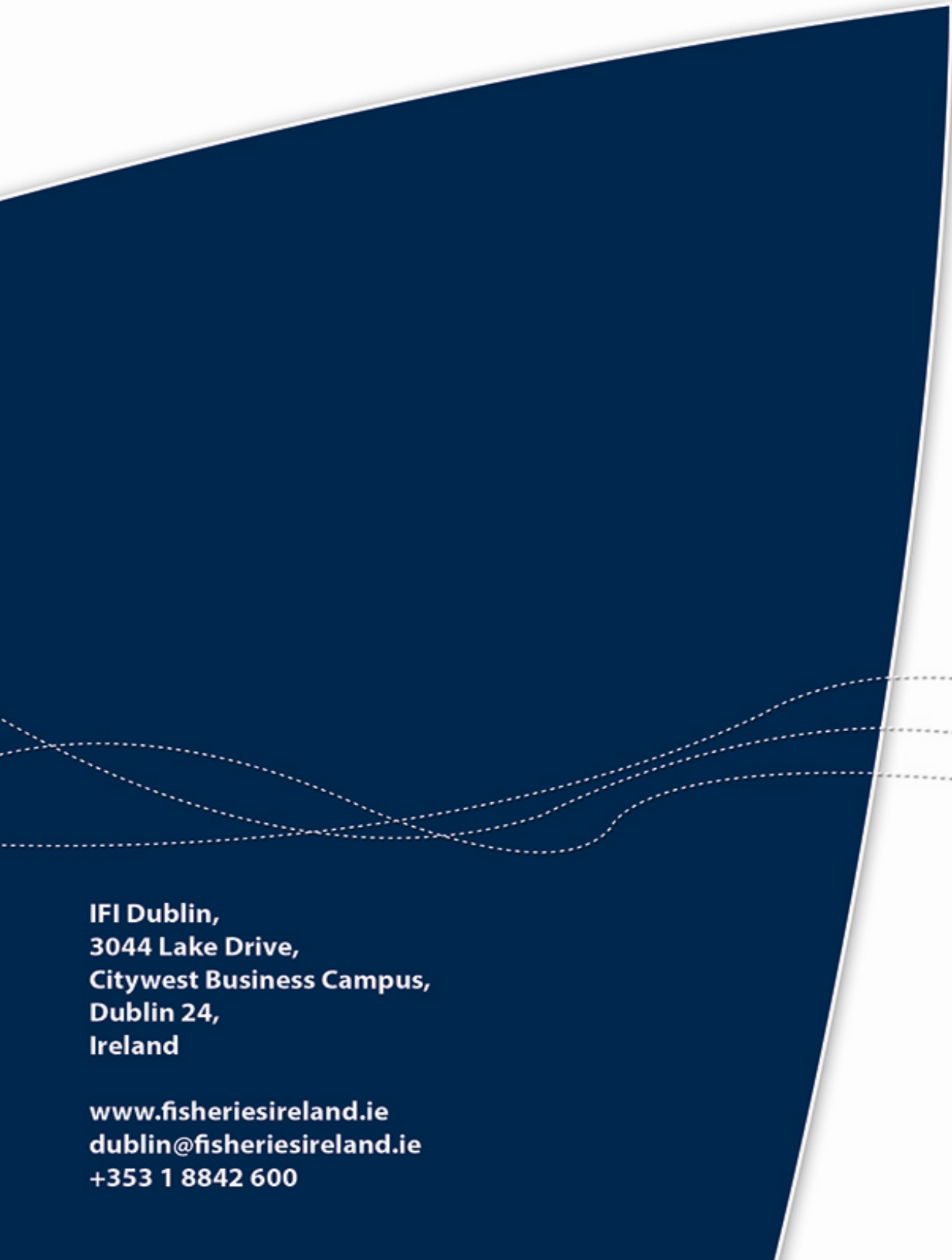
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A dark blue geometric shape, resembling a stylized wave or a folded piece of paper, occupies the lower-left portion of the page. It is decorated with several white dashed lines that flow across its surface. The rest of the page is plain white.

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