Sampling Fish for the Water Framework Directive

Lakes 2010

Ross Lake

Iascach Intíre Éireann
Inland Fisheries Ireland

ACKNOWLEDGEMENTS

1.1 Introduction

Ross Lake (Plate 1.1, Fig. 1.1) is siuated in the Corrib catchment, located approximately 1km south-east of Rosscahill and 3km north-west of Moycullen in a chain of lakes entering Lough Corrib in Moycullen Bay. 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 (WRFB, 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 as part of the WFD surveillance monitoring programme (Kelly and Connor, 2007). During this survey perch and roach were found to be the dominant species present in the lake. Roach x bream hybrids, bream, pike and eels were also recorded.

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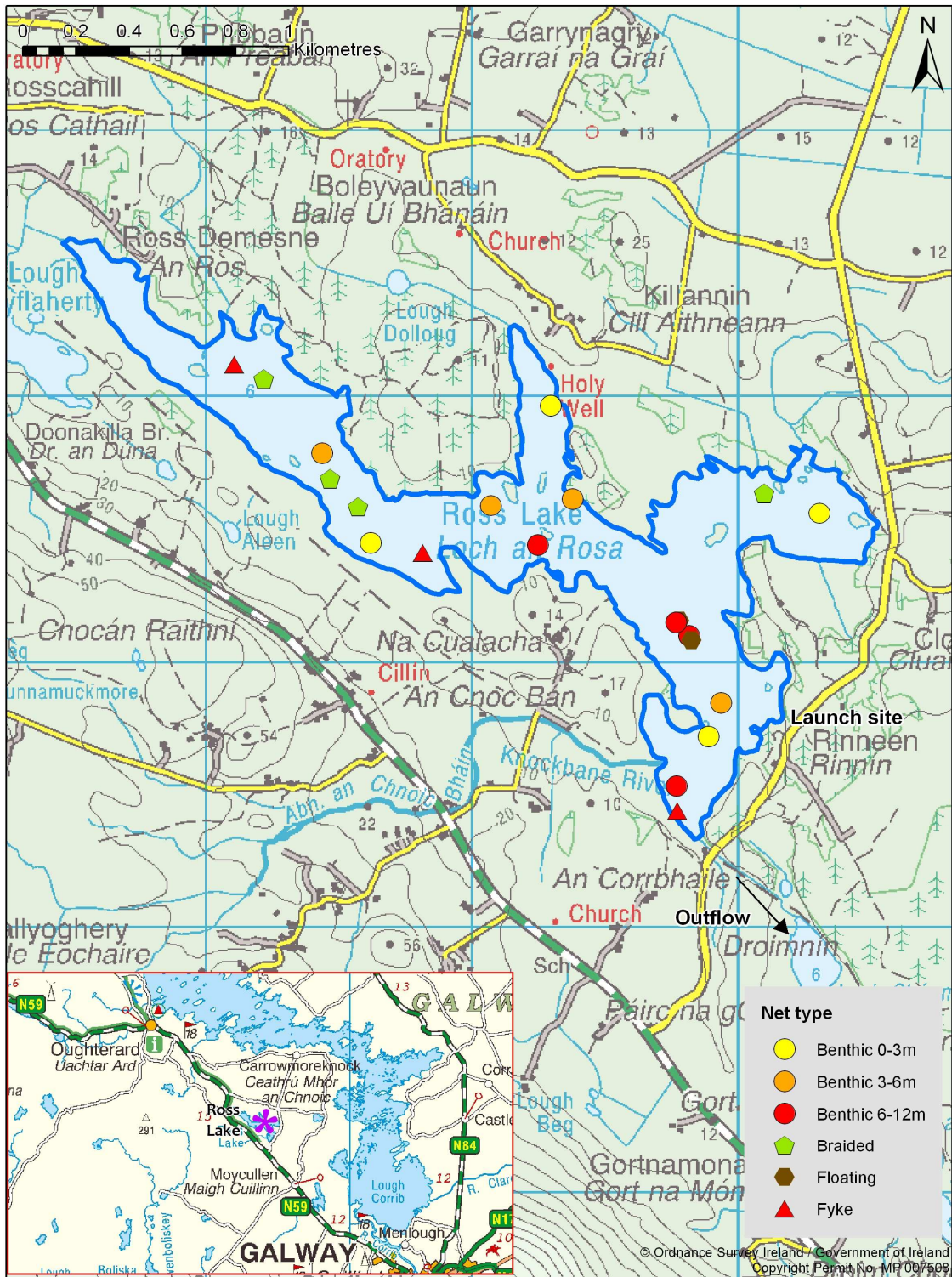
Fig. 1.1. Location map of Ross Lake showing net locations and depths of each net (outflow is indicated on map)

1.2 Methods

Ross Lake was surveyed over two nights from the 31st August to the 2nd of September 2010. 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 and 4 @ 6-11.9m) and two floating monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed in the lake (17 sites). The netting effort was supplemented using four benthic braided survey gill nets (62.5mm mesh knot to knot) at four additional sites. 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.

1.3 Results

1.3.1 Species Richness

A total of four fish species and one type of hybrid were recorded in Ross Lake in August/September 2010, with 327 fish being captured. The number of each species captured by each gear type is shown in Table 1.1. Roach was the most abundant fish species recorded, followed by perch. During the previous survey in 2007 the same species composition was recorded with the exception of eels, which were present during the 2007 survey but were not captured in the current survey.

Table 1.1. Number of each fish species captured by each gear type during the survey on Ross Lake, August/September 2010

Scientific name	Common name	Number of fish captured				
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Benthic braided gill nets	Fyke nets	Total
Rutilus rutilus	Roach	96	30	0	0	126
Perca fluviatilis	Perch	124	0	0	0	124
Rutilus rutilus x Abramis brama	Roach x bream hybrid	48	1	0	0	49
Abramis brama	Bream	15	0	7	0	22
Esox lucius	Pike	0	1	5	0	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 are summarised in Table 1.2. Mean CPUE is illustrated in Figure 1.2.

Although the mean perch and roach CPUE were lower in 2010 than in 2007, this was not statistically significant. The differences in the mean perch CPUE between Ross lake and four other similar lakes were assessed and found to be statistically significant (Kruskal-Wallis, P<0.05) (Fig. 1.3). Independent-Samples Mann-Whitney U tests between each lake showed that Ross Lake had a significantly lower mean perch CPUE than Urlaur Lough (z = -2.470, P<0.05).

The differences in the mean roach CPUE between Ross Lake and two other similar lakes were assessed and found to be statistically significant (Kruskal-Wallis, P<0.001) (Fig. 1.4). Independent-Samples Mann-Whitney U tests between each lake showed that Ross Lake had a significantly lower mean roach CPUE than Urlaur Lough (z = -2.484, P<0.05).

Table 1.2. Mean (S.E.) CPUE and BPUE for all fish species captured in Ross Lake, 2007 and 2010

Scientific name	Common name	2007	2010
		Mean CPUE	
Rutilus rutilus	Roach	0.343 (0.101)	0.200 (0.065)
Perca fluviatilis	Perch	0.421 (0.172)	0.197 (0.058)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	0.082 (0.029)	0.077 (0.021)
Abramis brama	Bream	0.072 (0.024)	0.036 (0.012)
Esox lucius	Pike	0.009 (0.003)	0.010 (0.005)
Anguilla anguilla	European eel	0.022 (0.011)	-
		Mean BPUE	
Esox lucius	Pike	7.769 (4.643)	25.593 (18.315)
Rutilus rutilus	Roach	10.065 (3.582)	12.548 (3.796)
Abramis brama	Bream	13.930 (5.127)	11.967 (6.257)
Rutilus rutilus x Abramis brama	Roach x bream hybrid	11.611 (3.932)	10.632 (3.039)
Perca fluviatilis	Perch	10.490 (3.322)	9.441 (3.577)
Anguilla anguilla	European eel	6.994 (4.204)	-

* On the rare occasion where biomass data was unavailable for an individual fish, this was determined from a length/weight regression for that species.
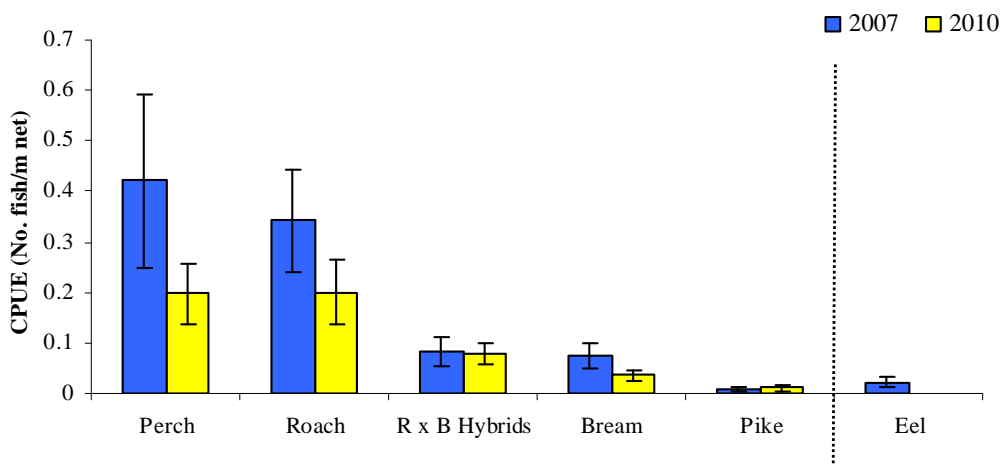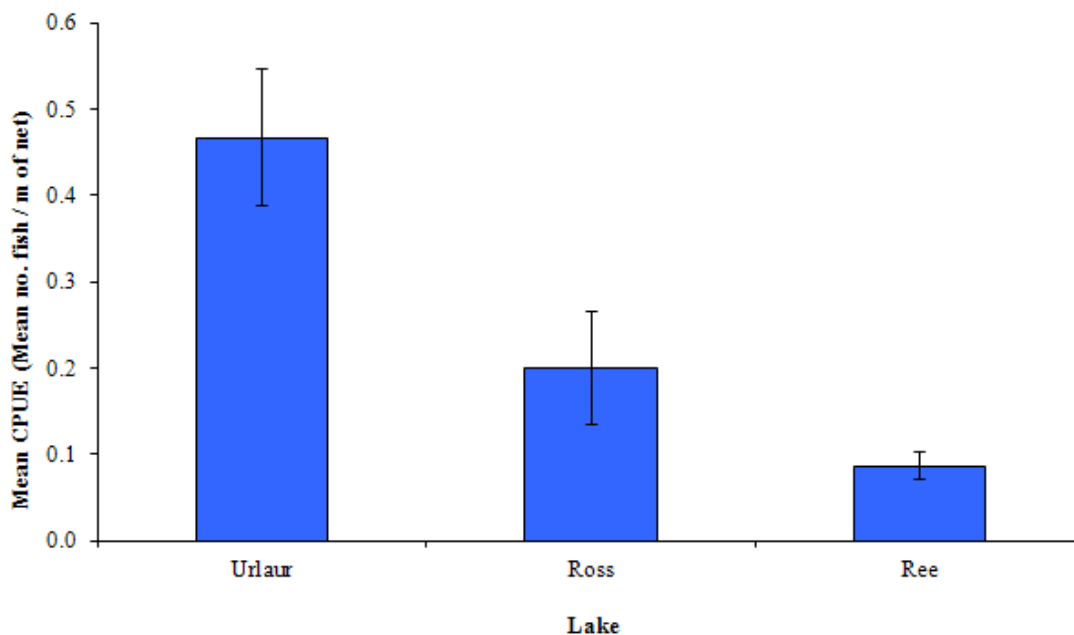
Fig. 1.2. Mean (±S.E.) CPUE for all fish species captured on Ross Lake (Eel CPUE based on fyke nets only), 2007 and 2010
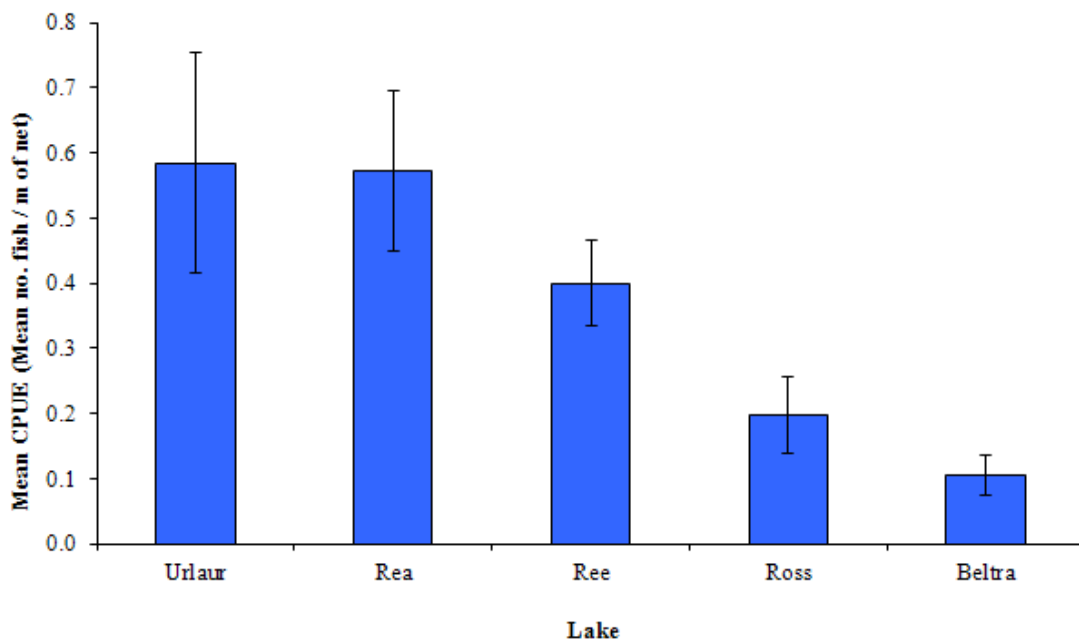
**Fig. 1.3. Mean (±S.E.) perch CPUE in five lakes surveyed during 2010**

Fig. 1.4. Mean (±S.E.) roach CPUE in three lakes surveyed during 2010

### 1.3.3 Length frequency distributions

Roach captured during the 2010 survey ranged in length from 4.7cm to 31.0cm (mean = 14.5cm) (Fig. 1.5). Roach captured during the 2007 had similar lengths, ranging from 4.5cm to 26.0cm (Fig. 1.5).

Perch captured during the 2010 survey ranged in length from 4.8cm to 26.3cm (mean = 13.1cm) (Fig.1.6). Perch captured during the 2007 survey ranged in length from 2.2cm to 29.6cm (Fig.1.6).

Bream captured during the 2010 survey ranged in length from 13.5cm to 42.0cm, pike ranged in length from 16.0cm to 84.5cm and roach x bream hybrids ranged in length from 6.7cm to 31.3cm.
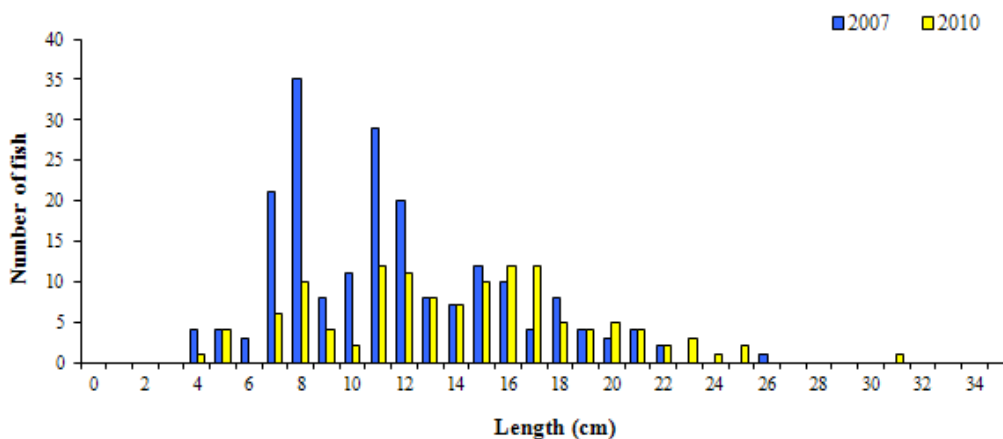
Fig. 1.5. Length frequency of roach captured on Ross Lake
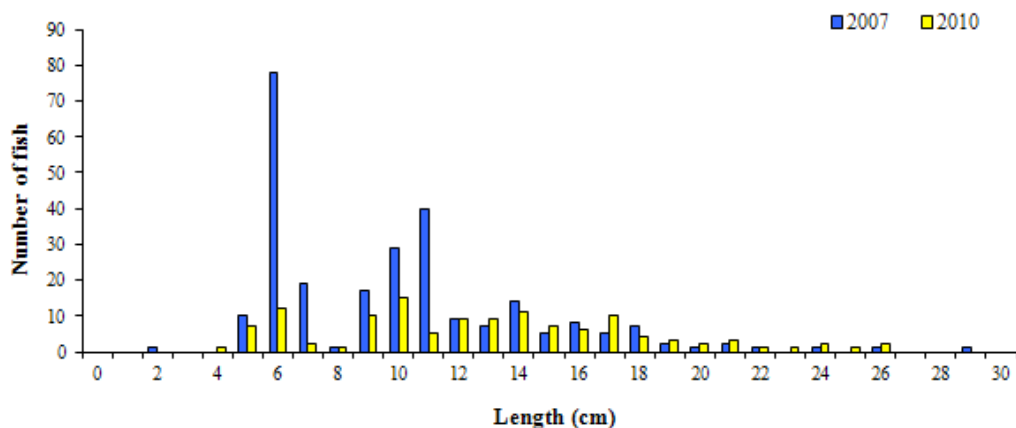
Fig. 1.6. Length frequency of perch captured on Ross Lake

1.3.4 Fish age and growth

Eight age classes of roach were present, ranging from 1+ to 9+, with a mean L1 of 3.3cm (Table 1.4). In the 2007 survey, roach ranged from 1+ to 8+ with a mean L1 of 3.8cm (Fig. 1.5).

Eight age classes of perch were present, ranging from 0+ to 7+, with a mean L1 of 5.7cm (Table 1.3). In the 2007 survey, perch ranged from 0+ to 7+ with a mean L1 of 7.2cm. In 2007 the dominant age class was 1+ which corresponded to the 6cm to 11cm length class (Fig. 1.6). No such dominant age class was evident in the perch population in the 2010 survey.

Eight age classes of roach x bream hybrids were present, ranging from 1+ to 9+, seven age classes of bream were present, ranging from 3+ to 12+ and three age classes of pike were present, ranging from 0+ to 6+.

Table 1.3. Mean (±SE) perch length (cm) at age for Ross Lake, August/September 2010

	L_1	L_2	L_3	L_4	L_5	L_6	L_7
Mean	5.7 (0.1)	9.5 (0.2)	13.0 (0.3)	15.8 (0.4)	18.7 (1.1)	21.1 (0.9)	20.8
N	67	55	40	32	10	3	1
Range	3.1-7.6	5.4-12.9	8.4-16.9	11.1-20.7	13.2-24.5	19.2-22.3	20.8-20.8

Table 1.4. Mean (±SE) roach length (cm) at age for Ross Lake, August/September 2010

	L_1	L_2	L_3	L_4	L_5	L_6	L_7	L_8	L_9
Mean	3.3 (0.1)	6.7 (0.1)	10.6 (0.2)	13.7 (0.2)	16.2 (0.3)	18.4 (0.4)	21.0 (0.6)	26.3	29.3
N	70	69	55	39	26	20	10	1	1
Range	2.0-4.5	4.6-8.6	7.5-13.7	11.4-17.7	13.7-20.7	15.7-22.2	18.6-24.2	26.3-26.3	29.3-29.3

1.4 Summary

Roach was the dominant species in terms of abundance (CPUE) and pike was the dominant species in terms of biomass (BPUE).

The mean perch CPUE in Ross Lake was significantly lower than Urlaur Lough but not significantly different to the other three similar lakes surveyed. Perch ranged in age from 0+ to 7+, indicating reproductive success in each of the last eight years.

The mean roach CPUE in Ross Lake was significantly lower than Urlaur Lough but not significantly different from Lough Ree. Roach ranged in age from 1+ to 9+, indicating reproductive success in each of the last number of 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. Using the FIL2 classification tool, Ross Lake has been assigned an ecological status of Poor/Bad based on the fish populations present. The ecological status assigned to the lake based on the 2007 survey data was Moderate.

In the 2007 to 2009 surveillance monitoring reporting period, the EPA assigned Ross Lake an overall ecological status of Moderate, based on all monitored physic0-chemical and biological elements, including fish. This status classification will be revised at the end of 2012.

1.5 References

Kelly, F. and Connor, L. (2007) *WFD Surveillance Monitoring - Fish in Lakes 2007*. Central Fisheries Board report.

Kelly, F.L., Harrison, A., Connor, L., Allen, M., Rosell, R. and Champ, T. (2008) *FISH IN LAKES Task 6.9: Classification tool for Fish in Lakes. FINAL REPORT*. Central Fisheries Board, NSSHARE project.

NPWS (1999) Site *synopsis: Ross Lake and Woods. Site code: 001312*. Site Synopsis report, National Parks and Wildlife Service.