Doo Lough

Sampling Fish for the Water Framework Directive - Lakes 2009

The Central and Regional Fisheries Boards

ACKNOWLEDGEMENTS

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1.1 Introduction

Doo Lough (Plate 1.1, Fig. 1.1) is located approximately 6km north-west of Leenaun, Co. Mayo. It is one of four lakes situated in the Delphi fishery - Fin, Doo, Glencullin and Cunne. Glencullin Lough, located directly above Doo Lough, flows into Doo Lough via a short stream. Doo Lough in turn drains into Fin Lough which is connected to Killary Harbour via the Bundorragha River.

The lake is approximately 3.5km in length and up to 750m wide. It has a surface area of 155ha, a maximum depth of 46m and an altitude of 30m a.s.l. The lake falls into typology class 4 (as designated by the EPA for the Water Framework Directive), i.e. deep (mean depth >4m), greater than 50ha and low alkalinity (<20mg/l $CaCO_3$).

Doo Lough forms part of the Mweelrea/Sheefry/Erriff candidate Special Area of Conservation complex (NPWS, 2005). The site has been selected for containing active blanket bog, lagoons, machair, decalcified dunes and petrifying springs - all priority habitats on Annex I of the E.U. Habitats Directive. The site is also selected for containing the following species listed on Annex II of the same Directive - freshwater pearl mussel, Atlantic salmon, otter, the snails *Vertigo angustior* and *V. geyeri*, the plant slender naiad and the liverwort petalwort (NPWS, 2005).

Doo Lough is an oligotrophic lake (NPWS, 2005) and was once famous for its sea trout fishery, which has been in decline since the late 1980s due to problems with sea lice. Doo Lough holds brown trout, sea trout, Arctic char and gets both a spring and grilse salmon run (O'Reilly, 2007).

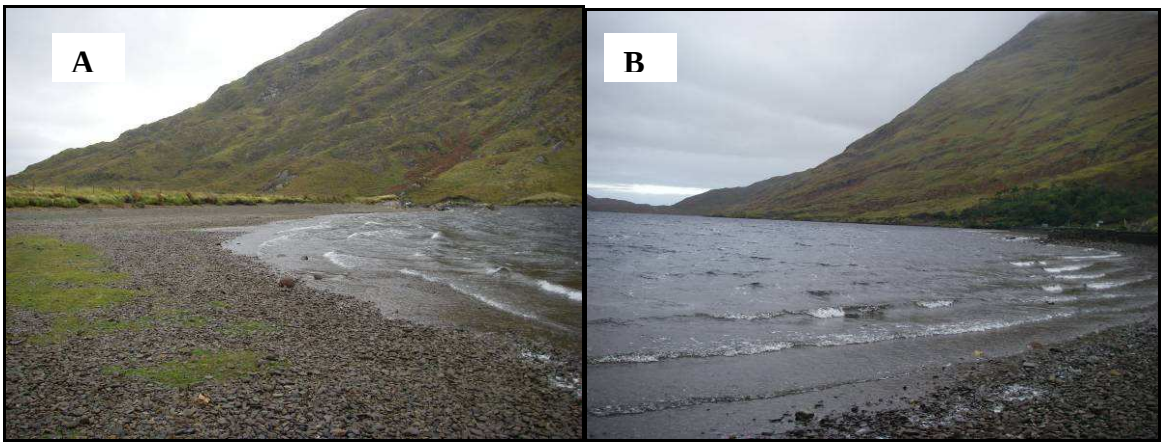


Plate 1.1. (a) Doo Lough on southern shore and (b) Doo Lough looking north-east

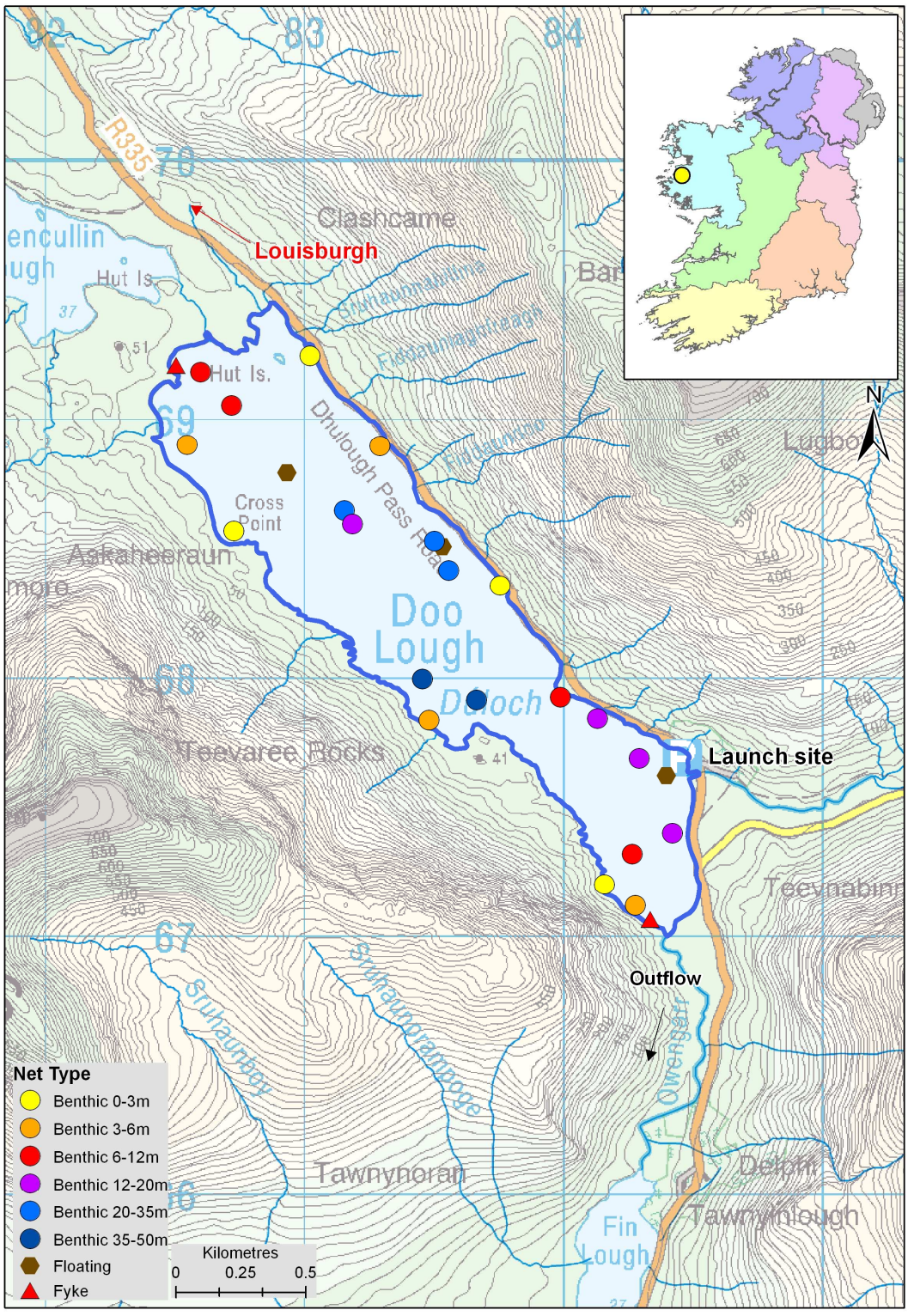


Fig. 1.1. Location map of Doo Lough showing locations and depths of each net (outflow is indicated on map)

1.2 Methods

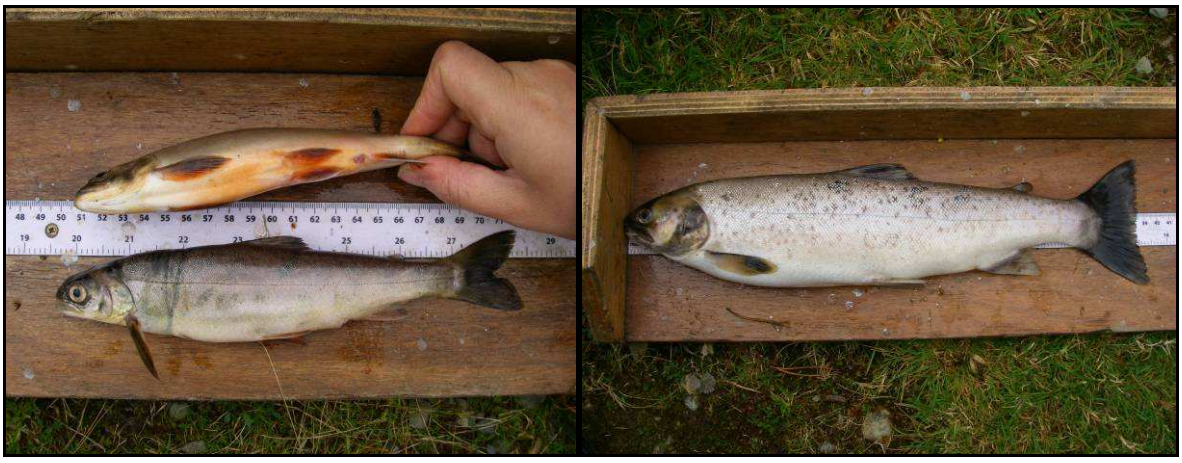
Doo Lough was surveyed over two nights between the 5th and the 7th of October 2009. A total of two sets of Dutch fyke nets, 21 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (4 @ 0-2.9m, 4 @ 3-5.9m, 4 @ 6-11.9m, 4 @ 12-19.9, 3 @ 20-34.9m and 2 @ 35-49.9m) and three surface monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets were deployed randomly in the lake (three sites). Survey locations were randomly selected within each depth zone using a grid placed over a map of the lake. 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. 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.

1.3 Results

1.3.1 Species Richness

A total of five fish species, as well as sea trout, were recorded on Doo Lough during the survey, with 80 fish being captured (Table 1.1). Brown trout, followed by Arctic char were the most abundant fish species recorded. Juvenile salmon, sea trout and three-spined stickleback were recorded in small numbers. Eels were captured in fyke nets only.



(a) **(b)**

Plate 1.2. (a) Arctic char and (b) Sea trout

Table 1.1. List of fish species recorded (including numbers captured) during the survey on Doo Lough, October 2009

Scientific name	Common name	Number of fish captured			
		Benthic mono multimesh gill nets	Surface mono multimesh gill nets	Fyke nets	Total
Salmo trutta	Brown trout	41	3	1	45
Salvelinus alpinus	Arctic char	18	0	0	18
Salmo trutta	Sea trout	9	0	0	9
Gasterosteus aculeatus	Three-spined stickleback	5	0	0	5
Salmo salar	Salmon	1	0	0	1
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 are summarised in Table 1.2.

The differences in the mean brown trout CPUE between Doo Lough and three other similar lakes were assessed and found to be statistically significant (Kruskal-Wallis, $P<0.05$) (Fig. 1.2). Independent-Samples Mann-Whitney U tests between each lake showed that Doo Lough had a significantly lower mean brown trout CPUE than Lough Dan ($z = -3.535$, $P<0.001$), Lough Tay ($z = -2.256$, $P<0.05$) and Lough Anure ($z = -2.869$, $P<0.05$).

The differences in the mean Arctic char CPUE between Doo Lough and two other similar lakes were also assessed, with no significant differences being found (Fig. 1.3).

Table 1.2. Mean (S.E.) CPUE and BPUE of all fish species captured on Doo Lough, October 2009

Scientific name	Common name	
		Mean CPUE
Salmo trutta	Brown trout	0.057 (0.018)
Salvelinus alpinus	Arctic char	0.023 (0.011)
Salmo trutta	Sea trout	0.012 (0.005)
Gasterosteus aculeatus	Three-spined stickleback	0.006 (0.003)
Salmo salar	Salmon	0.001 (0.001)
Anguilla anguilla	European eel	0.017 (0.017)
		Mean BPUE
Salmo trutta	Sea trout	4.824 (1.839)
Salmo trutta	Brown trout	3.437 (1.242)
Salvelinus alpinus	Arctic char	1.135 (0.770)
Gasterosteus aculeatus	Three-spined stickleback	0.025 (0.012)
Salmo salar	Salmon	0.008 (0.008)
Anguilla anguilla	European eel	3.967 (3.967)

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

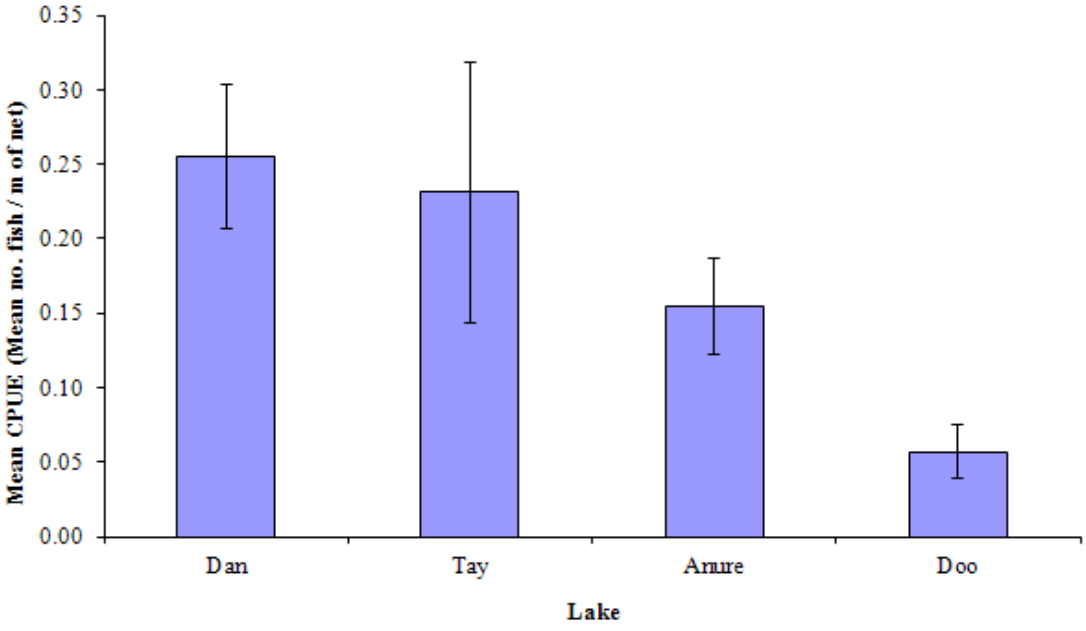


Fig. 1.2. Mean (±S.E.) brown trout CPUE in four lakes surveyed during 2009

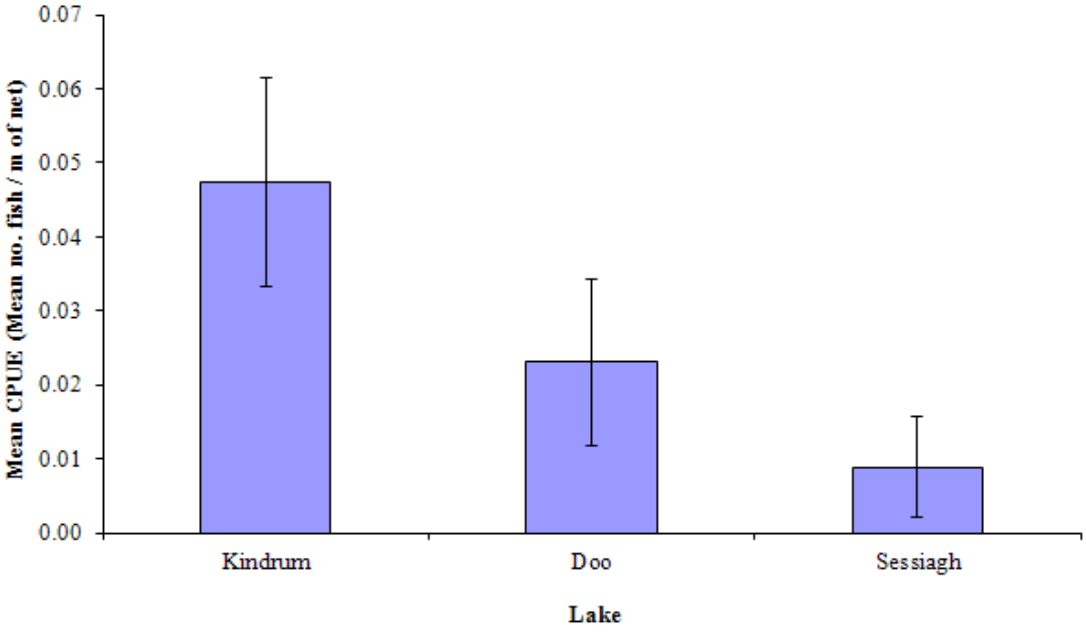


Fig. 1.3. Mean (±S.E.) Arctic char CPUE in four lakes surveyed during 2009

1.3.3 Length frequency distributions

Brown trout ranged in length from 7.7cm to 36.0cm (mean = 16.8 cm) (Fig. 1.4). Arctic char ranged in length from 12.0cm to 20.5cm (mean = 18.3cm) (Fig.1.5). Sea trout ranged in length from 26.5cm to 38.2cm and three-spined stickleback ranged from 3.5cm to 5.5cm. Two eels were recorded measuring 53.5cm and 55.0cm in length and the one salmon measured 6.0cm in length.

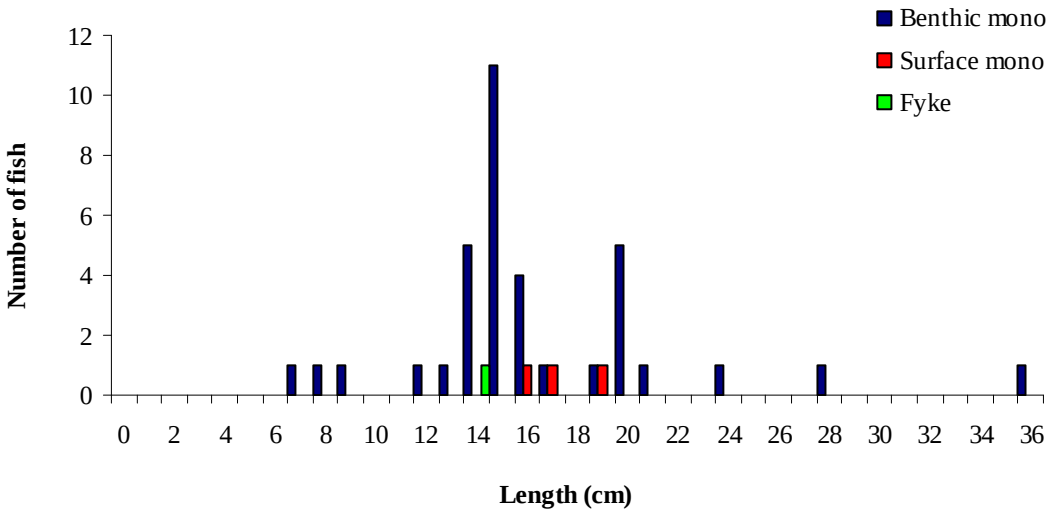


Fig. 1.4. Length frequency of brown trout (n=40) captured on Doo Lough, October 2009

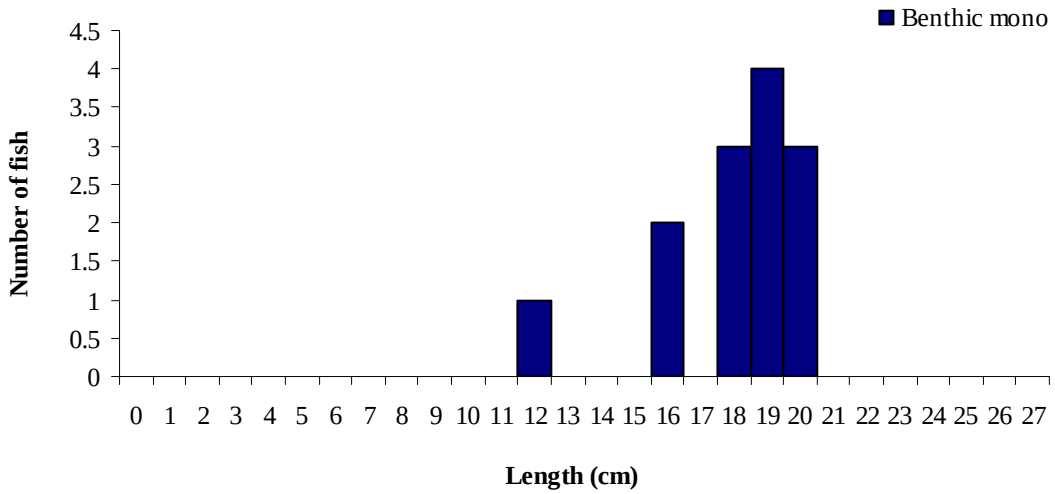


Fig. 1.5. Length frequency of Arctic char (n=13) captured on Doo Lough, October 2009

1.3.4 Fish age and growth

Four age classes of brown trout were present, ranging from 0+ to 3+, with a mean L1 of 6.8cm (Table 1.3).

Three age classes of Arctic char were present, ranging from 2+ to 4+. Three age classes of sea trout were also present, ranging from 2+ to 4+ and the one salmon was aged 0+.

Table 1.3. Mean (±SE) brown trout length at age for Doo Lough, October 2009

	L_1	L_2	L_3
Mean	6.8 (0.2)	13.7 (0.4)	19.3 (1.0)
N	30	9	5
Range	4.6-9.3	11.9-15.9	17.1-22.9

1.4 Summary

Brown trout was the dominant species in terms of abundance (CPUE) and sea trout was dominant in terms of biomass (BPUE).

The mean brown trout CPUE in Doo Lough was significantly lower than Lough Dan, Lough Tay and Lough Anure. Four age classes, 0+ to 3+, were present, indicating reproductive success in each of the previous two years.

The mean Arctic char CPUE in Doo Lough was significantly higher than Lough Mask. Although Doo Lough exhibited a lower mean Arctic char CPUE than Lough Kindrum, this was not statistically significant. Arctic char ranged in age from 2+ to 4+, with no 0+ or 1+ fish 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 WFD multimetric fish classification tool has been developed for the island of Ireland (Ecoregion 17) using CFB and Agri-Food and Biosciences Northern Ireland (AFBINI) data generated during the NSSHARE Fish in Lakes project (Kelly *et al.*, 2008). Using this tool, Doo Lough has been assigned an ecological status classification of High based on the fish populations present.

The EPA has assigned an overall status of Good to Doo Lough in an interim draft classification. This is based on physico-chemical parameters and biotic elements such as macroinvertebrates, macrophytes and fish.

1.5 References

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