National Research Survey Programme
Lakes 2021

Dunglow Lough

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Iascach Intíre Éireann
Inland Fisheries Ireland

Fish Stock Survey of Dunglow Lough,
August 2021

National Research Survey Programme

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1.   Introduction

Dunglow Lough is located in the Rosses fishery, 1.3km from Dunglow town, Co. Donegal (Plate 1.1, Figure 1.1). The Rosses fishery is composed of six salmon/sea trout/brown trout systems with isolated lakes interspersed throughout the fishery. Dunglow Lough is the furthest downstream of the lakes in the system. The lake is situated at an altitude of 17m a.s.l. It has a surface area of 61ha, a mean depth of 1.3m and a maximum depth of 7.5m. The lake is categorised as typology class 2 (as designated by the EPA for the purposes of the Water Framework Directive), i.e. shallow (<4m), greater than 50ha and low alkalinity (<20mg/l CaCO3). The lake has been classed as 2b (i.e. expected to meet good status by 2015) in the WFD characterization report (EPA, 2005). The geology of the area is predominantly granite, felsite and other intrusive rocks rich in silica.

The lake holds a good stock of small, wild brown trout which has historically been augmented by regularly stocking larger brown trout into the lake. There was also additional stocking of rainbow trout up to 680g in previous years (Cooke *et al*., 1997). In an effort to regenerate the sea trout population, the Rosses Anglers Association discontinued their stocking policy in 2006 (Gerry McCafferty IFI, *pers. comm*.). The sea trout run into the lake starts in July (O' Reilly, 2007).

Dunglow Lough was previously surveyed in 1996 (Cooke *et al*., 1997). Since then the lake has been surveyed on four occasions (2006, 2009, 2012 and 2015) (Kelly *et al.,* 2007, Kelly *et al.,* 2010, Kelly *et al.,* 2013 and Kelly *et al.,* 2016). Brown trout were the dominant species recorded on all sampling occasion between 1996 and 2015. Sea-trout and eels were also recorded.

This report summarises the results of the 2021 fish stock survey carried out on the lake using Inland Fisheries Ireland's fish in lakes monitoring protocol. The protocol is WFD compliant and also provides insight into fish stock status in the lake.
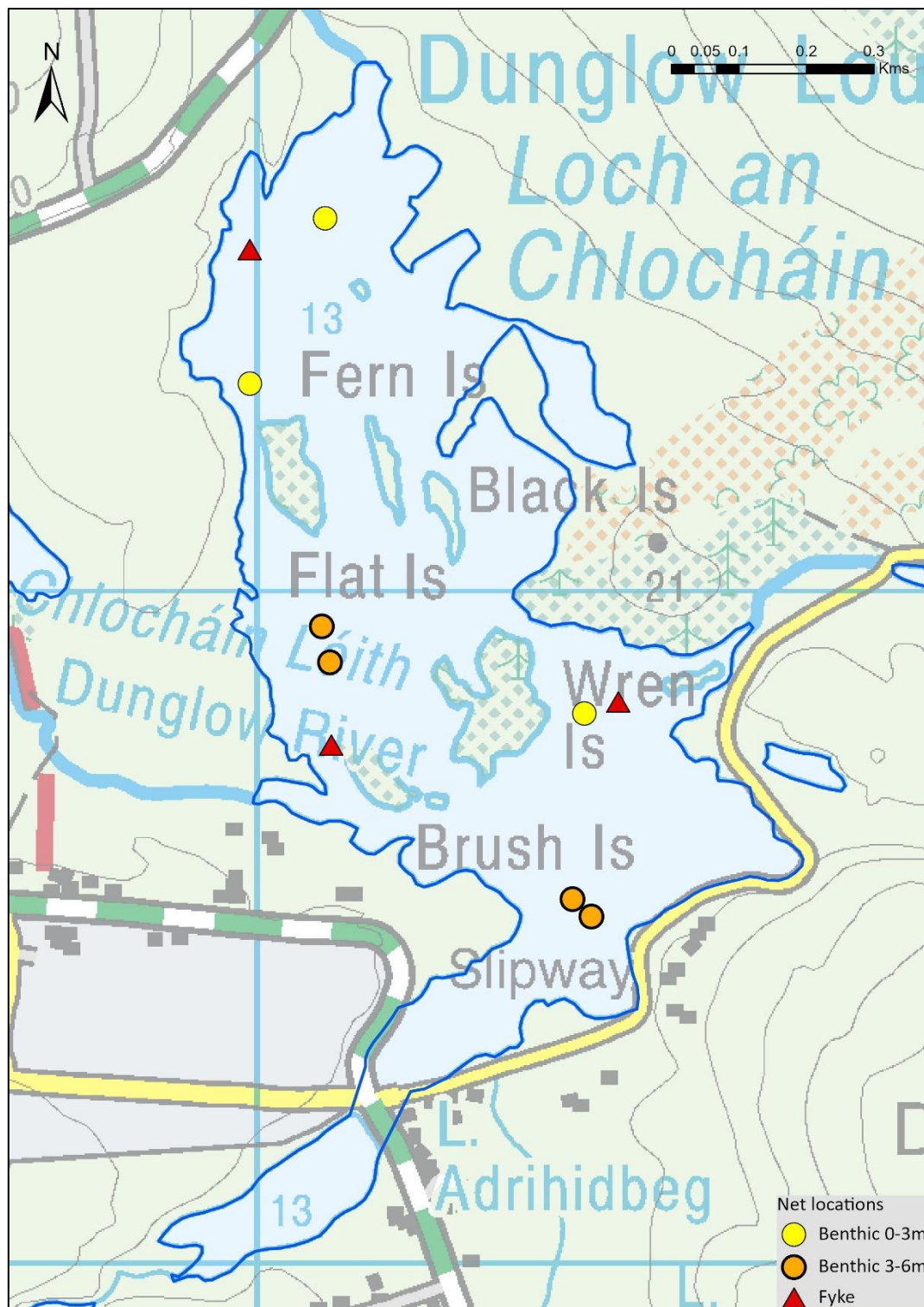

Plate 1.1. Dunglow Lough

Figure 1.1. Location map of Dunglow Lough showing locations and depths of each survey net

2. Methods

2.1. Netting methods

Dunglow Lough was surveyed over one night on the 9th of August 2021. A total of three sets of Dutch fyke nets (fyke) and seven benthic monofilament multi-mesh (BM CEN) (12 panel, 5-55mm mesh knot to knot) CEN standard survey gill nets (3 @ 0-2.9m and 4 @ 3-5.9m) were deployed in the lake (10 sites). Nets were deployed in the same locations as were randomly selected in the previous surveys in 2006, 2009, 2012 and 2015. 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 a sub-sample of all species except eels. 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.

2.2. Fish diet

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 then calculated to identify key prey items (Amundsen *et al.*, 1996).

$$\mathbf{FO}_i = \left(\frac{N_i}{N}\right) * 100$$

Where:

$\mathbf{FO}_i$ is the percentage frequency of prey item i,

N_i is the number of fish with prey i in their stomach,

N is total number of fish with stomach contents.

2.3. Biosecurity - disinfection and decontamination procedures

Procedures are required for disinfection of equipment 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.

3. Results

3.1. Species Richness

Two fish species (sea trout are included as a separate 'variety' of trout) were recorded in Dunglow Lough in August 2021. A total of 54 fish were captured. The number of each species captured by each gear type is shown in Table 3.1. Brown trout was the most abundant fish species recorded. Eels and sea trout were also captured. During the previous surveys in 2009 and 2012 the same species composition was recorded with the exception of salmon, which were only captured during the 2012 survey (Kelly *et al.*, 2010 and 2013).

Table 3.1. Number of each fish species captured by each gear type during the survey on Dunglow Lough, August 2021

Scientific name	Common name	Number of fish captured		
		BM CEN	Fyke	Total
Salmo trutta	Brown trout	44	3	47
Salmo trutta	Sea trout	2	0	2
Anguilla anguilla	European eel	0	5	5

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 (WFD and WFD+). For all fish species except eel, CPUE/BPUE is based on all nets, whereas eel CPUE/BPUE is based on fyke nets only. In 2021 brown trout was the dominant fish species in terms of abundance and biomass (Table 3.2).

For comparison purposes CPUE and BPUE for each species captured in all surveys per each net type between 2009 and 2021 are presented in Figures 3.1 and 3.2 respectively and illustrates fish community change over time. Brown trout have dominated catches on all sampling occasions and no obvious trend in abundance is apparent, although the median CPUE value was higher in recent years (Table 3.2 and Figures 3.1 and 3.2). While no clear trend was observed in eel numbers, there was a tendency towards reduced CPUE and BPUE in latter surveys.

Table 3.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Dunglow Lough, August 2021

Scientific name	Common name	Mean CPUE (± S.E)	Mean BPUE (± S.E)
Salmo trutta	Brown trout	0.152 (0.047)	6.440 (2.237)
Salmo trutta	Sea trout	0.007 (0.007)	1.300 (1.300)
*Anguilla anguilla**	European eel*	0.028 (0.011)	3.324 (0.079)

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.
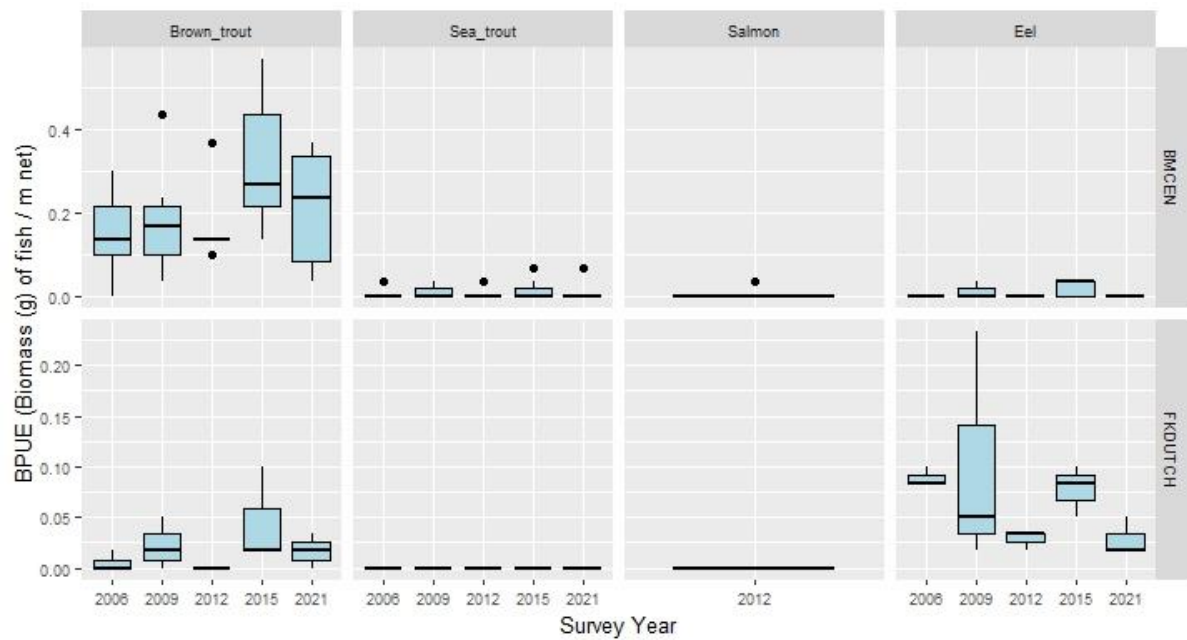
Figure 3.1. CPUE of all fish species captured in each net type during surveys of Dunglow Lough between 2006 and 2021. Figures are expressed as number of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots. The y axis (CPUE) is unique for each net type.
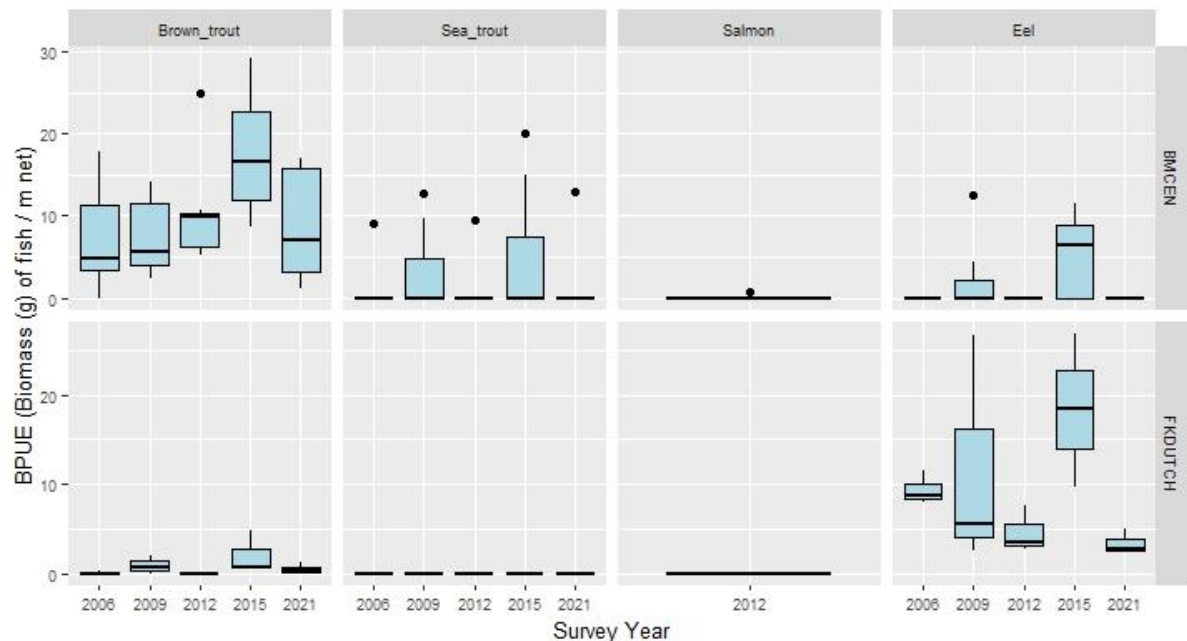

Figure 3.2. BPUE of all fish species captured in each net type during surveys of Dunglow Lough between 2006 and 2021. Figures are expressed as biomass (g) of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are marked by the upper and lower boundary of each box. The vertical 'whiskers' show the data range. Outliers are marked by dots. The y axis (BPUE) is unique for each net type.

3.3. Length frequency distributions and growth

Brown trout

Brown trout captured during the 2021 survey ranged in length from 7.5cm to 20.5cm (mean = 14.7cm) (Figure 3.3). Four age classes were present, ranging from 0+ to 3+. Mean L1 (i.e. length at the end of the first year) was 7.2cm (Table 3.3). The most abundant age class in the sample aged was 1+, corresponding to fish between 13-19cm (Figure 3.3). Few older (>2+) and larger fish (>20cm) were recorded and just one 3 year old fish was recorded in 2021 (Table 3.1 and Figure 3.3).
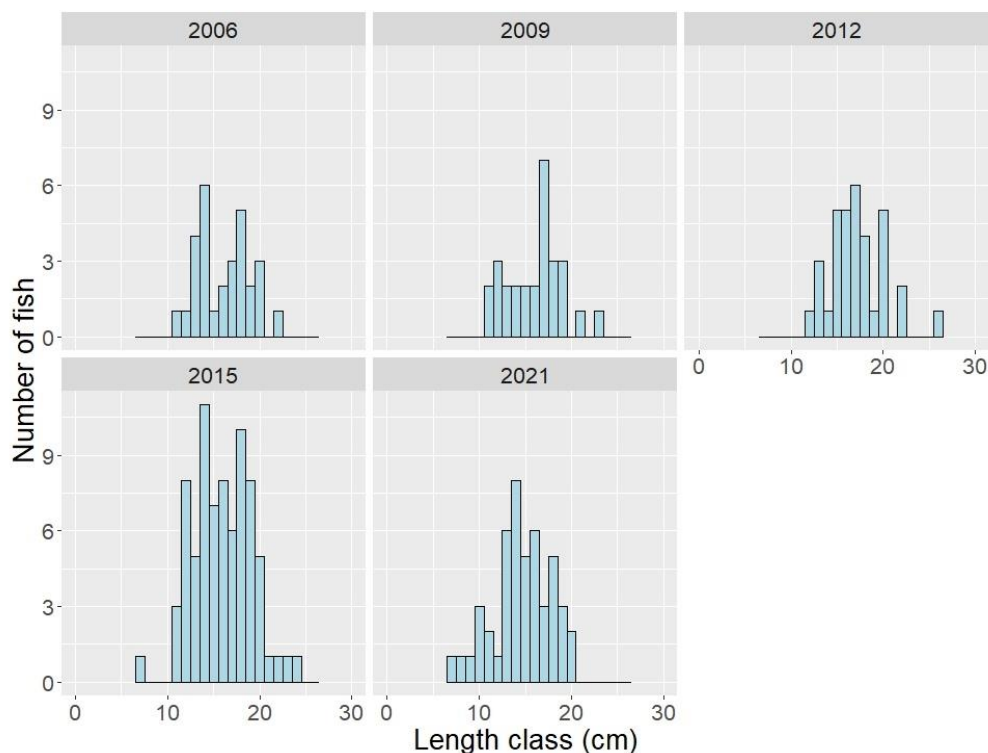

Figure 3.3. Length frequency of brown trout captured on Dunglow Lough, 2006, 2009, 2012, 2015 and 2021

Table 3.3. Mean (±S.E.) brown trout length (cm) at age for Dunglow Lough, August 2021

	L1	L2	L3
Mean (± S.E.)	7.3 (0.2)	14.1 0.3)	-
N	23	10	1
Range	6.0-8.7	12.6-15.1	18.2

Other species

Five eels captured during the 2021 survey ranged in length from 35.0cm to 44.5cm (mean = 39.9cm). Two sea trout captured were aged 1.2+ and 1.1+ and measured 25.2cm and 26.4cm in length respectively.

3.4. Stomach and diet analysis

The dietary analysis conducted provides insight to the prey of examined fish immediately prior to capture. Longer term and seasonal studies provide a more robust assessment of fish diet.

Nineteen brown trout stomachs were examined. Ten of these contained food. Invertebrates were found in the stomachs of three (30%) fish, while one stomach (10%) contained zooplankton. The contents of 6 stomachs (60%) were unidentified (Figure 3.4).
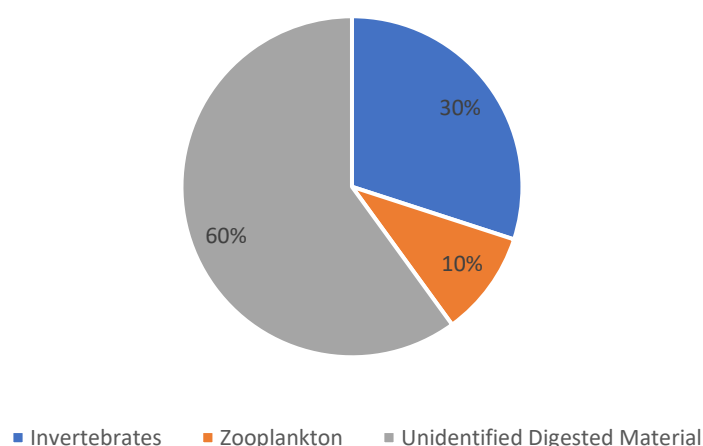

■ Invertebrates   ■ Zooplankton   ■ Unidentified Digested Material

Figure 3.4. Diet of brown trout (n = 10) captured on Dunglow Lough 2021 (% occurrence)

4. Summary and ecological status

Brown trout was the dominant species in terms of abundance (CPUE) and biomass (BPUE) captured in the survey gill nets during the 2021 survey. This species has dominated fish stocks in all previous surveys of the lake conducted since 2006. The population was dominated by young (i.e. 1+ and 2+) and small (<20cm) fish, suggesting that the population of trout in the lake is largely short lived. Length at age analyses revealed that brown trout in the lake exhibit a very slow rate of growth according to the classification scheme of Kennedy and Fitzmaurice (1971).

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*., 2012). Using the FIL2 classification tool, Dunglow Lough has been assigned an ecological status of High for 2021 based on the fish populations present. In previous years the lake was also assigned High fish ecological status (Figure 4.1).

In the 2013 to 2018 surveillance monitoring reporting period, the EPA assigned Dunglow Lough 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 2022.
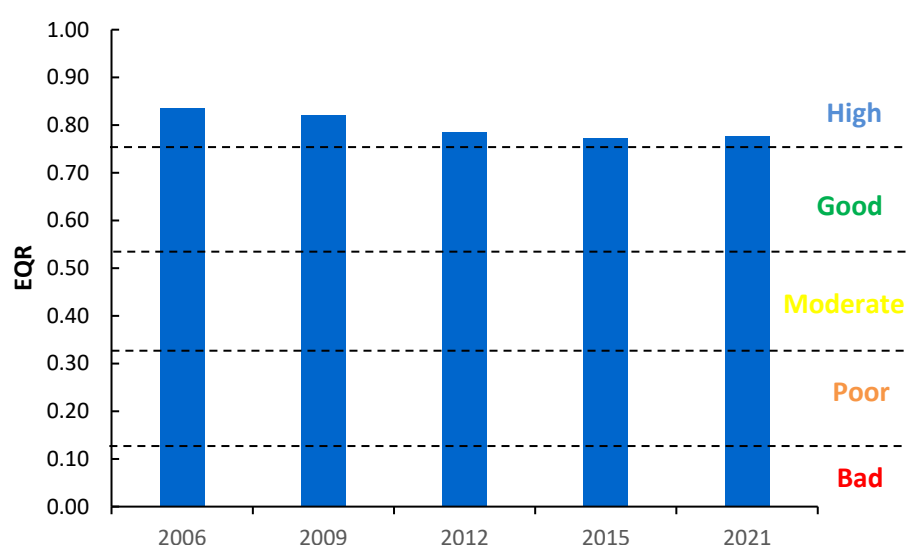

Figure 4.1 Fish ecological status of Dunglow Lough, 2006 to 2021

5.   References

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