January 8th 2025

Written Submission to
Inland Fisheries Ireland
Ardnaree House
Abbey Street
Ballina
Co. Mayo F29 K029

Public Consultation

on

Sligo District - Conservation of Trout on Lough Arrow (Inc Unshin River) Bye-Law

ballina@fisheriesireland.ie

January 8th, 2025.

Inland Fisheries Ireland,
Ardnaree House,
Abbey Street,
Ballina,
Co. Mayo F29 K029.
ballina@fisheriesireland.ie

RE: Sligo District - Conservation of Trout on Lough Arrow (Inc Unshin River) Bye-Law

How did this nonsense arise?

On Thursday, October 14th 2021 at 4pm, Inland Fisheries Ireland through their website opened a public consultation on a proposed bye-law prohibiting all angling for Arctic char (Salvelinus alpinus). The public consultation closed on Tuesday, November 16th 2021 at 5pm. Inland Fisheries Ireland also advertised the public consultation on page 15 of the The Irish Times, a newspaper with an alleged eclectic readership throughout Ireland.

In the attached appendix one to this submission, is a series of correspondence between Inland Fisheries Ireland and Donegal County Council regarding the necessity of the proposed Arctic char bye-law. The correspondence also shows a complete lack of faith in the bona fides of the proposed legislation by Donegal County Council.

The background to the intervention of Donegal County Council in this public consultation process is as follows. Lough Eske is a large lowland oligotrophic lake, which lies approximately 5km north-east of Donegal Town, in Co. Donegal. Lough Eske forms part of the Lough Eske and Ardnamona Wood Special Area of Conservation (SAC) and is selected as a SAC for containing Atlantic salmon (Salmo salar) plus the freshwater pearl mussel (Margaritifera margaritifera), both species are listed on Annex II of the EU Habitats Directive. Lough Eske retains a significant population of Arctic char, where a very seasonal recreational fishery exists for the harvesting of Arctic char by local anglers. There are no non-native or invasive fish species in Lough Eske that would put severe ecological pressure on Arctic char as documented by Inland Fisheries Ireland[1].

By attempting to introduce a national ban on angling for Arctic char, Inland Fisheries Ireland was deliberately inferring that the decline in national Arctic char populations, lay solely at the foot of the person holding a fishing rod. Otherwise, why ban angling for Arctic char?

Correspondence from the Fisheries Committee of Donegal County Council to Francis O'Donnell, CEO of Inland Fisheries Ireland, on November 29th 2021 made the following observation, "the committee noted the absence of any evidence presented as part of the consultation process, on the impact of angling on the conservation while noting and acknowledging the accepted reasons for loss of char in other lakes being driven by water catchment and water abstraction related issues and, to a lesser extent, invasive fish species". When presented with this glaring lacuna, Francis O'Donnell, CEO of Inland Fisheries Ireland, wrote back to Donegal County Council on January 14th 2022 acknowledging the deficiencies in the case for the proposed Arctic char bye-law, see appendix one.

[1] McLoone, P., Corcoran, W., Bateman, A., Cierpial, D., Gavin, A., Gordon, P., McCarthy, E., Heagney, B., Hyland, J., Robson, S., Fitzgerald, C. and Kelly, F.L. (2024). Fish Stock Survey of Lough Eske, September 2022. National Research Survey Programme, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

The full stock assessment survey of Arctic char in Lough Eske as ordered by Francis O'Donnell, CEO of Inland Fisheries Ireland, in January 2022 was eventually published just over a month ago on December 2nd 2024. This survey report is silent with regards to any negative angling pressure on Lough Eske Arctic char stocks, see appendix two.

The case is very simple. Had Donegal County Council not interceded in the public consultation process, then a national angling ban on Arctic char would presently be on the Irish Statute Book, driven by an unsubstantiated narrative that Inland Fisheries Ireland knew to be erroneous and misleading at the time of public engagement. The output of the 2022 Lough Eske survey only compounds the felony of Inland Fisheries Ireland.

The draft Lough Arrow (Inc Unshin River) Trout Conservation Bye-Law, proposes a reduction in the brown trout daily bag limit from 4 to 2 fish. The proposal infers that Inland Fisheries Ireland has quantitative data to support their contention that rod and line angling on Lough Arrow is having a direct negative impact on wild brown trout stocks. Contained within the online FAQs section publicising the Lough Arrow consultation, Inland Fisheries Ireland make the following claim, "these conservation measures aim to halt declines in brown trout numbers but may take many years to take effect"[2]. The rudimentary fact is that Inland Fisheries Ireland has failed to produce any prima facie evidence to substantiate this claim with regards to Lough Arrow brown trout stocks. Fish stock survey reports of Lough Arrow already in the public domain, consistently fail to indicate the negative anthropogenic influence of rod and line angling.

As discussed, Donegal County Council highlighted the same issue in relation to the proposed Arctic char bye-law in 2021 and Inland Fisheries Ireland retreated immediately. Are we going to end up with more inland fisheries legislation wholly based on supposition, conjecture and baseless narratives such as the pike and coarse fish conservation bye-laws from 2006? These bye-laws conserve all invasive and non-native fish species that have a measurable impact on the integrity of Lough Arrow SAC and reduce its EQR value under the EU Water Framework Directive FIL2 classification tool.

[redacted]

Lough Corrib SAC Riparian Stakeholder & Advocate.

[2] https://www.fisheriesireland.ie/news/public-consultations/conservation-of-trout-on-lough-arrow-including-the-unshin-river-sligo

Appendix One

From: **ANNE MARIE CONLON** AMCONLON@donegalcoco.ie
Subject: FW: Char bye-law proposal
Date: 19 December 2024 at 12:52
To: AMANDA MCNAMEE amcnamee@Donegalcoco.ie

AC

Hi Amanda,

Fyi and for filing as appropriate.

Kind regards,

Anne Marie

Anne Marie Conlon | Head of Economic Development
Donegal County Council, County House, Lifford, Co. Donegal, F93 Y622
Tel: 074 91 72 207 | Mob: 087 919 2275 | Email: amconlon@donegalcoco.ie |
www.donegal.ie

Comhairle Contae Dhún na nGall
Donegal County Council

DONEGAL
IRELAND'S DNA

Newsletter Subscription

From: GARRY MARTIN <GMARTIN@donegalcoco.ie>
Sent: Thursday, December 2, 2021 2:05 PM
To: ANNE MARIE CONLON <AMCONLON@donegalcoco.ie>; MARTINA TUFFY <mtuffy@Donegalcoco.ie>
Subject: FW: Char bye-law proposal

Anne Marie, Martina

FYI

Regards

Garry

Garry D Martin FCPFA
Director of Service
Economic Development, Information Systems & Emergency Services, County House, Lifford, Co. Donegal, Ireland.
gmartin@donegalcoco.ie
00 353 74 9172203

00 353 87 9048999

Designated Public Official under the Regulation of Lobbying Act 2015 / Oifigeach Poiblí Ainmnithe faoin Acht um Rialachán Brústocaireachta 2015.

From: Milton Matthews <milton.matthews@fisheriesireland.ie>
Sent: Wednesday 1 December 2021 12:13
To: GARRY MARTIN <GMARTIN@donegalcoco.ie>
Subject: RE: Char bye-law proposal

Dear Garry,

I am just writing to acknowledge receipt of your email below which I have forwarded onto our CEO's office for their attention. I have also taken the opportunity to flag that a further submission is to be anticipated from the Donegal Co. Co. Fisheries Committee following our last meeting. - As yet I have no information as to when the matter is to come before the Board of IFI.

Yours sincerely,

Milton Matthews
Director
Inland Fisheries Ireland- Ballyshannon

Iascach Intíre Éireann
Inland Fisheries Ireland

Tel +353 (0)7198 51435
Fax: +353 (0)7198 51816
Email milton.matthews@fisheriesireland.ie
Web www.fisheriesireland.ie

Station Road, Ballyshannon, Co. Donegal, Ireland. **F94 WV76**

From: GARRY MARTIN <GMARTIN@donegalcoco.ie>
Sent: 30 November 2021 09:13
To: Milton Matthews <milton.matthews@fisheriesireland.ie>
Subject: FW: Char bye-law proposal

Subject: FW: Char bye-law proposal

Dear Milton,

Many thanks for your e mail.

I was familiar with the 2006 and 2012 reports but didn't think that it was the basis of your commentary last week on what you referred to as the evident reduction of char in Lough Eske. If this were actual evidence of decline in the eyes of IFI, one would have assumed that there would have been an intervention shortly after the publication of this report from 2012 and not some 9 years after its date. In the absence of any evidence whatsoever, this suggests that the report is now being drawn on in an attempt to justify, on a conservation basis, the need to cease traditional char angling.

Your indication of a further survey in 2022 is positive but suggests that, at best, IFI's own position on the population status of char at Lough Eske is inconclusive at this time. It's unclear if the 2006 and 2012 surveys were taken on a like for like basis and, combined with the statistical risk of relying on a single survey for comparison purposes, the numbers netted in each of the years could not be relied upon to suggest a trend. The experience of the anglers, (which consist of a relatively small but consistent number of locals) on the other hand, and who have been present each and every year from late October to mid - November is one of a broad consistency of numbers, size etc. The most recent age analysis that I am aware of was undertaken by the independent ICCG and confirmed all age presences evident, which is positive and suggests successive and successful spawning seasons.

It seems to be accepted by all that the greatest threat are water catchment related issues, water abstraction and invasive species introduction. Thankfully, and given that char are the "canary in the coalmine" for water quality, there hasn't, to date, been an evident deterioration at Lough Eske. It is critically important that all efforts are made to maintain that. Everyone would be fully supportive of meaningful engagement, collaboration and submissions to bodies that have a role to play in these areas and it is again suggested that IFI concentrate their resources and focus on these areas.

My own and the locals concern is that the IFI effort at present, as referenced in its public consultation, seems to be wholly focused on nailing a local tradition that is not materially affecting the population at all. Char have been taken from the Lough for centuries by various means, as far back as 1795, Seward reported that "Eske Lough bounds with a most excellent kind of fish called char…….these fish……feeding in deep waters are taken only in nets". There are similar reports of char being caught commercially and potted for the UK market in the 19th century.

In light of all of the above, I really don't understand the motivation for this, for years IFI and their predecessors have known that a traditional fishery existed here and were respectful of its basis in tradition. IFI have, as I understand it, an existing legislative basis to use, had it been minded to do so, but for whatever reason, IFI now seem to want to create a "Year 0" approach with this new proposed bye-law.

Do you have a timeline that you can share on when this matter is to be considered by the Board of IFI and when would the various submissions made as part of the public consultation be available for public view ?

Were the Board of IFI agreeable, I would be happy to talk or present to them on this matter and to give them the local viewpoints and history of this.

Yours sincerely,

Garry Martin

From: Milton Matthews <milton.matthews@fisheriesireland.ie>
Sent: Friday 26 November 2021 18:57
To: GARRY MARTIN <GMARTIN@donegalcoco.ie>
Subject: RE: Char bye-law proposal

Dear Garry,

As you may be aware from the available scientific literature the overall national status of Arctic Char stocks in Ireland over recent years is worrying with over 30% of charr stocks classified as extinct. – Notable, high profile extinctions from the past 30 years include both Lough Corrib and Lough Conn. Consequently Arctic char are currently classified under the IUCN Red Data Book as 'vulnerable'.

Regarding your query below re. Lough Eske the most recent quantitative survey conducted by IFI was completed in 2012 as part of a collective survey of four Co. Donegal lakes all of which contained char stocks and for which there were concerns arising relating to water abstraction pressures. Habitats Directive Report 2012.pdf (fisheriesireland.ie)

As may seen from the report (see pages 44 -47 in particular) the survey results for L. Eske char were generally positive in that they indicated two, perhaps three, years classes to be present (indicating separate successful spawning events to have occurred). However, when compared to the previous standardised survey returns for L. Eske char from 2006 there was an overall reduction in CPUE (Catch Per Unit Effort) of circa 45%. That would indicate a potentially very significant decline in charr abundance if reflective of overall lake stock levels. The extent to which charr numbers in Lough Eske have recovered or declined in the intervening years since 2012 is also clearly a matter warranting further investigation and to that end I have requested that Lough Eske be prioritised next summer for repeat sampling to determine current stock status.

Apart from the above link to the IFI website, if you wish to view any of the other related IFI surveys from recent years click on 'Publications' and enter 'Red Data' on the search bar to see equivalent survey reports as available for other lakes in Co. Donegal and elsewhere the country.

Yours sincerely,

Milton Matthews
Director
Inland Fisheries Ireland- Ballyshannon

Iascach Intíre Éireann

Inland Fisheries Ireland

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Fax: +353 (0)7198 51816
Email milton.matthews@fisheriesireland.ie
Web www.fisheriesireland.ie

Station Road, Ballyshannon, Co. Donegal, Ireland. **F94 WV76**

From: GARRY MARTIN <GMARTIN@donegalcoco.ie>
Sent: 26 November 2021 14:37
To: 'milton.matthews@fisheriesireland.ie'
Subject: Char bye-law proposal

Dear Milton,

I refer to the Council Fisheries Committee meeting held on Wednesday 24th November and to the discussion revolving around proposed char bye-laws.

You referenced evidence on the website reflecting a decline in char numbers in Lough Eske as part of your commentary. I am having difficulty in sourcing this, can you let me know where this is, please ?

Yours sincerely

Garry Martin

00 353 87 9048999

Mr. Francis O Donnell,
Chief Executive Officer,
Inland Fisheries Ireland,
3044 Lake Dr,
Cheeverston,
Dublin

29th November 2021

Re: Proposed Bye-laws banning the angling of Arctic Char at Lough Eske, Donegal Town

Dear Mr. O Donnell,

I write on behalf of the Fisheries Committee of Donegal County Council, which, on 24th November 2021 discussed your recently closed consultation on establishment of bye-laws to ban angling for char.

Your Mr. Milton Matthews, who is a member of the committee, was in attendance on the day and participated in the discussion.

The committee concluded to resolve to write to you as CEO of Inland Fisheries Ireland (IFI), to the Chairperson of IFI and, separately, to the responsible Minister and Donegal based Oireachtas members on this subject, reflecting their dissatisfaction and concern on this matter and in relation to the following points.

1. The committee requested that in addition to the publicised consultation, that a local meeting be held with the people of Tawnawilly, Donegal Town, who are essentially the primary target for this bye-law, given that it relates to indicated concerns of IFI at Lough Eske and in advance of the proposed bye-laws being considered by the Board of the IFI. This local meeting would allow opposing viewpoints to be put forward, heard and understood and would ensure inclusivity not served by advertising on page 15 in the Irish Times and on the IFI website.
2. The committee, in noting that the 3-week period of angling at Lough Eske is a tradition going back hundreds of years, and is non-commercial in nature, asked that this tradition, custom and practice be respected in the Board's considerations.
3. The committee noted the absence of any evidence presented as part of the consultation process, on the impact of angling on the conservation while noting and acknowledging the accepted reasons for loss of char in other lakes being driven by water catchment and water abstraction related issues and, to a lesser extent, invasive fish species.
4. The committee considered the proposal for an outright ban to be punitive, in the absence of any precautionary or intermediary measures such as bag limits or catch and release options being put forward.

Yours sincerely,

Anne Marie Conlon,
Head of Economic Development,
Donegal County Council

From: ANNE MARIE CONLON AMCONLON@donegalcoco.ie
Subject: FW: Acknowledge receipt of letter from Inland Fisheries
Date: 19 December 2024 at 13:05
To: AMANDA MCNAMEE amcnamee@Donegalcoco.ie

AC

From: ANNE MARIE CONLON
Sent: Thursday, February 10, 2022 12:25 PM
To: AMANDA MCNAMEE <amcnamee@Donegalcoco.ie>
Cc: MARTINA TUFFY <mtuffy@Donegalcoco.ie>
Subject: FW: Acknowledge receipt of letter from Inland Fisheries

Hi Amanda,

Can you arrange to draft a letter from me acknowledging receipt of attached letter. Please also include - I would like thank you for taking the views of the Donegal County Council Fisheries Committee on board and for providing this update. Can you clarify that the proposed bye-laws will be stayed until such time as the study is completed.

Can you do this letter in hard copy form and I will sign. Can you get it in the post today.

Kind regards,

Anne Marie

From: ANNE MARIE CONLON
Sent: Tuesday 18 January 2022 17:20
To: GARRY MARTIN <GMARTIN@donegalcoco.ie>
Subject:

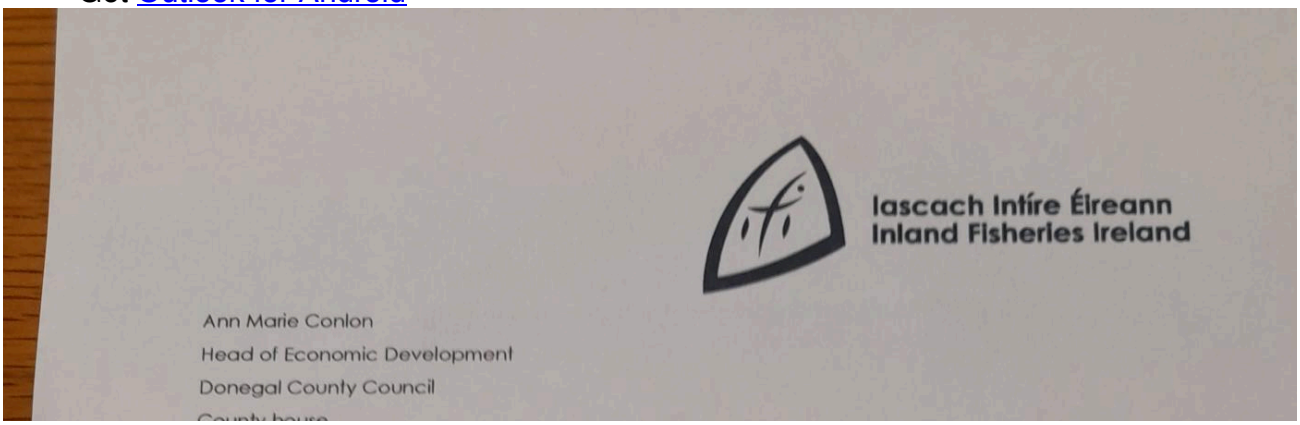
Hi Garry

Please find attached letter from Inland Fisheries Ireland.

Kind regards

Anne Marie

Get Outlook for Android



Lifford
Co. Donegal
F93 Y622

14th January 2022

Ref: ***Proposed Byelaw on Artic Char***

Dear Ms Conlon

I refer to your letter dated 29th November that was recevied by my office on 7th December.

I have reviewed your correspondence and taken your views on board. I have since instructed our Research & Development division to undertake a full stock assessment of Artic Char on Lough Eske and other lakes.

If you have any other queries please do not hesitate to contact me.

Yours Sincerely

Francis O'Donnell
Chief Executive Officer

Donegal County Council
17 JAN 2022
Received
Council Secretariat

IIE Baile Átha Cliath, 3044 Céide an Locha, Campas Gnó Larthar Na Cathrach, Baile Átha Cliath 24, D24 Y265
IFI Dublin, 3044 Lake Drive, Citywest Business Campus, Dublin 24, D24 Y265
+353(0)1 8842 600 - info@fisheriesireland.ie - www.fisheriesireland.ie

Iascach Intíre Éireann
Inland Fisheries Ireland

Ann Marie Conlon
Head of Economic Development
Donegal County Council
County house
Lifford
Co. Donegal
F93 Y622

14th January 2022

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Dear Ms Conlon

I refer to your letter dated 29th November that was recevied by my office on 7th December.

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If you have any other queries please do not hesitate to contact me.

Yours Sincerely

Francis O'Donnell
Chief Executive Officer

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Iascach Intíre Éireann
Inland Fisheries Ireland

Ann Marie Conlon
Head of Economic Development
Donegal County Council
County house
Lifford
Co. Donegal
F93 Y622

22nd February 2022

Ref: ***Proposed Byelaw on Artic Char***

Dear Ms Conlon

I refer to your letter dated 10th February.

I would like to confirm that the proposed bye-law will be stayed until such time as the study is completed.

If you have any other queries please do not hesitate to contact me.

Yours Sincerely

Francis O'Donnell
Chief Executive Officer

IIE Baile Átha Cliath, 3044 Céide an Locha, Campas Gnó Larthar Na Cathrach, Baile Átha Cliath 24, D24 Y265
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Appendix Two

National Research Survey Programme

Lakes 2022

Lough Eske

IFI/2023/1-4659

Iascach Intíre Éireann
Inland Fisheries Ireland

Inland Fisheries Ireland

National Research Survey Programme

Fish Stock Survey of Lough Eske, September 2022

Iascach Intíre Éireann
Inland Fisheries Ireland

Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

CITATION: McLoone, P., Corcoran, W., Bateman, A., Cierpial, D., Gavin, A., Gordon, P., McCarthy, E., Heagney, B., Hyland, J., Robson, S., Fitzgerald, C. and Kelly, F.L. (2024). Fish Stock Survey of Lough Eske, September 2022. National Research Survey Programme, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

Cover photo: Lough Lene, Co. Westmeath © Inland Fisheries Ireland

ACKNOWLEDGEMENTS

The authors wish to gratefully acknowledge the help and co-operation of all their colleagues in Inland Fisheries Ireland.

The authors would also like to acknowledge the funding provided for the project from the Department of Communications, Climate Action and Environment for 2022.

1. Introduction

Lough Eske is a large lowland oligotrophic lake. It lies approximately 5 km north-east of Donegal town (Plate 1.1, Figure 1.1). The lake has a surface area of approximately 364ha and a maximum depth of 30.1m. The lake is categorised as typology class 4 (as designated by the EPA for the purposes of the Water Framework Directive (i.e., deep (>4m), greater than 50ha and high alkalinity (<20mg/l CaCO3).

Lough Eske forms part of the Lough Eske and Ardnamona Wood Special Area of Conservation (SAC). The site also includes the River Eske and short stretches of the Lowerymore, Clogher and Drummenny Rivers, as well as a number of smaller tributaries (NPWS 2015). The site is selected as a SAC for containing Atlantic salmon (*Salmo salar*) and freshwater pearl mussel (*Margaritifera margaritifera*), both species listed on Annex II of the E.U. Habitats Directive. Ardnamona Wood, an old oak woodland is also found within the SAC. It displays a habitat range from dry areas dominated by Pedunculate Oak (*Quercus robur*) to wet woodland with Alder (*Alnus glutinosa*). The SAC also contains some petrifying springs, a priority Annex I habitat under the E.U. Habitats Directive (NPWS 2015).

Lough Eske is one of the largest lakes in Donegal an supports an important salmonid fishery. All species including char may be captured. Brown trout are small with occasional fish to 4.5lb (2kg) caught (Angling Ireland, 2024). Sea-trout average 0.75lb (0.34kg) and some much bigger fish to 5lb(2.27kg) possible. Eske remains a good salmon fishery and all angling is by boat (O'Reilly, 2007).

Lough Eske was previously surveyed in 2006 and 2012 by Inland Fisheries Ireland. Brown trout (*Salmo trutta*), Arctic char (*Salvelinus alpinus*), sea trout (*Salmo trutta*), Atlantic salmon (*Salmo salar*), three-spined stickleback (*Gasterosteus aculeatus*) and European eel (*Anguilla anguilla*) were recorded across the surveys (Rooney *et al*., 2013 and IFI unpublished data).

This report summarises the results of the 2022 fish stock survey carried out on the lake using Inland Fisheries Ireland's fish in lakes monitoring protocol. The protocol is WFD compliant and provides insight into fish stock status in the lake.

Plate 1.1. Lough Eske (launch site), September 2022

Plate 1.2. Arctic char from Lough Eske, September 2022.

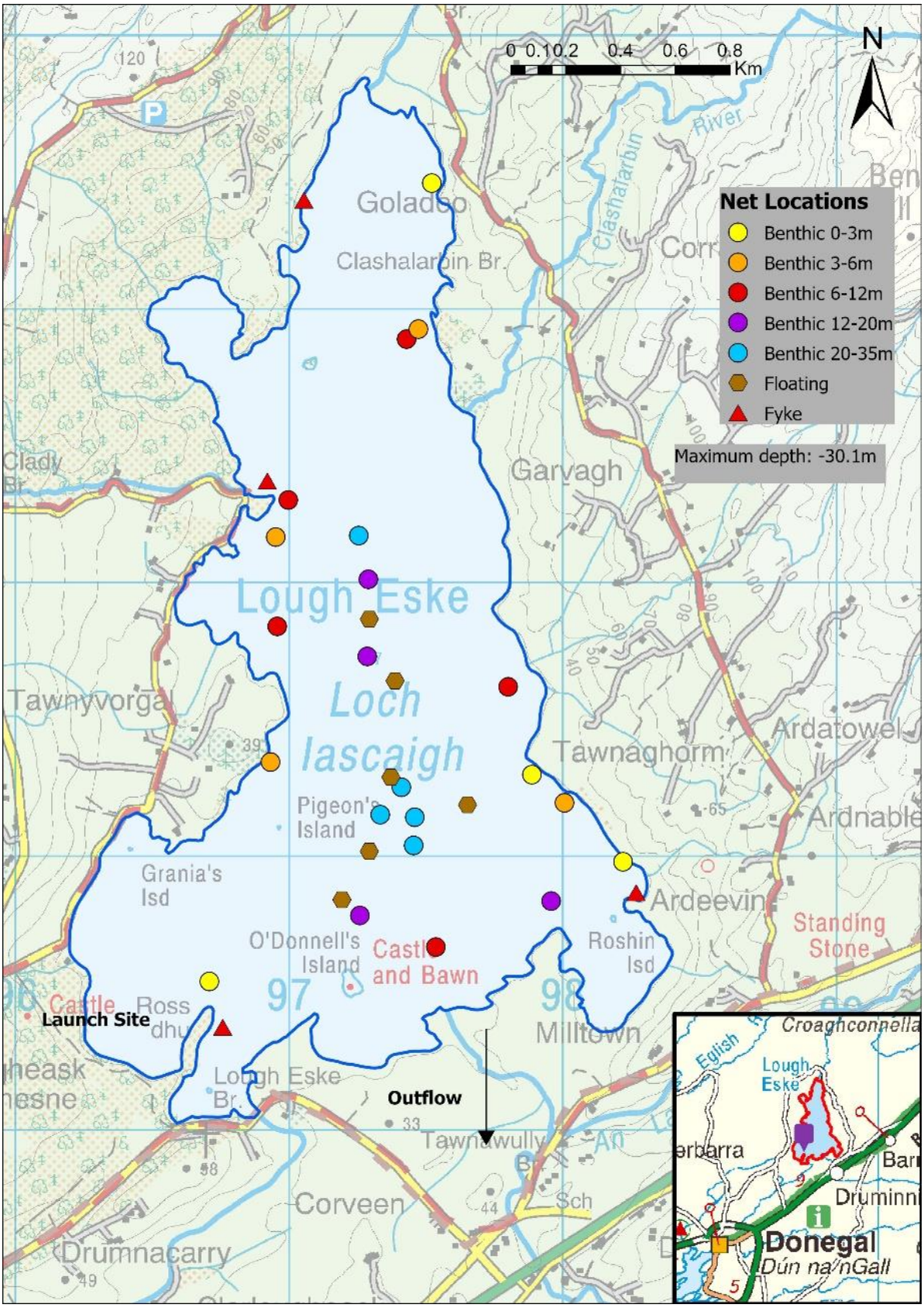

Figure 1.1. Location map of Lough Eske showing net locations and depths of each net (outflow is indicated on map).

2. Methods

2.1. Netting methods

Lough Eske was surveyed over two nights from the 5th to the 7th of September 2022. A total of four sets of Dutch fyke nets, 23 benthic monofilament multi-mesh (12 panel, 5-55mm mesh size) CEN standard survey gill nets (BM CEN) (4 @ 0-2.9m, 5 @ 3-5.9m, 5 @ 6-11.9m, 4 @ 12-19.9m and 5 @ 20-34.9m) and six floating monofilament multi-mesh (FM CEN) (12 panel, 5-55mm mesh size) CEN standard survey gill net were deployed in the same locations as were randomly selected in previous surveys (33 sites).

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 other 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 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).

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

Where:
$\mathbf{FO}_i$ is the percentage frequency of prey item i,
$\boldsymbol{N_i}$ is the number of fish with prey i in their stomach,
$\boldsymbol{N}$ 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 in IFI when moving between water bodies.

3. Results

3.1. Species Richness

Six fish species (sea trout are included as a separate 'variety' of trout) were recorded in Lough Eske in September 2022. A total of 254 fish were captured (Table 3.1). Brown trout was the most numerous fish species recorded, followed by Arctic char. Eels, three-spined stickleback, sea trout and salmon were also captured. The same species composition was present in 2006, while sea trout and salmon were not recorded in 2012 (IFI unpublished).

Table 3.1. Number of each fish species captured by each gear type during the survey on Lough Eske, September 2023.

Scientific name	Common name	Number of fish captured			
		BM CEN	FM CEN	Fyke	Total
Salmo trutta	Brown trout	140	5	12	157
Salvelinus alpinus	Arctic char	82	0	1	83
Gasterosteus aculeatus	Three-spined stickleback	5	0	0	5
Salmo trutta	Sea trout	1	0	0	1
Salmo salar	Salmon	1	0	0	1
Anguilla anguilla	European eel	1	6	0	7

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. Brown trout and char were the dominant species captured in terms of both abundance (CPUE) and biomass (BPUE) (Table 3.2).

For comparison purposes box plots of CPUE and BPUE for each species captured in all surveys per net type between 2009 and 2021 are presented in Figures 3.1 and 3.2 respectively and illustrates fish community change over time. Overall, brown trout populations have remained relatively stable across all sampling occasions, although there was an apparent decline in the number and biomass of fish captured in surface floating gill nets (Figure 3.1 and 3.2).

The median CPUE and BPUE of Arctic char was lower in 2022 than previous surveys in both the benthic and floating survey gill nets. CPUE and BPUE of eel in fyke nets were also lower in 2022 compared to the earlier surveys (Figure 3.1 and 3.2).

Table 3.2. Mean (S.E.) CPUE and BPUE for all fish species captured on Lough Eske, September 2023.

Scientific name	Common name	Mean CPUE (± S.E)	Mean BPUE (± S.E)
Salmo trutta	Brown trout	0.156 (0.031)	23.123 (4.746)
Salvelinus alpinus	Arctic char	0.084 (0.024)	8.644 (3.136)
Gasterosteus aculeatus	Three-spined stickleback	0.005 (0.004)	0.008 (0.007)
Salmo trutta	Sea trout	0.001 (0.001)	0.202 (0.202)
Salmo salar	Salmon	0.001 (0.001)	0.023 (0.023)
Anguilla anguilla	European eel	0.025 (0.008)*	2.335 (0.723)*

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 only.

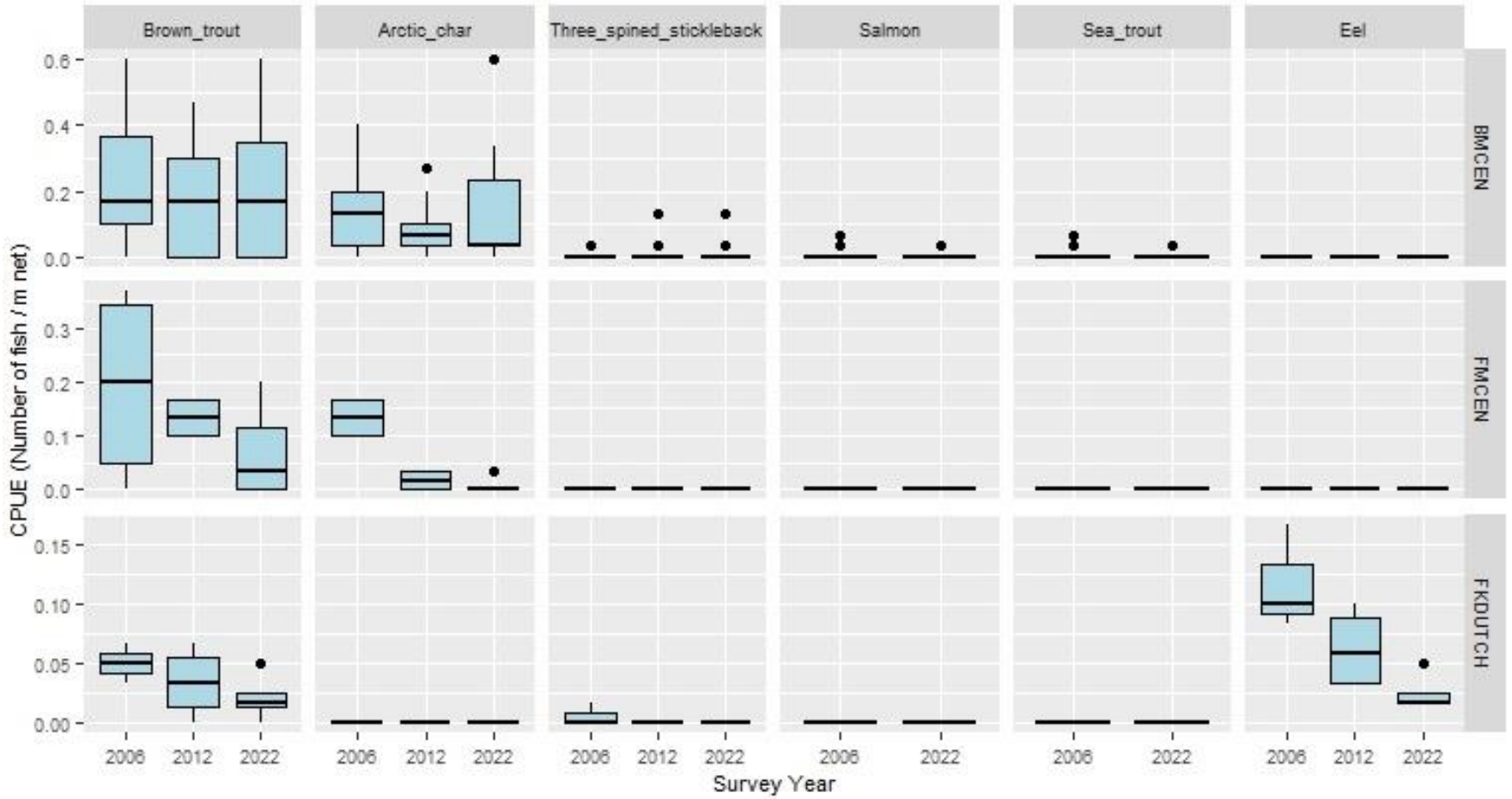

Figure 3.1. CPUE of all fish species captured in each net type during surveys of Lough Eske between 2006 and 2022. Figures are expressed as numbers of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles are 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.

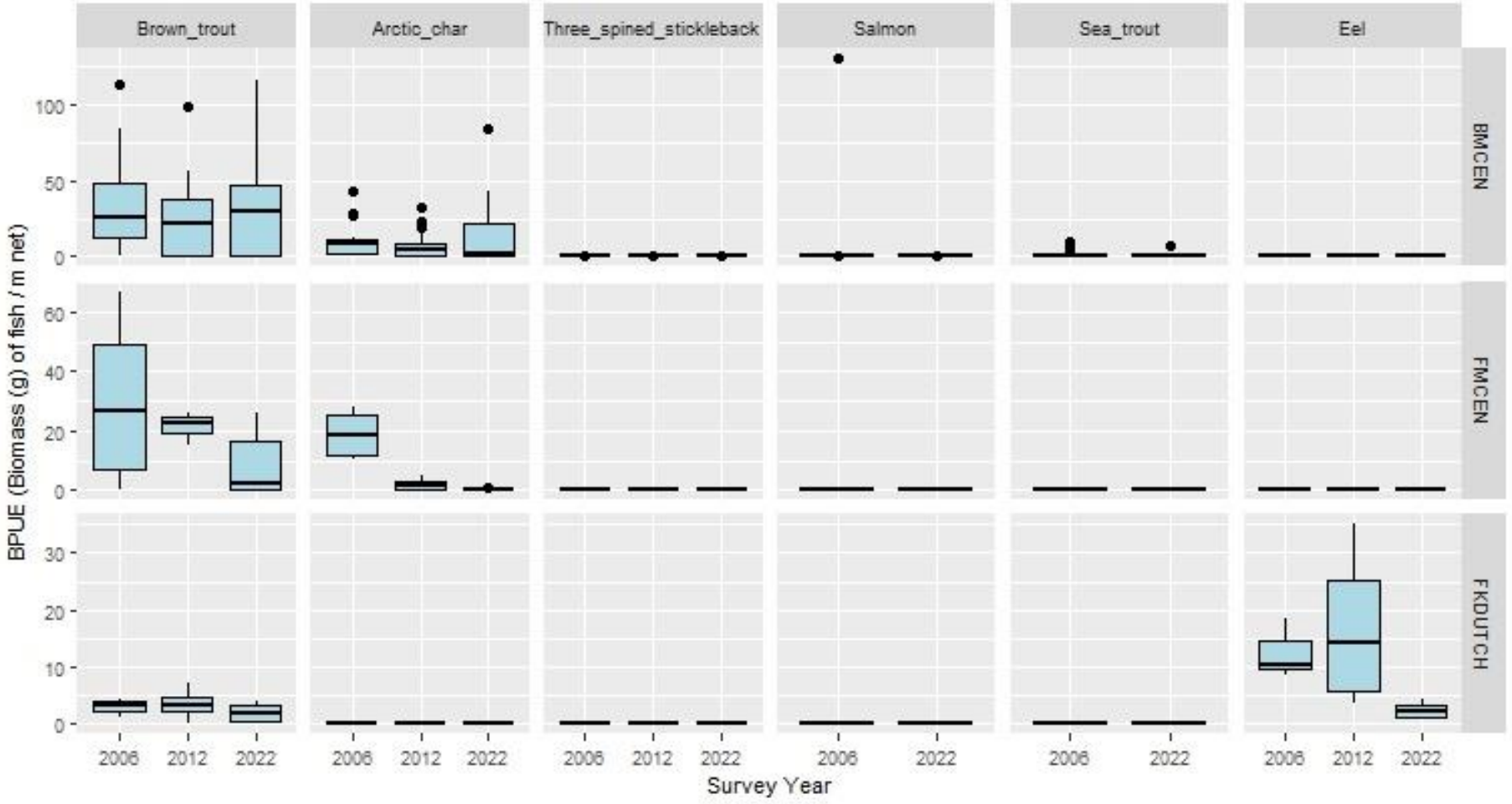

Figure 3.2. BPUE of all fish species captured in each net type during surveys of Lough Eske between 2006 and 2022. Figures are expressed as biomass (g) of fish captured per linear meter of net deployed. The horizontal bars represent the median value of the sample, while the 75th and 25th percentiles 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 2022 survey ranged in length from 10.0cm to 47.6cm (mean 21.9cm) Length range and distribution remained relatively stable across all surveys (Figure 3.3). Trout in the sample were aged between 1+ and 5+. Two year old fish were the most abundant age cohort. Mean L1 (i.e. length at the end of the first year was 7.1cm (Table 3.3).

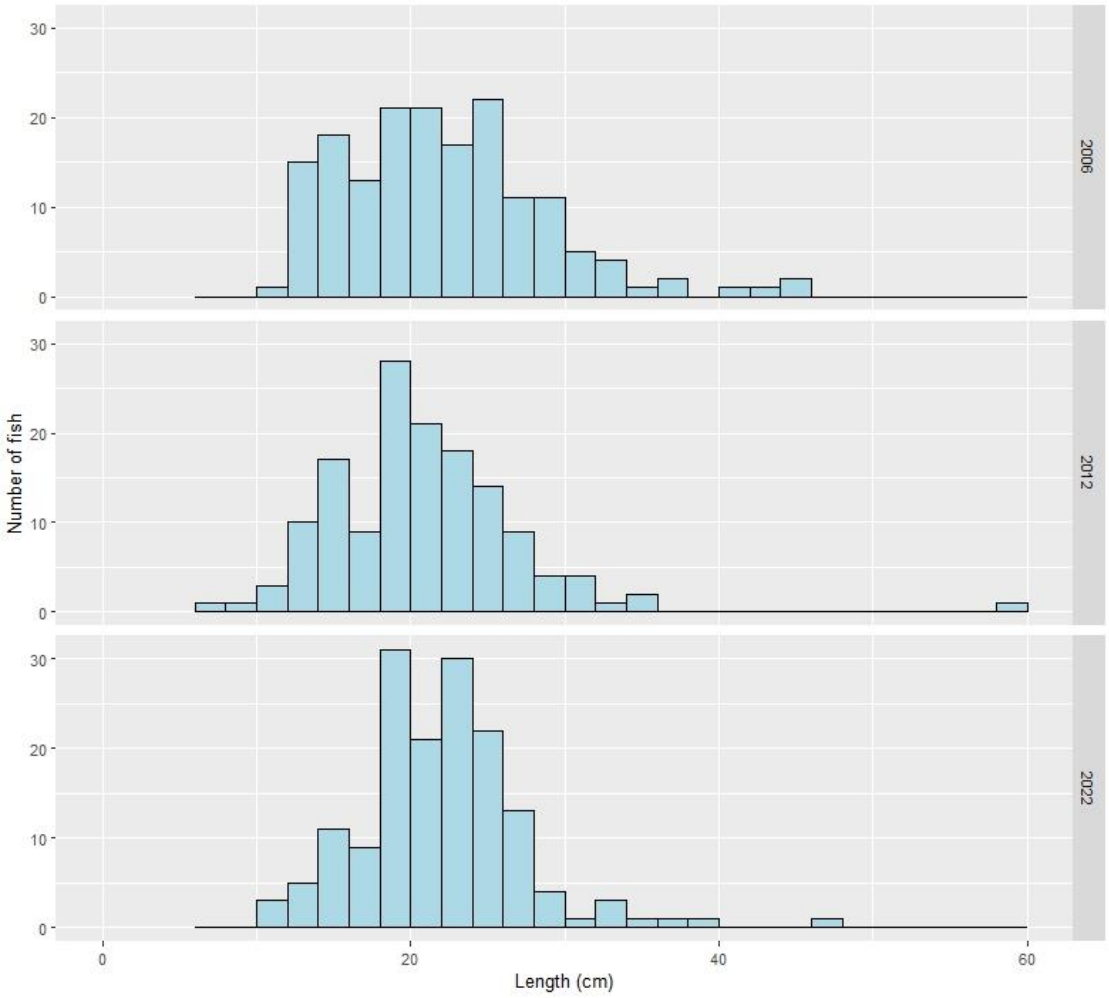

Figure 3.3. Length frequency of brown trout captured on Lough Eske, 2006, 2012 and 2022.

Table 3.3. Mean (±S.E.) brown trout length (cm) at age for Lough Eske, September 2022.

Length (cm)	L_1	L_2	L_3
Mean (±S.E.)	7.1 (0.1)	16.0 (0.2)	23.2 (0.0)
N	13	16	1
Range	5.8 - 8.3	14.4 - 17.0	23.2

Arctic char

Arctic char captured during the 2022 survey ranged in length from 8.0cm to 24.8cm (mean 19.3cm) (Figure 3.4).

Fish greater than 25cm in length were more prominent in 2006 than in latter surveys. Arctic char length frequencies from 2012 and 2022 are similar, although a larger cohort of fish in the 22-23 cm length class is present in 2022 compared to 2012. In both 2012 and 2022, Arctic char numbers-at-length decreased rapidly after a peak in abundance above 20 cm, with no fish above 25 cm captured (Figure 3.4).

In 2022, Arctic char in Lough Eske ranged in age from 1+ to 5+. The population was dominated by the 3+ and 4+ age cohorts.

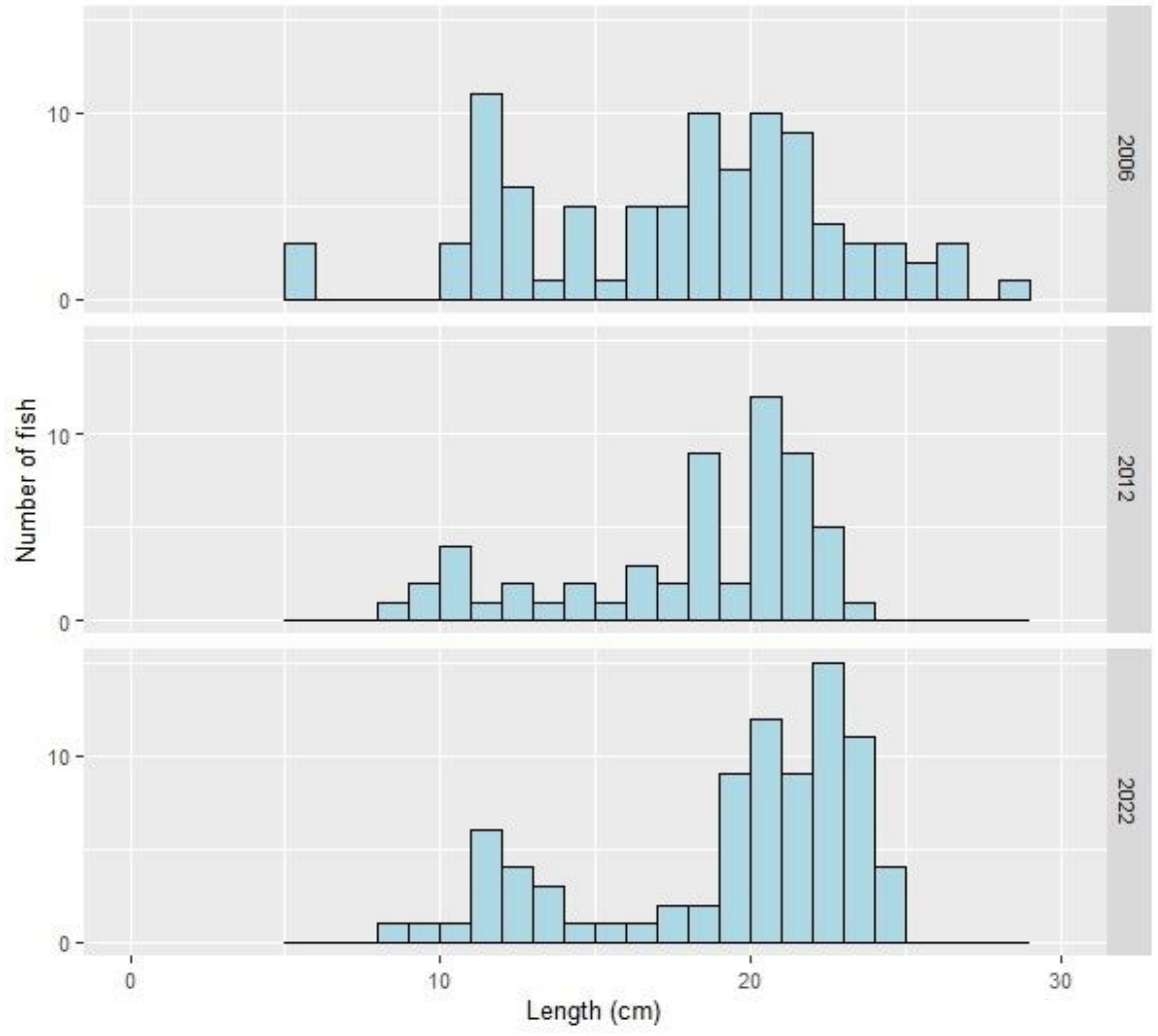

Figure 3.4. Length frequency of Arctic char captured on Lough Eske, 2006, 2012 and 2022.

Table 3.4. Summary age data from Arctic char captured on Lough Eske, September 2022. Number of fish (N) and length ranges of all fish aged in the sample is presented.

Length (cm)	Age Class					
	0+	1+	2+	3+	4+	5+
N	-	8	5	26	22	4
Mean L (cm)	-	12.2	17.1	20.4	22.8	24
Min L (cm)	-	9.9	14.9	19.0	21.0	23.4
Max L (cm)	-	15.3	18.9	22.3	24.6	24.8

An analysis of the current status of the Arctic char population in Lough Eske, with respect to the extent of any anthropogenic impacts is presented in section 3.4

Other species

Seven eels measuring 33.5cm and 46.9cm (mean 40.5cm) were captured and released during the 2022 survey. One sea trout was captured measuring 27.4cm in length. One salmon measuring 12.5cm was also recorded. Five three-spined stickleback (mean length 3.6cm) were also captured.

3.4 Using Arctic char life history characteristics to estimate vulnerability to overfishing or other anthropogenic disturbances

Length Based Spawning Potential Ratio Models

In marine fisheries, and where fisheries data is limited, length based stock assessment models (e.g. Length Based Spawning Potential Ratio LB-SPR**)** are important tools to assess the potential impact of excess fishing mortality on fished stocks or populations. In freshwater environments, the potential of LB-SPR to assess the possible impact on freshwater species has been demonstrated using data collected during IFIs fish stock assessments on four Irish Lakes (Hommik *et al*., 2015).

Using known growth, maturity, and fecundity data LB-SPR compares the reproductive capacity of fish in an exploited or impacted population to that in an unfished population, or a population that is not impacted by anthropogenic factors (Hordyk *et al*., 2015, 2016). It estimates how the capacity of a species to reproduce has been reduced by fishing or other factors and provides a measure of excess mortality, above that which might be expected naturally. Compared to marine environments, freshwaters can be subject to greater anthropogenic influences (e.g. habitat degradation, water

quality or invasive species colonisation) . LB SPR can therefore also be used to infer the impact that these factors are exerting on a population compared to pristine or unimpacted populations (Cousido-Rocha *et al*., 2022; Pons *et al*., 2019; Rudd and Thorson, 2018).

In healthy or pristine populations SPRs higher than 30-40% are expected (Brooks *et al*., 2009; Clark, 2002).

Fish stock assessment data collected in the three surveys (2006, 2012 and 2022) of Lough Eske were used to estimate LB SPR (and therefore population health) for Arctic char. Length and maturity data from all three surveys and age data from 2022 were used. Von Bertalanffy growth rates (Figure 3.5) and maturity indices (Figure 3.6) were estimated and natural mortality was derived using established growth based methods (Pauly NLS-T, Then *et al*., 2015). Summary parameters used in the model are presented in Table 3.5.

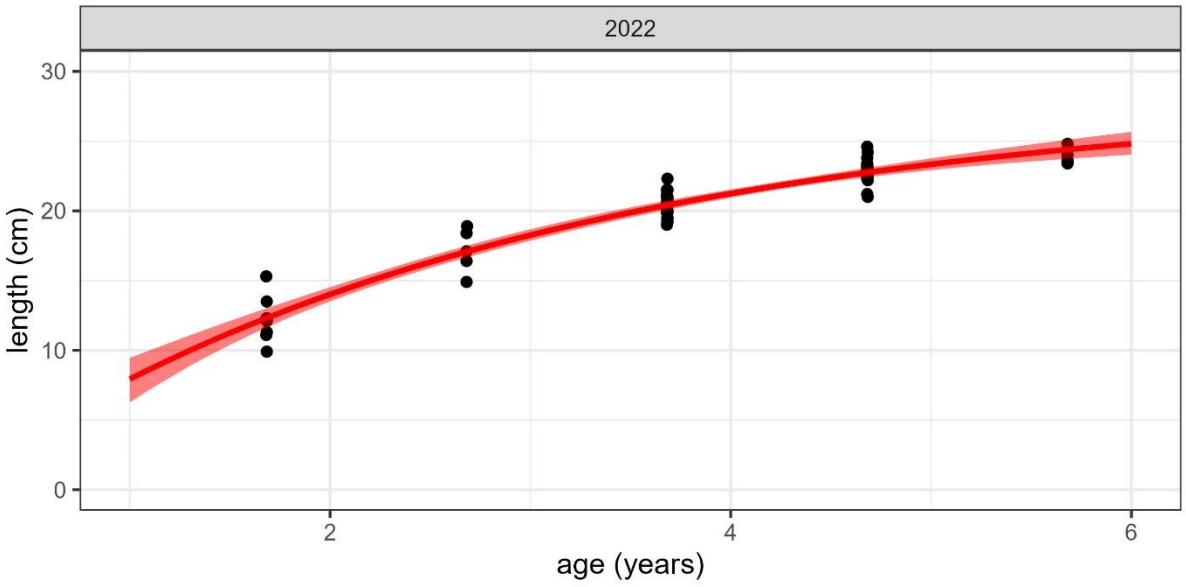

Figure 3.5. Von Bertalanffy growth fit (red) with confidence intervals (shaded red) for the mean length-at-age of Arctic char in Lough Eske based solely on 2022 otolith age determination.

LB-SPR assumes that recruitment remains constant; that natural mortality is constant across lengths/ages and that growth rate of males and females, as well as growth rate across time and across cohorts remains constant (Pons *et al*., 2020).

Estimations of excess mortality for Arctic char in each survey year are presented in Figure 3.7.

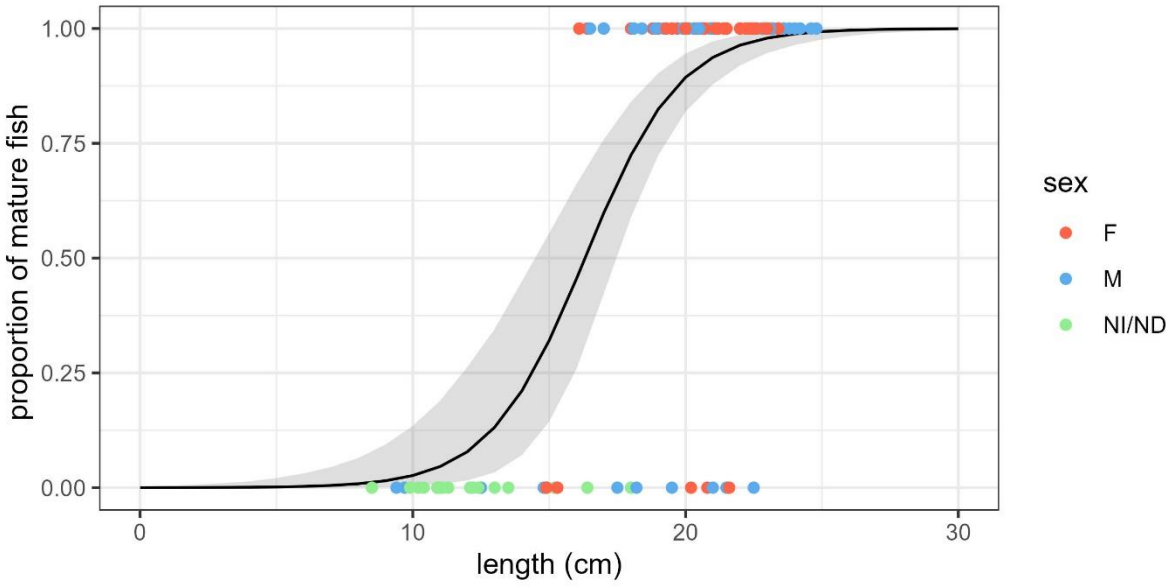

Figure 3.6. Maturity-at-length model fit (mean and confidence intervals indicated by black line and shaded grey region) to maturity data collected in the 2012 and 2022 Lough Eske fish stock surveys. Fish captured noted to have "no gonads" and fish recorded at maturity stage "I" were assigned maturity status 0.

LB-SPR SPR estimates, including uncertainty for each survey year, and with typical target and limit SPRs (i.e. target reference point=40% and limit reference point=30%) which would correspond to healthy / unimpacted stocks (Brooks *et al*., 2009; Clark, 2002) are presented in Figure 3.8. This illustrates that the SPR was significantly above the target reference point in 2006 and decreased to below 40% SPR in 2012. In 2022 the SPR was above 40%. However there is a high degree of uncertainty in predicted SPRs for the 2012 and 2022 surveys.

While there are some differences in population length (i.e. less fish greater than 25cm in 2012 and 2022 compared to 2006), and in estimated mortality and SPRs between the 2006 and latter surveys, there is currently too much uncertainty in the LB-SPR estimates to suggest definitively that the Arctic char population in Lough Eske has been impacted by anthropogenic activities.

Continued monitoring of this important, but vulnerable char population will be required.

Table 3.5. Life history parameter estimates for Lough Eske Arctic char. Growth parameters are based on otolith-derived age data obtained from a sub-sample of char captured during the Lough Eske 2022 fish stock survey. Empirical natural mortality estimators derive from the VBG parameter estimates.

Parameter	Source	Estimate
Asymptotic length L_∞	Sub-sample of Lough Eske 2022 survey catch (aged using otolith structures)	28.6 cm
Growth rate k		0.36 yr-1
CV L_∞	LB-SPR default (Hordyk et al., 2016)	0.1
Natural mortality M	$M_{PaulyMLS-T} = 4.118K^{0.73}L_\infty^{-0.33}$ $M_{2K} = 0.098 + 1.55K$ (Then et al., 2015)	0.65 yr-1 0.66 yr-1
Length-at-50% maturity L50	Eske fish stock survey data (2012, 2022)	16.3 cm
Length-at-95% maturity L95	Eske fish stock survey data (2012, 2022)	21. 4 cm
Mass-length coefficient α	Eske fish stock survey data (2006, 2012, 2022)	$1.296\times10^{(-5)}$
Mass-length exponent β	Eske fish stock survey data (2006, 2012, 2022)	2.969
Fecundity-length exponent	LB-SPR default (Hordyk et al., 2016)	3
Fishery selectivity shape	LB-SPR default (Hordyk et al., 2016)	Asymptotic (logistic)

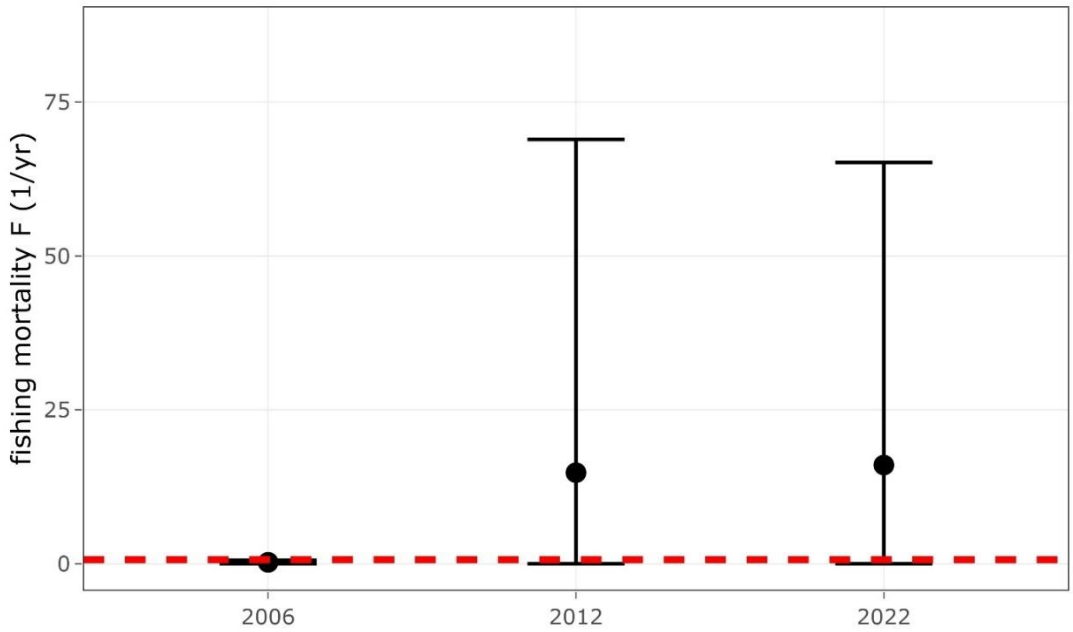

Figure 3.7. LB-SPR estimated excess mortality (i.e. measure of excess mortality, above that which might be expected naturally) F at full selectivity for 2006, 2012, 2022 survey length compositions excluding fish below 15 cm.

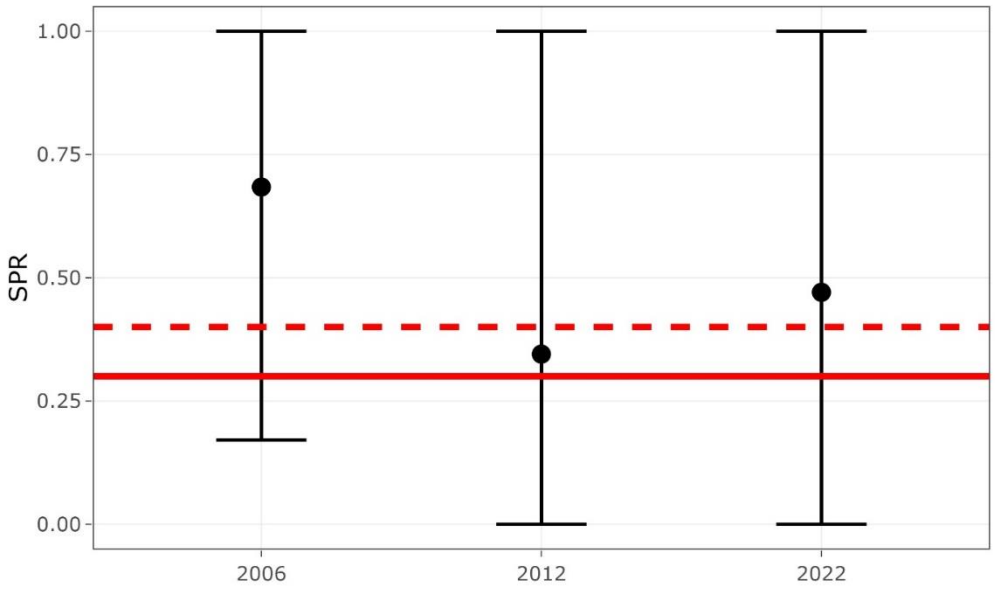

Figure 3.8: Spawning potential ratio (SPR) estimates from the LB-SPR model based on survey length compositions (Figure 3.4 and estimated life history parameters (Table 3.5). The dashed red line denotes a typical target reference point of SPR = 0.4 (40%) and the solid red lines denotes the limit reference point of SPR = 0.3 (30%).

3.5. 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. The stomach contents of a subsample of brown trout and Arctic char captured during the survey were examined and are presented below.

Brown trout

A total of 61 brown trout stomachs were examined. Nineteen (31.2%) were empty. Of the remaining 42 stomachs containing prey, 17 (41%) contained zooplankton. Invertebrates were the sole prey type recorded in 10 (24%) stomachs and were found together with zooplankton in nine (21%) stomachs. Fish was the sole prey type recorded in one (2%) stomach and was found with invertebrates in one other brown trout. Four stomachs contained unidentified digested material (Figure 3.9).

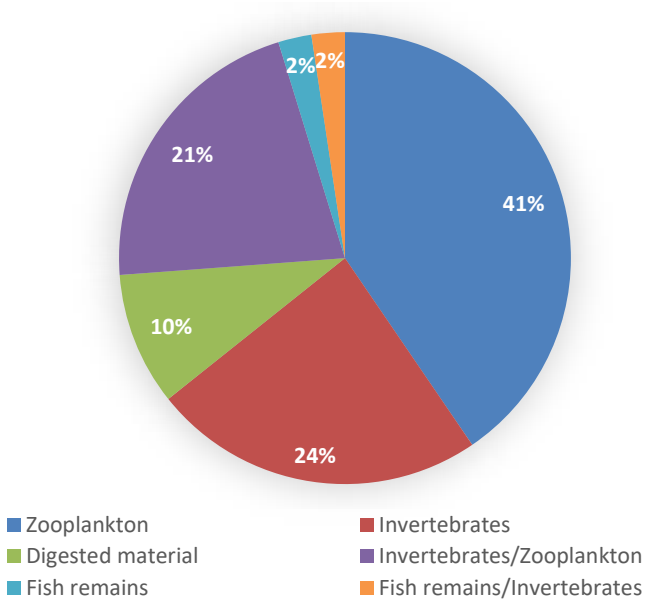

Figure 3.9. Diet of brown trout (N = 42) captured on Lough Eske 2022 (% FO).

Arctic char

A total of 71 Arctic char stomachs were examined. Fifty-three (74.7%) were empty. Of the remaining 18 stomachs containing prey, 16 (89%) contained zooplankton. Invertebrates and unidentified digested material were each recorded in one stomach (Figure 3.10).

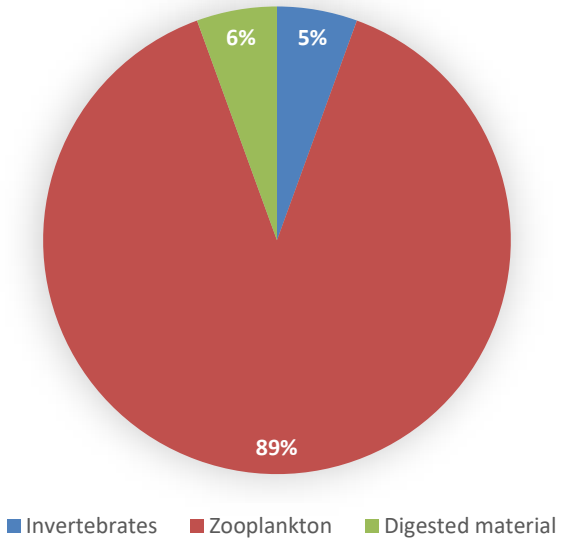

Figure 3.10. Diet of Arctic char (N = 18) captured on Lough Eske 2022 (% FO).

4. Summary

Six fish species (sea trout are included as a separate 'variety' of trout) were recorded in Lough Eske in September 2022.

Brown trout were the most abundant species recorded in Lough Eske and the population has remained relatively stable across all three recent surveys.

CPUE and BPUE of eel in fyke nets were also lower in 2022 compared to the earlier surveys

Lough Eske retains a significant population of Arctic char. Between 2006 and 2022 there was an apparent decline in the median CPUE and BPUE of Arctic char captured in benthic and surface floating survey gill nets. There was also a change in the length frequency of Arctic char. While the proportion of larger and older fish was higher in 2022 compared to earlier surveys, fish longer than 25cm, which were present in 2006 were not captured in 2022. LB-SPR analysis of the Eske char population indicates that excess, anthropogenic mortality was higher in both 2012 and 2022 compared to 2006. However, there is a degree of uncertainty around these estimates, and it is therefore difficult to ascribe these changes to anthropogenic effects. Continued monitoring of this vulnerable population will be necessary.

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, Lough Eske has been assigned an ecological status of High for 2022 based on the fish populations present. This is an improvement in status from 2006 and 2012, when the lake was assigned Good status (Figure 4.1).

In the 2016 to 2021 surveillance monitoring reporting period, the EPA assigned Lough Eske an overall ecological status of Good, based on all monitored physico-chemical and biological elements, excluding fish (EPA 2021).

Figure 4.1. Fish ecological status, Lough Eske, 2006 2012 and 2022 (dashed line indicates EQR status boundaries).

5. References

Brooks, E.N., Powers, J.E., Cortés, E., (2009) Analytical reference points for age-structured models: application to data-poor fisheries. *ICES Journal of Marine Science* **67**, 165–175. https://doi.org/10.1093/icesjms/fsp225

Amundsen P-A, Gabler H-M, Staldvik FJ. (1996) A new approach to graphical analysis of feeding strategy from stomach contents data—modification of the Costello (1990) method. *Journal of Fish Biology*, **48**, 607–614.

Angling Ireland (2024) https://fishinginireland.info/salmon/north/eske/

Caffrey, J. (2010) *IFI Biosecurity Protocol for Field Survey Work*. Inland Fisheries Ireland.

Clark, W.G. (2002) $F_{35\%}$ Revisited Ten Years Later. *North American Journal of Fisheries Management* **22**, 251–257. https://doi.org/10.1577/1548-8675(2002)022<0251:FRTYL>2.0.CO;2

Connor, L., Matson, R. and Kelly, F.L. (2017) Length-weight relationships for common freshwater fish

species in Irish lakes and rivers. *Biology and Environment: Proceedings of the Royal Irish Academy* **117 (2)**, 65-75.

Cousido-Rocha, M., Cerviño, S., Alonso-Fernández, A., Gil, J., Herraiz, I.G., Rincón, M.M., Ramos, F., Rodríguez-Cabello, C., Sampedro, P., Vila, Y., Pennino, M.G. (2022) Applying length-based assessment methods to fishery resources in the Bay of Biscay and Iberian Coast ecoregion: Stock status and parameter sensitivity. *Fisheries Research*, **248**, 106197. https://doi.org/10.1016/j.fishres.2021.106197

Hjelm, J., Persson, L., and Christensen, B. (2000) Growth, morphological variation and ontogenetic niche shifts in perch (*Perca fluviatilis*) in relation to resource availability. *Oecologia*, **122 (2)**, 190-199.

Hommik, K., Fitzgerald, C. J., Kelly, F. and Shephard, S. (2020) Dome-shaped selectivity in LB-SPR: Length-Based assessment of data-limited inland fish stocks sampled with gillnets. *Fisheries Research*, ***229***, 105574.

Hordyk, A., Ono, K., Sainsbury, K., Loneragan, N., Prince, J. (2015) Some explorations of the life history ratios to describe length composition, spawning-per-recruit, and the spawning potential ratio. *ICES Journal of Marine Science*, **72**, 204–216. https://doi.org/10.1093/icesjms/fst235

Hordyk, A.R., Ono, K., Prince, J.D., Walters, C.J. (2016) A simple length-structured model based on life history ratios and incorporating size-dependent selectivity: application to spawning potential ratios for data-poor stocks. *Canadian Journal of Fisheries and Aquatic Sciences*, **73**, 1787–1799. https://doi.org/10.1139/cjfas-2015-0422

Pons, M., Kell, L., Rudd, M.B., Cope, J.M., Lucena Frédou, F. (2019) Performance of length-based data-limited methods in a multifleet context: application to small tunas, mackerels, and bonitos in the Atlantic Ocean. *ICES Journal of Marine Science*, **76**, 960–973. https://doi.org/10.1093/icesjms/fsz004

Pons, M., Cope, J.M., Kell, L.T. (2020) Comparing performance of catch-based and length-based stock assessment methods in data-limited fisheries. *Canadian Journal of Fisheries and Aquatic Sciences*, **77**, 1026–1037. https://doi.org/10.1139/cjfas-2019-0276

Rooney, S.M., O'Gorman, N.M., King, J.J. (2013*) National Programme: Habitats Directive and Red Data Book Species Executive Report 2012*. Inland Fisheries Ireland, Swords Business Campus, Swords, Co. Dublin, Ireland

Rudd, M.B., Thorson, J.T. (2018) Accounting for variable recruitment and fishing mortality in length-based stock assessments for data-limited fisheries. *Canadian Journal of Fisheries and Aquatic Sciences*, **75**, 1019–1035. https://doi.org/10.1139/cjfas-2017-0143

Then, A.Y., Hoenig, J.M., Hall, N.G., Hewitt, D.A., Jardim, H. editor: E. (2015) Evaluating the predictive performance of empirical estimators of natural mortality rate using information on over 200 fish species. *ICES Journal of Marine Science*, **72**, 82–92. https://doi.org/10.1093/icesjms/fsu136

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