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Sampling Fish for the Water Framework Directive

Lakes 2011

Annaghmore Lough

Iascach Intíre Éireann
Inland Fisheries Ireland

Water Framework Directive Fish Stock Survey of Annaghmore Lough, October 2011

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1.1 Introduction

Annaghmore Lough is located approximately five kilometres north-west of Strokestown, Co. Roscommon, in the Upper Shannon catchment (Plate 1.1, Fig. 1.1). The lake has a surface area of approximately 53ha and a maximum depth of 16m. The lake falls into typology class 10 (as designated by the EPA for the Water Framework Directive), i.e. shallow (mean depth <4m), greater than 50ha and high alkalinity (>100mg/l $CaCO_3$).

Annaghmore Lough has been designated as a candidate Special Area of Conservation. It has been classified as such due to the presence of extensive areas of alkaline fen around the shoreline, a habitat listed on Annex I of the EU Habitats Directive. The site also contains the rare snail *Vertigo geyeri*, a species listed on Annex II of the EU Habitats Directive.

Annaghmore Lough is located in the centre of a network of small glacially formed lakes. It is a shallow, calcareous lake with a gently sloping shoreline. Due to these gently sloping banks the low lying margins are extensively flooded in winter months. During the summer, water levels recede substantially to reveal extensive areas of marl. The lake is surrounded by areas of common club-rush (*Scirpus lacustris*) which are backed by reed beds made up of common reed (*Phragmites australis*). Extensive areas of alkaline fen surround the shoreline which is dominated by black bog-rush (*Schoenus nigricans*). The site is important for wintering birds and is listed as a wildfowl sanctuary. Two species of bird present are listed on Annex I of the EU Birds Directive, the whooper swan and the golden plover (NPWS, 2003).

Annaghmore Lough historically held bream, roach, tench, rudd, perch, eels and pike. It is particularly known for its specimen rudd up to 1.75kg, and produces perch to over 0.45kg in weight (ShRFB, 2010).

Annaghmore Lough was previously surveyed in 2008 as part of the Water Framework Directive surveillance monitoring programme (Kelly *et al*., 2009). During this survey, perch were found to be the dominant species present in the lake. Roach, rudd, tench, pike and eels were also captured during the survey.

Plate 1.1. Annaghmore Lough

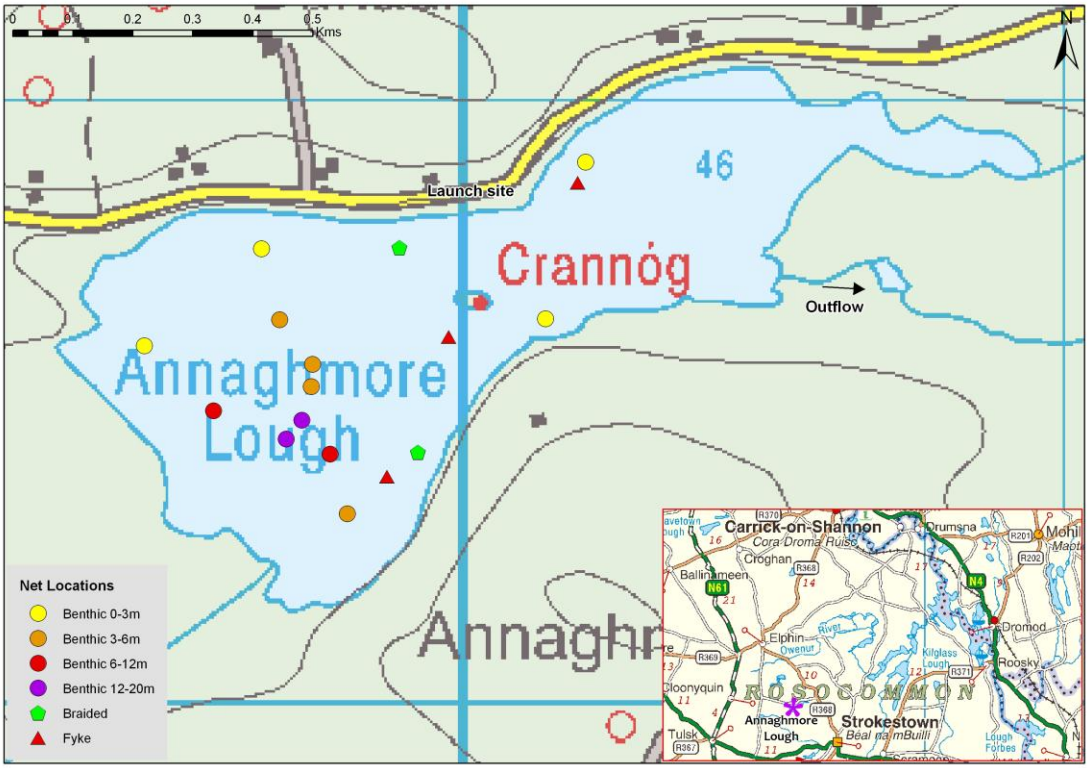

Fig. 1.1. Location map of Annaghmore Lough indicating sampling sites and depths of each net (outflow is displayed on map)

1.2 Methods

Annaghmore Lough was surveyed over one night between the 5th and the 6th of October 2011. 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 (4 @ 0-2.9m, 4 @ 3-5.9m, 2 @ 6-11.9m and 2 @ 12-19.9m) were deployed in the lake (15 sites). The netting effort was supplemented using two benthic braided survey gill nets (62.5mm mesh knot to knot) at two additional sites. Nets were deployed in the same locations as were randomly selected in the previous survey in 2008. 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 roach, pike, tench, rudd and hybrids. 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.

1.3 Results

1.3.1 Species Richness

A total of seven fish species and one type of hybrid were recorded on Annaghmore Lough in October 2011, with 175 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 roach. During the previous survey in 2008 the same species composition was recorded with the exception of three-spined stickleback and roach x rudd hybrids, which were present during the 2011 survey but were not captured in 2008.

Table 1.1. Number of each fish species captured by each gear type during the survey on Annaghmore Lough, October 2011

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Benthic braided gill nets	Fyke nets	Total
Perca fluviatilis	Perch	122	0	0	122
Rutilus rutilus	Roach	26	0	0	26
Scardinius erythrophthalmus	Rudd	9	0	0	9
Esox lucius	Pike	5	0	0	5
Tinca tinca	Tench	1	2	1	4
Rutilus rutilus x Scardinius erythrophthalmus	Roach x rudd hybrid	4	0	0	4
Gasterosteus aculeatus	3-spined stickleback	3	0	0	3
Anguilla anguilla	European eel	0	0	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 2008 and 2011 are summarised in Table 1.2. Mean CPUE and BPUE for all fish species is illustrated in Figures 1.2 and 1.3.

Although the mean perch CPUE appeared slightly lower in 2011 than in 2008, this difference was not statistically significant. The differences in the mean perch CPUE and BPUE between Annaghmore Lough and three similar lakes was also assessed, with no overall significant differences being found (Fig. 1.4 and Fig. 1.5). Although the mean perch BPUE also appeared slightly lower in 2011 than in 2008, this difference was not statistically significant.

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Annaghmore Lough, 2008 and 2011

Scientific name	Common name	2008	2011
		Mean CPUE	
Perca fluviatilis	Perch	0.298 (0.142)	0.254 (0.104)
Rutilus rutilus	Roach	0.024 (0.010)	0.054 (0.022)
	Rudd	0.021 (0.009)	0.018 (0.009)
Esox lucius	Pike	0.003 (0.002)	0.01 (0.005)
Tinca tinca	Tench	0.001 (0.001)	0.007 (0.003)
Rutilus rutilus x Scardinius erythrophthalmus	Roach x rudd hybrid	-	0.008 (0.008)
Gasterosteus aculeatus	3-spined stickleback	-	0.006 (0.004)
Anguilla anguilla	European eel	0.05 (0.028)	0.016 (0.016)
		Mean BPUE	
Perca fluviatilis	Perch	14.627 (5.233)	11.689 (7.191)
Rutilus rutilus	Roach	3.317 (1.713)	10.887 (4.846)
	Rudd	19.097 (10.119)	9.543 (7.461)
Esox lucius	Pike	2.998 (2.822)	11.777 (7.906)
Tinca tinca	Tench	0.680 (0.680)	8.307 (4.474)
Rutilus rutilus x Scardinius erythrophthalmus	Roach x rudd hybrid	-	1.322 (1.322)
Gasterosteus aculeatus	3-spined stickleback	-	0.006 (0.004)
Anguilla anguilla	European eel	27.744 (13.971)	15.066 (15.066)

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

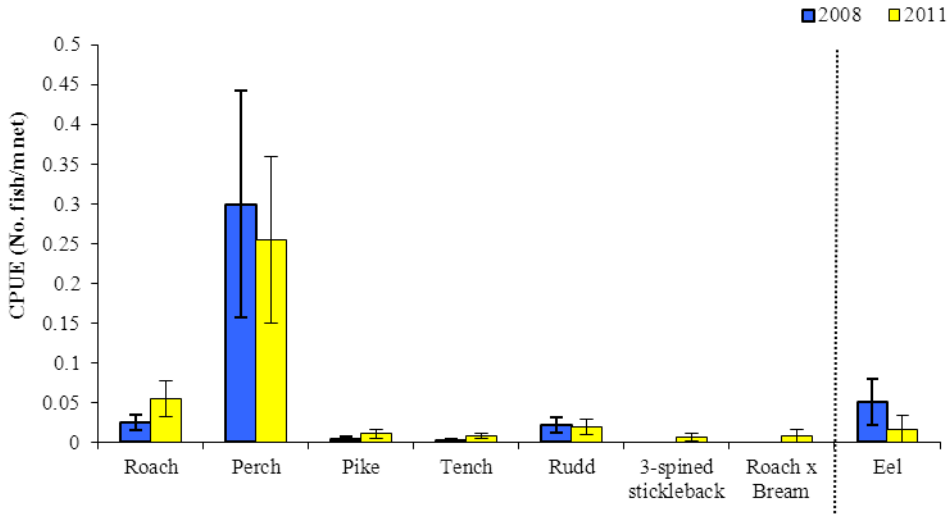

Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured in Annaghmore Lough (Eel CPUE based on fyke nets only), 2008 and 2011

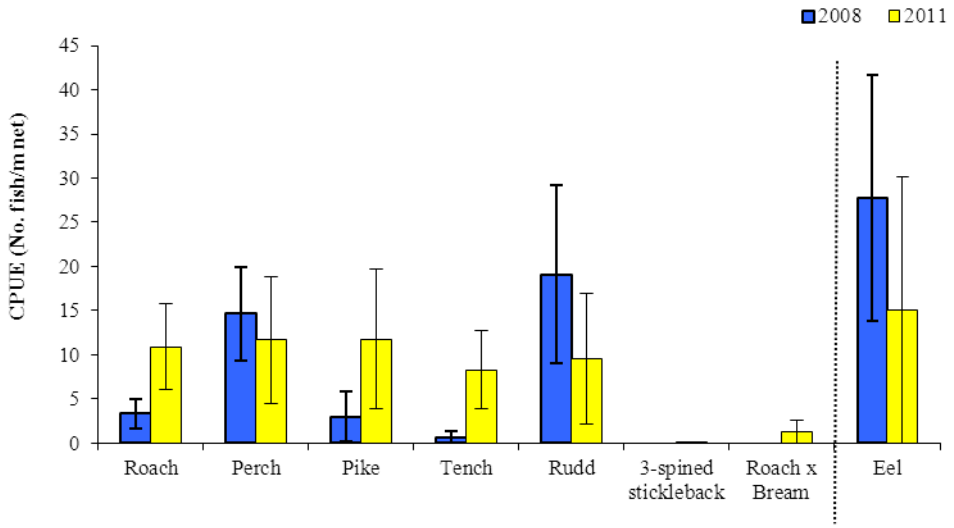

Fig. 1.3. Mean (±S.E.) BPUE for all fish species captured in Annaghmore Lough (Eel CPUE based on fyke nets only), 2008 and 2011

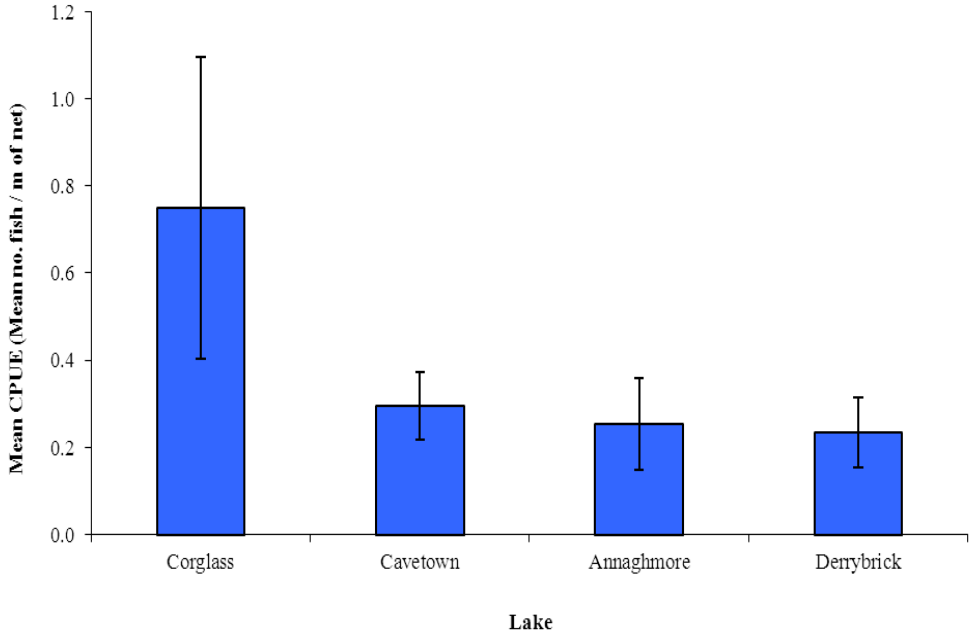

Fig. 1.4. Mean (±S.E.) perch CPUE in four lakes surveyed during 2011

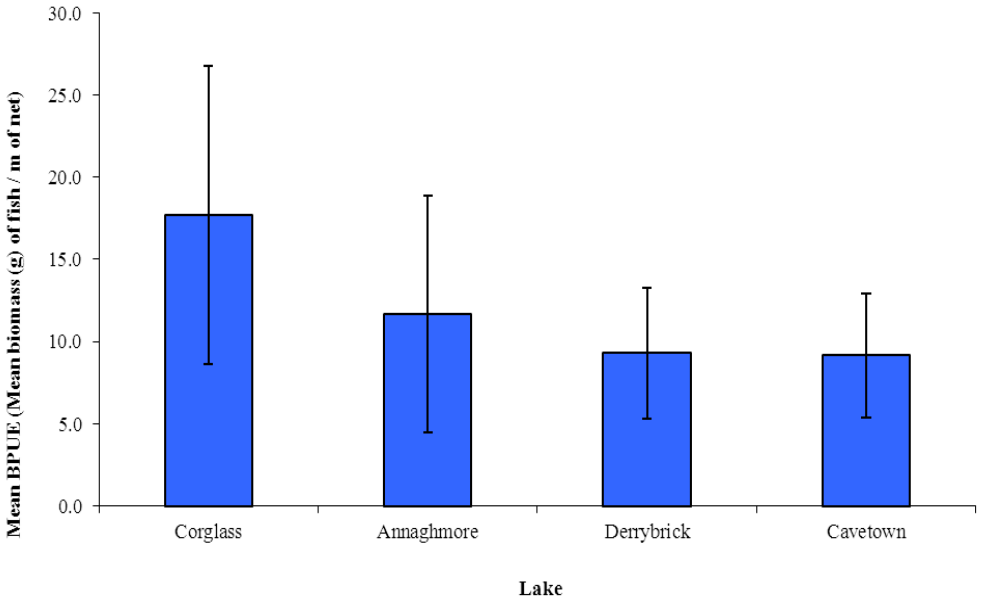

Fig. 1.5. Mean (±S.E.) perch BPUE in four lakes surveyed during 2011

1.3.3 Length frequency distributions

Perch captured during the 2011 survey ranged in length from 5.6cm to 29.6cm (mean = 10.2cm) (Fig. 1.6). Perch captured during the 2008 survey ranged in length from 3.4cm to 37.0cm (Fig. 1.6).

Roach captured during the 2011 survey ranged in length from 7.5cm to 27.0cm (mean = 20.7cm) (Fig.1.7). Roach captured during the 2008 survey had lengths ranging from 6.0cm to 24.6cm (Fig.1.7).

Pike captured during the 2011 survey ranged in length from 20.2cm to 74.6cm, roach x rudd hybrids ranged in length from 12.4cm to 23.3cm and rudd ranged from 7.8cm to 37.5cm. Tench ranged in length from 25.3cm to 51.0cm, two eels were recorded at 75.3cm and 76.2cm and all three-spined stickleback were measured at 4.1cm.

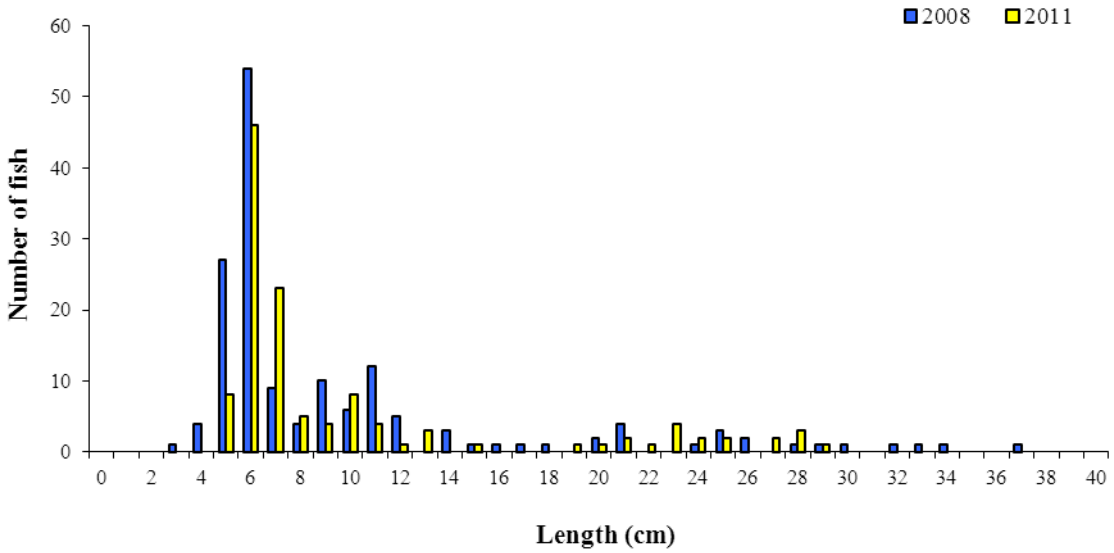

Fig. 1.6. Length frequency of perch captured on Annaghmore Lough, 2008 and 2011

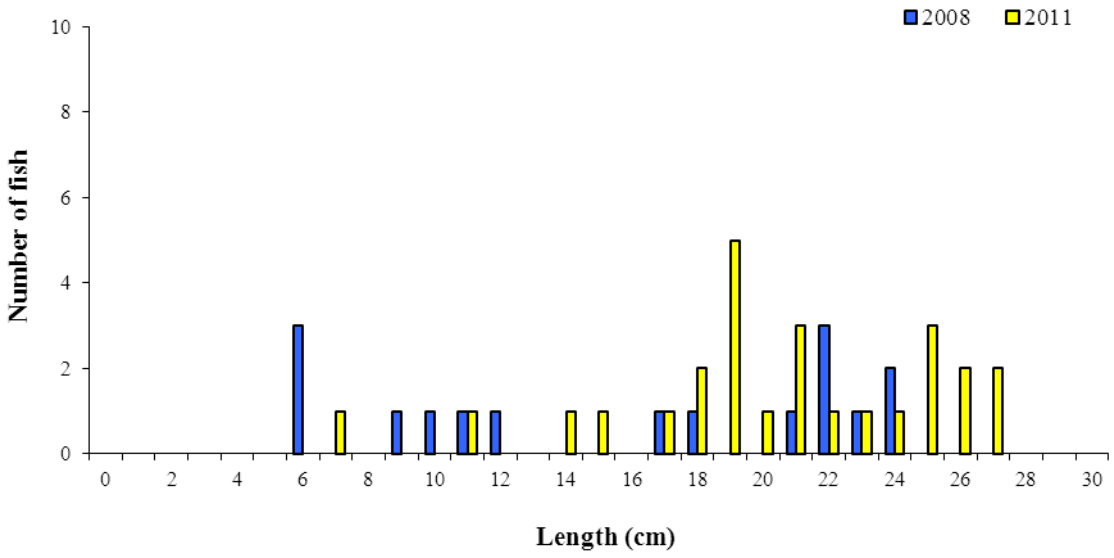

Fig. 1.7. Length frequency of roach captured on Annaghmore Lough, 2008 and 2011

1.3.4 Fish age and growth

Seven age classes of perch were present, ranging from 0+ to 6+, with a mean L1 of 5.6cm (Table 1.3). In the 2008 survey, perch ranged from 0+ to 8+ with a mean L1 of 5.9cm.

Six age classes of roach were present, ranging from 0+ to 7+, with a mean L1 of 2.3cm (Table 1.4). In the 2008 survey, roach ranged from 1+ to 6+ with a mean L1 of 4.1cm. Three age classes of pike were present, ranging from 0+ to 5+ and six age classes of rudd were present ranging from 1+ to 13+.

Table 1.3. Mean (±SE) perch length (cm) at age for Annaghmore Lough, October 2011

	L_1	L_2	L_3	L_4	L_5	L_6
Mean	5.6 (0.1)	11.9 (0.4)	16.7 (0.5)	20.5 (0.8)	24.6 (0.9)	25.2
N	42	19	14	8	5	1
Range	4.0-9.3	7.8-15.6	11.4-19.6	16.5-24.7	21.5-26.7	25.2-25.2

Table 1.4. Mean (±SE) roach length (cm) at age for Annaghmore Lough, October 2011

	L_1	L_2	L_3	L_4	L_5	L_6	L_7
Mean	2.3 (0.1)	6.6 (0.3)	12.3 (0.4)	16.8 (0.5)	20.7 (0.5)	21.2 (0.1)	24.1 (1.4)
N	23	23	20	11	7	2	2
Range	1.4-3.4	4.6-10.5	9.5-16.7	14.3-21.0	18.7-22.7	21.2-21.3	22.6-25.5

1.4 Summary

Perch was the dominant species in terms of abundance (CPUE) and pike were the dominant species in terms of biomass (BPUE) captured in the survey gill nets.

The mean perch CPUE and BPUE in Annaghmore Lough was lower in 2011 than in the 2008 survey, however this difference was not statistically significant. The mean perch CPUE and BPUE in the lake was similar to the other high alkalinity lakes assessed during 2011, with no statistically significant differences being found between lakes. Perch ranged in age from 0+ to 6+, with 0+ and 1+ fish being captured indicating reproductive success in recent years. The dominant age class of perch was 1+. Roach ranged in age from 0+ to 7+, with 0+ fish being captured indicating reproductive success in recent 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 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.*, 2012). Using the FIL2 classification tool, Annaghmore Lough has been assigned an ecological status of Moderate based on the fish populations present in 2011. The ecological status assigned to the lake based on the 2008 survey data was Good.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Annaghmore Lough an overall ecological status of Good, based on all monitored physico-chemical and biological elements, including fish. This status classification will be revised at the end of 2012.

1.5 References

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