Submissions received (redacted) to Draft Western Lakes Plan

Part 1

IFI/2023/1-4646

Iascach Intíre Éireann
Inland Fisheries Ireland

[redacted]

17/8/22

DEAR SIR (MDM)

COMPETITION ANGLERS WHO MOSTLY PRACTISE CATCH & KILL DO MORE DAMAGE TO TROUT STOCKS THAN THE COARSE FISH.

PERHAPS? HERE IS THE PERFECT OPPORTUNITY TO FORCE THEM TO PRACTISE CATCH AND RELEASE, AS THEY CERTAINLY WILL NOT VOLUNTEER TO CHANGE THEIR ANTIQUATED WAYS, OR MINDSET.

IN MY OPINION, THE TROUT IN THESE LAKES ARE UNIQUE AND SHOULD BE PROTECTED. THEY ARE A NATIONAL TREASURE AND

[redacted] ① WHERE IS THE LOGIC IN RUNNING AN END OF SEASON "LOUGH SHEELIN STREAM REHABILITATION FUND RAISER COMP." AND THEN THEY BONK THE VERY FISH THAT ARE GETTING READY TO RUN THE STREAMS. THE FIRST IS FISH LAST YEAR WERE OVER 4 lbs, ALL KILLED. ??!

[redacted] ② OUGHTERARD ANGLERS, THE ONES SCREAMING "PIKE OUT."

I WITNESSED A 2 DAY COMP. = PAIRS COMP. DURING THE DUCKFLY SEASON, WHERE THE BAYS WERE SYSTEMATICALLY FISHED, AND 92 TROUT 1 TO 1 lbs WERE WEIGHED IN.

[redacted] ③ L. LENE - KILLARNEY

IT'S DIFFICULT TO CATCH A FISH THERE OVER 10 INCHES NOW.

I HAVE NO PROBLEM WITH AN ODD TROUT BEING TAKEN FOR THE TABLE, JUST THE UNNECESSARY LARGE SCALE SLAUGHTER BY THE COMPETITION "ANGLERS".

THANK YOU FOR YOUR CONSIDERATION

[redacted]

Cumann Slat Iascairi
Tuar Mhic Eada
LOC MEASCA, CO. MHUIGHEO.

TOURMAKEADY
ANGLERS ASSOCIATION
Lough Mask, Co. Mayo.

COMMENTS RE.

THE IFI PLAN FOR WESTERN LAKES MANAGEMENT PLAN 2022

[redacted]

IFI Western Lakes Management Plan 2022

Lough Mask:

1. Lough Mask should be excluded from the conservation of Pike Bye Law 809 2006.
2. Electro fishing and netting of Pike in bays to be continued.
3. Netting of shoals of coarse fish where possible.
4. Mink control to be introduced.

In-stream Development:

1. Spawning to be developed on the Robe River and new grounds to be developed on the Western shores of the lake.
2. Repair work on existing spawning areas.

Environmental:

1. Water quality monitoring.
2. Potential pollution sources to be monitored.
3. Regulations under the Nitrates programme to be updated and strictly adhered to.
4. Special status to the protection of the Char population to be introduced.

Fishing Season:
The fishing season on tributaries rivers should be same as the Trout fishing season (Cong Canal and Finney River are exceptions).

Hydro Turbines:
No Hydro Turbines to be installed on the Spawning Tributaries of Lough Mask.

Signed: Tourmakeady Trout Anglers Association 2022

7/9/2022

Iascach Intíre Éireann
Inland Fisheries Ireland

Public Consultation Questionnaire

For the Long Term Management Plan for the Great Western Lakes.

Inland Fisheries Ireland wishes to develop a long term management plan for the Great Western lakes to address many of the factors currently impacting on the ecological wellbeing of native fish stocks in these catchments. To this end IFI have prepared a draft plan and now wish to consult with stakeholders to get their feedback on the approach proposed. In order to have your say, please provide your feedback in the spaces provided below. These spaces follow the structure of the draft plan. We request that people limit their feedback to one response per person.

Name:	[redacted]
Email address:	[redacted]

Introduction

Please provide your feedback on the Introduction here.

You are facing a difficult and delicate task protecting, caring for and reinforcing everything around the western lakes. Every action will have consequences that have to be taken in account. As well long and shorter effects are very different but both very decisive for the future and wellbeing of our precious nature.

The Great Western Lakes

Please provide your feedback on the Great Western Lakes here.

living at Lough Corrib myself, I can only say about the only water issue that the remedy with nets is not ok. Destructing a large water area, only to take care of a weed that may pose consequences to many other factors. Plants in general also weed provide oxygen, shelter for animals and food for animals too. Especially these habitats are important.

Fish

Please provide your feedback on Fish here.

We can only allow and promote catch & release of the fish are caught, cooked on an island and more fish is taken home.
I believe ① a change in mental state among anglers is needed to move to catch & release (which is actually heavily promoted in the commercial world of fishing)
② more control & presence of control body on the water.

Stakeholder Engagement

Please provide your feedback on Stakeholder Engagement here.

- Pike is not in native

Fisheries Management and Climate Change

Please provide your feedback on Fisheries Management and Climate Change here.

- climate change is not something to fight but to work with. Actions like providing good spawning grounds (lake cleaning streams and free gravel e.g.) can help many species to reproduce
- A good balance in genes and quantities is necessary in all lakes To have the good "genes" staying there and abundant.

Water Quality

Please provide your feedback on Water Quality here.

We see a massive explosion of weed growths over the years, enlarging weeded areas every year mainly due to the farming around the streams, rivers and lake This is a battle on another level, with a section that needs our months A single angler cannot influence this, but needs to be organised at a higher level.

Invasive Species

Please provide your feedback on Invasive Species here.

- Pike is not invasive. They are also the only specie that can control Perch and Roach. Due to the culling we now see an explosion of Roach & Perch, and no predators to fight it
- It's also a hoax pike predators or is focussed on eating trout
Trout is the fastest fish in our lakes and a passive pike is not actively chasing them. But a occasional course will be seen. This is nature.

Stock Management

Please provide your feedback on Stock Management here.

As the years nature always finds its balance, before the culling of pike there was more & bigger trout, perch and pike in the lakes.
Note: Lough Corrib after culling pike, roach exploded, eating all the fly life and trout is now small... then trout anglers complain and blame pike.
This is beyond my ideas ...

Habitat Management

Please provide your feedback on Habitat Management here.

When we talk about habitat only channels and streams are mentioned. Many streams feed the lakes and are used for the fish to spawn. It is important to take care of the streams by clearing excessive growth/life, adding gravel etc...
Fyi Trout spawns up the little stream near my house in november, a joy to see!
Every other year we try to clear weeds & plants ourselves to let the fish swim up.

Resedrch, Current Information and knowledge gaps

Please provide your feedback on Research, Current Information and Knowledge Gaps here.

- The culling of the pike needs to stop NOW.
- Commercially seen the pike is also beneficiary. Trout is popular in many, so for one month a year Pike can be fished all year around. Ireland in general is known and popular for pike fishing by anglers worldwide
Sad thing is think about...

Timelines / High level objectives

Please provide your feedback on Timelines / High Level Objectives here.

No comments, curious what we will see, how and where our lakes will be in 5 years time.

Other feedback

If you have feedback on any other element of the plan that is not listed above, please describe the theme of your feedback and your feedback in the spaces below.
Theme: Pike
Feedback: If you read my comments, I hope you will think about the strength and necessity of pike in our western lakes. Unfortunately the western lakes have a very bad reputation all over Europe because of the uppity ways of pike. It is time the minds of the people that can make a difference change to sense ... Thank you for taking the time to read my comments A worried angler [redacted]

Please note:

- Everyone who takes part in an IFI consultation will be notified of the final document emerging from the consultation process.
- The names of respondents and their submissions will be published on IFI's website at the end of the consultation process (i.e. at the time the document arising from the consultation is published). Any further information relating to an identified or identifiable natural person ("Personal data" as defined under Article 4 of GDPR) will be redacted prior to publication on the IFI website.
- IFI is subject to the provisions of the Freedom of Information Act 2014 and therefore has to consider any request made to it under that Act. If you consider that any part of your submission would be subject to any of the statutory exclusions under that Act please so indicate in your submission, specifying under which exemption you believe the content should be excluded.
- All personal data that Inland Fisheries Ireland (IFI) may use is collected, processed and held in accordance with the provisions of EU Regulation 2016/679 the General Data Protection Regulation ("GDPR") and The Data Protection Acts 1988 to 2018.

Please review our privacy notice here. (Hyperlink to WLMP privacy notice)

Iascach Intire Éireann
Inland Fisheries Ireland

Public Consultation Questionnaire

For the Long Term Management Plan for the Great Western Lakes.

Inland Fisheries Ireland wishes to develop a long term management plan for the Great Western lakes to address many of the factors currently impacting on the ecological wellbeing of native fish stocks in these catchments. To this end IFI have prepared a draft plan and now wish to consult with stakeholders to get their feedback on the approach proposed. In order to have your say, please provide your feedback in the spaces provided below. These spaces follow the structure of the draft plan. We request that people limit their feedback to one response per person.

Name:	[redacted]
Email address:	[redacted]

Introduction

Please provide your feedback on the Introduction here.

The Great Western Lakes

Please provide your feedback on the Great Western Lakes here.

Water quality has declined drastically over the past 30 years especially.
Fish numbers have declined.
Roach numbers have exploded

Fish

Please provide your feedback on Fish here.

Too much emphasis on pike culling.
Years ago many more pike but also many more trout + salmon.
Eels, once plentiful now almost extinct.
Roach numbers have exploded in recent years — why target only Pike.
eg. old style perch traps.

Stakeholder Engagement

Please provide your feedback on Stakeholder Engagement here.

Rift between local good will/knowledge and IFI.
Not enough IFI workers on the ground.
Little or no maintenance on streams/rivers

Fisheries Management and Climate Change

Please provide your feedback on Fisheries Management and Climate Change here.

Run off from slurry happening within a meter or 2 of prime spawning streams/rivers and over use of fertilizer — too large stocking rate on small farms.

Water Quality

Please provide your feedback on Water Quality here.

Particularly during warm spells water quality and algal blooms are widespread — including blue/green algae.
Weed control at mouths of streams/rivers needs to be implemented — not just South African pondweed — Attempts to control the spread of which are truly laughable (and a very expensive waste of time/man-power)

Invasive Species

Please provide your feedback on Invasive Species here.

Pike are NOT an invasive species. Roach are. Despite unfounded fear Zebra mussels have found their balance. The big danger is the introduction of the foreign crayfish.

Stock Management

Please provide your feedback on Stock Management here.

During the 1990s / early 2000's the terrific work done mainly by voluntary groups has been overlooked and degraded by lack of contact between locals and IFI and cut backs in staff numbers

Habitat Management

Please provide your feedback on Habitat Management here.

Old style weed maintenance needs to be brought back — not the lunatic methods of jute carpets and groomers. Tap into local knowledge / good will in predator control — eg. mink / cormorants.

Research, Current Information and knowledge gaps

Please provide your feedback on Research, Current Information and Knowledge Gaps here.

More, better and more concise communication from IFI to local communities / clubs to tap into the undoubted good will locally

Timelines / High level objectives

Please provide your feedback on Timelines / High Level Objectives here.

Have a long term vision — not unachievable short term targets that are fuzzy and too numerous layered with beureacracy.

Other feedback

If you have feedback on any other element of the plan that is not listed above, please describe the theme of your feedback and your feedback in the spaces below.
Theme: Tap into local knowledge and good will
Feedback: Implement existing by-laws, legislation Protection staff required to enforce legislation. At present it's almost non existant,

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Please review our privacy notice here. [Hyperlink to WLMP privacy notice]

[redacted]

From: [redacted]
Sent: Tuesday 6 September 2022 11:42
To: Western Lakes Plan
Subject: 5 year plan

Hi, please see below

1. Stock managment.
Stock management should cover All fish, birds and animals that pose a treat to the salmonid population.

2. Bag limit.
2 brown trout per angler. Maximum of 4 brown trout per boat.

3. Size Limit.
No Brown trout may be remove OVER 40cm.
(This protects the most valuable brood stock)

4. River enhancement and water quality.

Increase the numbers of staff on the ground working in river enhancement.
Increase the number of environmental officers.
Update the powers to shadow the powers off the NPW

Kind regards
[redacted]

[redacted]

From: [redacted]
Sent: Wednesday 7 September 2022 14:06
To: Western Lakes Plan
Subject: Public Consultation on the Great Western Lakes 5-year Development Plan

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Monday September the 5th 2022

Inland Fisheries Ireland,

3044 Lake Drive,

Citywest Business Campus,

Dublin,

D24 C66

Public Consultation on the Great Western Lakes 5-year Development Plan

Dear Sir,

This trout season was perhaps the worst on record.

Ireland has been blessed, but we are found wanting. It is limiting and reductive to speak of "Ireland's Great Western Lakes" as these are not only Ireland's but Western Europe's last great wild freshwater salmonid fisheries, and are a precious jewel we desperately need to preserve, rejuvenate, and reinforce. This is a point not to be looked over, as were European directives on preserving keystone biomes rich in unique bio-diversity be applied anywhere with urgent vigour, the combined systems of the Corrib, Mask, and Carra basins should be the poster-child.

We are all guilty. Over generations the EPA, the IFI, the Forestry service, agriculture, councils, a gamut of agencies and organisations, angling clubs, fishermen, and the public at large have been derelict in letting these wonders degrade. In the past emphasis has been on observation, with token gestures in education, but very little in terms of enforcement, prosecution, remediation, and rehabilitation.

The lakes are dying. The char is almost extinct, we're losing trout sub-species, and the salmon counts are plummeting. There are of course innumerable co-factors, but chief among the causes is we have vandalised our waters.

While a host of complex primary causes, secondary knock-on effects, and feedback loops are involved, the calculus boils down to this: Eutrophication is the root of fishery declines, and agriculture, population density, and poor water management is to blame. Heat shock is often cited, but other water systems in continental North America and Eurasia accommodate bountiful salmonids, even fragile arctic charr, throughout a searing hot summer. Not Ireland – save for well-managed private waters. That's the tell. It is the combination of heat and nutrients that is deadly. While redressing climate change is out of the IFI's capacity and competence, the latter can be addressed.

With global weather systems becoming more erratic, the increase in summer droughts and winter storms means we must shore up water treatment, storage and distribution, and waste management with urgency. Summer low water levels mean concentrated effluent and pollution, nutrient explosion, and algal blooms. Winter floods mean accidental runoff of greywater with pollution and corrupting waste. Every community around the great loughs must be on mains water and treated waste.

Stating the obvious, Limestone Karst and Marl systems are porous. Every proximate source of waste and nutrients drains right into the loughs and water table. Oversized agriculture, most notably out-of-control

pastoralism, but also profligate spreading of slurry needs to stop. We need a cordon where herds would be banned: 100 metres around the loughs, 50 metres around key feeding river systems, 20-10 metres around brooks and streams, while taking into account spring spate swelling. The low-water line commons need to be put to better use, for the common good, in preserving the key ecosystem of alkaline sub-alpine flower meadows. Watering-holes need to be installed further inland, with pumps bringing water to the stock rather than letting them venture into the banks of the lakes and rivers.

Overfishing and poaching needs to be prosecuted, not lauded. Gone are the good old days of "a man may fish" where outrageous abandon saw expeditions catch 30, 40, 50 trout for a day in a couple of boats. Even 10 or 20 is a shocking number considering the decline of salmonids at large. A boat should be happy with a fish per head, two at most. Competitions need to be culled and downsized. There are too many of them. Every angling club has a veritable ball-season of these and the combined circuit entire is just too much pressure. These should encourage catch and release.

Oversized outboards and jet-skis are also to blame. Nobody needs a 200HP RIB boat to fish the Corrib. It's fished fine for generations on a lake boat and oars. Fuel leaks, poor two-stroke engines, disturbed sediment erosion, and nuisance to fish in general should be discouraged. Knockferry, the narrows where migrating salmon must pass, is turning into a cheap jetski trick and race track. Were this about dirt bikes we would demand a separate, remote, motocross park. Perhaps restrict the days, hours, or mark out a specific stretch of open-water for acrobatics, away from the salmon run?

Natural and operated Hatcheries need to be reinforced and we need to enhance salmonid breeding programs. It is too late for natural hatchery alone. We're losing salmonids fast. One day when the loughs are fully rehabilitated, we can revert to noble hands-off natural stripping methods, but we need to seed the lakes now, liberally, and with a variety of species. Emphasis should be on brown trout and Atlantic salmon, of course, but we should also bring back arctic charr, introduce brook trout, lake trout, and even grayling. Salmonid species co-exist quite well, each will find its niche, and these may even hybridise which can only build in more genetic diversity and robustness.

Finally, the protection of coarse species needs to be rescinded. We need to search out and prosecute the criminals who introduced pike into the upper Owenriff. It's no longer a question of preserving native versus non-native species. If salmonids are to have a chance at

weathering the coming shocks, we need to be more proactive and selective. If we do not, nature will make the selection for us and we will be left with only coarse fisheries. There are plenty of those throughout Ireland and they are not at risk. Trout and salmon lakes are few, these are the only ones left intact enough in Western Europe to still qualify as wild open-water. They are immensely precious and they need the protection now.

Sincerely,

A concerned angler

[redacted]

From: FOI
Sent: Monday 12 September 2022 09:28
To: [redacted]
Cc: FOI; Western Lakes Plan
Subject: RE: Great Western Lakes long term management plan, 8 September 2002. Meeting at the Court House , Oughterard.

Dear [redacted]

I wish to acknowledge receipt of your submission in relation to the Great Western Lakes Long Term Management Plan.

Your email correspondence dated September 10th was received to the foi@fisheriesireland.ie email address today, September 12th, 2022.

Your feedback has been forwarded to the Western Lakes Plan consultation email address.

Further information on the Great Western Lakes Public Consultation is available at the following link https://www.fisheriesireland.ie/news/public-consultations/western-lakes-plan

Kind Regards

FOI Team

foi@fisheriesireland.ie • 01 8842600 • ☎ • www.fisheriesireland.ie • D24 CK66

Iascach Intíre Éireann
Inland Fisheries Ireland

From: [redacted]
Sent: 10 September 2022 19:47
To: FOI <foi@fisheriesireland.ie>
Subject: Great Western Lakes long term management plan, 8 September 2002. Meeting at the Court House , Oughterard.

Dear Sirs,
As a long term angler on Lough Corrib for over 60 years, I attended today's meet with interest.
Needless to say I have become seriously concerned over the state of the lake and lack of fish therein, over the last 20 years in particular.
I have observed:
Mainly:
1. The steady deterioration of the number of fish seen and /or caught.
2. Poor quality of many fish, and lack of strong pink color, if or when cooked.
3. Steady reduction of the numbers of small fish seen or caught.
4. A massive decline in the Mayfly and other hatches. This needs to be addressed urgently and a separate study programmed to ascertain reasons why.
5. Increasing numbers of other foreign species now seen, not seen in the lake prior, and certainly not indigenous.

6. Appalling state of all the feeder streams and rivers leading into the lake. Whereas there used to be control of these and a system in place to keep them clear of debris to enable faster flowing, instead algae and weed generally have been allowed to grow rapidly and choke same, reducing flow and detrimental to spawning as a result. Dead fish, eels and molluscs can be seen along some river and stream edges.
7. Forestry allowed too close to feeder streams and rivers.
8. Farm cattle and slurry sheds allowed too close to streams and rivers.
9. Thoughtless application of all fertilizers by farmers, both in quantity and timing e.g. before a lot of rain, so as a result everything washes quickly into the streams or lake.
10. General lack of supervision and works due shortage of manpower available. Locally used to be around 40 IFI staff, now only 6.
11. No proper inspection system or heavy penalties applied, for wrongful residential and commercial sewage systems around the lake, including towns and villages.

Observations/suggestions.
Lough Corrib , this exceptional body of water, is in poor ecological health.

It seems that IFI has an up hill struggle in every direction addressed, due the fact Government has allowed this state of affairs to go on far too long, even though fully aware. The existing problems have been escalating particularly over the last ten years. A blind eye has been turned.
A major Environmental Plan now needs to be activated urgently, with substantial Budget to match.

The ridiculous bye laws 806 and 809 need removing forthwith.

Addressing the water quality is paramount to stabilize the lake and allow successful fish stock growth and maturation.
Curtailing the farmers impact on the water quality, and sewage systems as mentioned above, must be addressed as a foremost requirement.

Freshwater game angling brings in enormous revenues world wide. This used to have a major economic impact on the locales surrounding Lough Corrib, from school children gathering mayflies for the anglers, to the ghillies and boatmen, B and Bs, guest houses, hotels and all the general commerce and trade of villages around. No longer.
The Irish economy also benefitted substantially. No longer.

Where 400 or more boats used to set off from the Baurisheen and Oughterard areas alone each morning in Mayfly time, this has dwindled to a mere handful today, twenty would be a lot! The financial loss as a result has impacted seriously far and wide.

Conclusion.
Unless the proposed Management Plan is put into action, fully budgeted ready to complete its targets as outlined, in the very near future, the Government and IFI will face an embarrassing world wide disgrace allowing one of the prime limestone freshwater lake systems to be unnecessarily overwhelmed and to disappear.
This is particularly pertinent at this time of global environmental and ecological awareness with global warming accelerating every issue.

Thank you.

Yours sincerely,

[redacted]

[redacted]

From: [redacted]
Sent: Tuesday 13 September 2022 18:17
To: Western Lakes Plan
Subject: Fwd: Western Lakes Plan

I wish to submit the attached as my response to the IFI Western Lakes plan .
This is a copy of my submission to [redacted].

[redacted]

[redacted] ----- Forwarded message ---------
From: [redacted]
Date: Thu 8 Sep 2022 at 15:06
Subject: Fwd: Western Lakes Plan
[redacted]

---------- Forwarded message ---------
[redacted]
Date: Thu 8 Sep 2022 at 15:05
Subject: Western Lakes Plan
[redacted]

H[redacted]
In response to your email of Aug 17th, I have put some of my thoughts together on the Lakes Plan . I have tried to remain as brief as possible and will just outline my proposals and keep the rationale for them for discussion at another time should the occasion arise.
1. General observations. There are many erstwhile and commendable objectives in the plan and I consider the document to be well thought out in large part although it will be largely aspirational and likely to be consigned to the shelf unless a sufficiently robust implementation body is put in place at the outset. I believe that the IFI in its current configuration is not sufficiently robust to implement the stated objectives of this plan.
At this time , there are according to the plan, 7 separate statutory agencies involved in various aspects of managing the lakes and their hinterlands viz
IFI, EPA, LAWPRO, NPWS, DAFM, OPW and Local Authorities .! The plan calls for enhanced “interagency cooperation” , while also identifying inadequate manpower levels, limited statutory powers of enforcement and insufficient budget
in the IFI. The NPWS in its restructuring plan announced in May , is to receive 55million euro and proceed with the early recruitment of 60 key staff.
Proposal.
1. That the catchments of the Great Western Lakes , at least those of Corrib, Mask and Carra be designated as a National Park with their ecosystems to be managed and protected statutorially by one agency comprised of representatives of the 7 agencies currently involved with funding derived from the budgets of these 7 agencies . Appropriate statutory enforcement powers should be approved forthwith (and not delayed until 2028, as in the Plan).
2. That provision be made within the structure/constitution of such agency for the inclusion of local advocacy and community inputs . As has been determined in other jurisdictions ,the aims and objectives of any such agency need to be valued by a broad spectrum of society and not just by those availing of leisure or other amenities in the catchment area. A balance between protecting and enhancing ecosystems while meeting the needs of local communities can be a difficult one to achieve but is vital to the effectiveness of such agencies.

Our Great Lakes and all their flora and fauna are well due proper management and recognition as outstanding natural - and national- resources . I believe the IFI - indeed any single agency relying on mere “interagency cooperation” - is not robust enough to implement the Great Western Lakes development plan without this interagency cooperation being formalised as a statutory body for the overall management of the Great Western Lakes catchments.

No doubt it would take considerable political will to create such a National Parks agency but without such a conjoint approach and the inclusion of the fisheries management plan as part of an overall catchment management plan , I fear the Great Lakes plan will go the way of so many other plans for the lakes.

[redacted]

From: [redacted]
Sent: Wednesday 14 September 2022 21:36
To: Western Lakes Plan
Subject: Fwd: Western Lakes plan

Hi,

[redacted] here. I have lived all my life on the shores of the Corrib and the future of the lake is very important to me.

I'd like to say firstly that I think the plan is very encouraging in so far that it highlights that wild brown trout are the fish species of principal concern.

There are some good points. It identifies the pressures to the lakes and highlights the decline in water quality, invasive species and the risks of predators.

It also goes as far as not labeling pike as a native species. And highlights that invasive species have the potential to casue severe and irreversible harm to native fish.

The plan does however need tweaking and needs to be stronger in relation to how it is going to achieve its goals.

From my reading of the plan it seems to suggest that roach, an invasive species, are as big a problem and risk than pike? And removing pike may have a negative impact on the numbers of roach, as Pike may prefer roach as opposed to trout? I question , does this mean that to control Roach numbers the Pike will be by kept to act as a stock control measure?
I also question when, where and how this diet sampling was done ?

Under the population modelling section 10.2 It talks about a mathematical model of population dynamics for brown trout and a predator species. Is this an idea of a mixed fishery?

If Roach are a such a high risk is there any other methods of control for them that can be look at?I dont think that it is satisfactory to protect one non native species to stock control another non native species.

While the plan is generally good It does seem to contradict itself in 10.4 where it states that in small water bodies pike are one of most significant threats to native fish and do not co exist with trout.

The plan therefore needs to be concrete on its position in relation to the pike bye law 806 and 809. No special protections should be given to non native species.

I do note that it states that this idea needs to be further studied. However, have these studies not already being done in other countries and lakes where pike have been introduced and taken over and wiped native fish?

I have nothing against pike fishing but I think there a enough lakes around the country. How many wild brown trout lakes are left in Ireland, in the world??
I feel the Corrib is a unique system and we need to protect it.

I also would like to touch on the water quality of the Corrib which I have seen deteriorating massively over the last few years. I think this is probably one of the most significant risks for the future of the lake. If the water quality of

the lake, the streams and rivers and the feeder lakes of the Corrib system are of such poor quality that the spawn and fry cannot survive then we will have nothing.
In my own opinion , the main causes of this deterioration is unsustainable farming methods on unsuitableland. You only have to drive west of the Corrib and you can see all the bog land being drained and hedge rows dug up. This land is then sprayed with serious harmful pesticides and toxicants, as well as slurry. This land has no soakage and everything runs into the lakes and rivers which directly and indirectly enter the Corrib .

I also livestock grazing right along, and even entering , rivers and streams that feed the Corrib.

I would like to see a stronger position being taken by IFI against offenders . I also feel awareness if the risks and consequences ofthese practices needs to be highlighted.
I would like to see more officers on the ground , particularly along the Owneriff system.

I alos think emphasis also must be put on clearing and protecting these rivers and streams where the Corrib trout spawn.

These are only small changes and amendments of the plan and I am optimistic that the correct decisions will be made.

This will not be an easy plan to implement and will I feel , require a lot of help from locals, fishing clubs, farmers, schools, etc..

I honestly believe that if done correctly and for the right reasons., the people around the lake will really get behind this movement will assist and help IFI protect the lake and get this work done.

What I really want is that the Corrib, and its feeder lakes and rivers, are solely managed as a trout fishery and the lake, and the trout, will still be there for our kids in the generations to come.

[redacted]

[redacted]

From: [redacted]
Sent: Thursday 15 September 2022 10:41
To: Western Lakes Plan
Subject: Western Lakes Plan

To whom it concerns

[redacted] along the shores of Lough Corrib.
In the spring time the the trout fishing is of huge benefit to the local area as it extends the tourist season.
We fully support this initiative by IFI and the Department to protect the future of the salmon and trout fishery of Lough Corrib.
Any measures necessary to protect the fisheries must and should be implemented.
Many Thanks,

[redacted]
Sent from my iPhone

[redacted]

From: [redacted]
Sent: Thursday 15 September 2022 14:21
To: Western Lakes Plan
Subject: Wester lakes development plan

To whom it may concern,

My name is [redacted] from [redacted]. I am writing to you to offer my support for the western lakes plan.

Having grown up beside [redacted], Co,Galway fishing for trout and salmon throughout my childhood, it sickens me to see such a wonderful eco system be destroyed by an invasive species.

Having read the proposed plans I find it hard to believe that IFI are continuing to protect invasive pike in the Owenriff system.

I would like to finish by wishing the best of luck to IFI in bringing forward future plans to tackle these issues affecting these special areas of conservation.

Kind regards,
[redacted]

[redacted]

From: [redacted]
Sent: Thursday 15 September 2022 19:21
To: Western Lakes Plan

[redacted]

Dear Sir or Madam,

I wish to make the following submission to the Great Western Lakes Plan; firstly I welcome the fact that the Department and IFI have now recognized the value of the Great Lakes as Salmonid Fisheries. The Great Western Lakes Plan is full of good ideas which need to be followed through on.

[redacted] on the shores of Lough Corrib, my father fished for a living for Trout, Salmon and Eels and our family [redacted] were reared from the proceeds of Fishing.

I now make a large part of my living from [redacted] ninety five percent of my income comes from Salmonid Anglers and this has not changed down through the years. I would like to make the following points.

1/ I am very concerned about Pollution of the Lake which appears to be getting worse year on year and the apparent lack of a plan to address this issue.

2/ The protection of Invasive species such as Pike, Roach, Perch etc who are having a huge impact on the Native fish, Char, Trout and Salmon, all protections of these fish need to be removed and where possible their numbers controlled.

3/ Staffing levels need to be addressed.

4/ Streams have been neglected for more than ten years; they need to be developed to their full potential.

5/ I would not agree that bag limits are an issue until such time as the issues outlined above are addressed.

6/ Pike will never control Roach numbers; as seems to be suggested in the Plan the numbers of Pike necessary to do this would wipe out the Salmonid population out completely.

[redacted]

PUBLIC CONSULTATION SUBMISSION TO INLAND FISHERIES IRELAND DRAFT LONGTERM PLAN ON THE PROPOSED DESIGNATED SALMOND WATERS OF THE GREAT WESTERN LAKES AS PUBLISHED IN JUNE 2022 - IFI/2022-4618

Submitted from [redacted]

[redacted] owns the fishing on a third of [redacted]. [redacted] is member owned with around 100 members and permit holders.

[redacted] is very disturbed that Lough Melvin was not included in the Western Lakes Plan and would like to see this omission rectified.

Lough Melvin urgently needs to be actively managed as a Salmonid Fishery as in fact it is already a designated SAC.

It is critical to the protection of our unique and endangered species of trout Sonaghan and Gillaroo and indeed Salmon.

[redacted] sstrongly supports the submission of [redacted] of which we are a member and reproduces part of the [redacted] submission below.

[redacted] welcomes the Government's genuine intention by the Minister, through IFI this time and not his Department, to introduce greater protection in designating Salmonid waters in the proposed Draft Plan as published on August 10th 2022, which includes 49 pages of the Draft Plan, 26 pages of the SEA Scoping Report and 83 pages of the Invas Appropriate Assessment Report, Press releases, Briefing meetings details and questionnaire which amounts to over 170 pages that took almost a year to prepare and for to expect a professional and constructive response from our federations by September 20th is unreasonable to the point of discouragement.

However, while we have read and debated the above documentation, we see it as a deflection to confuse and therefore will not engage or comment in detail in this submission until the obvious omission is rectified and the key sentence is inserted.

While we acknowledge the depth of work developed over a year that now has been submitted as a proposed roadmap to achieve our objectives of last year, we must state clearly this plan will not provide this intended protection and management responsibility that is required to safeguard these unique and important habitats while a mixed stock coarse fishery is being accepted. The EU Habitats Directive has long protected the integrity of our SAC's and our salmonid species, but this draft plan will now undermine it without a shadow of a doubt.

Last August, you may remember, in our submission to the Dept byelaw public consultation, we asked Minister Ryan to do two things to rectify the proposed bye law,

we proposed the following because we had trust in Inland Fisheries Ireland:

1. **This proposed draft Bye Law will not achieve the objective of protecting our unique salmonid habitat as it proposes to transfer the management responsibility from Inland Fisheries Ireland to the Minister unless the entire Section 7 is deleted.**

2. **We would also require that the Minster removes the word "primarily" from Section 4 which reads:** "The designated waters shall be managed primarily for the benefit of wild salmonid species. **to read as follows: "The designated waters shall be managed for the benefit of wild salmonid species."**

[redacted] strongly believes that coarse fish levels in Lough Melvin must be controlled Specifically Perch and Roach/Rudd hybrids are at record levels and are a detriment to the native Sonaghan and Gillaroo population.

The fishing clubs are willing to trap the coarse fish and relocate them to designated coarse fisheries.

Thankfully, the general angling public and our members agreed with these requests and further plans for the proposed Bye Law from the Department was dropped in a press release of September 2nd 2022 and was to be replaced by the IFI Draft Designated Salmonid Lakes Plan with *"its proposal to develop an evidence-based management plan for the seven lakes and to submit timelines for the plan to the Department by the end of September"* - within 28 days on September 30th 2022, which led us to believe that we should have at least had a draft before November or Christmas.

We can only speculate on what has delayed this Draft Plan which was already the product of a public consultation, and surely would not have merited another public consultation as time for urgent salmonid protection and conservation implementation is of the essence.

Whatever the delay, we hoped and trusted the eventual outcome would reflect the spirit of the 152 submissions out of the 180 that had the one theme that supported the call for legislation to designate our Western Lakes as salmonid lakes as laid down in the programme for Government.

Inland Fisheries Ireland's (IFI) very own submission summarised it very well, when it stated on page 3 under a heading of CONFLICTING BYELAWS that:

"it is evident, that unless the lakes in the Schedule to the draft bye law are excepted from the provisions of the two Byelaws – namely Byelaw 806 and Byelaw 809 of 2006, the byelaw it stands, does not achieve its stated aim of protecting the wild brown trout status of the lakes. In fact these byelaws have resulted in fish species which have become 'naturalised' in these lakes are now afforded equal protection to the native species which have bee there since the retreat of the last ice age. This is contrary to the aims of the Habitat Directive and fisheries legislation in general."

Indeed, the entire five pages have some excellent management plan points for a Designated Salmonid Lakes Plan that we enclose it in its entirety below, for your consideration.

Also, the Coarse Fish Conservation Bye-Law (No. 806) and the Pike Conservation Bye-Law (No. 809) continue to conflict with Ireland's legal obligations under the EU Habitats Directive and Water Framework Directives. Under the EU Water Framework Directive, IFI have been surveying lakes and rivers since the late 2000's using the FIL2 model, which classifies pike and most coarse fish as "non-native influencing ecology" for Ecoregion 17 (Ireland). Water bodies with non-native invasive fish species will not meet high status for EU Water Framework Directive (WFD) purposes due to the presence of these species. Future introductions of non-native species will also lead to a downgrading of the ecological status of a water body.

We are also aware through our membership who submitted multiple FOI and AIE requests to both IFI and their parent government department that no appropriate assessment screenings were conducted on the two bye-laws (806/809) when they were formulated in 2006. These bye-laws constitute a plan as laid down by articles 6.3 and 6.4 within the EU Habitats Directive. The screening requirement for bye-laws was confirmed in the Dáil by Minister Eamon Ryan on July 27th 2021 when responding to a PQ. With no screenings these two incumbent bye-laws are legally inadmissible and are completely at odds with the 'precautionary principle' laid down by the EU Habitats Directive. Without the insertion of this wording, IFI and the government will continue to stand over two bye-laws that encourage and

reward through conservation the spreading of invasive pike/coarse fish throughout the country including the deliberate targeting our salmonid SACs?

Therefore, we appeal to you as the state body responsible for the protection, conservation and management of the inland fisheries resource

to include in the draft plan for the long-term management for the seven lakes, the above principled wording shaded in yellow along with spirit of the enclosed five pages from your submission to the Minister of last August.

The lakes have long-been designated, as a matter of policy, to be managed primarily as wild brown trout waters. Therefore, the proposed management programmes for these lakes, as set out in the draft plan, will protect, conserve and, where possible, enhance the lakes' natural attributes and native biodiversity if this key principle is inserted to comply with the EU Habitats Directive.

We look forward to continuing to work with the Minister and his staff, and IFI to improve and enhance our wild salmonid habitat.

Yours sincerely

APPENDIX 1 - COPY OF IFI SUBMISSION TO PUBLIC CONSUTLTATION AUGUST 2021

Iascach Intíre Éireann
Inland Fisheries Ireland

Designated Salmonid Waters Byelaw
Submission to Public Consultation

August 2021

Author(s):	Inland Fisheries Ireland
Description of Content:	Submission to Department of the Environment, Climate and Communications

Byelaw Proposal

On page 66 of the programme for Government it states that the government intends to "Legislate to designate our western lakes as salmonid lakes".

IFI welcomes the Government's commitment to recognise these exceptional limestone lakes which are unique in Europe as salmonid – in particular wild brown trout - lakes. The intention of the designation of these lakes as 'salmonid' lakes from IFI's perspective needs to be fully explained. This requires some background.

Background:

Since the 1950's, and probably before, the main large limestone lakes of Ireland were selectively managed as wild brown trout fisheries. Few countries have such a unique resource whereby there is adequate spawning in clean rivers for wild trout to breed and this is complimented by limestone lakes with extensive stoneworth (*Charaphyte sp*) beds in which an abundance of invertebrate life exists on which the wild trout, which migrate down from the nursery streams, feed and grow quickly.

In the earlier years the fish fauna of these lakes was less diverse – over time more species appeared in these lakes as a result of anthropogenic activity and as a consequence most of these lakes have additional non-native species competing with the trout for food.

Under the management of the Inland Fisheries Trust all the large limestone lakes – some of which were originally known as the 'Crown Lakes' were managed selectively for wild brown trout angling. This entailed removing predator and competitor species as part of a management programme. It is IFI's policy and intention that the lakes in the Schedule to this draft bye-law will continue to be managed into the future with the reduction, through both angling and direct management, of both competitor and predator species into the future.

Proposed Designation:

The designation of these lakes is welcomed by IFI but should be simple. They are already designated in terms of the established management policy of Inland Fisheries Ireland and the agencies that preceded it such as the Central and Regional Fisheries Boards and the Inland Fisheries Trust and also marketing of these lakes as wild brown trout fisheries. However, there was never formal recognition of this. In the view of IFI, it is unclear that this byelaw, as currently drafted, actually achieves the intent of IFI to protect these lakes and enshrine their management in such a manner that they are primarily wild brown trout fisheries and competing or predator species shall be removed to improve the opportunity for trout to survive and grow.

On another detail, in view of the fact that some of the lakes in question are remote from the sea and have no migratory salmon component to their population – the byelaw would be best worded to specify wild brown trout as opposed to salmonid.

Conflicting Byelaws:

One of the over-riding concerns of Inland Fisheries Ireland in the past 15 years was the fact that two bye-laws introduced in 2006, (specifically to prohibit the widescale harvest of pike and coarse fish from certain waters in Ireland), was directly in conflict with the management policy of the then Central and Regional Fisheries Boards. This was intended as a 'stop-gap' measure to address a particular threat – but the anomaly caused by these byelaws in respect of the management and marketing of the Great Western Lakes as wild brown trout fisheries has continued for an inordinate period of time. The proposal to designate these lakes as salmonid (or wild brown trout) lakes must address this inconsistency once and for all.

It is evident that unless the lakes in the Schedule to the draft byelaw are excepted from the provisions of the two Byelaws – namely Byelaw 806 and Byelaw 809 of 2006 the byelaw as it stands does not achieve its stated aim of protecting the wild brown trout status of the lakes. In fact these byelaws have resulted in fish species which have become 'naturalised' in these lakes are now afforded equal protection to the native species which have been there since the retreat of the last ice age. This is contrary to the aims of the Habitats Directive and fisheries legislation in general.

Stock Assessments, Carrying Capacity and Angling Returns:

The draft byelaw as currently stated also appears to bind IFI into a massive undertaking in terms of regular stock assessments of all the lakes in the schedule (7) including most of the largest lakes in the country and such an assessment will also require surveys of all feeder rivers and streams. This will require very significant additional resources for IFI to be able to deliver on this component annually. Coupled with the assessment of the stocks IFI will be required to identify the carrying capacity of the lakes, the current stock and the 'harvestable surplus' available to anglers. IFI have never done such a detailed stock assessment for any of these lakes previously and the cost of such a commitment into the future for seven lakes will be very substantial.

The logical extension from this would be that the complimentary element to this will be an assessment of the fishing effort and catch of trout on the lakes in question. Previously voluntary "Creel Census" returns were introduced for some of these lakes but with limited success. Creating a system for all anglers to make required returns will be another significant administrative burden and may be seen by some as the precursor to the introduction of a 'fee or licence for trout angling' on these lakes which, it is clear, will never be an acceptable funding mechanism.

Without the substantial additional resources annually to carry out all these requirements IFI will not be in a position to fulfil the terms of the byelaw. This may lead to IFI being in breach of the byelaw which would be an unacceptable scenario. Furthermore, the byelaw as currently worded empowers the Minister – a politically elected public representative to amend the plans of IFI – prepared by fishery management professionals and scientists 'as he sees fit'. This leaves the future

management of these vitally important lakes open to potential pressure for change from lobby groups and takes it away from professional fisheries managers where such expertise exists and should remain.

Summary & Recommendations:

In the light of the foregoing IFI propose that a more manageable approach be adopted. One that addresses the fundamental anomalies of the 2006 byelaws and also encourages anglers to play their part in the future management of the lakes.

IFI believes this matter would benefit from further discussion and debate prior to finalising the wording of the proposed byelaw. This should involve detailed discussion with the relevant stakeholders in particular the local resident, local anglers, key tourist interests including guides, angling centres as well as local angling clubs. The buy-in from these sectors is fundamental to the success of the future management of these lakes. However, should that approach not be possible at this stage IFI proposes that the byelaw be amended to include the following:

(1) Calling the byelaw the Designated Wild Brown Trout Waters Bye-Law .....

(2) Defining "designated waters" as means the waters designated as wild brown trout waters under Article 3: which shall be managed by Inland Fisheries Ireland specifically for wild brown trout (Salmo trutta) in all its forms and subspecies.

(3) Defining "wild brown trout" as meaning fish of the species (Salmo trutta) including Ferox, Sonaghan and Gillaroo trout.

(4) Specifying that the designated waters shall be managed specifically as premier wild brown trout fisheries. Management shall include the unrestricted removal of predator and competitor species either by direct management or angling.

(5) Exempting the waters in the schedule from the provisions of Byelaw 806 of 2006 – for example:- The waters in Schedule 1 Column 2 of this byelaw shall be excluded from the bag limit and size provisions of byelaw 806 of 2006 namely a person may take (by angling) and kill more than 4 coarse fish and including fish less than or greater than 25 cms measured in a straight line from the tip of the snout to the fork of the tail.

6. Exempting the waters in the schedule from the provisions of Byelaw 809 of 2006 – for example:- The waters in Schedule 1 Column 2 of this byelaw shall be excluded from the bag limit and size provisions of byelaw 809 of 2006 namely a person may take (by angling) or kill more than one

pike including pike less than or greater than greater than 50 cms measured in a straight line from the tip of the snout to the fork of the tail.

7. Include a general provision for the proper management of the fishery – i.e. - IFI shall do whatever it deems necessary for the proper management of the lakes in Schedule 1 as wild brown trout fisheries.

8. Leave the transfer provision in the proposed regulation:- (a) A person shall not put or transfer into the designated waters fish of any species without the prior written consent of IFI. (b) An application for the prior written consent of IFI referred to in paragraph (a) shall be made in writing to IFI.

APPENDIX 2 - FISSTA SUBMISSION IS BASED ON THIS REFERENCE DOCUMENT AS IT LINKS LEGAL, ENVIRONMENTAL AND POLICY IN RELATION TO EU HABITATS DIRECTIVE SITES

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Viewpoint

A legal and ecological perspective of 'site integrity' to inform policy development and management of Special Areas of Conservation in Europe

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ABSTRACT

The European Union Habitats Directive (92/43/EEC) provides for the designation and management of Special Areas of Conservation (SACs) and requires that impacting activities are subject to 'an appropriate assessment' of their implications for the 'integrity' of the site. We define the term 'site integrity' from a legal and an ecological perspective. We demonstrate that 'site integrity' is the maintenance of ecological processes and functions that support the wider delivery of ecosystem services. 'Site integrity' can be influenced by SAC management. Management that seeks to support 'site integrity' may include the use of buffer zones or connecting areas that extend beyond the SAC site's designated features. We conclude that 'site integrity' and 'favourable conservation status' are powerful legal terms that if fully transposed into the law and policy of Member States can enable the achievement of broader European and International goals for marine conservation.

1. Introduction and legal perspective

Widespread and intensive human activity in the world's oceans and the subsequent loss of marine populations and species are believed to be impairing the ability of marine ecosystems to provide the essential ecosystem services that contribute to human well-being (CBD, 2010; Chapin III et al., 2000; Halpern et al., 2008; Hooper et al., 2005; Worm et al., 2006). Bearing in mind that MPA management remain adaptive to developments in scientific understanding of the spatial element of ecosystem service delivery (Smith et al., 2009; Smith and Wilen, 2003), networks of Marine Protected Areas (MPAs), designated though a system of marine spatial planning, are recognised as being the mechanism though which marine ecosystem services may be conserved, as 'they are the only approach to marine resource management specifically designed to protect the integrity of marine ecosystems and preserve intact portions and examples of them' (Sobel and Dahlgren, 2004).

In terms of public policy and law, the European Union (EU) (92/43/EEC) (the Habitats Directive) currently exerts great influence over MPA planning at a European scale. The Habitats Directive requires EU Member States to set up 'Natura 2000', a 'coherent European ecological network of Special Areas of Conservation' (SAC), comprising sites hosting the habitat types and species listed in its Annexes I and II (The Council of the European Communities, 1992). Within the network of SACs, Article 6.1 of the Habitats Directive requires the establishment of necessary 'conservation measures' corresponding to the ecological requirements of the Annex I habitats and the Annex II species present at the sites (The Council of the European Communities, 1992). Article 6.2 requires Member States to '… take appropriate steps to avoid, in the Special Areas of Conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of [the] Directive' (The Council of the European Communities, 1992). In regard to proposals for the management of activities within an SAC, Article 6.3 of the Habitats Directive requires an 'appropriate assessment' of the implications of 'plans or projects' for the site, in view of its conservation objectives. In light of the conclusions of that assessment, the plan or project may only be granted permission to proceed if it can be 'ascertained that it will not adversely affect the integrity of the site concerned' (The Council of the European Communities, 1992).

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The Habitats Directive is considered to be Europe's strongest legal tool for nature conservation (Hochkirch et al., 2013). However, despite such legal provisions the conservation status of 70% of European coastal habitats and 50% of European marine ecosystems is considered to be in an unfavourable condition (Conde et al., 2010). In the United Kingdom (UK), this unfavourable status is linked to SAC site management. Most SACs remain multiple use sites that are managed individually with a narrow remit of fixed habitat or species specific conservation objectives. There is no focus on the ecological function of the site and therefore no consideration of the contribution towards the ecological integrity of the site (Gaston et al., 2006). Notwithstanding the requirements of Article 6.2 of the Habitats Directive, the UK regulatory authorities have taken the view that on-going activities that pre-date SAC designation (including licenced fishing) need not be subject to an 'appropriate assessment'. Continued degradation of SAC site features is revealed as a result of the onus placed on Member States by Article 11 of the Habitats Directive to 'undertake surveillance of the conservation status' of habitats and species within SACs (The Council of the European Communities, 1992). Despite a growing body of evidence that demonstrates that some methods of fishing can impact upon sensitive SAC marine features (Fossa et al., 2002; Hall-Spencer, 1998; Hall-Spencer and Moore, 2000; Hinz et al., 2011; Riesen and Reise, 1982; Thrush et al., 1998) there has been limited commitment from the UK and devolved governments to act upon evidence. The few evidence based campaigns that have been successful in proving the damaging effects of fishing to sensitive marine features have proved to be costly, drawn-out and highly contentious (Rees et al., 2010a).

Recent rulings of the European Court of Justice (EC), CJUE) clearly demonstrate that the protection offered to SACs by Articles 6.2. and 6.3 of the Habitats Directive is equal ('the Waddenzee case' Case C-127/02, 2004; Commission v French Republic Case C-241/08, 2010; Commission v Ireland Case C-418/04, 2007). It is thus increasingly clear that the precautionary principle, which is clearly embedded in Article 6.3 in relation to proposed 'plans or projects' must also be applied when looking at existing activities and the status quo within SACs. In light of this, UK Non-Governmental Organisations (NGOs) are currently placing pressure on UK Government to review its implementation of the Habitats Directive, arguing that the UK Government is in breach of Article 6.2 for failing to deal with damaging fishing activity within SACs that leads to 'deterioration of natural habitats' and Article 6.3 for failing to subject fishing license grants and renewals to 'appropriate assessments' (Client Earth and Marine Conservation Society, 2011).

The equal stringency of the Habitats Directive's approach to both future and existing activities in SACs ought to have implications for the management of SACs across the EU, and should bring to the fore the issue of 'site integrity'. To support development of forthcoming guidance in the EU to integrate 'site integrity' into SAC management and therefore achieve the overarching goals of the Habitats Directive, this paper aims to:

- Clarify 'site integrity' from a legal perspective.
- Clarify 'site integrity' from an ecological perspective.
- Consider the importance of the 'typical' species of designated habitats in assessing conservation status.

Using a case study example we will:

- Demonstrate how 'site integrity' is linked to marine features.
- Demonstrate how 'site integrity' can be influenced by management.

2. A legal definition of 'site integrity'

The term 'integrity' is only used once in the Habitats Directive, in Article 6.3, in connection with the requirement only to give consent to plans or projects following an 'appropriate assessment' that allows it to be ascertained that they will not 'adversely affect the integrity of the site concerned' (The Council of the European Communities, 1992). It is notable that it is 'site integrity', rather than the integrity of specific habitats or species, that must not be adversely affected. 'Site' is defined as 'a geographically defined area whose extent is clearly delineated' (Article 1(j) of the Habitats Directive). The Habitats Directive does not define 'integrity'. However, the EC's guidance 'Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, European Commission (2000)' (the EC Guidance) states at 4.6.3 that 'It is clear from the context and from the purpose of the directive that the 'integrity of the site' relates to the site's conservation objectives'. The EC Guidance notes that integrity also relates spatially to the site and that activities are 'not allowed to destroy a site or part of it on the basis that the conservation status of the habitat types and species it hosts will anyway remain favourable within the European territory of the Member State' (European Commission, 2000). Importantly, the EC Guidance states that integrity can be considered as a quality or condition of being whole or complete. In a dynamic ecological context, it can also be considered as having the sense of resilience and ability to evolve in ways that are favourable to conservation (European Commission, 2000).

The EC Guidance (2000) states that the 'integrity of the site' may be defined as 'the coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and/or populations of species for which the site is or will be classified'. A site can be described as having a high degree of integrity where the inherent potential for meeting site conservation objectives is realised, the capacity for self-repair and self-renewal under dynamic conditions is maintained, and a minimum of external management support is required' (European Commission, 2000; Her Majesty's Government, 1994).

The recent Opinion of the Advocate General to the CJEU in the case of Sweetman and others – v – An Bord Pleanala (Case C-258/11, 2012) stresses a temporal element and includes the following: 'in order to establish whether a plan or project . . . has an adverse effect on the integrity of the site, it is necessary to determine whether that plan or project will have a negative effect on the constitutive elements of the site concerned, having regard to the reasons for which the site was designated and their associated conservation objectives. An effect which is permanent or long-lasting must be regarded as an adverse one. In reaching such a determination, the precautionary principle will apply.'

The link between 'site integrity' and the 'conservation objectives' for the site is made in Article 6.3 of the Habitats Directive and, necessarily, in the EC Guidance and in case law. The overarching requirement of the Habitats Directive is to achieve 'favourable conservation status' of Annex I habitats and Annex II species (Articles 3.1 and 4.4). Therefore, the primary conservation objective for those habitats and species within SACs designated for their protection must be the achievement of 'favourable conservation status' for those habitats and species within that site. The Habitats Directive specifically defines 'conservation status of a natural habitat' and 'conservation status of a species' (Article 1(e) and (i)) and goes onto set out the circumstances in which those statuses may be considered 'favourable' (The Council of the European Communities, 1992). Of considerable significance is the precondition in Article 1(e) that the conservation status of a designated habitat will only be taken to be favourable when the conservation status of its

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typical species is itself favourable. It is notable that there is no requirement for the typical species of a designated habitat to be species for which the SAC has been designated.

3. An ecological definition of 'site integrity'

The simplest ecological definition identifies ecological integrity as the ability of a system to support and maintain a biological community which displays species compositions, diversity and functional organisation analogous to a system which is undisturbed (Karr and Dudley, 1981). Truly pristine conditions are both difficult to identify or aspire to in Marine Protected Area management, and many would argue that humans are a natural part of the ecosystem, the social-ecological system (Armsworth et al., 2007; Curtin and Prellezo, 2010; Pollnac et al., 2010). A practical definition of ecological integrity therefore encompasses this natural state with the ability to cope with disturbance. Parrish et al. (2003) define ecological integrity as being met when the dominant ecological characteristics (composition, structure, function and ecological processes) of the system, '...occur within their natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human disruptions'. Ulanowicz (2002) expands this definition into three main concepts. The first, system health, relates to the continued successful functioning of the community, which in an anthropocentric view may be defined as the delivery of ecosystem services. The second looks at the ecosystems' ability to withstand stress (resilience). Finally, the concept of adaptation is considered, which Ulanowicz (2002) defines as the optimum capacity of a system to develop in different ways without human interference.

Whilst ecological integrity is not often defined specifically in conservation management policy, there have been efforts recently to focus on addressing the wider integrity of the ecosystem. For example, 'sea-floor integrity' is one of eleven descriptors used to assess 'Good Environmental Status' in Annex 1 of the EC Marine Strategy Framework (Directive 2008/56/EC) (Rice et al., 2012). 'Good Environmental Status' under this descriptor is found when 'sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected' (European Parliament and Council, 2008). It is proposed that the measurement of sea-floor integrity consists of identifying structures and functions of particular importance, identifying the pressures, and identifying appropriate indicators which reflect the sensitivity and resilience of the ecosystem.

4. Integrating 'site integrity' into SAC management

To integrate the legal principles of 'site integrity' and therefore 'favourable conservation status' into practical SAC management it is necessary to demonstrate how ecological functions and processes are linked to the conservation status of a habitat and influenced by changes in SAC management regimes. To demonstrate this, we use a case study area of Lyme Bay, UK where a consortium of scientists led by Plymouth University Marine Institute were commissioned by the UK Government to undertake a 3 year study to assess the ecological and socio-economic effects of changes to management of the marine area (Attrill et al., 2011).

4.1. Lyme Bay case study site

Lyme Bay is located in the southwest of England, UK (Fig. 1). Comprised of a mosaic of substrates from sand, mud and gravel to rock and mixed ground, the entire bay was defined as an area of 'high species richness that includes rare and threatened species' (Hiscock and Breckels, 2007). 'Reefs' are contained in Annex I of the Habitats Directive and are defined as 'habitats where animal and plant communities develop on rock or stable boulders and cobbles' (Jackson and Mcleod, 2000). In Lyme Bay, these include outcropping bedrock (with igneous, chalk, mudstone and limestone examples) and pebbles, cobbles and boulders, support a diverse range of reef species assemblages characterised by species such as the sea squirt (*Phallusia mammillata*), sponge (*Cliona celata*), anemone (*Aiptasia mutabilis*), bryozoan (*Pentapora fascialis*) and corals (*Alcyonium digitatum* and *Eunicella verrucosa*). Such species may be considered to be the 'typical species' of this reef habitat.

Fig. 1. Map showing location of Lyme Bay, cSAC and the order boundaries plus sites surveyed – 2012 sites. Substrate map data provided by Devon Biodiversity Records Centre.

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In July 2008, following advice from its statutory nature conservation advisors Natural England, the UK Government closed a 206 km^2 area of the Bay by way of 'The Lyme Bay Designated Area (Fishing Restrictions) Order' (2008) to bottom towed fishing gear. The objective of the Order was to promote marine biodiversity by ensuring that the structure of the reef system was maintained, and to aid the recovery of the benthos following damage caused by bottom towed fishing gear (Attrill et al., 2011; DEFRA, 2008). The Order was specific to bottom towed fishing gear and the area remains open to fishers using static gears such as pots and nets, and to recreational users.

In August 2010, a larger section of the Bay was put forward as a candidate SAC (cSAC) due to the presence of extended Annex 1 reef habitat that lie outside the boundary of the Order (Fig. 1). Selection criteria behind this decision concluded that the site has excellent representivity of a broad range of habitats and reef species, has good prospects for recovery of structure and function as a result of fisheries restrictions, and has excellent conservation (Natural England, 2010)

4.2. 'Site integrity' in the Lyme Bay cSAC

Using the definitions for ecological functions and ecological processes defined by (Balmford et al., 2008), The Lyme Bay and Torbay cSAC Annex I reef features, their associated (typical) species of conservation importance, ecological function, and ecological processes are shown in Table 1.

In addition to those species designated as being of conservation importance, the reefs in Lyme Bay provide habitat for a further range of species (some may be considered as 'typical' in a local context). Mobile organisms such as whelk, crab (Howard, 1982), lobsters and fish use them as a refuge and source of food and sessile species such as soft corals, hydroids and sponges use the reef structure for settlement. Some sessile species also provide platforms for the recruitment of others, for example hydroids, which provide a three dimensional structure above the sea bed, allowing scallop spat to settle off the seabed thereby reducing the risk of being smothered by sediments (Brand et al., 1980; Dare and Bannister, 1987; Eggleston, 1962). This can provide substantial increases in spat abundance, with Bradshaw et al. (2003) reporting 8.4 times more spat associated with hydroids than without. Structurally complex habitats are also known to be important as nursery habitats, they provide refugia for juvenile fish species, for which they are known to increase survivorship (Bradshaw et al., 2003; Connell and Jones, 1991).

The ecological composition and structure of the marine environment supports ecosystem functions and processes in Lyme Bay that, in turn, provide for a range of ecosystem services (the social–ecological system). Traditionally within Lyme Bay, fishermen towing demersal fishing gear (otter trawls, beam trawls, scallop dredges) avoid the hard rock reef areas and fish on the mixed sediment areas (sands, gravels, cobbles) and static gear fishermen place pots in the rocky areas, targeting crabs and lobster (Rees et al., 2010a). Recreational SCUBA diving, sea angling and wildlife watching trips are key components of the leisure and recreation activities undertaken in Lyme Bay, making use of the natural marine resources that stem from biological diversity (Rees et al., 2010b).

The implementation of the Order and the subsequent proposal for an SAC in Lyme Bay recognises 'site integrity' in that the reefs underpin the ecological processes and functions in the area and that these interact with non-SAC features and the wider marine environment to provide ecosystem services (Fig. 2). This interaction can be influenced by the 'conservation status' of the habitat.

4.3. Management and 'site integrity'

The EC Guidance states that 'site integrity' 'can be considered as a quality or condition of being whole or complete. In a dynamic ecological context, it can also be considered as having the sense of resilience and ability to evolve in ways that are favourable to conservation' (European Commission, 2000). Changes in management have enabled both recovery and expansion of the distribution of reef associated organisms.

Table 1
Habitats and typical species within the Lyme Bay portion of the Lyme Bay & Torbay cSAC listed for conservation and their associated ecological functions and ecological processes (developed from Fletcher et al., 2012).

	Ecological functions	Ecological processes
Habitats		
Annex I reef habitat[a]	Production	Primary production; secondary production; larval/gamete supply; formation of species habitat; species diversification; formation of physical barriers
Species		
Alcyonium digitatum[b]	Production; geological processes; ecological interactions	Formation of species habitat; species diversification; food web dynamics
Dead man's fingers		
Axinella dissimilis[b]	Production; geological processes; ecological interactions	Formation of species habitat; species diversification; food web dynamics
Erect branching sponge		
Eunicella verrucosa[c,d,e]	Production; geological processes; ecological interactions	Formation of species habitat; species diversification; food web dynamics
Pink sea fan		
Leptopsammia pruvoti[c,d,e,f]	Production; ecological interactions	Formation of species habitat
Sunset cup coral		
Pentapora fascialis[b]	Production; geological processes; ecological interactions	Formation of species habitat; species diversification; food web dynamics
Ross coral		

[a] Habitats Directive (HD).
[b] Nationally important marine features.
[c] Wildlife & Countryside Act 1981.
[d] The UK Biodiversity Action Plan 1995 (UK BAP).
[e] The International Union for Conservation of Nature (IUCN) Red Data List.
[f] Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).

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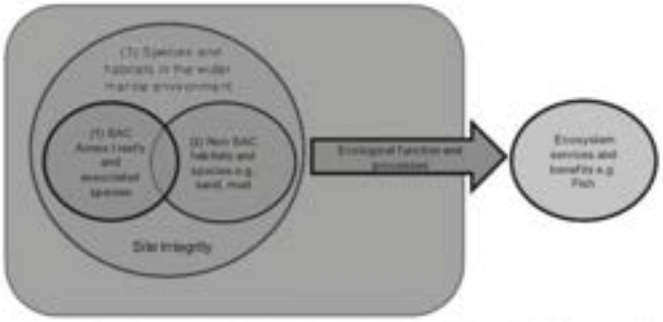

Fig. 2. A model depicting 'site integrity'. 'Site integrity' comprises the interaction between 1 and 2 to underpin ecological functions and processes to deliver ecosystem services.

In terms of recovery, results of the 3 year survey in Lyme Bay show that there has been some recovery of the reef community and that recovery has also been observed for certain individual species (such as the ross coral (*Pentapora fascialis*), sea squirt (*Phallusia mammillata*) and king scallop (*Pecten maximus*)) in areas where bottom towed fishing gear is no longer permitted (Fig. 3) (Attrill et al., 2011). Species which are long lived and slow growing such as the pink sea fan (*Eunicella verrucosa*) (Jackson et al., 2008), have, however, yet to exhibit consistent signs of recovery (Attrill et al., 2011).

The recovery of the reef habitats has also resulted in positive socioeconomic changes, with research demonstrating that the implementation of the Order in Lyme Bay has benefitted the local recreation industry by preventing further deterioration of natural resources (Rees et al., 2010b) and the static gear sector of the fishing industry, primarily by providing a safe haven in which they can set their pots and nets (Mangi et al., 2011). These changes are also linked to potential benefits for the delivery of ecosystem services via conservation of species that support ecological function (Rees et al., 2012). Therefore improvements in the 'conservation status' of the reef habitat via recovery has influenced 'site integrity' with positive implications for the delivery of ecosystem services.

In terms of the expansion of the distribution of reef organisms, research from Lyme Bay has determined that recovery of the reef habitat has not been restricted to those areas that are strictly defined as reef habitat for the purposes of Annex I of the Habitats Directive (Sheehan et al., 2012). The results demonstrate that sessile taxa associated with reef habitats are also now present on pebbly sand habitats in Lyme Bay that have been protected from bottom towed fishing gear for 3 years. These sessile species are found in greater abundances on pebbly-sand habitat in areas closed to fishing compared to those where bottom towed fishing continues (Sheehan et al., 2012). According to the Interpretation Manual of European Union Habitats (2007) 'hard substrata that are covered by a thin and mobile veneer of sediment are classed as reefs if the associated biota are dependent on the hard substratum rather than the overlying sediment', suggesting that these areas are an extension of the realised cSAC designated reef habitat and should be treated as such. This has only become evident following the cessation of bottom towed fishing in the area of cSAC covered by the Order.

The importance of areas between the rocky reefs is further evident when considering the life history of benthic species, some of which may be considered as 'typical' to the reef habitat. This often comprises several life stages, each of which may depend upon different components of the reef, highlighting the importance of comprehensive conservation of the various habitats of these species throughout their life cycle. Juvenile common lobsters (*Homarus gammarus*) for example, are known to bury in the sediment near to reef habitats (Howard and Bennett, 1979) and occupy crevices in the reef once matured (Holthuis, 1991). The edible crab (*Cancer pagurus*) also uses the reef for protection (Howard, 1982) or bury into mixed sediments when carrying eggs (Edwards, 1979). Thus, protecting the areas between the reefs could promote adult crustacean abundance, which should be of benefit not only for meeting the conservation objectives by reference to the conservation status of typical species of the site, but also for bringing wider economic benefits through fisheries enhancement.

It is therefore apparent that within Lyme Bay, reef habitat consists of rocky reef colonised by sessile fauna, areas between rocky reef outcrops where a veneer of sediment overlies hard substrata which, if left unfished will begin to be colonised by sessile reef species, and the linking patches of sediment that are also crucial for reef associated mobile fauna such as lobster providing ontogenetic stepping stones for reef species (Boström et al., 2011).

Fig. 3. Recovery of the reef community in an area previously fished. Image courtesy of the Marine Institute, Plymouth University.

5. Discussion

The application of legal principles ('site integrity' and 'favourable conservation status') to ecological functions and processes in a marine area poses some points for discussion that are pertinent to the development of Habitats Directive policy and the management of SAC sites in Europe.

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5.1. Improvements to the conservation status supports the ecological processes and function of a reef habitat

Through their contribution to production, Annex I reef habitats (as found in Lyme Bay) contribute to a range of ecological processes. Via management, the dominant ecological characteristics that typify the reef habitat have been enhanced, and recovery of these areas not only increases habitat complexity and benthic biodiversity, but also increases the three dimensional structure of the habitat, providing additional structure to enhance the settlement of species such as scallops, and for species such as cuttlefish, whelk and shark to lay their eggs (Bradshaw et al., 2003).

The recovery of the reefs will also increase their resilience. A key aspect of 'site integrity' is that the site must have capacity for 'self-repair and self-renewal'. A site which has integrity will be able to withstand episodes of storm disturbance, heavy predation and disease, and will have sufficient capacity to recolonise damaged areas as a result of the interconnectivity between the reefs and surrounding habitats.

In addition to protection of the rocky reef habitat, protection of areas between the reef outcrops in the Bay is important. Annual benthic surveys have demonstrated that the protection afforded by the Order has allowed gradual colonisation of reef species (some which may be considered as 'typical') in areas that would not be categorised as reef, based on apparent habitat type (Sheehan et al., 2012). Similar enrichment of sand gravel and mud biological communities after the cessation of scallop dredging has also been observed in closed area experiments on the Isle of Man, UK (Bradshaw et al., 2001). True assessment of the extent of the reef feature cannot therefore be quantified in an area that is trawled or dredged as the use of towed fishing gear will prevent growth of reef species. Annual monitoring in Lyme Bay has shown the importance of these areas, which, in the early years of site management, could not have been identified as reef associated due to the impact of fishing activity. Any 'appropriate assessment' of activities within an SAC must conclude by asking whether it can be ascertained that those activities, individually or collectively 'will not adversely affect the integrity of the site'. As 'site integrity' is closely linked with the 'capacity [of the habitat] for self-repair and self-renewal' (European Commission, 2000) it follows that the condition and management of features that have positive impacts on repair and renewal, such as areas between rocky reefs, is integral to an assessment of site integrity. Therefore, management of an SAC ought to take into consideration 'reference' or 'control' 'areas' against which to measure change and the inclusion of buffer zones around designated habitats, or connecting areas between designated habitats to allow typical species associated with those habitats to colonise and grow. All management must remain 'adaptive' to potential change.

5.2. Application of the legal principle of 'site integrity'

As has been noted, the principal goal of the Habitats Directive is the achievement, by maintenance or restoration, of 'favourable conservation status' for Annex I habitats and Annex II species. The existence of 'site integrity' is an implicit precondition to the achievement of 'favourable conservation status' and it is this quality that is specifically protected by the Habitats Directive's requirement for potentially harmful activities to be subject to an 'appropriate assessment and prevented from taking place if it cannot be ascertained that they will not affect 'site integrity'. On a true interpretation of the Habitats Directive and relevant case law (op. cit.) such an assessment should be applied to both proposed and existing activities. In terms of SAC management and compliance with the Habitats Directive 'site integrity' must therefore be informed by the status of the designated Annex I and II habitats and species and applied in the sense that these habitats and species support and interact with broader ecological processes and functions within a marine area.

It must also be recalled that 'favourable conservation status' requires that any 'typical species' of a designated habitat also be in favourable condition, whether or not they are themselves Article II species. The Interpretation Manual of European Habitats contains examples of species that may be regarded as typical for their habitats (European Commission, 2007). Many are not Annex II species, but if they are harmed by activities that do not directly impinge on the Annex I habitat there is a legal argument that such activities prevent the achievement of 'favourable conservation status' for that habitat.

5.3. An assessment of 'site integrity' within an SAC

The legal definition of 'site integrity' is informed by definitions of ecological integrity. Underlying the concepts of ecological integrity are various ecological components and processes which would require consideration at a site and network level to address integrity. Assessing 'site integrity' would therefore require the complex task of understanding the ecosystem organisation at a location in terms of the ecosystem structure, functions, processes and connectivity, especially in relation to the features of interest and its resilience to, and ability to recover from, disturbance. It can be argued that in some areas of science-policy research, the scientific knowledge can lag behind the ideology embedded in policy (Rees et al., 2013). This indeed remains the case in relation to a detailed understanding of ecological interactions in relation to measuring the contribution of individual habitats or species to ecological processes and functions (Chapin III et al., 2000; Ieno et al., 2006; Petchey and Gaston, 2006; Somerfield et al., 2008). This poses difficulty for conservation planning that relates directly to a measurement of ecological function, e.g. specifically as an indicator of 'site integrity' (Rees et al., 2012). However, as demonstrated in the case study for Lyme Bay, an understanding of the link between ecological function (e.g. primary production) to the delivery of ecosystem services (e.g. fish and raw materials) can potentially provide a framework by which 'site integrity' could be assessed.

6. Conclusions

The definition of 'site integrity' as a legal term and its translation to 'on the ground' practical management of an SAC from an ecological perspective demonstrates that interpretation of the Habitats Directive in conservation policy and SAC management needs to evolve to meet the current challenges of marine resource use management. In the example for Lyme Bay, UK, we have demonstrated that 'site integrity' is intimately associated with the maintenance of those ecological processes and functions that support the wider delivery of ecosystem services and may extend beyond just the designated features. The achievement of 'favourable conservation status' and 'site integrity' within the Lyme Bay cSAC is dependent upon securing ecological integrity of the reef and its typical species and interactions between both reef and non-reef elements of the ecosystem. It is, therefore, prudent for both ecological and legal purposes to treat the 'site' as a whole and not to focus management merely on the limited locations of reef areas within the site. A change in management that required the cessation of fishing using bottom towed gear within the area has demonstrated that the reefs have the capacity for self-repair and self-renewal, particularly in areas that were not previously considered as reef habitat. This, in turn, has provided for ecological processes and functions within the site and beyond the delineated boundaries of the SAC to interact and increase the potential for realisation of ecosystem services for a broad range of stakeholders.

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The Habitats Directive is not, however, a standalone instrument. The designation of Annex I and II species and habitats are part of the building blocks for broader marine environmental protection in European waters that stem from international drivers for MPAs and targets to halt further loss of biodiversity (Convention on Biological Diversity, 2011; OSPAR Convention, 2002; Secretariat of the Convention on Biological Diversity, 2004). The Marine Strategy Framework Directive 2008/56/EC aims to achieve 'Good Environmental Status' in all EU marine waters by 2020 while protecting the resource base for economic and social activities (European Parliament and Council, 2008). This Directive will play a key part in achieving targets for biodiversity, food webs and sea floor integrity (HM Government, 2012). 'Site integrity' under the Habitats Directive will need to contribute to the objective for sea-floor integrity that 'ensures that the structure and function of ecosystems are safeguarded' (European Parliament and Council, 2008). The Habitats Directive is considered to be a strong and comprehensive piece of legislation (Hochkirch et al., 2013). However, the conservation law and policy developed by Member States is generally narrow in focus and limited to Annex I habitats and Annex II species without necessarily having regard to the conservation status of typical species of Annex I habitats that are not themselves Annex II species or the position of Annex I habitats within their wider areas. In order to maintain pace with European and International conservation objectives the development of conservation policy must include the role of individual SAC sites in underpinning ecological function in a wider marine area. Otherwise there is a danger that these sites (SACs) will stay trapped by past conservation motivations and serve little purpose in a network of MPAs (Gaston et al., 2006). As such, the effectiveness and legitimacy of our broader, shared European and international goals for conservation will be undermined (Paavola, 2004).

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References

'the Waddenzee case' Case C-127/02. 2004. Landelijke Vereniging tot Behoud van de Waddenzee and Nederlandse Vereniging tot Bescherming van Vogels – v – Staatssecretaris van Landbouw, Natuurbeheer en Visserij Paragraph 36.

Ainsworth, P.R., Chan, K.M.A., Daily, G.C., Ehrlich, P.R., Kremen, C., Ricketts, T.H., Sanjayan, M.A., 2007. Ecosystem-service science and the way forward for conservation. Conservation Biology 21, 1383–1384.

Attrill, M.J., Austen, M.C., Bayley, D.T.I., Carr, H.L., Downey, K., Fowell, S.C., Gall, S.C., Hattam, C., Holland, L., Jackson, E.L., Langmead, O., Mangi, S.C., Marshall, C., Munro, C., Rees, S.E., Rodwell, L.D., Sheehan, E.V., Stevens, J., Stevens, T.F., Strong, S., 2011. Lyme Bay-a cave study: measuring recovery of benthic species; assessing potential "spillover" effects and socio-economic changes, 2 years after the closure. Response of the benthos to the zoned exclusion of bottom towed fishing gear and the associated socio-economic effects in Lyme Bay. Final Report 1. Report to the Department of Environment, Food and Rural Affairs from the University of Plymouth-led consortium. University of Plymouth Enterprise Ltd., Plymouth, pp. 108.

Balmford, A., Rodrigues, A.S.L., Walpole, M., ten Brink, P., Kettunen, M., Braat, L., de Groot, R., 2008. The Economics of Biodiversity and Ecosystems: Scoping the Science. European Commission, Cambridge.

Bostrom, C., Pittman, S., Simenstad, C., Kneib, R., 2011. Seascape ecology of coastal biogenic habitats: ad vances, gaps, challenges. Marine Ecology Progress Series, 191–217.

Bradshaw, C., Veale, L.O., Hill, A.S., Brand, A.R., 2001. The effect of scallop dredging on Irish Sea benthos: experiments using a closed area. Hydrobiologia, 129–138.

Bradshaw, C., Collins, P., Brand, A.R., 2003. To what extent does upright sessile epifauna affect benthic biodiversity and community composition? Marine Biology, 783–791.

Brand, A.R., Paul, J.D., Hungerager, J.N., 1980. Spat settlement of the scallops *Chlamys opercularis* (L.) and *Pecten maximus* (L.) on artificial collectors. Journal of the Marine Biological Association of the United Kingdom, 379–390.

Case C-258/11. 2012. Sweetman and Others – v – An Bord Pleanala.

CBD, 2010. Secretariat of the Convention on Biological Diversity. Global Biodiversity Outlook3. Montreal.

Chapin III, F.S., Zavaleta, E.S., Eviner, V.T., Naylor, R.L., Vitousek, P.M., Reynolds, H.L., Hooper, D.U., Lavorel, S., Sala, O.E., Hobbie, S.E., Mack, M.C., Diaz, S., 2000. Consequences of changing biodiversity. Nature 405, 234–242.

Client Earth, Marine Conservation Society, 2011. Habitats Directive Correspondance. Enquiry Letter and Reply: Fishing Vessel Licences and the Habitats Directive.

Commission v French Republic Case C-241/08. 2010. Commission of the European Communities – v – French Republic.

Commission v Ireland Case C-418/04. 2007. Commission of the European Communities – v – Ireland.

Conde, S., Jones-Walters, L., Torre-Marin, A., Roman, C., 2010. EU 2010 Biodiversity Baseline. European Environment Agency, Copenhagen, pp. 126.

Connell, S.D., Jones, G.P., 1991. The influence of habitat complexity on postrecruitment processes in a temperate reef fish population. Journal of Experimental Marine Biology and Ecology, 271–294.

Convention on Biological Diversity, 2011. Aichi Biodiversity Targets.

Curtin, R., Prellezo, R., 2010. Understanding marine ecosystem based management: a literature review. Marine Policy 34, 821–830.

Dare, P.J., Bannister, R.C.A., 1987. Settlement of scallop, *Pecten maximus*, spat on natural substances off south west England: the hydroid connection. In: Proceedings of the 6th International Pectinid Workshop. 9–14 April 1987, Menai Bridge.

DEFRA, 2008. The Lyme Bay Designated Area (Fishing Restrictions) Order. Department for Environment, Food and Rural Affairs, London.

Edwards, E., 1979. The Edible Crab and its Fishery in British Waters. Fishing New Books Ltd., Farnham, Surrey.

Eggleston, D., 1962. Spat of the Scallop *Pecten maximus* (L.) off Port Erin, Isle of Man. Annual Report. Marine Biological Station, Port Erin, vol. 74, pp. 29–32.

European Commission, 2000. Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitats Directive 92/43/EEC. European Commission, pp. 73.

European Commission, 2007. Natura 2000: Interpretation Manual of European Habitats. DG Environment: Nature and Biodiversity. European Commission and DG Environment, pp. 144. <http://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/2007_07_en.pdf>.

European Parliament and Council, 2008. Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 Establishing a Framework for Community Action in the Field of Marine Environmental Policy (Marine Strategy Framework Directive). The European Parliament, pp. 22.

Fletcher, S., Saunders, J., Herbert, R., Roberts, C., Dawson, K., 2012. Description of the ecosystem services provided by broad-scale habitats and features of conservation importance that are likely to be protected by Marine Protected Areas in the Marine Conservation Zone Project area. Natural England Commissioned Reports, pp. 88.

Fossa, J.H., Mortensen, P.B., Furevik, D.M., 2002. The deep-water coral *Lophelia pertusa* in Norwegian waters: distribution and fishery impacts. Hydrobiologia 471, 1–12.

Gaston, K.J., Charman, K., Jackson, S.F., Armsworth, P.R., Bonn, A., Briers, R.A., Callaghan, C.S.Q., Catchpole, R., Hopkins, J., Kunin, W.E., Latham, J., Opdam, P., Stoneman, R., Stroud, D.A., Tratt, R., 2006. The ecological effectiveness of protected areas: The United Kingdom. Biological Conservation 132, 76–87.

Hall-Spencer, J.M., 1998. Conservation issue relating to maerl beds as habitats for molluscs. Journal of Conchology Special Publication No. 2 271, 271–286.

Hall-Spencer, J.M., Moore, P.G., 2000. Impact of scallop dredging on maerl grounds. In: Kaiser, M.J., de Groot, S.J. (Eds.), Effects of Fishing on Non-Target Species and Habitats: Biological Conservation and Socio-Economic Issues. Blackwell Science, Oxford, pp. 105–117.

Halpern, B.S., Walbridge, S., Selkoe, K.A., Kappel, C.V., Micheli, F., D'Agrosa, C., Bruno, J.F., Casey, K.S., Ebert, C., Fox, H.E., Fujita, R., Heinemann, D., Lenihan, H.S., Madin, E.M.P., Perry, M.T., Selig, E.R., Spalding, M., Steneck, R., Watson, R., 2008. A global map of human impact on marine ecosystems. Science 319, 948–952.

Her Majesty's Government, 1994. Planning Policy Guidance Note 9 (PPG9) on Nature Conservation.

Hinz, H., Tarrant, D., Ridgeway, A., Kaiser, M.J., Hiddink, J.G., 2011. Effects of scallop dredging on temperate reef fauna. Marine Ecology Progress Series 432, 91–102.

Hiscock, K., Breckels, M., 2007. Marine Biodiversity Hotspots in the UK. A Report Identifying and Protecting Areas for Marine Biodiversity. WWF UK, Godalming, Surrey, pp. 118.

HM Government, 2012. Links Between the Marine Strategy Framework Directive and Other Legislation Marine Strategy Framework Directive Factsheet 2. Defra, pp. 2.

Hochkirch, A., Schmitt, T., Beninde, J., Hiery, M., Kinitz, T., Kirschey, J., Matenaar, D., Rohde, K., Stoefen, A., Wagner, N., Zink, A., Lötters, S., Veith, M., Proelss, A., 2013. Europe Needs a New Vision for a Natura 2020 Network. Conservation Letters. Early View (Online Version of Record Published before Inclusion in an Issue).

Holthuis, L.B., 1991. Marine Lobsters of the World. An Annotated and Illustrated Catalogue of Species of Interest to Fisheries Known to Date, FAO Species Catalogue. FAO, Rome, pp. 125.

Hooper, D.U., Chapin, F.S., Ewel, J.J., Hector, A., Inchausti, P., Lavorel, S., Lawton, J.H., Lodge, D.M., Loreau, M., Naeem, S., Schmid, B., Setala, H., Symstad, A.J., Vandermeer, J., Wardle, D.A., 2005. Effects of biodiversity on ecosystem functioning: a consensus of current knowledge. Ecological Monographs 75, 1–35.

Please cite this article in press as: Rees, S.E., et al. A legal and ecological perspective of 'site integrity' to inform policy development and management of Special Areas of Conservation in Europe. Mar. Pollut. Bull. (2013), http://dx.doi.org/10.1016/j.marpolbul.2013.03.036

Howard, A.E., 1982. The distribution and behaviour of ovigerous edible crabs (Cancer pagurus), and consequent sampling bias. Journal du Conseil International Pour l'exploration de la Mer, 258–261.

Howard, A.E., Bennett, D.B., 1979. The substrate preference and burrowing behaviour of juvenile lobsters (Homarus gammarus) (L.). Journal of Natural History, 433–438.

Ieno, E.N., Solan, M., Batty, P., Pierce, G.J., 2006. How biodiversity affects ecosystem functioning: roles of infaunal species richness, identity and density in the marine benthos. Marine Ecology Progress Series 311, 7.

Jackson, D.L., Mcleod, C.R., 2000. Handbook on the UK status of EC habitats directive interest features: provisional data on the UK distribution and extent of Annex I habitats and the UK distribution and population size of Annex II species. Joint Nature Conservatason Committee, Peterborough, pp. 180.

Jackson, E.L., Langmead, O., Barnes, M., Tyler-Walters, H., Hiscock, K., 2008. Identification of indicator species to represent the full range of benthic life history strategies for Lyme Bay and the consideration of the wider application for monitoring of Marine Protected Areas. Report to the Department of Environment, Food and Rural Affairs from the Marine Life Information Network (MarLIN). Marine Biological Association of the UK, Plymouth.

Karr, J.R., Dudley, D.R., 1981. Ecological perspective on water quality goals. Environmental Management 5, 55–68.

Mangi, S.C., Rodwell, L.D., Hattam, C., 2011. Assessing the impacts of establishing MPAs on fishermen and fish merchants: the case of Lyme Bay, UK. AMBIO: A Journal of the Human Environment 40, 457–468.

Natural England, 2010. Inshore Special Area of Conservation (SAC): Lyme Bay and Torbay SAC Selection Assessment Document Version 2.5. Natural England, Peterborough, pp. 26.

OSPAR Convention, 2002. Convention for the protection of the marine environment of the North-East Atlantic. OSPAR Commission, pp. 33.

Pauwels, J., 2004. Protected areas governance and justice: theory and the european union's habitats directive. Environmental Sciences 1, 59–77.

Parrish, J.D., Braun, D.P., Unnasch, R.S., 2003. Are we conserving what we say we are? Measuring ecological integrity within protected areas. Bioscience 53, 851–860.

Petchey, O., Gaston, K.J., 2006. Functional diversity: back to basics and looking forward. Ecology Letters 9, 741–758.

Pulliuat, R., Christie, P., Cinner, J., Dalton, T., Daw, T., Forrester, G., Graham, N., McClanahan, T., 2010. Marine reserves as linked social-ecological systems. Proceedings of the National Academy of Sciences of The United States of America 107, 18262–18265.

Rees, S.E., Attrill, M.J., Austen, M.C., Mangi, S.C., Richards, J.P., Rodwell, L.D., 2010a. Is there a win–win scenario for marine nature conservation? A case study of Lyme Bay, England. Ocean & Coastal Management 53, 135–145.

Rees, S.E., Rodwell, L.D., Attrill, M.J., Austen, M.C., Mangi, S.C., 2010b. The value of marine biodiversity to the leisure and recreation industry and its application to marine spatial planning. Marine Policy 34, 868–875.

Rees, S.E., Austen, M.C., Attrill, M.J., Rodwell, L.D., 2012. Incorporating indirect ecosystem services into marine protected area planning and management. International Journal of Biodiversity Science, Ecosystem Services & Management 8, 273–285.

Rees, S., Fletcher, S., Clegg, G., Marshall, C., Rodwell, L., Jefferson, R., Campbell, M., Langmead, O., Ashley, M., Bloomfield, H., Brutto, D., Colenutt, A., Converso, A., Earll, R., Hattam, C., Ingram, S., McKinley, E., Mee, L., Oates, J., Peckett, F., Portus, J., Reed, M., Rogers, S., Saunders, J., Scales, K., Wynn, R., 2013. Priority questions to shape the marine and coastal policy research agenda in the United Kingdom. Marine Policy 38, 531–537.

Ros, J., Arvanitidis, C., Borja, A., Frid, C., Hiddink, J.G., 2012. Indicators for sea-floor integrity under the European Marine Strategy Framework Directive. Ecological Indicators, 174–184.

Rumen, W., Rose, K., 1982. Macrobenthos of the subtidal Wadden Sea: revisited after 55 years. Helgoländer Meeresunters, 409–423.

Secretariat of the Convention on Biological Diversity, 2004. Technical Advice on the Establishment and Management of a National System of Marine and Coastal Protected Areas. In: SCBD (Ed.), CBD Technical Series Number 13, pp. 40.

Sheehan, E.V., Gall, S.C., Cousens, S.L., 2012. Between the reefs: the occurrance of sessile organisms on pebbly-sand habitats in the Lyme Bay cSAC compared to areas open to fishing. A Report to the Wildlife Trusts. Marine Institute, Plymouth, pp. 11.

Smith, M.D., Wilen, J.E., 2003. Economic impacts of marine reserves: the importance of spatial behavior. Journal of Environmental Economics and Management 46, 183–206.

Smith, M.D., Sanchirico, J.N., Wilen, J.E., 2009. The economics of spatial-dynamic processes: Applications to renewable resources. Journal of Environmental Economics and Management 57, 104–121.

Sobel, J., Dahlgren, C., 2004. Marine Reserves. A Guide to Science, Design and Use. Island Press, Washington.

Somerfield, P.J., Clarke, K.R., Warwick, R.M., Dulvy, N.K., 2008. Average functional distinctness as a measure of the composition of assemblages. ICES Journal of Marine Science 65, 1462–1468.

The Council of the European Communities, 1992. Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (The Habitats Directive). European Commission, pp. 66.

Thrush, S.F., Hewitt, J.E., Cummings, V.J., Dayton, P.K., Cryer, M., Turner, S.J., Funnell, G.A., Budd, R.G., Milburn, C.J., Wilkinson, M.R., 1998. Disturbance of the marine benthic habitat by commercial fishing: impacts at the scale of the fishery. Ecological Applications 8, 866–879.

Ulanowicz, R.E., 2002. The balance between adaptability and adaptation. BioSystems, 13–22.

Worm, B., Barbier, E.B., Beaumont, N., Duffy, J.E., Folke, C., Halpern, B.S., Jackson, J.B.C., Lotze, H.K., Micheli, F., Palumbi, S.R., Sala, E., Selkoe, K.A., Stachowicz, J.J., Watson, R., 2006. Impacts of biodiversity loss on ocean ecosystem services. Science 314, 787–790.

Please cite this article in press as: Rees, S.E., et al. A legal and ecological perspective of 'site integrity' to inform policy development and management of Special Areas of Conservation in Europe. Ma[redacted]1.036

[redacted]

From: [redacted]
Sent: Friday 16 September 2022 12:51
To: Western Lakes Plan
Cc: [redacted]
Subject: [redacted]
Attachments: [redacted]

Attached is a PDF containing the initial submission from [redacted]

We have used the [redacted] submission as a template and added [redacted] comments that are specific to [redacted]

I am operating on a new smartphone at the moment so I was not able to rename the [redacted] pdf attached , but it has been edited to reflect [redacted] concerns.

We look forward to the inclusion of [redacted] in the Western Lakes Plan.

And trust that [redacted] will be actively managed as a Salmonid Fishery.

[redacted] will actively participate in the Management of [redacted] as a Salmonid Fishery.

Sincerely

[redacted]

[redacted]

From: [redacted]
Sent: Friday 16 September 2022 13:52
To: Western Lakes Plan
Subject: Western Lakes Plan

To whom it may concern,
My name [redacted]. [redacted] is in business in Oughterard for the last 70 years supplying to pubs, restaurants and shops in the Galway area (especially around Lough Corrib), the Corrib is a vital cog in our business as it brings in a lot of trade at a vital time of the year and kick starts our season. Any and all measures taken by IFI and the department to protect salmon and trout in the Corrib will be fully supported.!!!.

Regards,
[redacted]

Sent from my iPhone

[redacted]

From: [redacted]
Sent: Friday 16 September 2022 20:12
To: Western Lakes Plan

My name is [redacted] I am a resident of Oughterard,on the shores of lough Corrib. My family have a long connection to the lake, indeed my ancestors lived and worked on [redacted] as boat builders, my father was one of the last generation born and raised there. I have grown up here in Oughterard,raised on the lore and lure of the lough Corrib trout and salmon and therefore i ask and implore that fisheries ireland in their Lake plan, do everything in their power to protect and save these beautiful creatures in their native habitat. These beautiful fish are far more important than any short term vested profiteering can ever be, and their loss can not be reversed.It is late, but not too late!

[redacted]

From: [redacted]
Sent: Saturday 17 September 2022 12:10
To: Western Lakes Plan
Subject: submission on draft plan
Attachments: Draft plan for 7 western lakes sept. '22-Submission.docx

Hi
Attached is my submission on the Draft Great Western Lakes Management Plan.
Can you confirm receipt of this submission please.
Regards
[redacted]

Sent from Mail for Windows

[redacted]

From: [redacted]
Sent: Saturday 17 September 2022 12:27
To: Western Lakes Plan

[redacted]

I'd like to welcome the publishing of the draft plan and the opportunity to provide submition.

I have fished and lived all my life on the lake.

I would like to make the following points:

1) we shouldn't be protecting the invasive of species which are having a negative effect on the native salmon and trout population.

2) Pollution in the lake has became very bad year by year and we would like to see a plan in action to address this.

3) we need to see more staff on the ground as numbers has been cut in the passed few years.

4) We agree with your policy of controlling weed on the lake.

5) Funds for Stream enhancement need to be increased to ensure maximum production of trout and salmon.

Until the above issues are solved. We don't agree with any reduction in bag limit as we don't feel that this is the main issue affecting the lakes.

[redacted]

From: [redacted]
Sent: Saturday 17 September 2022 13:48
To: Western Lakes Plan
Subject: Western lakes plan

Follow Up Flag: Follow up
Flag Status: Flagged

Hi my name is [redacted] I'm writing to support the western lakes plan I'm very happy to see that IFI and the department have recognised the value of these trout and salmon lakes to the community and the economy.
They are unique in Western Europe and if the problems outlined in your report are not addressed as a matter of urgency our native fish stocks will disappear forever we need more staffing to address stream enhancement and pollution problems we need the habitats directives fully enforced in order to maintain a sustainable fishery and all protections on non native fish should be removed immediately.

Thanking you

[redacted]

Sent from Yahoo Mail for iPhone

[redacted]

From: [redacted]
Sent: Saturday 17 September 2022 15:52
To: Western Lakes Plan
Subject: Western lakes Plan

To whom it concerns

Im am writing in relation to the Great Western Lakes Plan for Lough Corrib SAC.

While there are some very positive attributes to the plan and alot that each club can engage in and work with I feel the following details should be revised of the plan

1. More IFI staff on the ground and on the water, we need to see IFI to be an enforcement agency as well as an educational facility to clubs and we need to see more engagement between clubs and IFI officers

2. Lough Corrib is an SAC under the EU habitats directive and under the programme of government it is to be managed as a salmonid lake. We need the removal of bye law 806 and 809 to be able to effectively manage the fishery as a salmonid one. We cannot keep these bye laws in place as they are repugnant to the EU habitats directive.

3. We need direct action to be taken in regards to pollution and more evident programmes with the EPA and local farmers and angling clubs

4. More regular control programmes of invasive weeds

[redacted]

[redacted]

From: [redacted]
Sent: Saturday 17 September 2022 16:36
To: Western Lakes Plan
Subject: Great Western lakes plan
Attachments: [redacted]

Follow Up Flag: Follow up
Flag Status: Flagged

Please see attached

Regards,

[redacted]

[redacted]

To Whom it may concern,

I am a 4th generation fisherman on the [redacted]

I have a [redacted] business which has been handed down to me

I wish to make the following submission to the Great Western Lakes Plan;

Firstly I welcome the fact that the Department and IFI have now recognized the value of the Great Lakes as Salmonid Fisheries. The Great Western Lakes Plan is full of good ideas which need to be followed through on.

I feel very privileged to live on the shores of the [redacted] one of the best trout and salmon lakes in Europe

I would like to make the following points.

1/ I am very concerned about Pollution of the Lake which appears to be getting worse year on year and the apparent lack of a plan to address this issue.

2/ The protection of Invasive species such as Pike, Roach, Perch etc who are having a huge impact on the Native fish, Char, Trout and Salmon, all protections of these fish need to be removed and where possible their numbers controlled.

3/ Staffing levels need to be addressed.

4/ Streams have been neglected for more than ten years; they need to be developed to their full potential.

5/ I would not agree that bag limits are an issue until such time as the issues outlined above are addressed.

6/ Pike will never control Roach numbers; as seems to be suggested in the Plan the numbers of Pike necessary to do this would wipe out the Salmonid population out completely.

Regards,

[redacted]

[redacted]

From: [redacted]
Sent: Saturday 17 September 2022 18:19
To: Western Lakes Plan
Subject: Contribution

To whom it may concern

I would like for the for any changes to occur for the following points to adheres to and acted on:
Stream enhancement- total neglect currently on the stream enchantment in the catchment area of lough Corrib
Pollution- aggressive action to be take. On pollution in the lake. The pollution levels are at an all time high and not being addressed Invasive species - all protections to be removed for non native species to Lough Corrib. It is a salmonoid species fishery and under undue pressure competing on the food chain with non native species of fish.
No bag limit - I have seen no progress made in the last 30 years with the 0 bag limit for sea trout and has not helped the recovery of that species one bit. As a child growing up I. [redacted] I watched as the demise of the sea trout was overseen due to the introduction of the cages from the fish farms destroyed the native sea trout population. I see history repeating itself on lough Corrib and will not stand idly by and let this happen.

Thank you and would like a receipt/ acknowledgment of this email.

Yours

[redacted]

Sent from my iPhone

[redacted]

From: [redacted]
Sent: Saturday 17 September 2022 22:34
To: Western Lakes Plan
Subject: Submission

Reference submission,
[redacted]

My submission as follows,
I'm a Indigenous Ripiran Stakeholder in Lough Corrib SAC, I'm [redacted] generation on lough corrib SAC.
Lough corrib SAC is the last strong hold for wild brown trout with is protected under the European habbitat directive and the water frame work directive which is the primary legislation under European law and Irish law. However it now needs a very serious management plan that will restore it to up hold its integrity as a 100% SAC. It has two illegal bye laws 806 & 809 that protect Invasive fish that are not native to lough corrib SAC that have full protection under these bye laws.
You cannot stand bye any longer and continue to break the European law and Irish law under the Habitat directives to have these invasive fish protected in an SAC.
You cannot use and invasive fish to control another invasive in a SAC as a management tool, where is that written in the habbitat directive or the water frame work directive?
You must remove these two bye laws immediately to restore lough corrib to its full integrity.
You must tackle the gross pollution that is suffocating lough corrib.
You must hire alot more staff to give them the tools required as is the full powers of the habbitat directive and the water frame work directive at their disposal to protect the SACs.
We have 3 annex 2 species in our SAC system of lough corrib it is the jewel of the SACs.
We cannot stand by any longer and lose our lough corrib SAC to the most chronic pollution and predation that is choking it to death as you read my submission.
[redacted]

[redacted]

From: [redacted]
Sent: Sunday 18 September 2022 10:46
To: [redacted]
Cc:
Subject:

Great to have this [redacted]. Well done. I am told it will be put up on the ifi website next week after it is logged.
Maybe a few other of your members could send in this from around the lake as [redacted], especially [redacted] are going door to door with their submission to increase their submission numbers form lake.
Regards
[redacted]

From: [redacted]
Sent: Friday 16 September 2022 12:51
To: westernlakesplan@fisheriesIreland.ie
Cc: [redacted]
Subject: [redacted]

Attached is a PDF containing the initial submission from [redacted].

We have used the [redacted] submission as a template and added [redacted] comments that are specific to Logh [redacted]

I am operating on a new smartphone at the moment so I was not able to rename the [redacted] pdf attached , but it has been edited to reflect [redacted]

We look forward to the inclusion of [redacted] in the Western Lakes Plan.

And trust that [redacted] will be actively managed as a Salmonid Fishery.

[redacted] will actively participate in the Management of [redacted] as a Salmonid Fishery.

Sincerely

[redacted]

[redacted]

From: [redacted]
Sent: Sunday 18 September 2022 14:26
To: Western Lakes Plan
Subject: Western lakes plan

I am writing to offer my full support for the western lakes plan. I live beside and fish on Lough corrib. I am also a retired [redacted]. I would like to offer the following points for consideration.
Staff levels are at an all-time low on corrib with only one of four bases staffed on a full time basis. If this is not addressed it will be very hard for the plan to succeed.

Stock management must continue and increase. The bylaws protecting pike and coarse fish must be removed. In my experience the diet of pike has not changed over the years stomach contents of pike examined during gill netting contain trout, roach,salmon smolts,and frog's, this has changed very little in my experience. Also the most effective areas to set nets and electro fish are in bays with river's and streams flowing into them this is hardly a coincidence.

Water quality is a huge issue and needs all agencies working together to come up with a solution.

The control of invasive species is vital for the wellbeing of the lakes lagarasiphon major has become another spawning habitat for pike perch and roach. Consideration must be given to controlling the movement of boats between lakes or at least ensuring that people produce evidence of cleaning and disinfecting their boats and gear.

There needs to be constant monitoring,maintenance,and development of river's and streams this is vital to the success of the plan,

The activities of anglers fishing the western lakes during closed season needs to be monitored. Trout and salmon are at their most vulnerable during this period.

Finally i would like to congratulate I.F.I.for producing this plan and recognising the huge value and importance of the western lakes.

[redacted]

[redacted]

From: [redacted]
Sent: Sunday 18 September 2022 18:09
To: Western Lakes Plan
Subject: Submission to the Plan for the Western Lakes

Dear Sir / Madam,

Please accept my submission as part of the formulation into the western lakes salmonid lakes plan.

1) The Salmonid status for these lakes must be copperfastened and protected. This means that the trout/ salmon, and God forbid should there be any arctic char left in these lakes, should be protected from invasive species, even if those species are recent in geologic terms, but present since Norman times (eg Pike, roach, char, zebra mussel, invasive weeks)
2) Spawning grounds need to be protected and encouraged.
3) Anglers on rod and line do not make an impact on the population of Salmon, or Trout, and all anglers release undersized fish, and a significant portion of anglers release all their catch alive.
A zero bag limit is a sop to political correctness and will achieve nothing for sustainability of stock populations.
4) Please consider opening the season on 1st march rather than 15th feb. Also a byelaw of catch and release any trout after 1st September until season close, to protect spawning numbers.
5) Please remove any bag limit size for line caught pike to encourage back the european anglers who will happily help keep pike numbers within non threat levels.
6) The IFI boots on the ground need to be facilitated to apply these assistances.
7) Farm effluent is a major threat and is not being addressed for fear of upsetting the farming community who live in the watershed areas. The increase in the national herd has not helped. The green furry rocks in the centre of the corrib is an embarrassment.
8) Up until recently the IFI have been part of the problem as they have been defending byelaws that contributed to the sidelining of salmonid sustainability. There appears to be a new found vigour to protect the salmonid species and the habitat for them. Long may it last, and anglers will not be found wanting in supporting the IFI.
Sincerely.

[redacted]

[redacted]

From: [redacted]
Sent: Sunday 18 September 2022 21:18
To: Western Lakes Plan
Subject: Great Western Lakes Plan

To whom it may concern

A few areas of the plan need further attention

1. More IFI staff on the lakes- visible presence on a regular basis

2. A more proactive response to invasive species / pollution reports and needs to be a joint approach between IFI, EPA and all stakeholders of the lakes

3. Removal of Bye Law 806 and 809 as they are protecting non-native invasive species of protected SAC's, Lough Corrib needs to be protected and we need more programmes of predation management in conjunction with local clubs.

4. An educational programme to be rolled out to schools in the locality with clubs, IFI , water safety groups.

There are many areas of the plan that can be worked with and provide a positive relationship between clubs and IFI but the protection of a predatory species on an SAC is counterproductive - if these are not removed the next plan for Lough Corrib will be called the not-so-great western lake plan.

[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 07:07
To: Western Lakes Plan
Subject: Western Lakes Plan

To whom it may concern

A few areas of the plan need further attention

1. More lake restoration works

2. Lakes are highly polluted and not much being done about it

3. Removal of Bye Law 806 and 809 as they are protecting non-native invasive species of protected SAC's which is repugnant to EU habitats directive and the program of government.

4. More youth programs and educational facilities

There are many areas of the plan that can be worked with and provide a positive relationship between clubs and IFI but the protection of a predatory species on an SAC is counterproductive.

[redacted]

Sent from Yahoo Mail on Android

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 10:41
To: Western Lakes Plan
Subject: FW: IFI Long Term Management Plan For The Great Western Lakes.

Good morning all,

Please see below email received to info@ inbox yesterday evening.

Many thanks,

[redacted]
Administrator
Inland Fisheries Ireland - ERBD

Iascach Intíre Éireann
Inland Fisheries Ireland

Tel [redacted]
Web www.fisheriesireland.ie

3044 Lake Drive, Citywest Business Campus, Dublin 24, D24CK66, Ireland.

From: [redacted]
Sent: Sunday 18 September 2022 15:57
To: info <info@fisheriesireland.ie>
Subject: IFI Long Term Management Plan For The Great Western Lakes.

IFI Long Term Management Plan For The Great Western Lakes.

This is the optimum opportunity with the [redacted] for IFI to engage with the relevant stakeholders and statutory bodies in dealing with matters pertaining to water quality and biodiversity in the [redacted] catchment. Pollution sources in particular from agriculture need to be tackled as a matter of urgency with a heavy emphasis on dairy farming. In conjunction with this, it is imperative to ensure that there is full compliance with the nitrates directive.

The dramatic decrease in trout populations and the huge increase in pike numbers over the last ten to twelve years needs no clarification in terms of its significance. In that context I fully agree with the views expressed by the late [redacted] that stream enhancement programmes which are essential to the rejuvenation to trout stocks on Carra will be most effective and successful with a corresponding programme of rigorous predator control. Pike numbers need to be reduced as a matter of urgency by every means available. The resources in terms of finance and manpower with a team focused specifically on [redacted] will afford IFI the perfect opportunity to restore a once great trout fishery.

In relation to Lough [redacted], the [redacted] and [redacted] catchments should be fully restored. In conjunction with any stream enhancement work, a full and comprehensive predator control programme should be implemented. Coarse

fish populations should be reduced by target netting in localised bays and consideration should be given to the granting of commercial licenses to reduce coarse fish populations. All rivers flowing into and between [redacted] and [redacted] should be closed for all angling during the closed season. The prospect of hydro-turbines being installed on any river flowing into [redacted] should be opposed immediately. The role of IFI in this regard is crucial.

The important elements going forward for IFI are that the Great Western Lakes are managed as salmonid fisheries with an emphasis on controlling pollution, managing the predator populations and coarse fish populations and implementing stream enhancement programmes. All this is contingent on appropriate levels of staffing with the requisite resources. These salmonid fisheries should be exempted from By Laws 809 and 806, 2006 and the interference by the pike angling lobby in the management of salmonid fisheries should be consigned to history.

[redacted]
[redacted].

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 12:04
To: Western Lakes Plan
Subject: Fwd: Document1
Attachments: Document1.docx

Follow Up Flag: Follow up
Flag Status: Flagged

---------- Forwarded message ---------
From: [redacted]
Date: Mon 19 Sep 2022, 12:01
Subject: Document1
To: [redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 13:48
To: Western Lakes Plan
Subject: Western Lakes Plan

To whom it concerns,

I wish to welcome the publication of the Western Lakes Plan .

The trout and salmon fishing on Lough [redacted] is world renowned and an integral part of our heritage.

The water quality in the lake is of major concern and changes are evident for all to see . Also, a deterioration in fly hatches in certain areas is very worrying . I sincerely hope these issues can be addressed and improved by the implementation of this plan,

Rivers and streams are the lifeblood of the fisheries therefore enhancement works and maintenance of these resources are vital.

Predator control is a necessary part of the management of game fisheries. Pike congregating at river estuaries demonstrates their preference for a diet of salmonoids and this is something that will never change.

Nowhere is this more evident than in the owenriff system which has been virtually wiped out by invasive pike species.

Byelaws 806 and 809 which protect invasive species appear to be a complete contradiction and these bylaws need to be reviewed as a matter of urgency with the view to rescinding same.

Control of the movement of boats seems to be the only way of limiting the spread of invasive species.

All the plan hinges of the recruitment of staff which is at an all time low.
The closing of fishery work bases around our lake is a retrograde step when the pressure on the system is the greatest.

I sincerely hope that staff levels can be restored as a matter of urgency.

I wish you every success with the proposed plan and look forward to seeing it implemented.

Kind regards,

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 14:52
To: Western Lakes Plan
Subject: Western Lakes Plan

To whom it may concern,

I welcome this proposed plan for the Western lakes

However I would request the removal of Bye-Laws 809 and 806 as they protect invasive species on SACS and therefore until these are removed it is difficult to engage with the plan..

I am an Angler on [redacted]

[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 15:16
To: Western Lakes Plan
Subject: Submission by [redacted]

To whom it may concern,

I am writing to you about the Great Western Lakes Management Plan on behalf of [redacted] which is formed from [redacted] and are the [redacted] [redacted] The [redacted] welcomes and supports the intension of the Plan which is a very comprehensive document.

The Club's would like to point out the following.

1/ Page 17. Review of current bag Limits, the [redacted] feel that this is an unnecessary step as there is no current Science which says in a water body the size of [redacted] that Rod and Line affects the Sustainability of the Stock; we would also point out that there has been a total ban on the Harvesting of Sea Trout on the [redacted] for over thirty years and this has had no Perceval impact as the real issue has not been addressed; the [redacted] feel that when the issues like Pollution, Stream Enhancement & Development and Staffing Levels are addressed that the issue of bag limits could be looked at.

2/ Page 30. Enforcement and General Operatives numbers need to be increased not only for Pollution control, which is now at chronic levels in Corrib, but for general Stream work and Invasive Species removal.

3/ Page 32. Invasive species we would welcome the tightening of controls on the movement of Boats from and too [redacted] and increased penalties for the transfer of Live Fish.

4/ Page 36. Stock Management: we note that previous attempts to control Roach and Perch numbers has been unsuccessful and that their numbers fluctuate in response to environmental variables, this begs the question why Bye Laws 806 and 809 were introduced in the first instance as it would appear that Rod and Line fishing will have no impact. The idea that Pike will control Roach numbers seems to have come from the McLoone report Pike (Esox Lucius) in Ireland, a report that did not adhere to the standardized "whole Lake" fish sampling method EN 14757:2015 which provides an estimates of species occurrence, instead the EN 14011:2003 sampling method was used which is not intended for whole Lake sampling, as such this report cannot be considered reliable. Long term research indicates that Pike prey preferentially on Salmonids ; the numbers of Pike that would be required to (control) Roach would in our opinion bring Trout and Salmon to the point of total collapse as has happened in 425 Irish Lakes: Pike (Esox Lucius) in Ireland page 57 (Pike were recorded in 522 Irish Lakes, of these, 425 currently contain Pike, but not Trout) as Pike are an introduced specie we would assume that these Lakes contained Trout and or Salmon at one point. Bye laws 806 protecting Coarse fish and bye law 809 protecting Pike must be removed for the Great Western Lakes and all Special Areas of conservation as a matter of urgency as they defeat the purpose of this Plan.

5/ Page 43. Population Modelling. In the Plan IFI are developing a process based mathematical model of population dynamics, there is a question in this as regards a super abundance of Roach would result from high removal rates of Pike, this seems contradictory as it was earlier stated on Page 36 that Roach number fluctuate in response to environmental variables and the fact that Roach are a cyclic fish whose numbers explode and collapse in cycles; we cannot see how the removal of Pike would have any influence on overall numbers of Roach.

Finally, [redacted] would like to see the full implementation of the Habitats Directive which does not allow for the protection of Invasive Non-Native fish or Plants and aims to bring these Habitats back as close as possible to their original state, no unreliable science or mitigation is allowable under the Directives and these directives are the only hope that future generations will have a chance to see [redacted] in its fully glory.

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 16:43
To: Western Lakes Plan
Subject: Western lake's plan

[redacted]

To whom it may concern,

On behalf of the above [redacted] we would like to submit the following for the western lakes plan and other lakes and rivers,

These lakes and rivers which are natural salmon and brown trout fisheries, in which the numbers are decling over the last decade as results of a few issues,,

1, Water quality,
2, Invasive species
(pike,roach & rudd.),
3, Invasive water weeds,
4, Growing numbers of Cormorants,
5, Increasing numbers of rouge seal's in the rivers and lakes.

The invasive species which are protected by the bye laws 806/809 which was introduced in 2006 these bye laws do not protect the wild natural fish stock's, must be taken out.

The EU habitat directive must be enforced on all issues.

The Cormorants and rogue seal's issues must strongly be looked at as they have a huge apart in the declining numbers of wild salmon and trout.

[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 17:12
To: Western Lakes Plan
Subject: Western lake's plan

To whom it may concern.

I am a 3rd generation Angler and riparian steak holder on [redacted] I have enjoyed also fishing on lots of the great western lake's .

It is disappointing to see these fantastic waters been affected by pollution and the demise of water quality in our rivers and streams flowing into these lake's in the west of Ireland ,I would like to see a huge effort in this plan or any plan in the future to tackle water quality and the continued control of invasive non native species on [redacted] SAC and it's tributaries. This western lake's plan should work hand in hand with the river basement management plan and be scrutinized under the Water frame work directive.

This plan should endorse the governments position in their programme for Government and manage the western lake's as Salmonid fisheries, all Irish Native Annix ll spices are protected on SACs (special Area of Conservation)and I am asking The minister, the department and IFI (inland fisheries Ireland) to withdraw (Bye laws 809 and 806) as these bye laws are protecting non native invasive fish species on [redacted] and indeed all waters that have SAC status. These bye laws are repugnant to the Habitats directive ..Native Salmon and Trout are predated heavily by non native pike on the western lake's and also coarse fish effect the ecology and water quality when they become the dominant species, these fish are classed as non native and invasive under the Water frame work directive which is EU LEGISLATION.

I am a member of a club [redacted] that has invested heavily in stream enhancement work's and education of young Anglers both financially and voluntary, our club is delighted that the minister and IFI have come together and put forward a plan for the future and we need to see more staff employed in fisheries as the work load is huge . Together IFI and Trout and Salmon angling clubs can save our great western lake's and uphold the integrity of our SACs for all the local communities and to protect the wild habitats and water quality that is so important to our Native species and indeed humans for the healthy consumption of water for man and beast..

I am in favour of supporting this plan and any other plan on the western lake's but BYE LAWS protecting invasive species on our lake's and rivers in SACs have to be removed before we engage and go forward.

Respectively yours,

[redacted]

Sent from my Galaxy

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 17:49
To: Western Lakes Plan
Subject: western lakes plan

To whom it may concern [redacted]

The lake hotel was established in the early 1900s. A lot of our business has come form Trout and Salmon anglers , particularly in the spring shoulder season , we are delighted to see that the IFI and Department have at last recognizing the importance of Trout and Salmon fishing in [redacted] and the surrounding areas. We welcome the Western Lakes Plan and wish you all the best in the implantation of same . All necessary measures to protect this invaluable resource should be taken. Wishing you all the best from [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 20:22
To: Western Lakes Plan
Subject: Western lakes plan

To whom it may concern,

I have lived on the shore of [redacted] my entire life.

We welcome the western lakes plan and hope it will protect and preserve our most wonderful resource and amenity.

We hope the plan will address predator species which have evidently caused the shortage of native fish which has brought people from all over the world to fish our lake.

Without this tourism alone, many local livelihoods will suffer.

We hope adequate staff levels can be provided to ensure our lake is protected for future generations.

Mant thanks and best of luck,

[redacted]

Sent from Yahoo Mail on Android

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 20:30
To: Western Lakes Plan
Subject: Western lakes plan.

I want to offer my support for the western lakes plan and look forward to seeing the plan implemented in full over the coming years.
Kind regards.
[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 20:35
To: Western Lakes Plan
Subject: Submission

Hi my name is [redacted]
Here's my submission,
I'm from [redacted] co Galway, I live right beside [redacted] and its very special water, its spectacular that's its an SAC that's protected under European law and Irish state law,.
These laws are the most important to protect the lake the European habbitat directive and the water frame directive.
They are the most important primary laws of the European Union and the irish state.
It's a 100% SAC and a Salmonid fishery, the very last strong hold in Europe for wild brown trout.
There's a surprise it has very special annex 2 species in its system there's 3 of them so it's very very special and protected.
However there are invasive pike and coarse fish in [redacted] that compete and predate on the Salmonids, this is breaking the LAW why there's 2 illegal bye laws protecting these invasive fish that are non native in our SAC.
We the laughing stock of Europe with fines for breaches of the habbitat directive and the water frame work directives that protect SACs.
So remove these illegal bye laws to maintain lough corrib SACs integrity and its special waters.
Clean up its rivers to let the Salmonids swim freely to there spawning grounds with been wiped out by invasive pike and other coarse fish.
Enforce the law which is the habbitat directive and the water frame work directive to up hold the SAC status of lough corrib.
Do not say invasive pike will control other invasive fish in our SAC that's from a MIXED fishery model that's poor twisted thinking its not in the HD and the WFD.
Hire lots more IFI staff.
Tackle the gross irresponsible levels of pollution and levels of disregard to the lake to use it as a toilet to flush in down the salmon weir.
Get fines in place under these directives when the HD and the WFD applies.
It's a world renowned lake SAC, but we now have world renowned fines running up because its been abused and robbed of its status and integrity as a Premier SAC.
Please protect [redacted] its your job and the law. Go and do it.
Rgrds
[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 20:50
To: Western Lakes Plan
Subject: Western lakes plan

I want to offer my full support for the western lakes plan.I look forward to seeing the plan implemented in full over the coming years.
Kind regards
[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 21:01
To: Western Lakes Plan
Subject: Western lakes plan

I want to offer my full support for the western lakes plan.I Look forward to seeing the plan implemented in full over the coming years
Kind regards
[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 21:09
To: Western Lakes Plan
Subject: Western lakes plan

To whom it may concern,

I live on the shores of [redacted] and have done all of my life . I love to fish with other family member's. This is a wonderful wild Salmon and trout lake.

This is a great idea to have a long term plan for the western lakes.

I totally object to the protection of pike and coarse fish under the existing bye laws 809 and 806 , I would ask the minister to withdraw these current bye laws ,how can you protect invasive species on lakes that are SACs.
It's like asking people to go and sow Japanese knot weed in the national park in Connemara.

[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 21:53
To: Western Lakes Plan
Subject: Submission lake's plan

I am presenting a submission to the IFI in relation to the Western lakes plan.Bye laws 806 and 809 must be removed from SAC's and any protection from the Fisheries must go.Our lakes are in serious trouble and hope to restore them[redacted]

Get Outlook for Android

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 22:07
To: Western Lakes Plan
Subject: Western Lakes Plan

To whom it concerns,

We at [redacted] have been established in the beautiful village of [redacted] since 1945. [redacted]. Custom from angling on [redacted] has made up a large part of our business. Trout and salmon fishing on [redacted] has been the life's blood of our village and surrounding areas for many centuries. [redacted] is the constant heartbeat that has kept the life in our village. It has sustained all of us and all of the many generations that have gone before us. It is in our DNA and makes us what we are. It is our heritage and it is vital that we do everything possible to protect this most important amenity, especially for all the many generations yet to come. We fully support the initiative by the IFI and The Department to protect the future of the salmon and trout fisheries of [redacted]. Any measures necessary to protect the fisheries must and should be implemented.

Thanks.

Kind Regards,

[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 22:30
To: Western Lakes Plan
Subject: Western Lakes submission

To whom it concerns.

I have read the 5-year western lakes plan carefully and give it my full support. The future of these great lakes depends on plans like this being fully implemented going forward. I was lucky in life given the fact I was born on the shore of [redacted] and literally grew up with a fishing rod in my hand. Unfortunately, over the years I have witnessed many changes, some good and some not so good. One of the biggest changes I have seen to these lakes in the past 30 years is the arrival of non-native Bream and Roach. These invaders have had a huge negative effect on the lakes eco system in many areas 1) Destruction of habitat, 2) Displacement of Trout from their natural feeding grounds, 3) compete heavily for the same food source. Some system needs to be put in place to control these non-natives before the [redacted] catchment turns into one giant course fishery.

I would also like to see a 2 Trout / 4 per boat bag limit introduced. Also abolish the bylaws protecting pike and coarse Fish. It doesn't make since having IFI carrying out stock management operations in Springtime and in the other hand giving out fixed charge notices to anglers for taking a pike home to eat.

Ferox trout in recent years are being targeted much more so than in the past. These magnificent creatures need more protection, and I would suggest that the killing of ferox trout be banned altogether.

The genetic survey carried out by [redacted] a number of years ago needs to be revisited. This survey gave clear and precise figures on which rivers were performing or under-performing in the system. The sample trout for genetic testing need to be rod caught and from right across the entire system and not from competitions. This should be done every 3 years and the genetic print of the rivers checked every 10 years.

The development of as many Rivers and streams needs to continue into the future with the help of our stakeholders.

Regards

[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 22:35
To: Western Lakes Plan
Subject: western lakes plan

Hi,

I am from co Galway and I live on the shores of [redacted] . I am happy to see there is a genuine commitment from the minister and inland fisheries Ireland to put a long term plan for the western lakes but this commitment does not seem to have strong support from the Department.

I would support any plan that will keep and protect our Native Salmon, Trout and pearl mussel and their habitats. I totally want the removal of bye laws 809 and 806 that protect pike and course fish . It is wrong that invasive species have protection on an SAC like [redacted] and other western lakes these must be removed if we are to move forward with this plan…other wise it will be difficult to save and protect our native Annix ll species which are protected under the habitats directive and EU legislation.

Regards ,

[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 22:41
To: Western Lakes Plan
Subject: Western Lakes plan

To whom it may concern

My name is [redacted] I have lived in [redacted] all my life and have enjoyed fishing on [redacted] over the years.
I broadly welcome the plan but there are a few points that I take issues with.

I am very concerned with water quality/ pollution on the lake and in my opinion it is getting worse year on year. I don't see anything in this plan that will address this issue.

I believe that there is not enough work been done on the up keep of streams with keeping vegetation cut back ect.. with some streams being completely overgrown. I do not think that IFI have enough staff on the ground to do this type of work and are short on man power.

I would like to see the full implementation of the habitats directive which does not allow for the protection of invasive non-native fish.

I do not agree with the idea that pike can be used to control the roach numbers as this idea would be detrimental to the salmonid spices for the number of pike that would be needed.

I would like to see the whole [redacted] system managed primarily as a salmonid system.

Regards,
[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 22:32
To: Western Lakes Plan
Subject: Great Western Lakes Management Plan.

I have been fishing [redacted] for the last 55 years and l am very concerned about its current state.
There has been an explosion of the coarse fish population, pike, perch and roach numbers are now at an all time high. Byelaws 806 and 809 need to be removed and IFI need more staff to help reduce the coarse fish population and also to curtail the spread of African pond weed.
I am also greatly concerned about the sharp decrease in fly life on the lake, particularly over the last five years, is it due to pollution or are the coarse fish eating the nymphs??
Finally l welcome this plan and wish IFI every success in trying to restore the great lakes to their former glory.

Kind regards,

[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 23:07
To: Western Lakes Plan
Subject: Western Lakes Plan

To all concerned

My name is [redacted] and since moving to [redacted] over 20 years ago I have enjoyed fishing for trout and swimming on [redacted]
I welcome the plan but there are a few things that I think could be improved on.

I have seen a notable decline in water quality over the years and cannot see how this plan is going to address this major problem.

I think more work needs to be done on the streams and to keep them maintained. I have not seen IFI staff out doing this work for years and would question if they have enough staff.

I believe that all protection of non native species should be removed and the full implementation of the habitats directive which does not allow for the protection of invasive non native fish.

I would not agree that bag limits are an issue until all the above have been addressed.

Regards,
[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 23:24
To: Western Lakes Plan
Subject: Management Plan for Great Western Lakes

To whom it may concern,

I am writing to you on behalf of the [redacted] and the impact of the management plan for the great western lakes on this system.

The [redacted] is one of the major clubs on this river system and has been in existence since [redacted] The [redacted] is recognised as a major spawning tributary for a significant number of wild trout and Salmon in the [redacted] catchment system. [redacted] itself needs little introduction as it is one of the few remaining best game fisheries in the world. It is a wonderful place to experience what Ireland has to offer both in terms of game angling and hospitality. It is undoubtedly the jewel in the Irish crown of wild trout and salmon fishing.

[redacted] is the [redacted] catchment river in the [redacted] catchment. It is a critical spawning channel for the many trout and Salmon and a noted fishery for both species. Many of the Salmon that come through Galway are on their destination to the [redacted] and its noted tributaries.

The [redacted] welcomes and supports the plan and the efforts that IFI are going to take to conserve and maintain the water catchment areas around [redacted]. In this regard, we particularly welcome some of the pike management aspects of the plan. However, the [redacted] enters the [redacted] catchment at [redacted]. For many years, the area has been infested with Pike of all sizes. This is a situation that cannot be tolerated if the Salmonid species are to be offered greater protection. The protection of the juvenile trout and salmon in this area needs urgent attention. Much investment and project work has gone into the upgrading of spawning beds in this river system. This money and work will be of no long term benefit if the present situation continues. Long term research indicates that Pike prey preferentially on the Salmonids. Bye laws 806 and 809 have caused serious issues over the past few years in this area and we would recommend that they now be finally removed for the Great Western Lakes. urgent conservation measure towards the development of the [redacted].

The [redacted] has worked closely with many of the local members of IFI over the years. However, the number of general operatives and enforcement officers allocated to the river need to be addressed. As a major spawning system for the [redacted] for both Salmon and trout, the river is over exploited and many spawning fish are needlessly slaughtered each year. This exploitation seems to be increasing year on year even though stocks are getting lower. The river needs greater protection and care from all relevant stakeholders and IFI have a crucial role to play here.

In recent years, we have also had a number of periods of very low water conditions matched with very high water temperatures during the fishing season. As a result, wild fish in [redacted] get stressed and can barely survive in the low oxygen conditions.This trend looks very likely to continue into the forseeable future. While the guidelines from IFI in this regard have been helpful they are not enforceable and need to be looked at going forward. Consideration should be given to the restriction of all fishing in these low water periods once water temperatures reach a certain high.

These are just some of the points I would like to see progress on in conjunction with the proposed management plan, as you have set out. We look forward to the development of the greater [redacted] and the further development of these great fisheries and hope that future generations will continue to enjoy them as Salmonid fisheries as many others have in the past.

Thanking you,

[redacted]

[redacted]

From: [redacted]
Sent: Monday 19 September 2022 23:41
To: Western Lakes Plan
Subject: Western lakes plan

To whom it may concern,

Whilst I welcome the new plan for the great western lakes , I strongly feel that the bylaws 809 and 806 must be removed as these laws are protecting invasive non native species on [redacted] SAC along with other western lakes .

Regar[redacted]
[redacted]

SUBMISSION

TO THE

INLAND FISHERIES IRELAND

PUBLIC CONSULTATION

ON THE

DRAFT GREAT WESTERN LAKES MANAGEMENT PLAN

September 15th 2022

On January 31st 2005, dialogue was initiated between the Inland Fisheries Division of the Dept. of Communications, Marine and Natural Resources (DCMNR) and the Central Fisheries Board (CFB) to conserve all non-native/invasive coarse fish species in Ireland.

This dialogue eventually led to a national conservation plan for non-native/invasive fish species in the form of two special purpose vehicles, namely the Pike Conservation Bye-Law No. 809 of 2006 and the Coarse Fish Conservation Bye-Law No. 806 of 2006.

I have examined a multitude of documents sourced under FOI and AIE legislation and at no point during the drafting process for the 806 and 809 Bye-Laws was the ecological impact of conserving non-native/invasive fish species within Natura 2000 (SACs, SPAs) sites considered or assessed as legally mandated under the EU Habitats Directive (Council Directive 92/43 EEC). No Appropriate Assessment Screenings, no Natura Impact Statements or other ecological/environmental analysis was conducted as mandated by Article 6(3) and 6(4) of the EU Habitats Directive.

Proliferation of non-native/invasive fish species was the objective for the now defunct Central Fisheries Board and the legacy Dept of Marine. In other words, conservation to maximise reproductive success.

"The amendment to the existing pike legislation is being requested, in keeping with protection of fish and their spawning age/size…..This would ensure the added protection of spawning stocks"[1]

The implementation of the 806 and 809 Bye-Laws in 2006 lead to tacit approval by the Irish State for further illegal anthropogenical introductions of non-native/invasive fish and by extension this rewarded environmental vandalism and the subsequent destruction of native ecosystems, e.g., the Owenriff Catchment, Lough Inagh, Lough Shindilla, Aughrusbeg Lough, Lough Lettercraffroe, Lough Leane etc and the list goes on.

On September 9th 2010, Inland Fisheries Ireland (IFI) made a submission to the Department of Environment, Heritage and Local Government regarding the draft European Communities (Birds and Natural Habitats) Regulations 2010. These regulations were drafted to replace the European Communities (Natural Habitats) Regulations 1997 (S.I. No.94 of 1997). This revocation was necessary following an ECJ judgment against Ireland in relation to deficiencies in transcribing of the EU Habitats Directive into domestic legislation. In their submission, IFI stated that pike (Esox lucius) "need to be added to the list (Third Schedule - Non-native species subject to restrictions)". When the new regulations were signed off by Minister Deenihan on September 21st 2011, pike

[1] Internal Correspondence June7th 2006 - Inland Fisheries Division of DCMNR.

were absent but chub, dace, roach and carp were all listed. How can these four species, which are essentially classed as highly dangerous under S.I. No. 477/2011 - European Communities (Birds and Natural Habitats) Regulations 2011 be conserved under the Coarse Fish Bye-Law No. 806 of 2006? Why were pike absent from this list (Third Schedule) but still are classed as 'non-native influencing ecology' under the EU Water Framework Directive (WFD). Furthermore, why are all fish species classed as 'non-native influencing ecology' under the WFD protected under either the 806 or 809 Bye-Laws?

As it stands in September 2022, IFI and the present Dept. of the Environment, Climate and Communications (DECC) preside over an absolute duplicitous mess of policies and legislation, where invasive fish species have more legislative protection than our native salmonids in SACs? Has nobody within IFI or DECC ever considered the legislative necessity of 'site integrity'?

In a 2013 UK research paper, titled, "A legal and ecological perspective of 'site integrity' to inform policy development and management of Special Areas of Conservation in Europe", the authors made the following statements regarding SACs and the EU Habitats Directive (see APPENDICES):

"An effect which is permanent or long-lasting must be regarded as an adverse one. In reaching such a determination, the precautionary principle will apply".

"Of considerable significance is the precondition in Article 1(e) that the conservation status of a designated habitat will only be taken to be favourable when the conservation status of its typical species is itself favourable. It is notable that there is no requirement for the typical species of a designated habitat to be species for which the SAC has been designated".

"The simplest ecological definition identifies ecological integrity as the ability of a system to support and maintain a biological community which displays species compositions, diversity and functional organisation analogous to a system which is undisturbed (Karr and Dudley, 1981)".

Considering these statements, there is no way the 'site integrity' of [redacted] can be maintained whilst the 806 and 809 Bye-Laws remain on the Statute Book.

In a 2014 European Commission Water Framework Directive Intercalibration Technical Report on 'Northern Lake Fish fauna ecological assessment methods', the following statements were made (see APPENDICES):

"Ireland has a depauperate and distinctly young freshwater fish fauna compared with the rest of Europe. It is widely believed that Irish freshwaters were frozen to the point where there were no freshwater fish during the last glaciation, ending approximately 11,000 years ago. (Went 1949, 1950). This has resulted in a native fish fauna derived from salt tolerant, often migratory, ancestors that would have been able to colonise Irish freshwaters at the end of the last Ice Age. In addition to this native group there are non native species present, very probably introduced by man over the past 1000 years for food, bait, sport or accidentally. The result is a highly patchy and discontinuous fish species distribution in Irish freshwaters, which is further and strongly influenced by a "who put what where when?" effect. A consequence of this history is that not all water bodies have been exposed to colonisation by all fish species present on the island. Rather, fish communities in Irish freshwaters tend to separate into three main groups; the first group contains mainly native species, primarily salmonids and is characteristic of upland or more isolated lakes. The second group contains native species, along with cyprinids, perch and pike. The third group, typical of lowland lakes linked by river and canal systems, contains no (or a limited number of) native species and is dominated by cyprinids, perch and pike (Kelly et al., 2008a). Therefore it is quite difficult to describe the fish communities representing the borderline conditions between high and good and good and moderate status for Irish lakes".

"Intolerant fish species (such as brown trout and Arctic char) were the dominant fish species in High and Good status lakes (Figure C.6). Nutrient enriched lakes (moderate and poor/bad) were characterised by a higher biomass of tolerant fish species than intolerant fish species. Analysis also showed that in general intolerant fish species decreased and tolerant fish species increased in relation to in relation to decreasing ecological status".

"In high status Irish lakes all type specific intolerant or disturbance sensitive species fish species (e.g. trout and char) are present and dominant. The species composition and abundance of these species corresponds to undisturbed conditions".

In August 2021, IFI made a submission to its parent Department (DECC) vis-à-vis the public consultation on the Designated Salmonid Waters Bye-Law. IFI made the following comments in relation to the 806 and 809 Bye-Laws (see APPENDICES):

"In fact these bye-laws have resulted in fish species which have become "naturalised" in these lakes are now afforded equal protection to the native species which have been there since the retreat of the last ice age. This is contrary to the aims of the Habitat Directive and fisheries legislation in general".

In conclusion, the 806 and 809 Bye-Laws should never have been constituted in their present manner. They are the product of the 'Good Idea Fairy'[2]. The fairy visits every organisation at some point in time. They bring with them pixie dust of a new and improved idea to apply a solution to a problem that may or may not exist, which in turn has caused the greatest loss in native Irish fish ecosystems since the last glacial maximum.

This loss is self evident written in the post mortem pages of the annual EU Water Framework Directive Fish Surveys conducted by IFI and all eco-vandalism validated by the 806 and 809 Bye-Laws.

The draft Great Western Lakes Management Plan is and will continue to be an impotent instrument while the fly in the ointment (806 and 809 Bye-Laws) is continually ignored. Obfuscation, political interference from the Leinster region, departmental meddling and downright negligence now takes precedence over EU Law and the integrity of SACs in Ireland.

IFI has zero credit in the bank with [redacted] stakeholders and goodwill towards the statutory body will never materialise considering all that has happened regarding freshwater fishery policies since 1997. However, if certain individuals in IFI found a backbone and made the legally correct decisions then a prosperous and symbiotic relationship could develop between all [redacted] game angling stakeholders and IFI.

All 7 of the High Level Objectives (HLOs) listed in the draft Great Western Lakes Management Plan are exercises in vanity while the fundamental legislative issues are continually ignored. Let us see how many successful prosecutions IFI can make in 2023 under the 806 and 809 Bye-Laws on [redacted]

Finally, on July 27th this year, after many years of deliberate dithering, the necessary legislative measures have been listed for [redacted] by the Department of Housing, Local Government and Heritage via S.I. (Statutory Instrument) No. 384 of 2022[3], which completed the formal designation of the site as a Special Area of Conservation in accordance with Article 4 of the EU Habitats Directive. Given the primacy of the EU Habitats Directive over domestic legislation the inclusion of 'Activities Requiring Consent 2 - stocking or restocking of fish' implies that fish as a species can have a negative impact on the integrity of a SAC. Will Inland Fisheries Ireland and the Inland Fisheries Division within the DECC finally acknowledge this simple concept?

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[2] Contemplations With The Good Idea Fairy By: Lt Col Gabriel "gaberock" Avilla., Military Leadership - Why we lead.

[3] European Union Habitats (Lough Corrib Special Area of Conservation 000297) Regulations 2022.

APPENDICES

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Viewpoint

A legal and ecological perspective of 'site integrity' to inform policy development and management of Special Areas of Conservation in Europe

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ABSTRACT

The European Union Habitats Directive (92/43/EEC) provides for the designation and management of Special Areas of Conservation (SACs) and requires that impacting activities are subject to 'an appropriate assessment' of their implications for the 'integrity' of the site. We define the term 'site integrity' from a legal and an ecological perspective. We demonstrate that 'site integrity' is the maintenance of ecological processes and functions that support the wider delivery of ecosystem services. 'Site integrity' can be influenced by SAC management. Management that seeks to support 'site integrity' may include the use of buffer zones or connecting areas that extend beyond the SAC site's designated features. We conclude that 'site integrity' and 'favourable conservation status' are powerful legal terms that if fully transposed into the law and policy of Member States can enable the achievement of broader European and International goals for marine conservation.

1. Introduction and legal perspective

Widespread and intensive human activity in the world's oceans and the subsequent loss of marine populations and species are believed to be impairing the ability of marine ecosystems to provide the essential ecosystem services that contribute to human well-being (CBD, 2010; Chapin III et al., 2000; Halpern et al., 2008; Hooper et al., 2005; Worm et al., 2006). Bearing in mind that MPA management remain adaptive to developments in scientific understanding of the spatial element of ecosystem service delivery (Smith et al., 2009; Smith and Wilen, 2003), networks of Marine Protected Areas (MPAs), designated though a system of marine spatial planning, are recognised as being the mechanism though which marine ecosystem services may be conserved, as 'they are the only approach to marine resource management specifically designed to protect the integrity of marine ecosystems and preserve intact portions and examples of them' (Sobel and Dahlgren, 2004).

In terms of public policy and law, the European Union (EU) (92/43/EEC) (the Habitats Directive) currently exerts great influence over MPA planning at a European scale. The Habitats Directive requires EU Member States to set up 'Natura 2000', a 'coherent European ecological network of Special Areas of Conservation' (SAC), comprising sites hosting the habitat types and species listed in its Annexes I and II (The Council of the European Communities, 1992). Within the network of SACs, Article 6.1 of the Habitats Directive requires the establishment of necessary 'conservation measures' corresponding to the ecological requirements of the Annex I habitats and the Annex II species present at the sites (The Council of the European Communities, 1992). Article 6.2 requires Member States to '... take appropriate steps to avoid, in the Special Areas of Conservation, the deterioration of natural habitats and the habitats of species as well as disturbance of the species for which the areas have been designated, in so far as such disturbance could be significant in relation to the objectives of [the] Directive' (The Council of the European Communities, 1992). In regard to proposals for the management of activities within an SAC, Article 6.3 of the Habitats Directive requires an 'appropriate assessment' of the implications of 'plans or projects' for the site, in view of its conservation objectives. In light of the conclusions of that assessment, the plan or project may only be granted permission to proceed if it can be 'ascertained that it will not adversely affect the integrity of the site concerned' (The Council of the European Communities, 1992).

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The Habitats Directive is considered to be Europe's strongest legal tool for nature conservation (Hochkirch et al., 2013). However, despite such legal provisions the conservation status of 70% of European coastal habitats and 50% of European marine ecosystems is considered to be in an unfavourable condition (Conde et al., 2010). In the United Kingdom (UK), this unfavourable status is linked to SAC site management. Most SACs remain multiple use sites that are managed individually with a narrow remit of fixed habitat or species specific conservation objectives. There is no focus on the ecological function of the site and therefore no consideration of the contribution towards the ecological integrity of the site (Gaston et al., 2006). Notwithstanding the requirements of Article 6.2 of the Habitats Directive, the UK regulatory authorities have taken the view that on-going activities that pre-date SAC designation (including licenced fishing) need not be subject to an 'appropriate assessment'. Continued degradation of SAC site features is revealed as a result of the onus placed on Member States by Article 11 of the Habitats Directive to 'undertake surveillance of the conservation status' of habitats and species within SACs (The Council of the European Communities, 1992). Despite a growing body of evidence that demonstrates that some methods of fishing can impact upon sensitive SAC marine features (Fossa et al., 2002; Hall-Spencer, 1998; Hall-Spencer and Moore, 2000; Hinz et al., 2011; Riesen and Reise, 1982; Thrush et al., 1998) there has been limited commitment from the UK and devolved governments to act upon evidence. The few evidence based campaigns that have been successful in proving the damaging effects of fishing to sensitive marine features have proved to be costly, drawn-out and highly contentious (Rees et al., 2010a).

Recent rulings of the European Court of Justice (ECJ, CJUE) clearly demonstrate that the protection offered to SACs by Articles 6.2. and 6.3 of the Habitats Directive is equal ('the Waddenzee case' Case C-127/02, 2004; Commission v French Republic Case C-241/08, 2010; Commission v Ireland Case C-418/04, 2007). It is thus increasingly clear that the precautionary principle, which is clearly embedded in Article 6.3 in relation to proposed 'plans or projects' must also be applied when looking at existing activities and the status quo within SACs. In light of this, UK Non-Governmental Organisations (NGOs) are currently placing pressure on UK Government to review its implementation of the Habitats Directive, arguing that the UK Government is in breach of Article 6.2 for failing to deal with damaging fishing activity within SACs that leads to 'deterioration of natural habitats' and Article 6.3 for failing to subject fishing license grants and renewals to 'appropriate assessments' (Client Earth and Marine Conservation Society, 2011).

The equal stringency of the Habitats Directive's approach to both future and existing activities in SACs ought to have implications for the management of SACs across the EU, and should bring to the fore the issue of 'site integrity'. To support development of forthcoming guidance in the EU to integrate 'site integrity' into SAC management and therefore achieve the overarching goals of the Habitats Directive, this paper aims to:

- Clarify 'site integrity' from a legal perspective.
- Clarify 'site integrity' from an ecological perspective.
- Consider the importance of the 'typical' species of designated habitats in assessing conservation status.

Using a case study example we will:

- Demonstrate how 'site integrity' is linked to marine features.
- Demonstrate how 'site integrity' can be influenced by management.

2. A legal definition of 'site integrity'

The term 'integrity' is only used once in the Habitats Directive, in Article 6.3, in connection with the requirement only to give consent to plans or projects following an 'appropriate assessment' that allows it to be ascertained that they will not 'adversely affect the integrity of the site concerned' (The Council of the European Communities, 1992). It is notable that it is 'site integrity', rather than the integrity of specific habitats or species, that must not be adversely affected. 'Site' is defined as 'a geographically defined area whose extent is clearly delineated' (Article 1(j) of the Habitats Directive). The Habitats Directive does not define 'integrity'. However, the EC's guidance 'Managing Natura 2000 Sites: The provisions of Article 6 of the 'Habitats' Directive 92/43/EEC, European Commission (2000)' (the EC Guidance) states at 4.6.3 that 'It is clear from the context and from the purpose of the directive that the 'integrity of the site' relates to the site's conservation objectives'. The EC Guidance notes that integrity also relates spatially to the site and that activities are 'not allowed to destroy a site or part of it on the basis that the conservation status of the habitat types and species it hosts will anyway remain favourable within the European territory of the Member State' (European Commission, 2000). Importantly, the EC Guidance states that integrity can be considered as a quality or condition of being whole or complete. In a dynamic ecological context, it can also be considered as having the sense of resilience and ability to evolve in ways that are favourable to conservation (European Commission, 2000).

The EC Guidance (2000) states that the 'integrity of the site' may be defined as 'the coherence of the site's ecological structure and function, across its whole area, or the habitats, complex of habitats and/or populations of species for which the site is or will be classified'. A site can be described as having a high degree of integrity where the inherent potential for meeting site conservation objectives is realised, the capacity for self-repair and self-renewal under dynamic conditions is maintained, and a minimum of external management support is required' (European Commission, 2000; Her Majesty's Government, 1994).

The recent Opinion of the Advocate General to the CJEU in the case of Sweetman and others – v – An Bord Pleanala (Case C-258/11, 2012) stresses a temporal element and includes the following: 'in order to establish whether a plan or project ... has an adverse effect on the integrity of the site, it is necessary to determine whether that plan or project will have a negative effect on the constitutive elements of the site concerned, having regard to the reasons for which the site was designated and their associated conservation objectives. An effect which is permanent or long-lasting must be regarded as an adverse one. In reaching such a determination, the precautionary principle will apply.'

The link between 'site integrity' and the 'conservation objectives' for the site is made in Article 6.3 of the Habitats Directive and, necessarily, in the EC Guidance and in case law. The overarching requirement of the Habitats Directive is to achieve 'favourable conservation status' of Annex I habitats and Annex II species (Articles 3.1 and 4.4). Therefore, the primary conservation objective for those habitats and species within SACs designated for their protection must be the achievement of 'favourable conservation status' for those habitats and species within that site. The Habitats Directive specifically defines 'conservation status of a natural habitat' and 'conservation status of a species' (Article 1(e) and (i)) and goes onto set out the circumstances in which those statuses may be considered 'favourable' (The Council of the European Communities, 1992). Of considerable significance is the precondition in Article 1(e) that the conservation status of a designated habitat will only be taken to be favourable when the conservation status of its

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typical species is itself favourable. It is notable that there is no requirement for the typical species of a designated habitat to be species for which the SAC has been designated.

3. An ecological definition of 'site integrity'

The simplest ecological definition identifies ecological integrity as the ability of a system to support and maintain a biological community which displays species compositions, diversity and functional organisation analogous to a system which is undisturbed (Karr and Dudley, 1981). Truly pristine conditions are both difficult to identify or aspire to in Marine Protected Area management, and many would argue that humans are a natural part of the ecosystem, the social-ecological system (Armsworth et al., 2007; Curtin and Prellezo, 2010; Pollnac et al., 2010). A practical definition of ecological integrity therefore encompasses this natural state with the ability to cope with disturbance. Parrish et al. (2003) define ecological integrity as being met when the dominant ecological characteristics (composition, structure, function and ecological processes) of the system, '...occur within their natural range of variation and can withstand and recover from most perturbations imposed by natural environmental dynamics or human disruptions'. Ulanowicz (2002) expands this definition into three main concepts. The first, system health, relates to the continued successful functioning of the community, which in an anthropocentric view may be defined as the delivery of ecosystem services. The second looks at the ecosystems' ability to withstand stress (resilience). Finally, the concept of adaptation is considered, which Ulanowicz (2002) defines as the optimum capacity of a system to develop in different ways without human interference.

Whilst ecological integrity is not often defined specifically in conservation management policy, there have been efforts recently to focus on addressing the wider integrity of the ecosystem. For example, 'sea-floor integrity' is one of eleven descriptors used to assess 'Good Environmental Status' in Annex 1 of the EC Marine Strategy Framework (Directive 2008/56/EC) (Rice et al., 2012). 'Good Environmental Status' under this descriptor is found when 'sea-floor integrity is at a level that ensures that the structure and functions of the ecosystems are safeguarded and benthic ecosystems, in particular, are not adversely affected' (European Parliament and Council, 2008). It is proposed that the measurement of sea-floor integrity consists of identifying structures and functions of particular importance, identifying the pressures, and identifying appropriate indicators which reflect the sensitivity and resilience of the ecosystem.

4. Integrating 'site integrity' into SAC management

To integrate the legal principles of 'site integrity' and therefore 'favourable conservation status' into practical SAC management it is necessary to demonstrate how ecological functions and processes are linked to the conservation status of a habitat and influenced by changes in SAC management regimes. To demonstrate this, we use a case study area of Lyme Bay, UK where a consortium of scientists led by Plymouth University Marine Institute were commissioned by the UK Government to undertake a 3 year study to assess the ecological and socio-economic effects of changes to management of the marine area (Attrill et al., 2011).

4.1. Lyme Bay case study site

Lyme Bay is located in the southwest of England, UK (Fig. 1). Comprised of a mosaic of substrates from sand, mud and gravel to rock and mixed ground, the entire bay was defined as an area of 'high species richness that includes rare and threatened species' (Hiscock and Breckels, 2007). 'Reefs' are contained in Annex I of the Habitats Directive and are defined as 'habitats where animal and plant communities develop on rock or stable boulders and cobbles' (Jackson and Mcleod, 2000). In Lyme Bay, these include outcropping bedrock (with igneous, chalk, mudstone and limestone examples) and pebbles, cobbles and boulders, support a diverse range of reef species assemblages characterised by species such as the sea squirt (*Phallusia mammillata*), sponge (*Cliona celata*), anemone (*Aiptasia mutabilis*), bryozoan (*Pentapora fascialis*) and corals (*Alcyonium digitatum* and *Eunicella verrucosa*). Such species may be considered to be the 'typical species' of this reef habitat.

Fig. 1. Map showing location of Lyme Bay, cSAC and the order boundaries plus sites surveyed – 2012 sites. Substrate map data provided by Devon Biodiversity Records Centre.

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In July 2008, following advice from its statutory nature conservation advisors Natural England, the UK Government closed a 206 km^2 area of the Bay by way of 'The Lyme Bay Designated Area (Fishing Restrictions) Order' (2008) to bottom towed fishing gear. The objective of the Order was to promote marine biodiversity by ensuring that the structure of the reef system was maintained, and to aid the recovery of the benthos following damage caused by bottom towed fishing gear (Attrill et al., 2011; DEFRA, 2008). The Order was specific to bottom towed fishing gear and the area remains open to fishers using static gears such as pots and nets, and to recreational users.

In August 2010, a larger section of the Bay was put forward as a candidate SAC (cSAC) due to the presence of extended Annex 1 reef habitat that lie outside the boundary of the Order (Fig. 1). Selection criteria behind this decision concluded that the site has excellent representivity of a broad range of habitats and reef species, has good prospects for recovery of structure and function as a result of fisheries restrictions, and has excellent conservation (Natural England, 2010)

4.2. 'Site integrity' in the Lyme Bay cSAC

Using the definitions for ecological functions and ecological processes defined by (Balmford et al., 2008), The Lyme Bay and Torbay cSAC Annex I reef features, their associated (typical) species of conservation importance, ecological function, and ecological processes are shown in Table 1.

In addition to those species designated as being of conservation importance, the reefs in Lyme Bay provide habitat for a further range of species (some may be considered as 'typical' in a local context). Mobile organisms such as whelk, crab (Howard, 1982), lobsters and fish use them as a refuge and source of food and sessile species such as soft corals, hydroids and sponges use the reef structure for settlement. Some sessile species also provide platforms for the recruitment of others, for example hydroids, which provide a three dimensional structure above the sea bed, allowing scallop spat to settle off the seabed thereby reducing the risk of being smothered by sediments (Brand et al., 1980; Dare and Bannister, 1987; Eggleston, 1962). This can provide substantial increases in spat abundance, with Bradshaw et al. (2003) reporting 8.4 times more spat associated with hydroids than without. Structurally complex habitats are also known to be important as nursery habitats, they provide refugia for juvenile fish species, for which they are known to increase survivorship (Bradshaw et al., 2003; Connell and Jones, 1991).

The ecological composition and structure of the marine environment supports ecosystem functions and processes in Lyme Bay that, in turn, provide for a range of ecosystem services (the social–ecological system). Traditionally within Lyme Bay, fishermen towing demersal fishing gear (otter trawls, beam trawls, scallop dredges) avoid the hard rock reef areas and fish on the mixed sediment areas (sands, gravels, cobbles) and static gear fishermen place pots in the rocky areas, targeting crabs and lobster (Rees et al., 2010a). Recreational SCUBA diving, sea angling and wildlife watching trips are key components of the leisure and recreation activities undertaken in Lyme Bay, making use of the natural marine resources that stem from biological diversity (Rees et al., 2010b).

The implementation of the Order and the subsequent proposal for an SAC in Lyme Bay recognises 'site integrity' in that the reefs underpin the ecological processes and functions in the area and that these interact with non-SAC features and the wider marine environment to provide ecosystem services (Fig. 2). This interaction can be influenced by the 'conservation status' of the habitat.

4.3. Management and 'site integrity'

The EC Guidance states that 'site integrity' 'can be considered as a quality or condition of being whole or complete. In a dynamic ecological context, it can also be considered as having the sense of resilience and ability to evolve in ways that are favourable to conservation' (European Commission, 2000). Changes in management have enabled both recovery and expansion of the distribution of reef associated organisms.

Table 1
Habitats and typical species within the Lyme Bay portion of the Lyme Bay & Torbay cSAC listed for conservation and their associated ecological functions and ecological processes (developed from Fletcher et al., 2012).

	Ecological functions	Ecological processes
Habitats		
Annex I reef habitat[a]	Production	Primary production; secondary production; larval/gamete supply; formation of species habitat; species diversification; formation of physical barriers
Species		
Alcyonium digitatum[b] Dead man's fingers	Production; geological processes; ecological interactions	Formation of species habitat; species diversification; food web dynamics
Axinella dissimilis[b] Erect branching sponge	Production; geological processes; ecological interactions	Formation of species habitat; species diversification; food web dynamics
Eunicella verrucosa[c,d,e] Pink sea fan	Production; geological processes; ecological interactions	Formation of species habitat; species diversification; food web dynamics
Leptopsammia pruvoti[c,d,e,f] Sunset cup coral	Production; ecological interactions	Formation of species habitat
Pentapora fascialis[b] Ross coral	Production; geological processes; ecological interactions	Formation of species habitat; species diversification; food web dynamics

[a] Habitats Directive (REF).
[b] Nationally important marine features.
[c] Wildlife & Countryside Act 1981.
[d] The UK Biodiversity Action Plan 1995 (UK BAP).
[e] The International Union for Conservation of Nature (IUCN) Red Data List.
[f] Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES).

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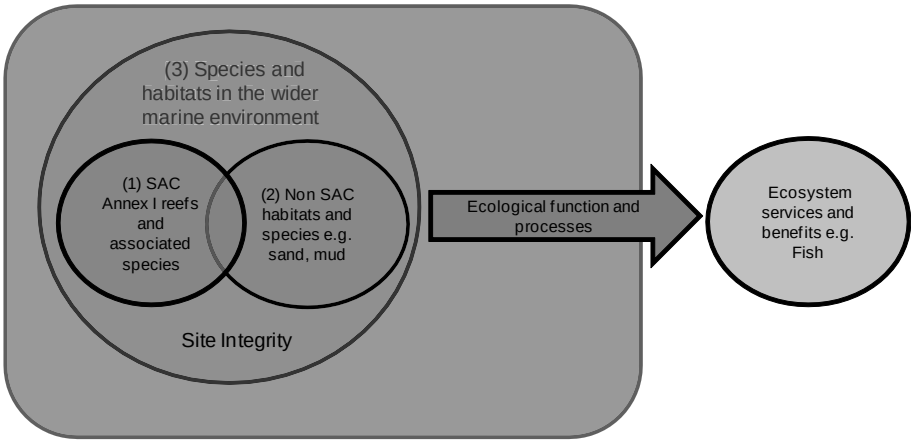

Fig. 2. A model depicting 'site integrity'. 'Site integrity' comprises the interaction between 1 and 2 to underpin ecological functions and processes to deliver ecosystem services.

In terms of recovery, results of the 3 year survey in Lyme Bay show that there has been some recovery of the reef community and that recovery has also been observed for certain individual species (such as the ross coral (*Pentapora fascialis*), sea squirt (*Phallusia mammillata*) and king scallop (*Pecten maximus*)) in areas where bottom towed fishing gear is no longer permitted (Fig. 3) (Attrill et al., 2011). Species which are long lived and slow growing such as the pink sea fan (*Eunicella verrucosa*) (Jackson et al., 2008), have, however, yet to exhibit consistent signs of recovery (Attrill et al., 2011).

The recovery of the reef habitats has also resulted in positive socioeconomic changes, with research demonstrating that the implementation of the Order in Lyme Bay has benefitted the local recreation industry by preventing further deterioration of natural resources (Rees et al., 2010b) and the static gear sector of the fishing industry, primarily by providing a safe haven in which they can set their pots and nets (Mangi et al., 2011). These changes are also linked to potential benefits for the delivery of ecosystem services via conservation of species that support ecological function (Rees et al., 2012). Therefore improvements in the 'conservation status' of the reef habitat via recovery has influenced 'site integrity' with positive implications for the delivery of ecosystem services.

In terms of the expansion of the distribution of reef organisms, research from Lyme Bay has determined that recovery of the reef habitat has not been restricted to those areas that are strictly defined as reef habitat for the purposes of Annex I of the Habitats Directive (Sheehan et al., 2012). The results demonstrate that sessile taxa associated with reef habitats are also now present on pebbly sand habitats in Lyme Bay that have been protected from bottom towed fishing gear for 3 years. These sessile species are found in greater abundances on pebbly-sand habitat in areas closed to fishing compared to those where bottom towed fishing continues (Sheehan et al., 2012). According to the Interpretation Manual of European Union Habitats (2007) 'hard substrata that are covered by a thin and mobile veneer of sediment are classed as reefs if the associated biota are dependent on the hard substratum rather than the overlying sediment', suggesting that these areas are an extension of the realised cSAC designated reef habitat and should be treated as such. This has only become evident following the cessation of bottom towed fishing in the area of cSAC covered by the Order.

The importance of areas between the rocky reefs is further evident when considering the life history of benthic species, some of which may be considered as 'typical' to the reef habitat. This often comprises several life stages, each of which may depend upon different components of the reef, highlighting the importance of comprehensive conservation of the various habitats of these species throughout their life cycle. Juvenile common lobsters (*Homarus gammarus*) for example, are known to bury in the sediment near to reef habitats (Howard and Bennett, 1979) and occupy crevices in the reef once matured (Holthuis, 1991). The edible crab (*Cancer pagurus*) also uses the reef for protection (Howard, 1982) or bury into mixed sediments when carrying eggs (Edwards, 1979). Thus, protecting the areas between the reefs could promote adult crustacean abundance, which should be of benefit not only for meeting the conservation objectives by reference to the conservation status of typical species of the site, but also for bringing wider economic benefits through fisheries enhancement.

It is therefore apparent that within Lyme Bay, reef habitat consists of rocky reef colonised by sessile fauna, areas between rocky reef outcrops where a veneer of sediment overlies hard substrata which, if left unfished will begin to be colonised by sessile reef species, and the linking patches of sediment that are also crucial for reef associated mobile fauna such as lobster providing ontogenetic stepping stones for reef species (Boström et al., 2011).

Fig. 3. Recovery of the reef community in an area previously fished. Image courtesy of the Marine Institute, Plymouth University.

5. Discussion

The application of legal principles ('site integrity' and 'favourable conservation status') to ecological functions and processes in a marine area poses some points for discussion that are pertinent to the development of Habitats Directive policy and the management of SAC sites in Europe.

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5.1. Improvements to the conservation status supports the ecological processes and function of a reef habitat

Through their contribution to production, Annex I reef habitats (as found in Lyme Bay) contribute to a range of ecological processes. Via management, the dominant ecological characteristics that typify the reef habitat have been enhanced, and recovery of these areas not only increases habitat complexity and benthic biodiversity, but also increases the three dimensional structure of the habitat, providing additional structure to enhance the settlement of species such as scallops, and for species such as cuttlefish, whelk and shark to lay their eggs (Bradshaw et al., 2003).

The recovery of the reefs will also increase their resilience. A key aspect of 'site integrity' is that the site must have capacity for 'self-repair and self-renewal'. A site which has integrity will be able to withstand episodes of storm disturbance, heavy predation and disease, and will have sufficient capacity to recolonise damaged areas as a result of the interconnectivity between the reefs and surrounding habitats.

In addition to protection of the rocky reef habitat, protection of areas between the reef outcrops in the Bay is important. Annual benthic surveys have demonstrated that the protection afforded by the Order has allowed gradual colonisation of reef species (some which may be considered as 'typical') in areas that would not be categorised as reef, based on apparent habitat type (Sheehan et al., 2012). Similar enrichment of sand gravel and mud biological communities after the cessation of scallop dredging has also been observed in closed area experiments on the Isle of Man, UK (Bradshaw et al., 2001). True assessment of the extent of the reef feature cannot therefore be quantified in an area that is trawled or dredged as the use of towed fishing gear will prevent growth of reef species. Annual monitoring in Lyme Bay has shown the importance of these areas, which, in the early years of site management, could not have been identified as reef associated due to the impact of fishing activity. Any 'appropriate assessment' of activities within an SAC must conclude by asking whether it can be ascertained that those activities, individually or collectively 'will not adversely affect the integrity of the site'. As 'site integrity' is closely linked with the 'capacity [of the habitat] for self-repair and self-renewal' (European Commission, 2000) it follows that the condition and management of features that have positive impacts on repair and renewal, such as areas between rocky reefs, is integral to an assessment of site integrity. Therefore, management of an SAC ought to take into consideration 'reference' or 'control' 'areas' against which to measure change and the inclusion of buffer zones around designated habitats, or connecting areas between designated habitats to allow typical species associated with those habitats to colonise and grow. All management must remain 'adaptive' to potential change.

5.2. Application of the legal principle of 'site integrity'

As has been noted, the principal goal of the Habitats Directive is the achievement, by maintenance or restoration, of 'favourable conservation status' for Annex I habitats and Annex II species. The existence of 'site integrity' is an implicit precondition to the achievement of 'favourable conservation status' and it is this quality that is specifically protected by the Habitats Directive's requirement for potentially harmful activities to be subject to an 'appropriate assessment and prevented from taking place if it cannot be ascertained that they will not affect 'site integrity'. On a true interpretation of the Habitats Directive and relevant case law (op. cit.) such an assessment should be applied to both proposed and existing activities. In terms of SAC management and compliance with the Habitats Directive 'site integrity' must therefore be informed by the status of the designated Annex I and II habitats and species and applied in the sense that these habitats and species support and interact with broader ecological processes and functions within a marine area.

It must also be recalled that 'favourable conservation status' requires that any 'typical species' of a designated habitat also be in favourable condition, whether or not they are themselves Article II species. The Interpretation Manual of European Habitats contains examples of species that may be regarded as typical for their habitats (European Commission, 2007). Many are not Annex II species, but if they are harmed by activities that do not directly impinge on the Annex I habitat there is a legal argument that such activities prevent the achievement of 'favourable conservation status' for that habitat.

5.3. An assessment of 'site integrity' within an SAC

The legal definition of 'site integrity' is informed by definitions of ecological integrity. Underlying the concepts of ecological integrity are various ecological components and processes which would require consideration at a site and network level to address integrity. Assessing 'site integrity' would therefore require the complex task of understanding the ecosystem organisation at a location in terms of the ecosystem structure, functions, processes and connectivity, especially in relation to the features of interest and its resilience to, and ability to recover from, disturbance. It can be argued that in some areas of science-policy research, the scientific knowledge can lag behind the ideology embedded in policy (Rees et al., 2013). This indeed remains the case in relation to a detailed understanding of ecological interactions in relation to measuring the contribution of individual habitats or species to ecological processes and functions (Chapin III et al., 2000; Ieno et al., 2006; Petchey and Gaston, 2006; Somerfield et al., 2008). This poses difficulty for conservation planning that relates directly to a measurement of ecological function, e.g. specifically as an indicator of 'site integrity' (Rees et al., 2012). However, as demonstrated in the case study for Lyme Bay, an understanding of the link between ecological function (e.g. primary production) to the delivery of ecosystem services (e.g. fish and raw materials) can potentially provide a framework by which 'site integrity' could be assessed.

6. Conclusions

The definition of 'site integrity' as a legal term and its translation to 'on the ground' practical management of an SAC from an ecological perspective demonstrates that interpretation of the Habitats Directive in conservation policy and SAC management needs to evolve to meet the current challenges of marine resource use management. In the example for Lyme Bay, UK, we have demonstrated that 'site integrity' is intimately associated with the maintenance of those ecological processes and functions that support the wider delivery of ecosystem services and may extend beyond just the designated features. The achievement of 'favourable conservation status' and 'site integrity' within the Lyme Bay cSAC is dependent upon securing ecological integrity of the reef and its typical species and interactions between both reef and non-reef elements of the ecosystem. It is, therefore, prudent for both ecological and legal purposes to treat the 'site' as a whole and not to focus management merely on the limited locations of reef areas within the site. A change in management that required the cessation of fishing using bottom towed gear within the area has demonstrated that the reefs have the capacity for self-repair and self-renewal, particularly in areas that were not previously considered as reef habitat. This, in turn, has provided for ecological processes and functions within the site and beyond the delineated boundaries of the SAC to interact and increase the potential for realisation of ecosystem services for a broad range of stakeholders.

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The Habitats Directive is not, however, a standalone instrument. The designation of Annex I and II species and habitats are part of the building blocks for broader marine environmental protection in European waters that stem from international drivers for MPAs and targets to halt further loss of biodiversity (Convention on Biological Diversity, 2011; OSPAR Convention, 2002; Secretariat of the Convention on Biological Diversity, 2004). The Marine Strategy Framework Directive 2008/56/EC aims to achieve 'Good Environmental Status' in all EU marine waters by 2020 while protecting the resource base for economic and social activities (European Parliament and Council, 2008). This Directive will play a key part in achieving targets for biodiversity, food webs and sea floor integrity (HM Government, 2012). 'Site integrity' under the Habitats Directive will need to contribute to the objective for sea-floor integrity that 'ensures that the structure and function of ecosystems are safeguarded' (European Parliament and Council, 2008). The Habitats Directive is considered to be a strong and comprehensive piece of legislation (Hochkirch et al., 2013). However, the conservation law and policy developed by Member States is generally narrow in focus and limited to Annex I habitats and Annex II species without necessarily having regard to the conservation status of typical species of Annex I habitats that are not themselves Annex II species or the position of Annex I habitats within their wider areas. In order to maintain pace with European and International conservation objectives the development of conservation policy must include the role of individual SAC sites in underpinning ecological function in a wider marine area. Otherwise there is a danger that these sites (SACs) will stay trapped by past conservation motivations and serve little purpose in a network of MPAs (Gaston et al., 2006). As such, the effectiveness and legitimacy of our broader, shared European and international goals for conservation will be undermined (Paavola, 2004).

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References

'the Waddenzee case' Case C-127/02, 2004. Landelijke Vereniging tot Behoud van de Waddenzee and Nederlandse Verenining tot Bescherming van Vogels – v – Staatssecretaris van Landbouw, Natuurbeheer en Visserij Paragraph 36.

Armsworth, P.R., Chan, K.M.A., Daily, G.C., Ehrlich, P.R., Kremen, C., Ricketts, T.H., Sanjayan, M.A., 2007. Ecosystem-service science and the way forward for conservation. Conservation Biology 21, 1383–1384.

Attrill, M.J., Austen, M.C., Bayley, D.T.I., Carr, H.L., Downey, K., Fowell, S.C., Gall, S.C., Hattam, C., Holland, L., Jackson, E.L., Langmead, O., Mangi, S.C., Marshall, C., Munro, C., Rees, S.E., Rodwell, L.D., Sheehan, E.V., Stevens, J., Stevens, T.F., Strong, S., 2011. Lyme Bay-a case study: measuring recovery of benthic species; assessing potential "spillover" effects and socio-economic changes, 2 years after the closure. Response of the benthos to the zoned exclusion of bottom towed fishing gear and the associated socio-economic effects in Lyme Bay. Final Report 1. Report to the Department of Environment, Food and Rural Affairs from the University of Plymouth-led consortium. University of Plymouth Enterprise Ltd., Plymouth, pp. 108.

Balmford, A., Rodrigues, A.S.L., Walpole, M., ten Brink, P., Kettunen, M., Braat, L., de Groot, R., 2008. The Economics of Biodiversity and Ecosystems: Scoping the Science. European Commission, Cambridge.

Boström, C., Pittman, S., Simenstad, C., Kneib, R., 2011. Seascape ecology of coastal biogenic habitats: ad vances, gaps, challenges. Marine Ecology Progress Series, 191–217.

Bradshaw, C., Veale, L.O., Hill, A.S., Brand, A.R., 2001. The effect of scallop dredging on Irish Sea benthos: experiments using a closed area. Hydrobiologia, 129–138.

Bradshaw, C., Collins, P., Brand, A.R., 2003. To what extent does upright sessile epifauna affect benthic biodiversity and community composition? Marine Biology, 783–791.

Brand, A.R., Paul, J.D., Hoogesteger, J.N., 1980. Spat settlement of the scallops *Chlamys opercularis* (L.) and *Pecten maximus* (L.) on artificial collectors. Journal of the Marine Biological Association of the United Kingdom, 379–390.

Case C-258/11, 2012. Sweetman and Others – v – An Bord Pleanala.

CBD, 2010. Secretariat of the Convention on Biological Diversity. Global Biodiversity Outlook3, Montreal.

Chapin III, F.S., Zavaleta, E.S., Eviner, V.T., Naylor, R.L., Vitousek, P.M., Reynolds, H.L., Hooper, D.U., Lavorel, S., Sala, O.E., Hobbie, S.E., Mack, M.C., Diaz, S., 2000. Consequences of changing biodiversity. Nature 405, 234–242.

Client Earth, Marine Conservation Society, 2011. Habitats Directive Correspondance. Enquiry Letter and Reply: Fishing Vessel Licences and the Habitats Directive.

Commission v French Republic Case C-241/08, 2010. Commission of the European Communities – v – French Republic.

Commission v Ireland Case C-418/04, 2007. Commission of the European Communities – v – Ireland.

Conde, S., Jones-Walters, L., Torre-Marin, A., Romao, C., 2010. EU 2010 Biodiveristy Baseline. European Environment Agency, Copenhagen, pp. 126.

Connell, S.D., Jones, G.P., 1991. The influence of habitat complexity on postrecruitment processes in a temperate reef fish population. Journal of Experimental Marine Biology and Ecology, 271–294.

Convention on Biological Diversity, 2011. Aichi Biodiversity Targets.

Curtin, R., Prellezo, R., 2010. Understanding marine ecosystem based management: a literature review. Marine Policy 34, 821–830.

Dare, P.J., Bannister, R.C.A., 1987. Settlement of scallop, *Pecten maximus*, spat on natural substances off south west England: the hydroid connection. In: Proceedings of the 6th International Pectinid Workshop. 9–14 April 1987, Menai Bridge.

DEFRA, 2008. The Lyme Bay Designated Area (Fishing Restrictions) Order. Department for Environment, Food and Rural Affairs, London.

Edwards, E., 1979. The Edible Crab and its Fishery in British Waters. Fishing New Books Ltd., Farnham, Surrey.

Eggleston, D., 1962. Spat of the Scallop *Pecten maximus* (L.) off Port Erin, Isle of Man, Annual Report, Marine Biological Station, Port Erin, vol. 74, pp. 29–32.

European Commission, 2000. Managing Natura 2000 Sites: The Provisions of Article 6 of the Habitats Directive 92/43/EEC. European Commission, pp. 73.

European Commission, 2007. Natura 2000: Interpretation Manual of European Habitats. DG Environment; Nature and Biodiversity. European Commission and DG Environment, pp. 144. <http://ec.europa.eu/environment/nature/legislation/habitatsdirective/docs/2007_07_im.pdf>.

European Parliament and Council, 2008. Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 Establishing a Framework for Community Action in the Field of Marine Environmental Policy (Marine Strategy Framework Directive). The European Parliment, pp. 22.

Fletcher, S., Saunders, J., Herbert, R., Roberts, C., Dawson, K., 2012. Description of the ecosystem services provided by broad-scale habitats and features of conservation importance that are likely to be protected by Marine Protected Areas in the Marine Conservation Zone Project area. Natural England Commissioned Reports, pp. 88.

Fossa, J.H., Mortensen, P.B., Furevik, D.M., 2002. The deep-water coral *Lophelia pertusa* in Norwegian waters: distribution and fishery impacts. Hydrobiologia 471, 1–12.

Gaston, K.J., Charman, K., Jackson, S.F., Armsworth, P.R., Bonn, A., Briers, R.A., Callaghan, C.S.Q., Catchpole, R., Hopkins, J., Kunin, W.E., Latham, J., Opdam, P., Stoneman, R., Stroud, D.A., Tratt, R., 2006. The ecological effectiveness of protected areas: The United Kingdom. Biological Conservation 132, 76–87.

Hall-Spencer, J.M., 1998. Conservation issue relating to maerl beds as habitats for molluscs. Journal of Conchology Special Publication No. 2 271, 271–286.

Hall-Spencer, J.M., Moore, P.G., 2000. Impact of scallop dredging on maerl grounds. In: Kaiser, M.J., de Groot, S.J. (Eds.), Effects of Fishing on Non-Turret Species and Habitats: Biological Conservation and Socio-Economic Issues. Blackwell Science, Oxford, pp. 105–117.

Halpern, B.S., Walbridge, S., Selkoe, K.A., Kappel, C.V., Micheli, F., D'Agrosa, C., Bruno, J.F., Casey, K.S., Ebert, C., Fox, H.E., Fujita, R., Heinemann, D., Lenihan, H.S., Madin, E.M.P., Perry, M.T., Selig, E.R., Spalding, M., Steneck, R., Watson, R., 2008. A global map of human impact on marine ecosystems. Science 319, 948–952.

Her Majesty's Government, 1994. Planning Policy Guidance Note 9 (PPG9) on Nature Conservation.

Hinz, H., Tarrant, D., Ridgeway, A., Kaiser, M.J., Hiddink, J.G., 2011. Effects of scallop dredging on temperate reef fauna. Marine Ecology Progress Series 432, 91–102.

Hiscock, K., Breckels, M., 2007. Marine Biodiversity Hotspots in the UK. A Report Identifying and Protecting Areas for Marine Biodiversity. WWF UK, Godalming, Surrey, pp. 118.

HM Government, 2012. Links Between the Marine Strategy Framework Directive and Other Legislation Marine Strategy Framework Directive Factsheet 2. Defra, pp. 2.

Hochkirch, A., Schmitt, T., Beninde, J., Hiery, M., Kinitz, T., Kirschey, J., Matenaar, D., Rohde, K., Stoefen, A., Wagner, N., Zink, A., Lötters, S., Veith, M., Proelss, A., 2013. Europe Needs a New Vision for a Natura 2020 Network. Conservation Letters. Early View (Online Version of Record Published before Inclusion in an Issue).

Holthuis, L.B., 1991. Marine Lobsters of the World. An Annotated and Illustrated Catalogue of Species of Interest to Fisheries Known to Date, FAO Species Catalogue. FAO, Rome, pp. 125.

Hooper, D.U., Chapin, F.S., Ewel, J.J., Hector, A., Inchausti, P., Lavorel, S., Lawton, J.H., Lodge, D.M., Loreau, M., Naeem, S., Schmid, B., Setala, H., Symstad, A.J., Vandermeer, J., Wardle, D.A., 2005. Effects of biodiversity on ecosystem functioning: a consensus of current knowledge. Ecological Monographs 75, 3–35.

Howard, A.E., 1982. The distribution and behaviour of ovigerous edible crabs (*Cancer pagurus*), and consequent sampling bias. Journal du Conseil International Pour l'exploration de la Mer, 258–261.

Howard, A.E., Bennett, D.B., 1979. The substrate preference and burrowing behaviour of juvenille lobsters (*Homarus gamarus*) (L.). Journal of Natural History, 433–438.

Ieno, E.N., Solan, M., Batty, P., Pierce, G.J., 2006. How biodiversity affects ecosystem functioning: roles of infaunal species richness, identity and density in the marine benthos. Marine Ecology Progress Series 311, 7.

Jackson, D.L., Mcleod, C.R., 2000. Handbook on the UK status of EC habitats directive interest features: provisional data on the UK distribution and extent of Annex I habitats and the UK distribution and population size of Annex II species. Joint Nature Conservataion Committee, Peterborough, pp. 180.

Jackson, E.L., Langmead, O., Barnes, M., Tyler-Walters, H., Hiscock, K., 2008. Identification of indicator species to represent the full range of benthic life history strategies for Lyme Bay and the consideration of the wider application for monitoring of Marine Protected Areas. Report to the Department of Environment, Food and Rural Affairs from the Marine Life Information Network (MarLIN). Marine Biological Association of the UK, Plymouth.

Karr, J.R., Dudley, D.R., 1981. Ecological perspective on water quality goals. Environmental Managment 5, 55–68.

Mangi, S.C., Rodwell, L.D., Hattam, C., 2011. Assessing the impacts of establishing MPAs on fishermen and fish merchants: the case of Lyme Bay, UK. AMBIO: A Journal of the Human Environment 40, 457–468.

Natural England, 2010. Inshore Special Area of Conservation (SAC): Lyme Bay and Torbay SAC Selection Assessment Document Version 2.5. Natural England, Peterborough, pp. 26.

OSPAR Convention, 2002. Convention for the protection of the marine environment of the North-East Atlantic. OSPAR Commission, pp. 33.

Paavola, J., 2004. Protected areas governance and justice: theory and the european union's habitats directive. Environmental Sciences 1, 59–77.

Parrish, J.D., Braun, D.P., Unnasch, R.S., 2003. Are we conserving what we say we are? Measuring ecological integrity within protected areas. Bioscience 53, 851–860.

Petchey, O., Gaston, K.J., 2006. Functional diversity: back to basics and looking forward. Ecology Letters 9, 741–758.

Pollnac, R., Christie, P., Cinner, J., Dalton, T., Daw, T., Forrester, G., Graham, N., McClanahan, T., 2010. Marine reserves as linked social-ecological systems. Proceedings of the National Academy of Sciences of The United States of America 107, 18262–18265.

Rees, S.E., Attrill, M.J., Austen, M.C., Mangi, S.C., Richards, J.P., Rodwell, L.D., 2010a. Is there a win–win scenario for marine nature conservation? A case study of Lyme Bay, England. Ocean & Coastal Management 53, 135–145.

Rees, S.E., Rodwell, L.D., Attrill, M.J., Austen, M.C., Mangi, S.C., 2010b. The value of marine biodiversity to the leisure and recreation industry and its application to marine spatial planning. Marine Policy 34, 868–875.

Rees, S.E., Austen, M.C., Attrill, M.J., Rodwell, L.D., 2012. Incorporating indirect ecosystem services into marine protected area planning and management. International Journal of Biodiversity Science, Ecosystem Services & Management 8, 273–285.

Rees, S., Fletcher, S., Glegg, G., Marshall, C., Rodwell, L., Jefferson, R., Campbell, M., Langmead, O., Ashley, M., Bloomfield, H., Brutto, D., Colenutt, A., Conversi, A., Earll, B., Hattam, C., Ingram, S., McKinley, E., Mee, L., Oates, J., Peckett, F., Portus, J., Reed, M., Rogers, S., Saunders, J., Scales, K., Wynn, R., 2013. Priority questions to shape the marine and coastal policy research agenda in the United Kingdom. Marine Policy 38, 531–537.

Rice, J., Arvanitidis, C., Borja, A., Frid, C., Hiddink, J.G., 2012. Indicators for sea-floor integrity under the European Marine Strategy Framework Directive. Ecological Indicators, 174–184.

Riesen, W., Reise, K., 1982. Macrobenthos of the subtidal Wadden Sea: revisited after 55 years. Helgoländer Meersunters, 409–423.

Secretariat of the Convention on Biological Diversity, 2004. Technical Advice on the Establishment and Management of a National System of Marine and Coastal Protected Areas. In: SCBD (Ed.), CBD Technical Series Number 13, pp. 40.

Sheehan, E.V., Gall, S.C., Cousens, S.L., 2012. Between the reefs: the occurrance of sessile organisms on pebbly-sand habitats in the Lyme Bay cSAC compared to areas open to fishing. A Report to the Wildlife Trusts. Marine Institute, Plymouth, pp. 11.

Smith, M.D., Wilen, J.E., 2003. Economic impacts of marine reserves: the importance of spatial behavior. Journal of Environmental Economics and Management 46, 183–206.

Smith, M.D., Sanchirico, J.N., Wilen, J.E., 2009. The economics of spatial-dynamic processes: Applications to renewable resources. Journal of Environmental Economics and Management 57, 104–121.

Sobel, J., Dahlgren, C., 2004. Marine Reserves. A Guide to Science, Design and Use. Island Press, Washington.

Somerfield, P.J., Clarke, K.R., Warwick, R.M., Dulvy, N.K., 2008. Average functional distinctness as a measure of the composition of assemblages. ICES Journal of Marine Science 65, 1462–1468.

The Council of the European Communities, 1992. Council Directive 92/43/EEC of 21 May 1992 on the Conservation of Natural Habitats and of Wild Fauna and Flora (The Habitats Directive). European Commission, pp. 66.

Thrush, S.F., Hewitt, J.E., Cummings, V.J., Dayton, P.K., Cryer, M., Turner, S.J., Funnell, G.A., Budd, R.G., Milburn, C.J., Wilkinson, M.R., 1998. Disturbance of the marine benthic habitat by commercial fishing: impacts at the scale of the fishery. Ecological Applications 8, 866–879.

Ulanowicz, R.E., 2002. The balance between adaptability and adaptation. BioSystems, 13–22.

Worm, B., Barbier, E.B., Beaumont, N., Duffy, J.E., Folke, C., Halpern, B.S., Jackson, J.B.C., Lotze, H.K., Micheli, F., Palumbi, S.R., Sala, E., Selkoe, K.A., Stachowicz, J.J., Watson, R., 2006. Impacts of biodiversity loss on ocean ecosystem services. Science 314, 787–790.

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Water Framework Directive Intercalibration Technical Report

Northern Lake Fish fauna ecological assessment methods

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Introduction

The European Water Framework Directive (WFD) requires the national classifications of good ecological status to be harmonised through an intercalibration exercise. In this exercise, significant differences in status classification among Member States are harmonized by comparing and, if necessary, adjusting the good status boundaries of the national assessment methods.

Intercalibration is performed for rivers, lakes, coastal and transitional waters, focusing on selected types of water bodies (intercalibration types), anthropogenic pressures and Biological Quality Elements. Intercalibration exercises were carried out in Geographical Intercalibration Groups - larger geographical units including Member States with similar water body types - and followed the procedure described in the WFD Common Implementation Strategy Guidance document on the intercalibration process (European Commission, 2011).

In a first phase, the intercalibration exercise started in 2003 and extended until 2008. The results from this exercise were agreed on by Member States and then published in a Commission Decision, consequently becoming legally binding (EC, 2008). A second intercalibration phase extended from 2009 to 2012, and the results from this exercise were agreed on by Member States and laid down in a new Commission Decision (EC, 2013) repealing the previous decision. Member States should apply the results of the intercalibration exercise to their national classification systems in order to set the boundaries between high and good status and between good and moderate status for all their national types.

Annex 1 to this Decision sets out the results of the intercalibration exercise for which intercalibration is successfully achieved, within the limits of what is technically feasible at this point in time. The Technical report on the Water Framework Directive intercalibration describes in detail how the intercalibration exercise has been carried out for the water categories and biological quality elements included in that Annex.

The Technical report is organized in volumes according to the water category (rivers, lakes, coastal and transitional waters), Biological Quality Element and Geographical Intercalibration group. This volume addresses the intercalibration of the Lake Northern Fish fauna ecological assessment methods.

C. Irish fish assessment system (FIL2)

An ecological classification tool (FIL2) suitable for establishing ecological status of lakes in Ireland based on fish population parameters has been recently developed to comply with the requirements of the Water Framework Directive. Agencies from the Republic of Ireland and Northern Ireland have contributed data from netting surveys and supporting information which was used in model development. A suite of metrics from native and non-native fish species were combined to derive a classification, using nutrients (total phosphorus and chlorophyll a) as the predominant pressure as this is the primary pressure on lakes in Ireland (Tierney *et al*, 2010)

Sampling Method

Fish sampling was conducted using standard Nordic monofilament multi-mesh benthic and surface survey gill nets. The gill netting procedure was in accordance with a modified version of the European standard multi-mesh gillnetting method (CEN, 2005) which was adapted by Inland Fisheries Ireland for WFD fish monitoring in Irish lakes (Kelly *et al*., 2008b). Fyke nets and surface floating survey gill nets were used to supplement the gill netting effort in all lakes. In some lakes (particularly high alkalinity lakes) the netting effort was supplemented with single panel multifilament survey gillnets (27.5 x 2.0m) of larger mesh sizes (60-70mm knot to knot). Fish data from 137 lakes (151 surveys) in the Republic of Ireland and Northern Ireland were used. 43 reference sites were included in the database.

FIL2 model

A lake typology relevant to fish populations in lakes from Ecoregion 17 was produced as part of the ecological classification tool development. Four lake types were determined based on fish metrics and abiotic variables from 43 "reference" lakes using cluster analysis and stepwise discriminant analysis. The specific lake fish typology categorised lakes into low (≤ 67 $CaCO_3$ mg L^{-1}) or high (> 67 $CaCO_3$ mg L^{-1}) alkalinity, and shallow (≤ 17m) or deep (> 17m) maximum depth.

The fish in lakes classification tool (FIL2) follows a multimetric predictive approach and assigns ecological status to a lake using a novel approach of two independent methods. FIL2 qualitatively defines a lake's ecological status based on fish metrics using discriminant classification rules and, using a generalised linear model, quantitatively derives an Ecological Quality Ratio (EQR, 0<EQR<1), along with associated 95% confidence intervals. It is recommended that both methods are used to validate output and cross-check and highlight potential misclassification. The results of the qualitative classification rule and quantitative EQR model were cross-tabulated at various cut-points in order to quantify class boundaries. A High lake was defined to be [0.76, 1]; Good [0.53, 0.76); Moderate [0.32, 0.53); and, Poor/Bad [0, 0.32).

An investigation was also carried out to assess if FIL2 could be used to classify lakes in Scotland. Initial results are positive and the Scottish Environmental Protection Agency is provisionally adopting the tool for use in Scotland.

The relationship between FIL2 and pressure

The mean EQR of lakes classified as 'reference' (0.71) during the tool development was significantly higher than those classified as 'impacted' (0.43) (Independent t-test, $P<0.001$) (Figure C.1). FIL2 EQR values were negatively correlated with both mean total phosphorus (Pearsons correlation, $r=-0.598$, $P<0.01$) and maximum chlorophyll a (Pearsons correlation, $r=-0.536$, $P<0.01$) (Figure C.2 and Figure C.3). There was also a significant difference in the EQR between each pressure index class (Independent samples Mann Whitney U test, High vs Good, $P<0.05$; Good vs Moderate $P<0.05$, Moderate vs Poor/Bad $P<0.05$; High vs Moderate $P<0.05$; High vs Poor/bad $P<0.05$; Good vs Poor/Bad $P<0.05$) (Figure C.4).

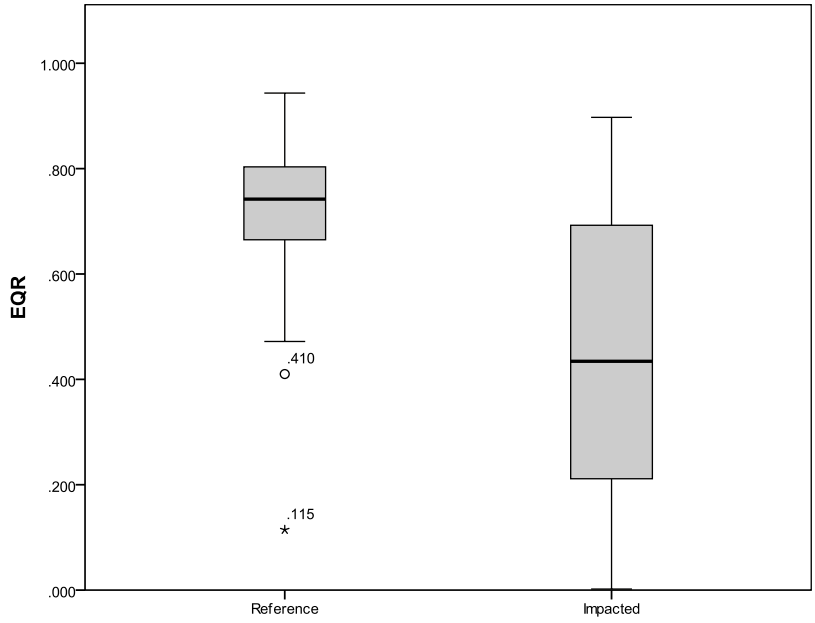

Figure C.1 Box and whisker plots of FIL2 ecological quality ratio (EQR) scores in reference and impacted lakes (minimum, 1st quartile, median, 3rd quartile and maximum).

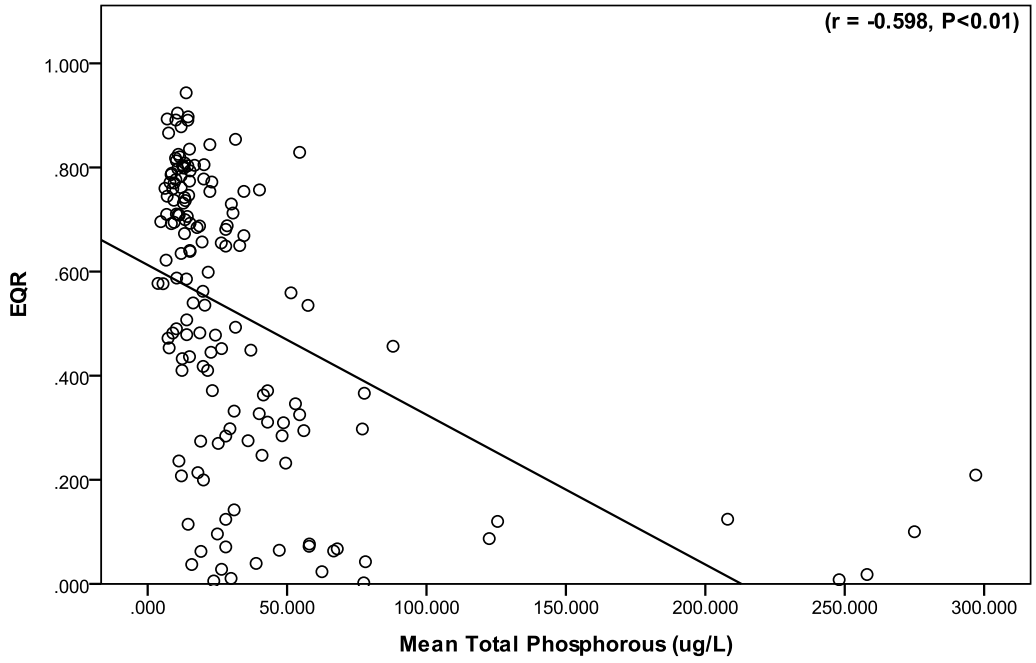

Figure C.2 FIL2 ecological quality ratio (EQR) scores versus total phosphorus (mean) in Irish lakes.

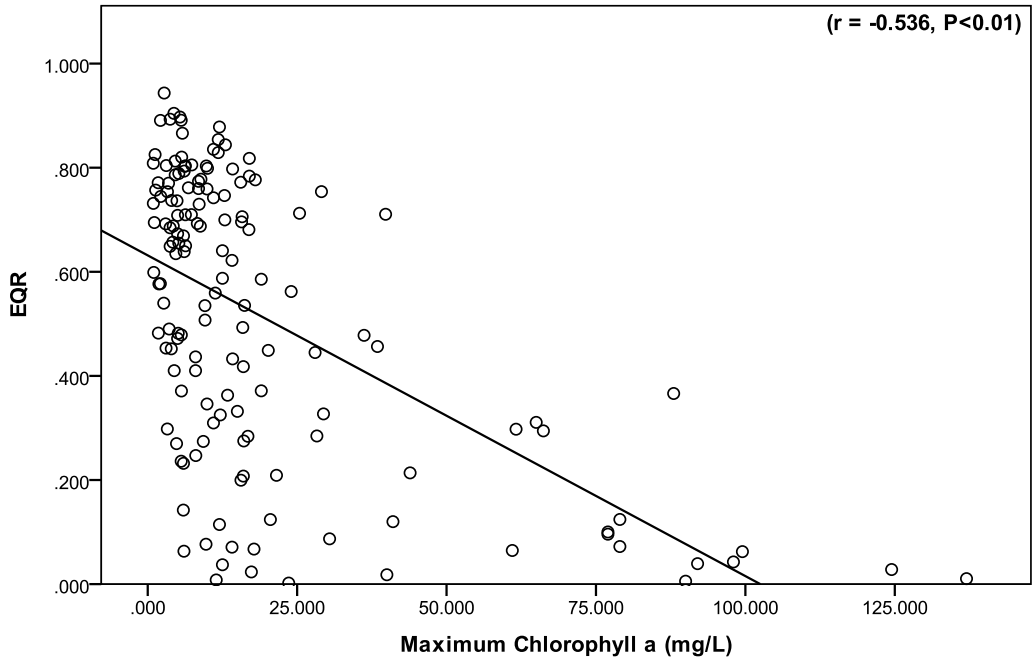

Figure C.3 FIL2 ecological quality ratio (EQR) scores versus chlorophyll a (maximum) in Irish lakes.

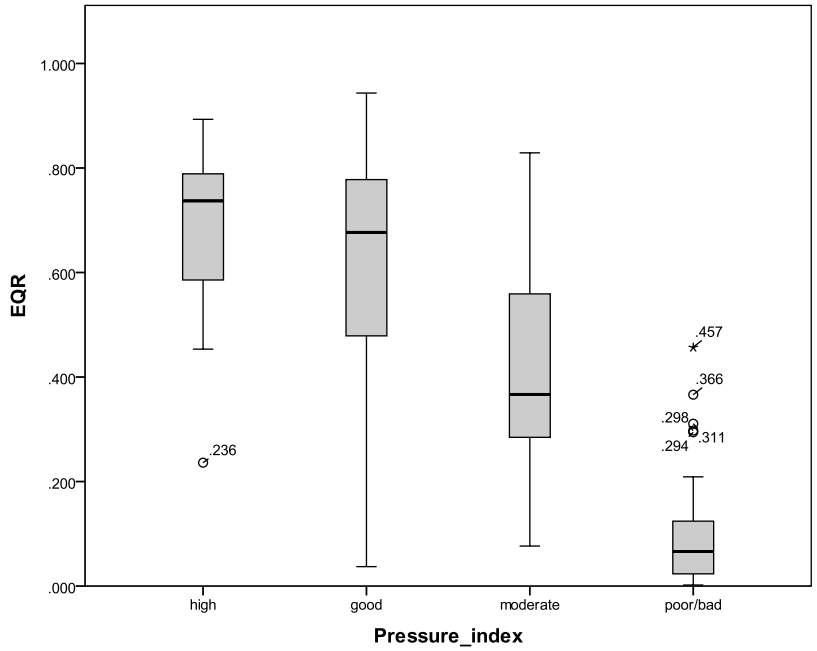

Figure C.4 Box and whisker plots of FIL2 ecological quality ratio (EQR) scores in relation to the pressure index in Irish lakes.

Boundary setting

The Irish assessment method FIL2 has a multimetric predictive approach and assigns ecological status to a lake using a novel approach of two independent methods. FIL2 qualitatively defines a lake's ecological status based on fish metrics using discriminant classification rules for each of the four typologies using a water quality gradient and, using a generalised linear model, quantitatively derives an Ecological Quality Ratio (EQR, $0<EQR<1$), along with associated 95% confidence intervals. Both methods are used to validate output and cross-check and highlight potential misclassification. A range of bounary values were investigated to determine the High/Good, Good/Moderate, Moderate/Poor and Poor/Bad boundaries. The results of the qualitative classification rule and quantitative EQR model were cross-tabulated at various cut-points (boundaries) in order to quantify the class boundaries. Each boundary was determined when the maximum correct classification from the cross tabulation of EQR ecological status class and discriminant analysis ecological status class was achieved for that ecological status class. This resulted in an overall correct classification between the EQR ecological status class and discriminant analysis ecological status class of 56.9%. Expert opinion was then used to verify if the boundaries and ecological status classes could be compared to the normative definitions according to WFD. In high status Irish lakes all type specific intolerant or disturbance sensitive species fish species (e.g. trout and char) are present and dominant. The species composition and abundance of these species corresponds to

undisturbed conditions. There was no observed failure in the reproduction or development of any particular species. In good status Irish lakes only a slight decrease in the type specific communities was observed and there was no observed failure in the reproduction or development of any species. In moderate status Irish lakes there was a moderate decrease in the type specific fish community and a moderate increase in the proportion of tolerant species (e.g. cyprinidae and percidae). Analysis showed that there appears to be an equal proportion of tolerant and sensitive species at the G/M boundary.

Description of the biological community representing the borderline conditions between good and moderate ecological status and between good and high ecological status

Method: Compare the fish community half a class over and half a class below the considered (H/G and G/M)

Ireland has a depauperate and distinctly young freshwater fish fauna compared with the rest of Europe. It is widely believed that Irish freshwaters were frozen to the point where there were no freshwater fish during the last glaciation, ending approximately 11,000 years ago. (Went 1949, 1950). This has resulted in a native fish fauna derived from salt tolerant, often migratory, ancestors that would have been able to colonise Irish freshwaters at the end of the last Ice Age. In addition to this native group there are non-native species present, very probably introduced by man over the past 1000 years for food, bait, sport or accidentally. The result is a highly patchy and discontinuous fish species distribution in Irish freshwaters, which is further and strongly influenced by a "who put what where when?" effect. A consequence of this history is that not all water bodies have been exposed to colonisation by all fish species present on the island. Rather, fish communities in Irish freshwaters tend to separate into three main groups; the first group contains mainly native species, primarily salmonids and is characteristic of upland or more isolated lakes. The second group contains native species, along with cyprinids, perch and pike. The third group, typical of lowland lakes linked by river and canal systems, contains no (or a limited number of) native species and is dominated by cyprinids, perch and pike (Kelly et al., 2008a). Therefore it is quite difficult to describe the fish communities representing the borderline conditions between high and good and food and moderate status for Iriah lakes.

Mean TOTAL_BPUE, mean TOL_%_BIO (% BPUE tolerant fish species) and mean INTOL_%_BIO (% BPUE of intolerant fish species) were calculated for each EQR half class for each lake (Figure C.5 and Figure C.6). Data analysis shows that there was a continuous increase in TOTAL_BPUE in relation to decreasing ecological status/decreasing water quality (Figure C.4). Statistical analysis revealed that TOTAL_BPUE was significantly different between the high-good boundary and the good-moderate boundary (Independent samples Mann Whitney U test; Hlwr vs Gupr $P<0.05$; Glwr vs Mupr $P<0.05$).

Intolerant fish species (such as brown trout and Arctic char) were the dominant fish species in High and Good status lakes (Figure C.6). Nutrient enriched lakes (moderate and poor/bad) were characterised by a higher biomass of tolerant fish species than intolerant fish species. Analysis also showed that in general intolerant fish species

decreased and tolerant fish species increased in relation to in relation to decreasing ecological status (Figure C.6). Although there was no significant difference between the high-good (hlwr/gupr) and good-moderate (glwr/mupr) boundaries for intolerant and tolerant fish species (% bpue), the mean tol_%_BIO at Hlwr was slightly lower than at Gupr and Glwr was also lower than Mupr Figure C.6). For mean intol_%_bio the hlwr was greater than the gupr and glwr was greater than mupr (Figure C.6).

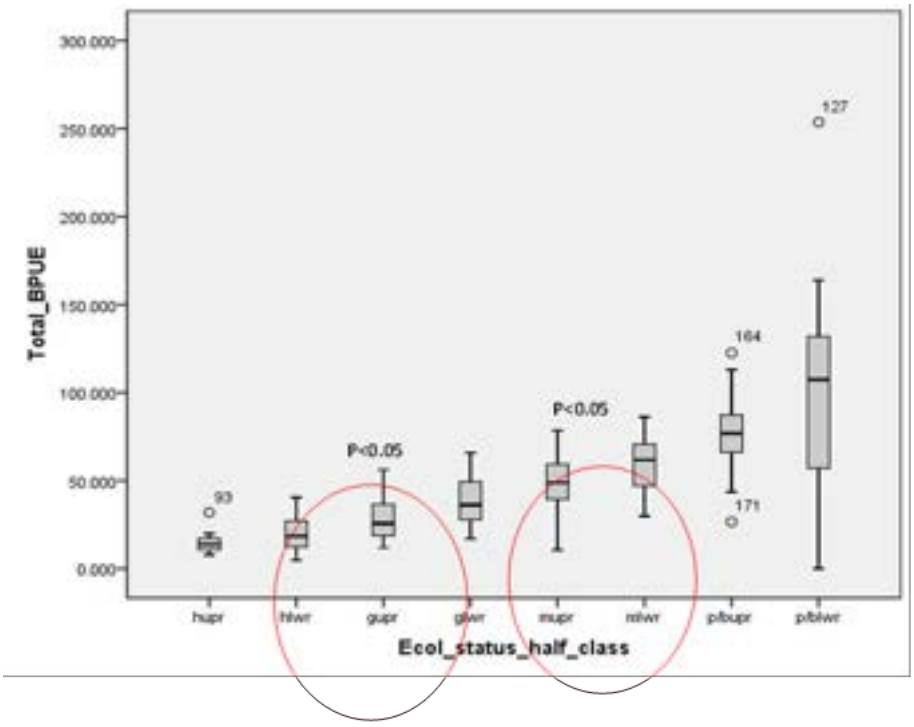

Figure C.5 TOTAL_BPUE (all fish species) vs ecological status (as indicated by half class boundaries) in Irish lakes. N=176).

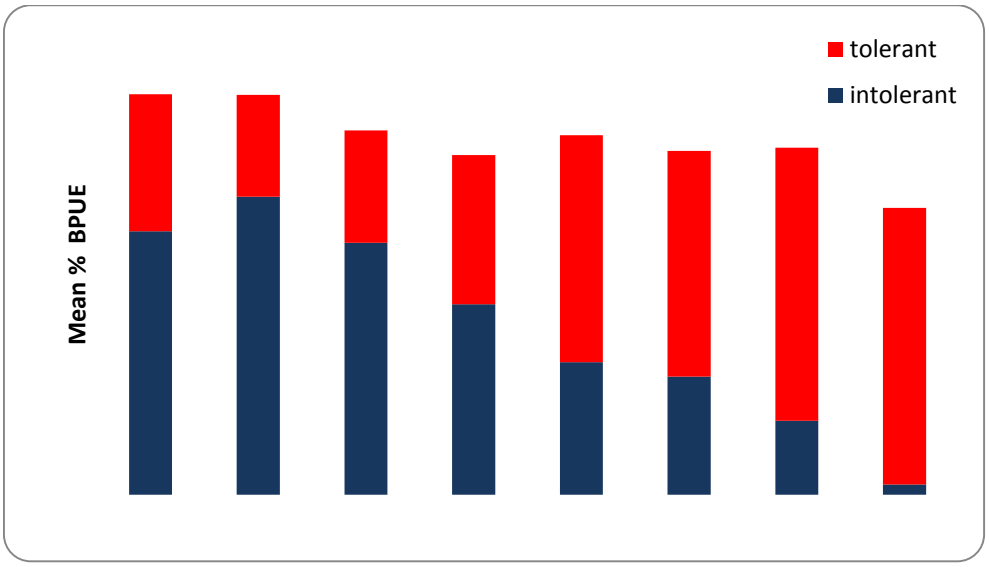

Figure C.6 Mean percentage BPUE of tolerant and intolerant fish species in Irish lakes in relation to ecological status (as indicated by half class boundaries) N=176.

References

Allen, M. and Rosell, R. (2011) Classification tool for Fish in Lakes. Final report, commissioned by Inland Fisheries Ireland.

CEN (2005) Water Quality –Sampling of fish with multi-mesh gill nets. Document CEN EN 14757

Kelly, F., Harrison, A., Connor, L., Allen, M., Rosell, R. and Champ, T. (2008b) North South Shared Aquatic Resource (NS Share) Lakes Project: FISH IN LAKES, Task 6.9: Classification Tool for Fish in Lakes. Final Report. (www.nsshare.com).

Kelly, F.L., Allen, M., Harrison, A., Connor, L. and Rosell, R. (submitted for publication) Development and Application of an Ecological Classification Tool for Fish in Lakes in Ireland (Ecoregion 17).

Tierney D., Free G., Kennedy B., Little R., Plant C., Trodd W. & Wynne C. (2010) Water Quality of Lakes .In: M. McGarrigle, J. Lucey & M. Cinnéide (eds.) Water Quality in Ireland 2007 to 2009. Environmental Protection Agency, Ireland.

Iascach Intíre Éireann
Inland Fisheries Ireland

Designated Salmonid Waters Byelaw
Submission to Public Consultation

August 2021

Author(s):	Inland Fisheries Ireland
Description of Content:	Submission to Department of the Environment, Climate and Communications

Byelaw Proposal

On page 66 of the programme for Government it states that the government intends to "Legislate to designate our western lakes as salmonid lakes".

IFI welcomes the Government's commitment to recognise these exceptional limestone lakes which are unique in Europe as salmonid – in particular wild brown trout - lakes. The intention of the designation of these lakes as 'salmonid' lakes from IFI's perspective needs to be fully explained. This requires some background.

Background:

Since the 1950's, and probably before, the main large limestone lakes of Ireland were selectively managed as wild brown trout fisheries. Few countries have such a unique resource whereby there is adequate spawning in clean rivers for wild trout to breed and this is complimented by limestone lakes with extensive stoneworth (*Charaphyte sp*) beds in which an abundance of invertebrate life exists on which the wild trout, which migrate down from the nursery streams, feed and grow quickly.

In the earlier years the fish fauna of these lakes was less diverse – over time more species appeared in these lakes as a result of anthropogenic activity and as a consequence most of these lakes have additional non-native species competing with the trout for food.

Under the management of the Inland Fisheries Trust all the large limestone lakes – some of which were originally known as the 'Crown Lakes' were managed selectively for wild brown trout angling. This entailed removing predator and competitor species as part of a management programme. It is IFI's policy and intention that the lakes in the Schedule to this draft bye-law will continue to be managed into the future with the reduction, through both angling and direct management, of both competitor and predator species into the future.

Proposed Designation:

The designation of these lakes is welcomed by IFI but should be simple. They are already designated in terms of the established management policy of Inland Fisheries Ireland and the agencies that preceded it such as the Central and Regional Fisheries Boards and the Inland Fisheries Trust and also marketing of these lakes as wild brown trout fisheries. However, there was never formal recognition of this. In the view of IFI, it is unclear that this byelaw, as currently drafted, actually achieves the intent of IFI to protect these lakes and enshrine their management in such a manner that they are primarily wild brown trout fisheries and competing or predator species shall be removed to improve the opportunity for trout to survive and grow.

On another detail, in view of the fact that some of the lakes in question are remote from the sea and have no migratory salmon component to their population – the byelaw would be best worded to specify wild brown trout as opposed to salmonid.

Conflicting Byelaws:

One of the over-riding concerns of Inland Fisheries Ireland in the past 15 years was the fact that two bye-laws introduced in 2006, (specifically to prohibit the widescale harvest of pike and coarse fish from certain waters in Ireland), was directly in conflict with the management policy of the then Central and Regional Fisheries Boards. This was intended as a 'stop-gap' measure to address a particular threat – but the anomaly caused by these byelaws in respect of the management and marketing of the Great Western Lakes as wild brown trout fisheries has continued for an inordinate period of time. The proposal to designate these lakes as salmonid (or wild brown trout) lakes must address this inconsistency once and for all.

It is evident that unless the lakes in the Schedule to the draft byelaw are excepted from the provisions of the two Byelaws – namely Byelaw 806 and Byelaw 809 of 2006 the byelaw as it stands does not achieve its stated aim of protecting the wild brown trout status of the lakes. In fact these byelaws have resulted in fish species which have become 'naturalised' in these lakes are now afforded equal protection to the native species which have been there since the retreat of the last ice age. This is contrary to the aims of the Habitats Directive and fisheries legislation in general.

Stock Assessments, Carrying Capacity and Angling Returns:

The draft byelaw as currently stated also appears to bind IFI into a massive undertaking in terms of regular stock assessments of all the lakes in the schedule (7) including most of the largest lakes in the country and such an assessment will also require surveys of all feeder rivers and streams. This will require very significant additional resources for IFI to be able to deliver on this component annually. Coupled with the assessment of the stocks IFI will be required to identify the carrying capacity of the lakes, the current stock and the 'harvestable surplus' available to anglers. IFI have never done such a detailed stock assessment for any of these lakes previously and the cost of such a commitment into the future for seven lakes will be very substantial.

The logical extension from this would be that the complimentary element to this will be an assessment of the fishing effort and catch of trout on the lakes in question. Previously voluntary "Creel Census" returns were introduced for some of these lakes but with limited success. Creating a system for all anglers to make required returns will be another significant administrative burden and may be seen by some as the precursor to the introduction of a 'fee or licence for trout angling' on these lakes which, it is clear, will never be an acceptable funding mechanism.

Without the substantial additional resources annually to carry out all these requirements IFI will not be in a position to fulfil the terms of the byelaw. This may lead to IFI being in breach of the byelaw which would be an unacceptable scenario. Furthermore, the byelaw as currently worded empowers the Minister – a politically elected public representative to amend the plans of IFI – prepared by fishery management professionals and scientists 'as he sees fit'. This leaves the future

management of these vitally important lakes open to potential pressure for change from lobby groups and takes it away from professional fisheries managers where such expertise exists and should remain.

Summary & Recommendations:

In the light of the foregoing IFI propose that a more manageable approach be adopted. One that addresses the fundamental anomalies of the 2006 byelaws and also encourages anglers to play their part in the future management of the lakes.

IFI believes this matter would benefit from further discussion and debate prior to finalising the wording of the proposed byelaw. This should involve detailed discussion with the relevant stakeholders in particular the local resident, local anglers, key tourist interests including guides, angling centres as well as local angling clubs. The buy-in from these sectors is fundamental to the success of the future management of these lakes. However, should that approach not be possible at this stage IFI proposes that the byelaw be amended to include the following:

(1) Calling the byelaw the Designated Wild Brown Trout Waters Bye-Law .....

(2) Defining "designated waters" as means the waters designated as wild brown trout waters under Article 3; which shall be managed by Inland Fisheries Ireland specifically for wild brown trout (Salmo trutta) in all its forms and subspecies.

(3) Defining "wild brown trout" as meaning fish of the species (Salmo trutta) including Ferox, Sonaghan and Gillaroo trout.

(4) Specifying that the designated waters shall be managed specifically as premier wild brown trout fisheries. Management shall include the unrestricted removal of predator and competitor species either by direct management or angling.

(5) Exempting the waters in the schedule from the provisions of Byelaw 806 of 2006 – for example:- The waters in Schedule 1 Column 2 of this byelaw shall be excluded from the bag limit and size provisions of byelaw 806 of 2006 namely a person may take (by angling) and kill more than 4 coarse fish and including fish less than or greater than 25 cms measured in a straight line from the tip of the snout to the fork of the tail.

6. Exempting the waters in the schedule from the provisions of Byelaw 809 of 2006 – for example:- The waters in Schedule 1 Column 2 of this byelaw shall be excluded from the bag limit and size provisions of byelaw 809 of 2006 namely a person may take (by angling) or kill more than one

pike including pike less than or greater than greater than 50 cms measured in a straight line from the tip of the snout to the fork of the tail.

7. Include a general provision for the proper management of the fishery – i.e. - IFI shall do whatever it deems necessary for the proper management of the lakes in Schedule 1 as wild brown trout fisheries.

8. Leave the transfer provision in the proposed regulation:- (a) A person shall not put or transfer into the designated waters fish of any species without the prior written consent of IFI. (b) An application for the prior written consent of IFI referred to in paragraph (a) shall be made in writing to IFI.

STATUTORY INSTRUMENTS.

S.I. No. 384 of 2022

EUROPEAN UNION HABITATS (LOUGH CORRIB SPECIAL AREA OF CONSERVATION 000297) REGULATIONS 2022

S.I. No. 384 of 2022

EUROPEAN UNION HABITATS (LOUGH CORRIB SPECIAL AREA OF CONSERVATION 000297) REGULATIONS 2022

I, DARRAGH O'BRIEN, Minister for Housing, Local Government and Heritage, in exercise of the powers conferred on me by section 3 of the European Communities Act 1972 (No. 27 of 1972) and for the purpose of giving further effect to Council Directive 92/43/EEC of 21 May 1992[1], hereby make the following regulations:

Citation

1. These Regulations may be cited as the European Union Habitats (Lough Corrib Special Area of Conservation 000297) Regulations 2022.

Interpretation

2. (1) In these Regulations -

"Directive" means Habitats Directive within the meaning of the Regulations of 2011;

"Minister" means Minister for Housing, Local Government and Heritage;

"Regulations of 2011" means European Communities (Birds and Natural Habitats) Regulations 2011 (S.I. No. 477 of 2011);

"Special Area of Conservation" means the area designated under Regulation 3 as a Special Area of Conservation.

(2) In these Regulations a word or expression that is used in these Regulations and is also used -

(*a*) in the Regulations of 2011 shall, unless the contrary intention is expressed, have in these Regulations the meaning that it has in the Regulations of 2011, or

(*b*) in the Directive shall, unless the contrary intention is expressed, have in these Regulations the meaning that it has in the Directive.

Designation of Special Area of Conservation

3. (1) Having taken account of the matters referred to in Article 4 of the Directive and having been adopted by the European Commission in accordance with the procedure laid down in Article 4(2) of the Directive, the area identified by reference to the map contained in Schedule 1 and further referred to in Schedule 2 is designated as a Special Area of Conservation, in accordance with Article 4(4) of the Directive, in order to ensure the protection of natural

[1] OJ No. L206, 22.07.1992, P. 7

Notice of the making of this Statutory Instrument was published in "Iris Oifigiúil" of 2nd *August,* 2022.

habitats and species in Annex I and II to the Directive, including in particular the natural habitat type and animal and plant species specified in Schedule 3.

(2) The Minister shall, in accordance with the Regulations of 2011, establish and publish such particular conservation objectives as he or she, from time to time, considers necessary for the Special Area of Conservation with regard to the natural habitat type and animal and plant species specified in Schedule 3.

Matters relating to maps

4. (1)(*a*) The indicative map contained in Schedule 1 showing the boundary of the Special Area of Conservation shall be drawn to such convenient scale as the Minister thinks fit and sealed and shall be deposited in the offices of the Minister.

(*b*) The Minister may prepare more detailed maps, in such convenient number of separate sheets as the Minister thinks fit, showing the boundary of the Special Area of Conservation and shall seal each of the maps and shall deposit them in the offices of the Minister.

(*c*) Any dispute involving the boundaries of the Special Area of Conservation shall be determined by reference to maps prepared under this subsection in relation to the area.

(2) (*a*) A map referred to in paragraph (1) when so deposited in the offices of the Minister shall be retained in such offices and the map, or a true copy of it, shall be open for inspection free of charge in such offices by any person at any time at which the offices are open for the transaction of public business.

(*b*) The Minister may cause to be prepared and supplied to any person so requesting a true copy of a map deposited with the Minister under paragraph (1)(a) or (b) or any particular part or sheet of it and to charge for such copy such sum to cover administrative costs as the Minister decides.

Activities requiring consent

5. (1) Subject to paragraph (2), a person shall not carry out, cause or permit to be carried out or continue to carry out, or assist in carrying out, any activity specified in Schedule 4 within the Special Area of Conservation except with, and in accordance with, consent given by the Minister under Regulation 30 of the Regulations of 2011, upon application in writing to the Minister to carry out the activity.

(2) There is no requirement upon a person to obtain the consent of the Minister under paragraph (1) where a proposed activity or continued activity referred to in that paragraph -

(*a*) is one that requires consent or consents under one or more of the enactments set out in the Second Schedule to the Regulations of 2011 or under the Planning and Development Acts 2000 to 2015 and the activity is carried out with and in compliance with such consent or consents,

(*b*) is part of a project that has received consent under one or more of the enactments set out in the Second Schedule to the Regulations of 2011 or under the Planning and Development Acts 2000 to 2015 and the project or activity is carried out with and in compliance with a consent or consents given under the applicable statutes,

(*c*) is part of a project that has received consent under one or more regulations made under the European Communities Act 1972 or under one or more regulations made under any of the enactments set out in the Second Schedule to the Regulations of 2011 and the project or activity is carried out with and in compliance with such consent, or

(*d*) has been authorised as part of an agreed farm or land management plan.

(3) A person affected by a decision to refuse to give consent, to attach or vary conditions or revoke a consent under Regulation 30 of the Regulations of 2011, in respect of an activity referred to in paragraph (1), may appeal the decision under Regulation 37(3) of the Regulations of 2011.

Offence and proceedings

6. (1) A person who carries out, causes or permits to be carried out, or assists in the carrying out of an activity referred to in Regulation 5(1), without a consent or otherwise than in accordance with a consent given by the Minister under Regulation 30 of the Regulations of 2011, commits an offence and is liable -

(*a*) on summary conviction, to a class A fine or to imprisonment for a term not exceeding 6 months, or both, or

(*b*) on conviction on indictment, to a fine not exceeding €500,000 or to imprisonment for a term not exceeding 3 years, or both.

(2) In imposing a penalty under paragraph (1), the court shall, in particular, have regard to the risk or extent of injury to the environment arising from the act constituting the offence.

(3) Proceedings for an offence under paragraph (1) may be brought summarily by -

(*a*) the Minister,

(*b*) the public authority concerned, or

(*c*) a member of the Garda Síochána, in accordance with section 8 of the Garda Síochána Act 2005.

(4) Any fine in respect of an offence prosecuted summarily by a public authority shall be paid to that public authority.

Offence - body corporate

7. (1) Where an offence under Regulation 6 is committed by a body corporate and is proven to have been so committed with the consent, connivance or approval of or to have been attributable to the wilful neglect on the part of any person, being a director, manager, secretary or other officer of the body corporate or a person who was purporting to act in any such capacity, that person, as well as the body corporate, commits an offence and is liable to be proceeded against and punished as if he or she were guilty of the first-mentioned offence.

(2) Where the affairs of a body corporate are managed by its members, paragraph (1) applies in relation to the acts and defaults of a member in connection with his or her functions of management as if he or she were a director or manager of the body corporate.

Costs of prosecutions

8. Where a person is convicted of an offence under Regulation 6, the court shall, unless it is satisfied that there are special and substantial reasons for not so doing, order the person to pay to the prosecutor the costs and expenses, measured by the court, incurred by the prosecutor or other person in relation to the investigation, detection and prosecution of the offence, including costs and expenses incurred in the taking of samples and the carrying out of tests, examinations and analyses.

Authorised officers

9. A person appointed as an authorised officer under Regulation 4 of the Regulations of 2011 for the purposes of ensuring compliance with these Regulations may exercise the powers of an authorised officer under Part 2 of the Regulations of 2011.

Sceideal 1 / Schedule 1

LIMISTÉAR FAOI
CHAOMHNÚ SPEISIALTA
SPECIAL AREA OF CONSERVATION

Limistéar faoi Chaomhnú Speisialta
Special Area of Conservation

Rialachán 4(1)(b) Innéacs Mapa Mionsonraithe
Regulation 4(1)(b) Detail Map Index

LCS Loch Coirib
Lough Corrib SAC

000297

Achar / Area 24,956.62 ha

Co. na Gaillimhe, Co. Mhaigh Eo agus Co. Ros Comáin
Co. Galway, Co. Mayo and Co. Roscommon

Córas Comhordaithí: Trasfhorpaí Meicheár na hÉireann / Co-ordinate System: Irish Transverse Mercator

Leagan / Version: 3.16

Arna chló an / Printed on: 09/03/2022

Schedule 2

Regulation 3

Description of area designated as a Special Area of Conservation

The area known as Lough Corrib Special Area of Conservation 000297 is situated in the counties of Galway, Mayo and Roscommon being the land and waters enclosed on the map (contained in Schedule 1) within the inner margin of the red line and hatched in red and is situated in whole or in part in the townlands of Abbert, Abbert Demesne, Abbey (E.D. Abbey West), Abbeyland North, Abbeyland South, Addergoole More, Ahgloragh, Airgloony, Áit Tí Seonac, An Baile Ard, An Charraig Láir, An Charraig Thiar, An Charraig Thoir, An Cheathrú Gharbh [T: Conga], An Cloigeann, An Currach Mór [T: Baile Chláir], An Ghráinseach [T: Eanach Dhúin], An Laighdeacán [T: An Carn Mór], An Móinín Mór, An Móinteach Theas, An Móinteach Thuaidh, An Pollach [T: Bearna], An Pollach [T: Maigh Cuilinn], An Saighleán [T: Ceathrú an Bhrúnaigh], An tArdán Thiar, An tArdán Thoir, An tÁth Buí [T: Bearna], An tÁth Buí [T: Maigh Cuilinn], An tEanach Thiar, An tEanach Thoir, An tSeanchill [T: Eanach Dhúin], Anbally, Annagh (E.D. Kilmoylan), Annaghbeg (E.D. Letterfore), Annaghkeelaun, Annaghkeen, Annaghwood, Ard, Ard na Gaoithe, Ardcloon, Ardfintan, Ardnasillagh, Ardskea Beg, Ardskea More, Aughnanure, Baile an Bhrúnaigh, Baile an Dúlaigh, Baile Chláir, Baile Dhúlocha, Baile Uí Chuirc Thiar, Baile Uí Chuirc Thoir, Baile Uí Laoigh [T: Eanach Dhúin], Ballaghalode, Ballinderry (E.D. Ballinderry), Ballinduff (E.D. Ballinduff), Ballinlass (E.D. Carrownagur), Ballybanagher, Ballybaun (E.D. Derryglassaun), Ballybrone, Ballyedmond, Ballygaddy, Ballygally, Ballyglass (E.D. Cappalusk), Ballyglooneen, Ballyhale, Ballykeaghra, Ballymary, Ballymoney North, Ballynaboorkagh, Ballynacreg South, Ballynacregga, Ballynahallia, Ballynakilla (E.D. Killererin), Ballywataire, Banagher, Barbersfort, Barnaboy (E.D. Headford), Barnagorteeny, Barr Eanaigh, Barratleva, Barrusheen, Baunoges North, Baunoges South, Bealnalappa, Bellaconeen, Boghilmore Island, Boyounagh Beg, Bracklagh (E.D. Raheen), Breanra, Brooklodge Demesne, Brownes Island, Bullaun (E.D. Kilmoylan), Burnthouse or Bleanoran, Bushypark, Cahergal (E.D. Killererin), Cahernahoon, Cahernashilleeny, Callownamuck, Canrawer East, Canrawer West, Cappagarriff, Cappanalaurabaun, Cappantruhaun, Cargin, Carrowferrikeen, Carrowkeelanahglass, Carrowmacowan, Carrowmanagh (E.D. Oughterard), Carrowmore (E.D. Abbey East), Carrowmore (E.D. Derryglassaun), Carrowmoreknock, Carrowntomush, Carrowntootagh, Cartron (E.D. Milltown), Cartronroe, Cashel (E.D. Boyounagh), Castle, Castlefarm, Castlemoyle, Castletown (E.D. Killeen), Cathair Ghabhann, Ceapach Chorcóige Thiar, Ceapach Chorcóige Thoir, Cill Torróg, Cinn Uisce, Claídeach [T: Maigh Cuilinn], Clare, Claremount, Claretuam, Clashaganny (E.D. Doonbally), Clashard, Claureen, Clerhaun, Clogh, Clonbern, Clonkeenkerrill, Cloonagawnagh, Cloonagh (E.D. Dunmore South), Cloonaghgarve, Cloonarkan, Cloonascragh (E.D. Cooloo), Cloonascragh (E.D. Tuam Rural), Cloonboo Beg, Cloonbrusk (E.D. Addergoole), Cloonconra (E.D. Hillsbrook), Clooncurreen, Cloondahamper (Blake), Cloondahamper (Brown), Cloondarone, Cloondergan, Clooneen (E.D. Dunmore South), Cloonfane, Cloonfush, Clooninagh, Cloonkeely, Cloonkeen (E.D. Abbey East),

Cloonkeen North, Cloonkeen South, Cloonlusk, Cloonmore (E.D. Carrownagur), Cloonmore (E.D. Claretuam), Cloonmore (E.D. Wormhole), Cloonmoyle, Cloonnacat, Cloononaghaun, Cluain Brón, Cluain Bú, Cluain Duibh, Cluain na Binne, Cluid, Clydagh (E.D. Killursa), Coill Uachtair, Colmanstown, Common (E.D. Claretuam), Common (E.D. Kilmoylan), Conagher, Cooladooaun, Coolanillaun, Coolaran, Coolfowerbeg, Coolrevagh, Coosaun, Corbally North, Corbally South, Cordarragh, Cormacuagh East, Cormacuagh West, Cornacartan, Cornaminaun, Corr na Móna, Corralea (E.D. Levally), Corrandrum, Corranellistrum, Corrofin, Corskeagh Beg, Corskeagh More, Creevaghbaun, Cregcarragh, Cregg (E.D. Oughterard), Cregmore (E.D. Lisheenavalla), Cromghlinn Thiar, Cromghlinn Thoir, Cuddoo East, Cuddoo West, Cúil Each [T: Mionlach], Culliagh North, Cummer, Curra, Curraghaun (E.D. Addergoole), Curraghaun (E.D. Killeen), Curraghcreen (E.D. Levally), Curraghduff East, Curraghduff Middle, Curraghduff West, Curraghmore (E.D. Killursa), Currarevagh (E.D. Letterfore), Curraun Beg, Curraun More, Curraveha or Birchhall, Currawatia, Daley's Island, Dalgin, Dangan Lower, Darrary South, Dawros, Dawros Lower, Derradda (E.D. Oughterard), Derreenmeel, Derreighter, Derroogh, Derroura, Derryherbert (E.D. Letterfore), Devinish Island, Drimnahoon, Drimneen (E.D. Oughterard), Droim na Gaoithe, Droim Snámha, Drum (E.D. Milltown), Drumminnakill, Dubhachta, Dunmore, Dúráithe, Dúros [T: Conga], Eadargúil [T: Eanach Dhúin], Eadargúil [T: Maigh Cuilinn], Eanach Dhúin, Eighterard, Farnocht, Farravaun (E.D. Letterfore), Fartamore, Fortbrown, Fough East, Fough West, Freeheen Island, Gallcharrick Island, Gardenfield, Garraun (E.D. Killererin), Garraunbaun (E.D. Clonbern), Gaterstreet, Gilkagh, Ginnaun, Gleann Loiscthe, Glengowla East, Glengowla West, Glennamucka, Gort an Chalaidh, Gort an Chalaidh, Gort an tSléibhe [T: An Carn Mór], Gortaganny (E.D. Boyounagh), Gortaghokera, Gortdrishagh (E.D. Oughterard), Gorteen (E.D. Cappalusk), Gorteen (E.D. Carrownagur), Gorteendrishagh, Gorterwulla, Gortgarrow, Gortmore (E.D. Wormhole), Gortnaglogh (E.D. Monivea), Gortnagoyne, Gortnaloura, Gortnashingaun, Gowlaun (E.D. Letterfore), Grange (E.D. Dunmore South), Grange (E.D. Killererin), Grange East, Grange West, Greenfield or Shanbally, Gurlaun Island, Hillswood East, Illaunaragh, Illaunavee, Illauncarbry, Illaunfadda, Illaunfadda Beg, Illaunfadda More, Illaunmahon, Illaunnafinnoge, Illaunnagower, Illaunnashinnagh, Illaunroe (E.D. Ballinderry), Inchagoill, Inchiquin, Inis Camáin, Inis Dúrois, Inis Mhic an Trír, Inish, Inishcunnia, Inishflynn, Inishgarraun Beg, Inishgarraun More, Islandmore (E.D. Lisheenavalla), Joyces Park, Keekill, Kentfield, Kid Island, Kilbeg (E.D. Killursa), Kilbeg (E.D. Monivea), Kilcloggaun, Kilcloghans, Kilcloony (E.D. Doonbally), Kilcreevanty, Kilgarriff, Kilgevrin, Killaclogher, Killaguile, Killaloonty, Killeelaun, Killeen (E.D. Barna), Killeighter, Killerneen, Killuney, Kilmore (E.D. Killererin), Kilmore (E.D. Tuam Rural), Kilphrasoga, Kiltrasna, Kinnakinelly, Knock North, Knockatee East, Knockatee West, Knockaunkeel, Knockbaun (E.D. Oughterard), Knockcorrandoo, Knockdoebeg East, Knockkillaree, Lack, Lackadunna Island, Lackagh Beg, Lackagh More, Lackavrea, Laghtgannon, Largan, Larragan, Laughil (E.D. Cloonkeen), Lee's Island, Lehid (E.D. Kilbennan), Lemonfield, Lenamore (E.D. Tiaquin), Lettercraff, Levally East, Levally West, Liagán [T: Tulaigh Mhic Aodháin], Lisheennageeha, Lisheennaheltia, Lisín an Óráin, Liskeevy, Lisnaminaun, Liss (E.D. Abbey East), Lissybroder, Lissyconor, Luimnagh East, Luimnagh West,

Maghera Beg, Mahanagh (E.D. Ballinderry), Mahanagh (E.D. Clonbern), Maigh Cuilinn, Meelick More, Meelick West, Meelickbeg, Menus, Milltown (E.D. Milltown), Mionlach, Monivea Demesne, Mountross, Moyvoon East, Muckcoort, Muckrush Island, Mucrois, Na Croisíni, Newcastle (E.D. Graigabbey), Newcastle (Rathún Ph), Newtown (E.D. Abbey East), Oileán an Aoil, Oileán Mhatha Bhreatnaigh [T: Eanach Dhúin], Oileán na gCoiníní [T: Eanach Dhúin], Oileán na mBráthar [T: Maigh Cuilinn], Omaun Beg, Omaun More, Ordnance Ground, Ower (E.D. Killursa), Ower (E.D. Wormhole), Páirc na bhFia [T: An Fhairche], Park (E.D. Wormhole), Parkacurry, Parkbaun (E.D. Raheen), Patch (E.D. Raheen), Pollacappul (E.D. Hillsbrook), Pollacorragune, Pollacrossaun, Pollaturick, Pollawarla, Pollbaun, Polldarragh, Polleighter, Pollnamal, Porridgetown East, Portacarron, Portdarragh, Potato Islands, Rabbit Island (E.D. Oughterard), Rabbit Island North, Raha, Rinn na hAirne, Rinnaknock, Rinnerroon, River Island, Ross (E.D. Headford), Rusheeny (E.D. Oughterard), Russelstown, Ryehill Demesne, Sceach Liag, Shanballymore (E.D. Cappalusk), Shanballymore (E.D. Oughterard), Shannawagh, Shantallow (E.D. Killererin), Shoodaun, Shrub Island, Shrulegrove, Skehanagh (E.D. Derryglassaun), Slieve, Slieveroe (E.D. Killursa), Srue, Stowelodge, Straw Island, Timadooaun, Tír an Fhia [T: Conga], Tír na Cille Theas, Tír Oileáin, Togher Beg, Tom na Sraithe, Tom Naíonán, Tonacurragh, Tonamace (E.D. Kilmoylan), Tonlegee (E.D. Belclare), Tonmoyle, Tulaigh Mhic Aodháin, Tullyvrick, Turloughcartron, Turloughmartin, Ummeracly East, Ummeracly West, Walsh's Island (E.D. Killeany), Whitemare's Island, Willyrogue Island, Woodfield (E.D. Carrownagur) and Woodquay in County Galway and Ballinvilla (E.D. Kilvine), Ballycurrin Demesne, Ballykilleen, Ballymacgibbon North, Ballymacgibbon South, Ballynalty, Brodullagh South, Carheens (E.D. Houndswood), Carrownlough, Castletown (E.D. Houndswood), Cloonbanaun, Cordroon, Corgarve, Creevard, Creeveeshel, Culnacleha, Derry (E.D. Houndswood), Derrynamuck (E.D. Culnacleha), Doonmacreena, Gortacurra, Gortatober, Gortbrack (E.D. Shrule), Kilvine, Kinlough, Lackafinna, Lislaughera, Moyne (E.D. Shrule), Ramolin, Shrule, Strandhill and Toorard (E.D. Shrule) in County Mayo and Cloonfad East, Cloonfad West, Cornabanny, Curragh, Fiddaun, Hundred Acres, Meeltraun (Daniel Kelly), Meeltraun (Denis Kelly), Meeltraun (Wills), Mountdelvin, Pollanalty East, Pollanalty West, Pollaphuca and Swinefield in County Roscommon.

Schedule 3

Regulation 3

Natural habitat type and animal and plant species lists

Natural Habitat Type

In this list the sign [*] *indicates a priority habitat type as defined in the Directive.*

Natura 2000 Code	**Description**
3110	Oligotrophic waters containing very few minerals of

	sandy plains (Littorelletalia uniflorae)
3130	Oligotrophic to mesotrophic standing waters with vegetation of the Littorelletea uniflorae and/or Isoeto-Nanojuncetea
3140	Hard oligo-mesotrophic waters with benthic vegetation of *Chara* spp.
3260	Water courses of plain to montane levels with the Ranunculion fluitantis and Callitricho-Batrachion vegetation
6210	Semi-natural dry grasslands and scrubland facies on calcareous substrates (Festuco Brometalia) (* important orchid sites)*
6410	*Molinia* meadows on calcareous, peaty or clayey-silt-laden soils (Molinion caeruleae)
7110	Active raised bogs*
7120	Degraded raised bogs still capable of natural regeneration
7150	Depressions on peat substrates of the Rhynchosporion
7210	Calcareous fens with *Cladium mariscus* and species of the Caricion davallianae*
7220	Petrifying springs with tufa formation (Cratoneurion)*
7230	Alkaline fens
8240	Limestone pavements*
91A0	Old sessile oak woods with *Ilex* and *Blechnum* in the British Isles
91D0	Bog woodland*

Animal and Plant Species

Natura 2000 Code	Common Name	Scientific Name
1029	Freshwater Pearl Mussel	*Margaritifera margaritifera*
1092	White-clawed Crayfish	*Austropotamobius pallipes*
1095	Sea Lamprey	*Petromyzon marinus*

1096	Brook Lamprey	*Lampetra planeri*
1106	Salmon	*Salmo salar*
1303	Lesser Horseshoe Bat	*Rhinolophus hipposideros*
1355	Otter	*Lutra lutra*
1833	Slender Naiad	*Najas flexilis*
6216	Slender Green Feather-moss	*Hamatocaulis vernicosus*

Schedule 4

Regulation 5

Activities requiring consent of Minister

ARC Code	Description
ARC 01	Reclamation, including infilling.
ARC 02	Stocking or re-stocking with fish.
ARC 03	Blasting, drilling, dredging or otherwise removing or disturbing fossils, rock, minerals, mud, sand, gravel or other sediment.
ARC 04	All activities relating to turf cutting and/or peat extraction.
ARC 05	Cutting, uprooting or otherwise removing plants. [Consent is not required for harvesting of cultivated crops, or for grazing or mowing.]
ARC 06	Introduction, or re-introduction, of plants or animals not found in the area. [Consent is not required for the planting of crops on established reseeded grassland or cultivated land.]
ARC 09	Construction or alteration of tracks, paths, roads, bridges, culverts or access routes.
ARC 10	Construction, removal or alteration of fences, stone walls, hedgerows, banks or any field boundary other than temporary electric fencing. [Consent is not required for normal maintenance.]
ARC 11	Digging, ploughing, harrowing or otherwise disturbing soil or substrate. [Consent is not required for these activities on established reseeded grassland or cultivated land provided it

is greater than 50m from a river, stream, floodplain, wetland, lake, turlough or pond.]

ARC 12 Applying inorganic or organic fertiliser, including slurry and farmyard manure. [Consent is not required for these activities on established reseeded grassland or cultivated land provided it is greater than 20m from a river, stream or floodplain; or greater than 50m from a wetland, lake, turlough or pond.]

ARC 13 Applying lime. [Consent is not required for this activity on established reseeded grassland or cultivated land provided it is greater than 20m from a river, stream or floodplain; or greater than 50m from a wetland, lake, turlough or pond.]

ARC 14 Storage, burial, disposal or recovery of any materials. [Consent is not required for these activities on established reseeded grassland or cultivated land provided it is greater than 20m from a river, stream or floodplain; or greater than 50m from a wetland, lake, turlough or pond.]

ARC 15 Burning, topping, clearing scrub or rough vegetation or reseeding. [Consent is not required for these activities on established reseeded grassland or cultivated land provided it is greater than 20m from a river, stream or floodplain; or greater than 50m from a wetland, lake, turlough or pond.]

ARC 18 Application of pesticides, including herbicides. [Consent is not required for these activities on established reseeded grassland or cultivated land provided it is greater than 20m from a river, stream or floodplain; or greater than 50m from a wetland, lake, turlough or pond.]

ARC 19 Supplementary feeding of livestock. [Consent is not required for this activity on established reseeded grassland or cultivated land provided it is greater than 20m from a river, stream or floodplain; or greater than 50m from a wetland, lake, turlough or pond.]

ARC 20 Significant changes in livestock density (including introduction of grazing), changes in livestock type or grazing season, other than on established reseeded grassland. [Consent is not required for changes of less than 20% in livestock density unless notice has been given that a lower percentage is applicable to a particular site.]

ARC 21 Grazing of livestock between 1st April and 31st October on traditional winterages.

ARC 22 Changing of agricultural use from hay meadow to any other use.

ARC 24	Works on, or alterations to, the banks, bed or flow of a drain, watercourse or waterbody.
ARC 25	Drainage works including digging, deepening, widening or blocking a drain, watercourse or waterbody.
ARC 26	Entry of livestock or machinery into stretches of river containing, or upstream from, freshwater pearl mussel.
ARC 27	Water abstraction, sinking of boreholes and wells.
ARC 28	Felling of trees or removing timber, including dead wood.
ARC 29	Planting of trees or multi-annual bioenergy crops.
ARC 31	Developing or consenting to the development or operation of commercial recreational/visitor facilities or organised recreational activities.
ARC 34	Alteration, renovation or removal of buildings, ruins or other structures.
ARC 38	Lighting up caves, buildings or other places used by bats for roosts.

L.S.

GIVEN under my Official Seal,
27 July, 2022.

DARRAGH O'BRIEN,
Minister for Housing, Local Government and Heritage.

EXPLANATORY NOTE

(*This note is not part of the Instrument and does not purport to be a legal interpretation.*)

The European Union's Habitats Directive (92/43/EEC) (as amended) requires Member States to protect habitats and wildlife areas of European interest by, among other things, designating sites as Special Areas of Conservation in order to create a coherent European ecological network. The hyperlink: http://ec.europa.eu/environment/nature/legislation/habitatsdirective/index_en.htm which connects to the European Commission Environment (Nature and Biodiversity) website also contains a further link to the text of the Habitats Directive.

The effect of these Regulations is to complete the formal designation of the site as a Special Area of Conservation in accordance with Article 4 of the Directive. The geographical area of the Special Area of Conservation designated by these Regulations is defined in Schedule 1 (a map of the area) and Schedule 2 (a list of the townlands in question or a description of the area). For more detailed maps than those contained in Schedule 1, or for greater detail on boundary delineation, contact should be made with the National Parks and Wildlife Service of the Department of Housing, Local Government and Heritage or by viewing the relevant text or map details on www.npws.ie.

The natural habitat types and animal and plant species lists cited in Schedule 3 of these Regulations are specified, in accordance with the Directive, in order to ensure their conservation (i.e. the measures required to maintain or restore the natural habitats and the populations of species of wild fauna and flora at a favourable status). The updated list of published conservation objectives referred to in Regulation 3 is available on www.npws.ie. Public authorities should have regard to these objectives when undertaking a screening or appropriate assessment of plans or projects in accordance with the EU Habitats Directive.

Those activities that require consent of the Minister or in some circumstances another public authority listed at Schedule 4 to these Regulations are cited for their potential to cause disturbance or damage to the natural habitat types and animal and plant species specified in Schedule 3 of these Regulations. Landowners or occupiers should contact the local National Parks and Wildlife Service office of the Department of Housing, Local Government and Heritage before undertaking any of the works listed at Schedule 4. (See www.npws.ie for contact details). Please note that activities other than those listed at Schedule 4 to these Regulations, such as effluent discharge, construction work, aquaculture, fishing or forestry require a licence or permission from the appropriate consent authority.

These Regulations provide (Regulations 6 and 7) that contravention of the provisions of these Regulations shall constitute an offence. Regulation 6 also provides for penalties.

BAILE ÁTHA CLIATH
ARNA FHOILSIÚ AG OIFIG AN tSOLÁTHAIR
Le ceannach díreach ó
FOILSEACHÁIN RIALTAIS,
BÓTHAR BHAILE UÍ BHEOLÁIN,
CILL MHAIGHNEANN,
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[redacted]

From: [redacted]
Sent: Tuesday 20 September 2022 07:53
To: Western Lakes Plan
Subject: Submission for the Great Western lake

Dear Sir or Madam
My name is [redacted]. I have lived beside the [redacted] for over fifty years. Having grown up beside the lake for all those years.Listening to stories from my parents about how important the lake and how the trout and salmon were such a big part of their diet. It sickens me to see such a wonderful eco system being destroyed by invasive species.
I wish to make my submission to the Great Western Lake Plan firstly I welcome the fact that the Department and IFI have now recognised the value of the Great Lakes as Salmonid Fisheries. The Great Western Lakes Plan is full of good ideas which need to be followed through on but having read the proposed plans I find it hard to believe that IFI are continuing to protect Invasive Pike in the [redacted] System .
I would like to see the full implementation of the Habitats Directive which does not allow for the protection of invasive non native fish or plants and aims to bring these habitats back as close as possible to their original state, no unreliable science or migration is allowable under the directives and those directives are the only hope that future generations will have a chance to see the [redacted] in its full glory.
I would like to finish by wishing the best of luck to IFI in bringing forward future plans to tackle these issues affecting these special areas of conservation.
Kind regards
[redacted]

[redacted]

From: [redacted]
Sent: Tuesday 20 September 2022 09:23
To: Western Lakes Plan
Subject: Re: Public Consultation on the Great Western Lakes 5-year Development Plan

Dear Sir,

With your pemrmission I would like to make some additional comments.

A migratory route for salmon and sea-trout needs to be opened at Cong between Loughs Corrib and Mask. The same between Mask and Carra. Salmon run are fast disappearing, and we have a real oppotunity here to sustain and enhance an existing salmon fishery into a rich and fecund system with much breadth and disversity.

Ill-sited water treatment plants like Luimnagh which sits in a shallow inlet, and Oughterard which sits on the Owenriff must no longer be built. Existing ones need to be modernised and monitored with the most stringent of standards; new projects should be sited well away from inflow rivers and spawing grounds.

Algacide, herbicide, and insecticide must never be used in the Great Lakes nor their watershed, including Dichlobenil to combat Lagorosyphon. On that topic, jute matting is effective, but limited in scope, and complicated by technical submerged operations. An interesting alternative coud be to install vast floating farm beds of watercress or some other produce. The beds would not only provide shade to cool of fthe waters and stifle weeds, but would actively soak up excess nutrients responsible for eutrophication.

Sincerely,

[redacted]

On Wednesday, 7 September 2022, 14:05:53 BST, [redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Monday September the 5th 2022

Inland Fisheries Ireland,

3044 Lake Drive,

Citywest Business Campus,

Dublin,

D24 C66

Public Consultation on the Great Western Lakes 5-year Development Plan

Dear Sir,

This trout season was perhaps the worst on record.

Ireland has been blessed, but we are found wanting. It is limiting and reductive to speak of "Ireland's Great Western Lakes" as these are not only Ireland's but Western Europe's last great wild freshwater salmonid fisheries, and are a precious jewel we desperately need to preserve, rejuvenate, and reinforce. This is a point not to be looked over, as were European directives on preserving keystone biomes rich in unique bio-diversity be applied anywhere with urgent vigour, the combined systems of the [redacted] basins should be the poster-child.

We are all guilty. Over generations the EPA, the IFI, the Forestry service, agriculture, councils, a gamut of agencies and organisations, angling clubs, fishermen, and the public at large have been derelict in letting these wonders degrade. In the past emphasis has been on observation, with token gestures in education, but very little in terms of enforcement, prosecution, remediation, and rehabilitation.

The lakes are dying. The char is almost extinct, we're losing trout sub-species, and the salmon counts are plummeting. There are of course

innumerable co-factors, but chief among the causes is we have vandalised our waters.

While a host of complex primary causes, secondary knock-on effects, and feedback loops are involved, the calculus boils down to this: Eutrophication is the root of fishery declines, and agriculture, population density, and poor water management is to blame. Heat shock is often cited, but other water systems in continental North America and Eurasia accommodate bountiful salmonids, even fragile arctic charr, throughout a searing hot summer. Not Ireland – save for well-managed private waters. That's the tell. It is the combination of heat and nutrients that is deadly. While redressing climate change is out of the IFI's capacity and competence, the latter can be addressed.

With global weather systems becoming more erratic, the increase in summer droughts and winter storms means we must shore up water treatment, storage and distribution, and waste management with urgency. Summer low water levels mean concentrated effluent and pollution, nutrient explosion, and algal blooms. Winter floods mean accidental runoff of greywater with pollution and corrupting waste. Every community around the great loughs must be on mains water and treated waste.

Stating the obvious, Limestone Karst and Marl systems are porous. Every proximate source of waste and nutrients drains right into the loughs and water table. Oversized agriculture, most notably out-of-control pastoralism, but also profligate spreading of slurry needs to stop. We need a cordon where herds would be banned: 100 metres around the loughs, 50 metres around key feeding river systems, 20-10 metres around brooks and streams, while taking into account spring spate swelling. The low-water line commons need to be put to better use, for the common good, in preserving the key ecosystem of alkaline sub-alpine flower meadows. Watering-holes need to be installed further inland, with pumps bringing water to the stock rather than letting them venture into the banks of the lakes and rivers.

Overfishing and poaching needs to be prosecuted, not lauded. Gone are the good old days of "a man may fish" where outrageous abandon saw expeditions catch 30, 40, 50 trout for a day in a couple of boats. Even 10 or 20 is a shocking number considering the decline of salmonids at large. A boat should be happy with a fish per head, two at most. Competitions need to be culled and downsized. There are too many of them. Every angling club has a veritable ball-season of these and the combined circuit entire is just too much pressure. These should encourage catch and release.

Oversized outboards and jet-skis are also to blame. Nobody needs a 200HP RIB boat to fish the Corrib. It's fished fine for generations on a lake boat and oars. Fuel leaks, poor two-stroke engines, disturbed sediment erosion, and nuisance to fish in general should be discouraged. Knockferry, the narrows where migrating salmon must pass, is turning into a cheap jetski trick and race track. Were this about dirt bikes we would demand a separate, remote, motocross park. Perhaps restrict the days, hours, or mark out a specific stretch of open-water for acrobatics, away from the salmon run?

Natural and operated Hatcheries need to be reinforced and we need to enhance salmonid breeding programs. It is too late for natural hatchery alone. We're losing salmonids fast. One day when the loughs are fully rehabilitated, we can revert to noble hands-off natural stripping methods, but we need to seed the lakes now, liberally, and with a variety of species. Emphasis should be on brown trout and Atlantic salmon, of course, but we should also bring back arctic charr, introduce brook trout, lake trout, and even grayling. Salmonid species co-exist quite well, each will find its niche, and these may even hybridise which can only build in more genetic diversity and robustness.

Finally, the protection of coarse species needs to be rescinded. We need to search out and prosecute the criminals who introduced pike into the upper Owenriff. It's no longer a question of preserving native versus non-native species. If salmonids are to have a chance at weathering the coming shocks, we need to be more proactive and selective. If we do not, nature will make the selection for us and we will be left with only coarse fisheries. There are plenty of those throughout Ireland and they are not at risk. Trout and salmon lakes are few, these are the only ones left intact enough in Western Europe to still qualify as wild open-water. They are immensely precious and they need the protection now.

Sincerely,

A concerned angler

[redacted]

From: [redacted]
Sent: Tuesday 20 September 2022 09:24
To: Western Lakes Plan
Subject: Western Lakes Plan

To whom it may concern.
My name is [redacted] and I am the owner of [redacted]. We are an [redacted] We are blessed to be on the doorstep of [redacted]. Every year Salmon and Trout Anglers from all over Ireland, the UK and Europe come and stay ,socialize and dine with us. Every year after the quite winter months we look forward to February and the start of the fishing season .In a lot of cases we are welcoming old friends who have been coming back to stay with us every year for twenty years. May and the Mayfly is my favorite time of year. All our rooms are occupied . The mixture of anglers form Wales ,Cork ,Dublin, Kerry , France ,Germany with the mis mash of accents in the restaurant and bar in the evening is magical. It allows me to employ up to thirty local people each year with the add on benefits that accrue to our local economy.
Needless to say, the Salmon and trout anglers are a vital part of my business.
I fully endorse the IFI's Western Lakes Plan .Any measures that protect the Salmon and brown trout stocks are to be fully supported .What we are unique and special and worth protecting by any and all means.
I thank you for your time.
Kind Regards,

[redacted]

[redacted]

[redacted]

[redacted]

From: [redacted]
Sent: Tuesday 20 September 2022 09:57
To: Western Lakes Plan
Subject: Western Lakes Plan Submission
Attachments: [redacted]

Follow Up Flag: Follow up
Flag Status: Flagged

To whom it may concern,
Please find attached my submission regarding the Western Lakes Development plan.
Kind Regards,
[redacted]

[redacted]

From: [redacted]
Sent: Tuesday 20 September 2022 10:25
To: Western Lakes Plan
Subject: Western Lakes L Corrib

In relation to this plan re [redacted],

I support the plan to a certain extent.

I'm not comfortable with invasive species, ie. pike and roach, being protected under a bye law that never should have being introduced . Under what bye laws are the native species protected.?
It is quite embarrassing to be honest, especially when engaging with fishing enthusiasts from overseas. The proposal of a mixed Fishery is quite absurd. Pike have destroyed wild trout fishing in the US and they will do the same here if we do not act.

[redacted] and it should be managed as one. The salmonid species need to be protected.

The water quality is of significant importance. The quality of the water in the [redacted] area has seriously declined. The plan touches on this but we need to see more IFI officer's enforcing current legislations and prosecuting offenders.

I would like to see more work being done on the streams that run into the [redacted] to create safe spawning and habitual zones for our salmonid species

Tackling pollution of rivers and streams should be to the fore .

To achieve these goals IFI need more staff on the ground and polices and practices need to be appropriate and effective.

[redacted]

[redacted]

From: [redacted]
Sent: Tuesday 20 September 2022 10:54
To: Western Lakes Plan
Subject: Lake

In relation to this plan re [redacted]

I support the plan to a certain extent.

I'm not satisfied however, with invasive species, ie. pike and roach, being protected under a bye law .
What protection do native wild trut and salmon have.

Pike are known predators that have destroyed wild fishing accorss Ireland and indeed the rest of the world. I have no issue with pike fishing , but there are hundreds of course lakes in Ireland.
The wild trout left In our Western Lakes need to be protected. A mixed Fishery does not achieve this.

[redacted]and it should be managed as one. The salmonid species need to be protected.

The water quality is of significant importance. The quality of the water in the [redacted] area has seriously declined. The plan touches on this but we need to see more IFI officer's enforcing current legislations and prosecuting offenders.

I would like to see more work being done on the streams that run into the [redacted] to create safe spawning and habitual zones for our salmonid species

Tackling pollution of rivers and streams should be to the fore .

To achieve these goals IFI need more staff on the ground and polices and practices need to be appropriate and effective

[redacted]

Draft Long Term Management Plan for the Great Western Lakes.

Submission from [redacted]

In drawing up a plan the status of the [redacted] as an SAC under the Habitats Directive will determine the future development and management of the lake and what is best for it in order for the lake to return to its world renowned full potential as a wild brown trout fishery.
This has not been the case as the lakes have been mismanagement over the past two decades

The state must;

(a) Recognise that the lakes are unique and Salmonid since the ice age.

(b) That pike have a detrimental effect on the trout population and feed almost exclusively on trout and salmon.
The argument that roach offer a buffer for trout and salmon is pie in the sky. If this was the case roach would never have seen the light of day in these lakes as it had already an established pike population. You will find that certain areas of the [redacted] are now devoid of trout except for large trout.

So what needs to be done?

(i) Removal of bye laws 806 & 809.

(ii) Proper predator control be put in place with all captured pike removed. Returning large pike defeats the purpose of predator control. These lakes are Salmonid waters for the benefit of these species as it was until the 1800's. The [redacted] river in Oughterard is a clear example of how destructive pike are and how they leave a system unproductive in a short space of time.

(iii) Stream rehabilitation and development to bring streams back. This work is futile unless there are trout to run the streams.

(iv) Staffing levels must to be increased so that the necessary manual work can be done.

(v) Water Quality.
- (a) Pollution must be addressed and in particular the spreading of slurry in sensitive catchments. This should not be allowed unless the farmer has checked with Fisheries or the National Parks and Wildlife.
- (b) Water Frameworks Directive must be adhered to.

(vi) Putting bag limits forward as a solution to declining trout population is not the answer as this was tried with the sea trout and failed. Unless the real issues as stated above are addressed, then no progress will be made with regards to rejuvenating the lakes in question.

Biosecurity must form part of this plan due to the mobility of all types of craft. It is time that the movement of craft from a body of water to another be examined. At the moment all types of craft from all over the world can be launched without restriction, which leaves the lakes open to all types of invasive species and pollution.

[redacted]

From: [redacted]
Sent: Tuesday 20 September 2022 11:42
To: Western Lakes Plan
Subject: Submission
Attachments: Great Lakes Sub.docx

Follow Up Flag: Follow up
Flag Status: Flagged

A Chara,

Attached please find submission in relation to the Long Term Management Plan for the Great Western Lakes.

Yours sincerely,

[redacted]

[redacted]

From: [redacted]
Sent: Tuesday 20 September 2022 12:20
To: Western Lakes Plan
Cc: [redacted]
Subject: [redacted] GWLMP Public Consultation
Attachments: P220901_001 Submission on WLMP and Scope of SEA Rev1_0.pdf

GWLMP Public Consultation,
Inland Fisheries Ireland,
3044 Lake Drive,
Citywest Business Campus,
D24 CK66

20th September 2022

Dear Sir/Madam,

On behalf of [redacted] please find attached, the submission regarding the draft Plan for the Long-Term Management of the Great Western Lakes.

We propose that Inland Fisheries Ireland considers the entire attached submission and all appendices and incorporates the entire suite of submission items and supporting information into the following:

- Inland Fisheries Ireland's further consideration of the draft Plan and any future revisions or other plans or projects related in any way to the management of the Great Western Lakes by Inland Fisheries Ireland;

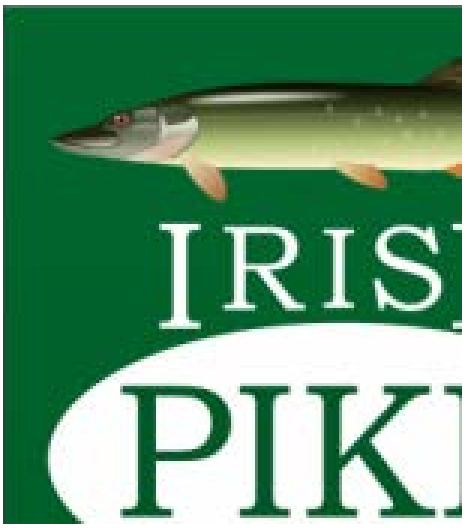
- The Natura Impact Statement for the Plan and any future plans or projects related in any way to the management of the Great Western Lakes by Inland Fisheries Ireland;

- Appropriate Assessments for the Plan and any future Appropriate Assessment Screening Reports and Stage 2 Reports for plans or projects related in any way to the management of the Great Western Lakes by Inland Fisheries Ireland;

It is requested that Inland Fisheries Ireland provides written responses to any queries raised in the submission prior to continuing the public consultation process related to the proposed plan.

Yours sincerely,

[redacted]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Submission on Inland Fisheries Ireland's -

Long Term Management Plan for the Great Western Lakes

Document	P220901/001

Participating Bodies of the

Angling Consultative Council of Ireland

This submission considers four main issues:

1. The biases against non-salmonid stakeholders that the 'Salmonid' tourism designation of the 'Great Western Lakes' imposes on non-salmonid fish species.

2. The omittance of the best available scientific evidence within the context of the 'Long Term Management Plan for the Great Western Lakes' proposed by Inland Fisheries Ireland.

3. The failure of the 'Long Term Management Plan for the Great Western Lakes' to align with certain High-Level Objectives of Inland Fisheries Ireland's Corporate Plan (2021-2025).

4. The potential negative implications and un-certainties of the 'Long Term Management Plan for the Great Western Lakes' on existing native and naturalised species including several species protected by the Habitats Directive, inter-alia the ecological integrity of Natura 2000 sites.

1 REVISION HISTORY

Revision History		
Revision	Author	Notes
1.0	[redacted]	First Issue

CONTENTS

Appendices:

2 EXECUTIVE SUMMARY

Inland Fisheries Ireland has initiated a public consultation process to seek submissions on it's 'Long Term Management Plan for the Western Lakes' (The Plan).

Inland Fisheries Ireland (IFI) state within the proposed plan, that through a series of targeted actions, connected to an overall strategy - they will coordinate programmes under 7 categories of High-Level Objectives (HLO). It is further stated that *"each HLO aligns to IFI's Corporate Plan (2021 to 2025)".* See Corporate Plan at following link: https://www.fisheriesireland.ie/sites/default/files/2021-12/ifi-corporate-plan-2021-2025.pdf.

Section 3 of this submission, amongst fundamental considerations related to the management of the Western Lakes, reviews the plans' HLO's in the context of the IFI's Corporate Plan and discusses areas where IFI's proposed plan fails to align with the HLO's of the Corporate Plan. This section also sets out revised and/or additional proposals regarding 'Actions' related to the plan.

Inland Fisheries Ireland have engaged a consultant (INVAS) to undertake an Appropriate Assessment Screening report of the proposed 'Long Term Management Plan for the Western Lakes'. Inland fisheries Ireland has itself, undertaken a Strategic Environmental Assessment Scoping Report to accompany the plan. This submission considers that both of these reports are deficient in their appraisal of the ecological impact upon Natura 200 sites related to areas of the plan e.g. stock management and stock management operations. Furthermore, the 'Action's contained in the published draft plan for public consultation have been amended by its author's, such that the new 'Actions' in section 11 of the plan, are not the same 'Actions' that were appraised by INVAS. The revision of the plan, pre-public consultation, in itself requires independent investigation to establish who authorised the revision to the 'Actions'; have all of the 'Actions' been approved by the Minister responsible; on what scientific basis did these revisions take place, and why was INVAS not given the revised 'Actions' to review, at Appropriate Assessment screening stage?

Sections 4, 5 & 6 of this submission has incorporated a detailed suite of impacts on Natura 2000 sites that have not been appraised by INVAS or Inland Fisheries Ireland thus far, including a number of 'Potentially Significant' environmental effects will also impact upon human health and the landscape. This submission considers that the plan has the potential to adversely affect the conservation objectives and overall ecology of the Natura 2000 sites and deems that all of the items in section 4 should be fully incorporated, and scientifically assessed by Inland Fisheries Ireland and/or any appointed consultants, during the preparation of Natura Impact Statements, Appropriate Assessments and the Environmental Report prepared in respect of the Strategic Environmental Assessment Scoping Report for this or any future plans related to the Western Lakes.

Appendix D of this plan summarises the submission items included with this submission. Each submission item should be read in conjunction with the specific submission section to which it refers. This submission in its entirety, including all appendices, should be given to current and any future consultants and IFI authors engaged in preparing Natura Impact Statements, Stage 1 & 2 Appropriate Assessments or Strategic Environmental Assessment Scoping / Environmental Reports prepared for this or any future plans related to the management of the Western Lakes.

3 OVERARCHING SUBMISSION RELATED TO THE PROPOSED 'LONG TERM MANAGEMENT PLAN FOR THE WESTERN LAKES'

In response to the invite for submissions regarding Inland Fisheries Ireland's 'Long Term Management Plan for the Western Lakes', a number of overarching headings are discussed in this section to question the appropriateness and validity of the proposed plan.

The headings are as follows:

3.1 The Salmonid Designation – Is it Fit for Purpose?

3.2 Deficiencies in Alignment of the Plan to IFI's Corporate Plan (2021-2025)

3.3 Failure of the Plan to State Salmonid Measurables or Key Performance Indicators

3.4 Failure of Plan to Provide Outline of 'Funding' and 'Staffing' Required for Implementation

3.5 Economic and Ecological Deficiencies Related to the Plan Regarding the Management of Pike – Apparent Over-Reach of the Proposed Plan

3.6 Strategic Environmental Assessment - Natura Impact Statement & Appropriate Assessment

3.7 Table of Submission Comments & Proposed Amendment / Additions to Plan 'Actions'

3.1 THE SALMONID DESIGNATION – IS IT FIT FOR PURPOSE?

Historically, a number of large limestone lakes in the west of Ireland have been managed *"preferentially"* as wild brown trout fisheries (Ref: 'Long Term Management Plan for the Western Lakes').

However, Inland Fisheries Ireland (IFI) has a statutory remit under the Inland Fisheries Act of 2010 - to protect, conserve and manage Irelands inland fisheries resources.

This submission recognises the inherent ability of the catchments of the Western Lakes to provide for sustainable salmonid stocks into the future with a programme of protection and rehabilitation measures attached to spawning and nursey streams and rivers within each catchment along with increased protection from water pollution. While the Western Lakes are of unique ecological importance in their own right, they are not solely unique wild brown trout habitats. The lakes, due to their ecological qualities, have since their formation provided a unique habitat for all species present.

The over-riding question to be answered is why Inland Fisheries Ireland continues to pursue fish stock management on the Western Lakes, particularly in an ever-changing ecological climate and one very much different to the 1950's, and why and how does it link the 'salmonid designation' to removing other fish species. This same question is asked by Inland Fisheries Ireland's Research Division (Ref: Appendix 4), yet the question remains unanswered in light of current scientific evidence to the contrary.

3.1.1 RISK ASSOCIATED WITH CURRENT TOURISM BRANDING OF THE 'WESTERN LAKES'

The Western Lakes, as they are known, have been branded as salmonid lakes since the 1950's, principally by Bord Fáilte to promote trout angling tourism (Ref: FOI, Email of 6th October 2016 – See Appendix A).

IFI and its predecessors have since that time, retained this original 'tourism' designation and widened the scope of "salmonid" to include salmon, with the advent of the EU Habitats Directive. The designation such as it is, has become a springboard for IFI over the past seven decades, to justify the artificial manipulation of fish stocks, principally by removing pike.

The outcome of this approach has been to:

1) Mask the true impact of failing to address the real issues affecting the Western Lakes i.e. declining water quality, nutrient enrichment and habitat destruction as particularly evidence on Lough Sheelin, and

2) Starve local communities around the Western Lakes of potential specialist pike angling tourism revenue.

It is known that while angling for pike and indeed coarse fish in Ireland in the 1950's by Irish anglers was in its infancy, adventurous English pike anglers during the reign of Queen Victoria visited the Western Lakes to enjoy high-quality pike, trout and salmon fishing that was available at that time (Ref: Mammoth Pike – Fred Buller, 1979).

Pike anglers, as stakeholders who live on; those who operate pike angling guiding services and those who regularly visit to fish the Western Lakes will be marginalised further by the 'salmonid' designation and the 'Actions' outlined in the plan.

The 'Long Term Management Plan for the Western Lakes' will apply to 7 of Ireland's largest lakes (i.e. Corrib, Mask, Carra, Conn, Cullin, Arrow and Sheelin). Together they comprise approximately 27% of the total surface area of angling lakes within the State and will be a significant loss to Ireland's non-salmonid tourism market as a result of the 'Actions' contained in the current plan.

Section 3.1.1 - Proposed Management Plan – Submission Item:

1) This submission considers that all species can be accommodated on the Western Lakes without compromising the status of the lakes as producers of quality trout and salmon angling – provided only, that measures specifically designed to elevate the importance of the spawning and nursery catchments, and water quality issues, are the primary focus of the plan.

3.1.2 FAILURE TO ACKNOWLEDGE AND PROMOTE THE 'WESTERN LAKES' FOR PIKE ANGLING TOURISM

Angling in Ireland and the Irish angling tourism sector has progressed significantly since the 1950's. Pike angling in particular in the western lakes has become a significant attraction for domestic and overseas angling tourists, who seek really big pike in the 30lb to 40lb size bracket, many of them driven by 'Mammoth Pike', a book written in the 1970's by the late Fred Buller, an angling historian.

In 2015 Inland Fisheries Ireland produced a document outlining market research into angling in Ireland for the 'National Strategy for Angling Development'. Sources for information included Fáilte Ireland and Tourism Development International and utilized data from online surveys. According to the document, pike angling in the year 2015 was worth €102m to the Irish economy and trout angling was worth €148m during the same year.

See:
https://www.fisheriesireland.ie/sites/default/files/migrated/docman/2015/nsad/NSAD%20Work%20Package%203%20FINAL%2018Nov15.pdf

The market research found the following in relation to Ireland's Pike Angling Product:

> *"Pike is the number one sport fish in Germany, France, the Netherlands and Italy and also quite popular amongst anglers in the UK. Irish pike have a world-wide reputation as extremely hard fighting, fast growing*

and powerful predators. ***Ireland boasts an incredible number of top-class pike fisheries including the Shannon and Erne catchments, the Cavan/Monaghan Lakelands and the Great Western Lakes.***

Additionally, there are myriads of other smaller, seldom fished pike waters which provide excellent sport for the more adventurous angler. All of this makes Ireland probably the number one pike angling destination in Europe; only to be rivalled by North America and Alaska's Northern Pike and Muskie fisheries. Our biggest competitors in Europe would include Sweden and the Bodden fisheries off the German Baltic coast."

The research also stated the following regarding Ireland's Policies regarding Pike Management:

"Pike angling is one of our strongest products and should be promoted in most countries but particularly in Germany, the Netherlands, Italy and France. ***However, current pike management policies may impact negatively on Ireland's reputation as a prime pike angling destination****".*

While it may be argued that a policy for fisheries management on waters containing salmonids should seek the highest environmental standards in the interest of sustainable salmonid populations for angling tourism and to meet EU requirements, the inference that culling and removing other species is acceptable, is both ecologically unsound, but it also has negative consequences for pike angling tourism in general.

Section 3.1.2 - Proposed Management Plan – Submission Item:

1) This submission considers that the salmonid designation should be reviewed in terms of how Inland Fisheries Ireland links culling to the designation, and as such, this submission proposes that an angling tourism product risk review regarding angling for all species affected in the Western Lakes and also generally to Ireland's angling tourism product takes place, before any plan regarding the Western Lakes is adopted.

3.1.3 MARGINALISATION OF PIKE ANGLING STAKEHOLDERS

Inland Fisheries Ireland's Corporate Plan (i.e. HLO 03 – Action 3.2), states that Inland Fisheries Ireland will manage state owned fisheries ***"sustainably for the benefit of all stakeholders"***. The proposed plan does not deliver on this high-level objective. The proposed plan instead adopts a preferential position with regard to trout angling tourism and stakeholders, at the expense of pike angling tourism and indeed potential coarse angling tourism opportunities for local economies and angling tourism providers around the Western Lakes – some of which are leaving the angling tourism sector. The marginalisation of pike angling and other non-salmonid stakeholders potentially impacts upon the sustainability of Multi-Season angling tourism on the Western Lakes and potentially the attractiveness of the locales to new entrants to the angling tourism market.

Some businesses for sale at the time of writing:

https://www.daft.ie/for-sale/detached-house-corrib-wave-house-corrib-wave-house-connemara/3699810
https://www.daft.ie/for-sale/detached-house-oughterard-holiday-hostel-and-angling-centre-station-road-oughterard-co-galway/3997751
https://www.daft.ie/for-sale/detached-house-portarra-lodge-moycullen-co-galway/4024192
https://www.daft.ie/commercial-property-for-sale/fairhill-house-hotel-main-street-clonbur-co-galway/3728509

Section 3.1.3 - Proposed Management Plan – Submission Item:

1) This submission considers that the plan does not meet Inland Fisheries Ireland's Corporate Plan (i.e. HLO 03 – Action 3.2) objective to manage state owned fisheries for the benefit of all stakeholders, and therefore the plan marginalises non-salmonid stakeholders, and discriminates against pike angling stakeholders in particular, and coarse angling stakeholders generally.

3.1.4 PIKE CONSERVATION – PROTECTION OF THE UNIQUE "IRISH STRAIN"

Scientific research indicates that pike may have first naturally colonized Ireland 8000 years ago (Pedreschi et al. 2014). Inland Fisheries Ireland released a statement on 15th October 2013, that "New Study Reveals Pike Native to Ireland".

In 2018, Dr. Pedreschi met with the review group established by Inland Fisheries Ireland to review their current pike management policy on brown trout fisheries. Dr. Pedreschi stated that her research regarding pike colonization was continuing, albeit slowly, however Dr. Pedreschi confirmed that the additional research using single nucleotide polymorphism (SNPs) was supporting the original conclusions. The conclusions of the paper were questioned by D. Ensing (2015) who suggested that pike could have been introduced by man 4000 years ago. Pedreschi & Mariani (2015) responded to Ensing in a published paper entitled "Towards a balanced view of pike in Ireland: a reply to Ensing" and stated their contention that Ensing's theory did not fit with the available scientific and historical evidence and that the opinion expressed was "too speculative and unsupported by data".

The implications of the research undertaken by Dr. Pedreschi is that we now can appreciate that a "unique Irish strain" of pike, linked through genetics may inhabit some of the Western Lakes e.g. Corrib, despite contrary historical data held by Inland Fisheries Ireland, that has yet to be scientifically verified.

Section 3.1.4 - Proposed Management Plan – Submission Item:

1) This submission considers that DNA evidence suggests that the plan does not meet Inland Fisheries Ireland's Corporate Plan (i.e. HLO 02 – Action 2.3) objective to develop fishery management plans in light of best evidence-based research and modelling available, based upon the possibility that the plan seeks to remove and cull a potentially unique strain of naturally colonised native Irish pike from the Western Lakes, and as such all culling and removal of pike should cease.

2) This submission considers that in light of the conclusions of Pedreschi & Mariani (2015) stating that many ubiquitous freshwater species in Ireland remain to be investigated such as gudgeon, stoneloach, minnow and perch, that scientific research should now be undertaken by Inland Fisheries Ireland to scientifically examine the possible native status of these additional species and that Inland fisheries Ireland should advise of its intentions in this regard.

3.1.5 ARE BROWN TROUT POPULATIONS PROTECTED AND/ OR AT RISK

The 'Long Term Management Plan for the Western Lakes' prioritises a fish species (brown trout) that is:

a) Not under threat of extirpation or extinction;

b) Is not an annex ii species as defined by the EU habitats directive;

c) Is the most common and wide spread fish in Ireland (ref: IFI website);

d) Is not on any environmental protection Red List;

This prioritisation of brown trout in the plan, compromises the objectives of the EU Habitats Directive for SPAs, SACs and Natura 2000 sites and puts at risk many of their Qualifying Interests by adding pressures such as:

a) Unquantified predation and competition pressure as a result of an artificially enhanced/ managed wild brown trout population on Annex II Salmon;

b) Potential compromise of Otter Habitat by stock management operation's;

c) The potential spread of invasive weed species (L. Major) by stock management operations;

Section 3.1.5 - Proposed Management Plan – Submission Item:

1) This submission considers that the artificial increase of the brown trout populations above natural capacity on the Western Lakes inter-alia the management culling operations executed on other species in that pursuit, compromises the objectives of the EU Habitats Directive for SPAs, SACs and Natura 2000 sites and puts at risk many of their Qualifying Interests and as such should be reviewed in the context of a Natura Impact Statement and Appropriate Assessment carried out on the Natura 2000 sites.

2) This submission considers that Inland Fisheries Ireland should provide data on biomass, density and length frequency distribution of the current existing trout stocks in each of the Western Lakes and also the optimum trout stock that it considers stocks need to be increased to, or reduced by to ensure a sustainable trout stock in each of the Western Lakes, and that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

3) This submission considers that Inland Fisheries Ireland should provide data on biomass, density and length frequency distribution of the current existing pike stocks in each of the Western Lakes and define what the numerical objectives of the plan are in regard to those stocks, and that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

4) This submission considers that Inland Fisheries Ireland should provide data on biomass, density and length frequency distribution of the current existing perch, roach and bream stocks in each of the Western Lakes and define what the numerical objectives of the plan are in regard to those stocks, and that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

5) This submission considers that Inland Fisheries Ireland have not provided for any additional trout angling conservation regulations within the 'Long Term Management Plan for the Western Lakes' and that Table 1 (P17) of the plan clearly defines a wide variance in current regulation (e.g. 2 fish per day legally killed on Lough Sheelin to unlimited killing of trout per day on Lough Conn and Cullin), reflecting a loose conservation of trout on the Western Lakes, and therefore reflecting the prevalence of trout believed to presently exist on the Lakes, and as such Inland Fisheries Ireland are requested to provide scientifically based reasons for this omission, and that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

3.1.6 FISHERY UTILITY AND COMMUNITY INTEREST

The plan states that ***"The protection of other species and habitats of community interest, which are also important to the health and wellbeing of these important aquatic ecosystems, is also a vital component of the plan."***

The plan fails to assess or acknowledge the fishery utility/community interest relating to non-salmonid species. The plan suggests that fishery utility may increase by implementing the measures outlined in each HLO, however, the plan does not consider the negative impact on fishery utility as a result of the destruction of non-salmonid fish stocks. The proposed actions in the plan have wide ranging effects relating to local non-salmonid anglers, local fishing guides, service and accommodation providers.

Section 3.1.6 - Proposed Management Plan – Submission Item:

1) This submission considers that the proposed plan does not align with Inland Fisheries Ireland's Corporate Plan - HLO 03 – Action 3.2 in the first instance at high-level for the benefit of all stakeholders (See P45, 46 & 47 - Actions 4.1, 4.4, 5.1, 5.3 & 5.4 of the plan). Therefore, it is requested that IFI show how it has engaged with non-salmonid stakeholders (e.g. pike anglers, local businesses such as pike angling guides, pike angler friendly accommodation and local services etc.), to specifically assess community interest and fishery utility impact relating to the artificial and purposeful destruction of their fish stocks within the proposed plan, inter-alia the decreased utility of the fishery?

3.1.7 HISTROICAL EVIDENCE OF THRIVING SALMONID POPULATIONS

There is a long history of commercial fish cropping and angling related mortality of trout on some of the lakes targeted by the plan e.g. Lough Corrib.

Historical records show that pike, salmon, eels and other fish species have been harvested for commercial purposes for almost 500 years on Lough Corrib (Ref: email to IFI).

In the early 20th century reports from the Lough Corrib Fisheries Association estimated that between 30 and 40 tons of trout were being taken on rod and line each season (Ref: Salmon and Trout Magazine, 1959). Commercial trout harvesting operated on Lough Corrib until at least the mid 1970's (Ref: IFI Data).

Historical angling records show that despite intense angling and commercial operations and the presence of pike in the lakes, the salmonid populations were thriving.

In relation to stock management the proposed plan does not adequately consider this historical evidence which indicates the real link between large self-sustaining salmonid populations and pristine ecological conditions, and instead focuses on a biomanipulation of non-salmonid fish stocks to buffer against salmonid diminution.

In this regard, salmonid anglers should be extremely concerned about the over-reliability by IFI on stock management within IFI management plans related to the Western Lakes.

Section 3.1.7 - Proposed Management Plan – Submission Item:

1) This submission considers that Inland Fisheries Ireland should review historical data relating to habitat destruction and water quality reduction on each of the Western Lakes to establish salmonid population responses related to environmental improvement on each of the Western Lakes.

3.2 DEFICIENCIES IN ALIGNMENT OF THE PLAN TO IFI'S CORPORATE PLAN (2021-2025)

The Research Division of Inland Fisheries Ireland has previously advised Inland Fisheries Ireland's management of the specific role that science has in informing policy and management in Ireland's fisheries.
(See Research Division Document – "The role of IFI science in informing policy and management in fisheries" Appendix G)

The above document notes that ***"the provision of robust science by RD places IFI in a solid position to implement best practice evidence-based management (EBM)".***

The document further states that evidence-based management aims to ***"explicitly use the current, strongest evidence in management and decision-making, where the first principle is to employ published peer-reviewed scientific research that bears on whether and why a particular management practice is likely to work".***

This submission is of the considered view that the 'Long Term Management Plan for the Western Lakes' has provided no evidence that it is founded upon best practice evidence-based management (EBM).

3.2.1 FAILURE TO BASE PROPOSED PLAN ON BEST EVIDENCE BASED RESEARCH

Inland Fisheries Ireland's Corporate Plan (i.e. HLO 02 – Action 2.3), states that Inland Fisheries Ireland will develop fishery management plans ***"in light of best evidence-based research and modelling available"***. In the first instance to ***"assist in the management of wild brown trout fisheries manage state owned fisheries"***.

The Corporate Plan specifically promotes a "***science-based policy"*** supporting the rationale for managing managed wild brown trout fisheries "***in a sustainable manner"***. The Corporate Plan does not specifically promote the removal of non-salmonid fish species within the context of a sustainable management model.

It is considered in this submission that the proposed plan does not deliver on this high-level objective. The proposed plan instead refers to "recent studies" but does not directly base any of the' Actions' within the Plan on the world-wide acknowledged scientific evidence presented in these studies.

It should also be acknowledged that the scientific research undertaken since 2013 has resulted in suite of peer-reviewed research papers upon which Inland Fisheries Ireland can base its management plans. (See Appendix C). Much of this research has been supported by DECC funded programmes, undertaken by or in co-operation with Inland Fisheries Ireland, and in some cases, within a Memoranda of Understanding with University College Dublin.

The following are links to the best evidence-based research currently available to Inland Fisheries Ireland:

- https://www.researchgate.net/publication/257967424_O_R_I_G_I_N_A_L_A_R_T_I_C_L_E_Genetic_structure_of_pike_Esox_lucius_reveals_a_complex_and_previously_unrecognized_colonization_history_of_Ireland
- https://www.researchgate.net/publication/281635920_Trophic_flexibility_and_opportunism_in_pike_Esox_lucius
- https://www.researchgate.net/project/Pike-in-Ireland-Developing-Knowledge-and-Tools-to-Support-Policy-and-Management
- https://www.researchgate.net/publication/327865921_Coexistence_of_pike_Esox_lucius_and_brown_trout_Salmo_trutta_in_Irish_lakes
- https://doi.org/10.1016/j.ecolmodel.2019.108740
- Shifts in diet of an apex predator following the colonisation of an invasive fish | SpringerLink
- https://www.researchgate.net/publication/328814887_Salmonid_Conservation_in_an_Invaded_Lake_Changing_Outcomes_of_Predator_Removal_with_Introduction_of_Nonnative_Prey

The document entitled **"The role of IFI science in informing policy and management in fisheries"** (See Appendix G), describes further, Inland Fisheries Ireland's most recent peer-reviewed and published research. These papers were published as part of the McLoone (2018) pike project entitled **'Pike (Esox Lucius) in Ireland: developing Knowledge and tools to Support Policy and Management'**. The pike project set out in a series of papers, the learnings on the Western Lakes and changes in the lakes over many decades including the dynamics of fish communities in response to environmental changes during that period.

Inland Fisheries Ireland's Research Division stated that ***"The Key findings from the Inland Fisheries Ireland pike project were published as four peer-reviewed papers in international scientific journals. These journals are highly-regarded and report science that strongly informs fisheries and environmental policy worldwide. The papers have been well received, including winning an international award for scientific excellence. The set of publications highlight limitations and avenues for future research, but provide a solid foundation for evidence-based fisheries management at IFI".***

Section 3.2.1 - Proposed Management Plan – Submission Item:

1) This submission considers that the proposed plan does not align with Inland Fisheries Ireland's Corporate Plan - HLO 02 – Action 2.3 in the first instance at high-level (See P45, 46 & 47 - Actions 4.1, 4.4, 5.1, 5.3 & 5.4 of the Plan). Therefore, it is requested that Inland Fisheries Ireland provide definitive scientific comment that shows that the plan has been appraised, based upon evidence-based management (EBM) and shows how the best peer-reviewed scientific evidence available has been used to support each of the individual actions mentioned in this item, and that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

3.2.2 CONCERNS RAISED BY THE IFI RESEARCH DIVISION

The Freedom of Information Act has been used to request information from Inland Fisheries Ireland regarding the application of scientific evidence inter-alia advice given from the Research Division to the Chief Executive Officer of Inland Fisheries Ireland regarding pike.

One of the documents received, entitled **"The role of IFI science in informing policy and management in fisheries"** (See Appendix G), clearly expressed some ***"extremely serious concerns"*** regarding the intention of Inland Fisheries Ireland's Development Section to allow anglers to participate in culling pike. Action 4.4 and 5.3 (See P46 & 47) of the 'Long Term Management Plan for the Western Lakes' proposes to ***"encourage"*** and ***"enable local stakeholders"*** to cull pike on rod and line.

The clear intention of the plan is to remove the pike bye-law (809 of 2006) and the coarse bye-law (806 of 2006) on the Western Lakes (See P37 & P38). However, the plan provides no scientific evidence to support these actions, nor does it provide evidence that there will be an increased abundance of trout or salmon as a consequence.

The questions raised by the Research Division are as pertinent now as they were when they were written. The proposed plan does not in any way provide an answer to the ***"extremely serious concerns"*** expressed by the Research Division.

At a minimum IFI Development and Management are required to consider and produce detailed answers to the concerns raised, based upon the most recent and best available scientific research available. In relation to stock management, the proposed plan should not proceed, prior to addressing all of the items raised by the IFI Research Division as many of these concerns relate to the outcome of stock management, by whatever form.

This information should be published and form part of the supporting documentation made available to stakeholders for consideration in the public consultation process and to the independent consultants to inform the Natura Impact Statement and Appropriate Assessment regarding the High-Level Actions contained in the plan.

The public consultation process should be deemed compromised in the absence of this information.

Section 3.2.2 - Proposed Management Plan – Submission Item:

1) This submission considers that the proposed plan has not addressed the "serious concerns" expressed by Inland Fisheries Ireland's Research Division regarding the document entitled **"The role of IFI science in informing policy and management in fisheries"** relating to Action 4.4 and 5.3 (See P46 & P47) of the 'Long Term Management Plan for the Western Lakes'. Therefore, it is requested that Inland Fisheries Ireland's Development Section and Senior Management provide definitive scientific comment on each of the 45 queries raised by the Research Division in the aforementioned document, and that these are made publicly available, prior to proceeding further with the proposed plan, or any future management plans or activities planned for the Western Lakes.

2) The document entitled **"The role of IFI science in informing policy and management in fisheries"** states that the stock size for brown trout and pike "is unknown" on the Western Lakes" and questions "on what basis is culling effort being defined". It is requested here that Inland Fisheries Ireland's Development Section and/or Chief Executive Officer provide the evidence-based research to support culling effort in response to this query regarding pike stock management proposed within the following:
   a) The proposed plan, and
   b) The current 2022 pike management plans presently being enacted on each of the Western Lakes.

3) This submission considers that the proposed plan has not provided any evidence to show that the pike stocks in each of the individual Western Lakes are large and in need of reducing. It is requested here that Inland Fisheries Ireland provide the evidence-based research that has determined that stocks need reducing, for each individual Western Lake.

4) This submission considers that recent international scientific publications from Inland Fisheries Ireland's own Research Division indicate that pike removal may have a neutral or negative impact on brown trout populations in lakes having established roach populations. It is requested here that Inland Fisheries Ireland provide details of peer-reviewed evidence-based research that is being used to justify the removal of pike as a brown trout stock enhancement tool within:
   a) The proposed plan, and
   b) The current 2022 pike management plans presently being enacted on each of the Western Lakes.

5) This submission considers that the proposed plan has not provided any evidence to show what outcome the stock management element of the proposed plan will have on the fish community dynamics and brown trout abundance in each of the Western Lakes. It is requested here that Inland Fisheries Ireland provide details of peer-reviewed evidence-based research to show what improvement in brown trout abundance and salmon and fish community dynamics generally will take place on each of the Western Lakes, in response to:
   a) The proposed plan, and
   b) The current 2022 pike management plans being enacted on each of the Western Lakes.

3.2.3 THE ROLE OF IFI SCIENCE IN INFORMING POLICY AND MANAGEMENT IN FISHERIES

The website of Inland Fisheries Ireland (IFI) states that the Research Division (RD) carries out applied fisheries research to assess the conservation status of Ireland's fish species, to monitor fisheries stocks in inland and coastal waters and to explore environmental issues that have an impact on fish and their habitats.

The Research Division also provides scientific advice to IFI's parent department, the Department of the Environment, Climate and Communications.

The document entitled **"The role of IFI science in informing policy and management in fisheries"** (See Appendix G), advises that the research and advice function of the Research Division (RD) is ***"consistent with the purpose of similar groups worldwide, who strive to provide independent and unbiased scientific understanding which can inform policy and management".***

The document states that the ***"provision of robust science by the Research Division places IFI in a solid position to implement best practice evidence-based management (EBM)".*** It further states that EBM aims to ***"explicitly use the current, strongest evidence in management and decision-making, where the first principle is to employ published peer-reviewed scientific research that bears on whether and why a particular management practice is likely to work".***

The Research Division place emphasis on scientific evidence to **"provide an explicit means by which bias in the system can be minimized".** The principle on which the Research Division rely ***"strongly contrasts EBM with weaker management alternatives based on subjective perception, i.e., hearsay, opinion, belief or advocacy".***

The proposed plan states that the *"management of pike stocks has been ongoing for over 5 decades, on the western lakes. This has always been regarded as an important management tool for the conservation of salmonids"* (P38). There is an inference from this statement that as this is how things were done, the status quo should continue. However, the statement is in itself erroneous and not supported by results. By contrast, the Research Division, having reviewed Inland Fisheries Ireland's own published research conclude that ***"The ecology of the designated Irish trout Lakes has changed markedly since the 1960s, when these systems were reasonably pristine and the fish community was dominated by brown trout and pike".*** The RD further state that ***"The lakes currently experience impacts from agricultural run-off, invasive species, angling and other human pressures. These factors probably interact to influence the fish community and the relative abundance of particular species. The impact of invasive roach populations is likely to be particularly important".***

The Research Division conclude, in contrast to the comments presented in the proposed plan, that ***"in this complex environment, the effect of removing a predator such as pike is difficult to predict and may be negative. The IFI studies suggest that pike removal may have benefited trout in the simpler fish communities occupying healthier lake systems in the past. This management practice is likely to be much less effective in the current impaired situation".***

This submission considers that the 'Long Term Management Plan for the Western Lakes' has not been informed by "best practice evidence-based management", and that the outcomes of the plan are highly un-certain and are likely to impact negatively upon the ecology of each of the Western Lakes.

Section 3.2.3 - Proposed Management Plan – Submission Item:

1) This submission considers that the stock management aspect of proposed plan is not informed by "*best practice evidence-based management (EBM)"* and as such, Actions 4.1, 4.4, 5.1, 5.2, 5.3 & 5.4 (See P46 & P47) of the proposed 'Long Term Management Plan for the Western Lakes' are likely to lead to adverse and uncertain impacts on the Natura 2000 sites and should be removed from the plan. In addition, there has been no evidence provided to show how these risks have and would be considered at High-Level stage in the form of a Natura Impact Statement (NIS) and Appropriate Assessment (AA) specifically for each of the High-Level Actions mentioned in this section.

2) This submission proposes in the first instance, that stock management ceases on each of the Western Lakes pending a review of the application of existing best evidence peer-reviewed research, and the completion of any continued long-term studies (e.g. per IFI document IFI/2021/1-4562) to align any future stock management proposals to Inland Fisheries Ireland's Corporate Plan (2021-2025) - HLO 02 – Action 2.3.

3) This submission requests an answer to the query raised by the IFI Research Division (Appendix G) to IFI Management requesting on what scientific basis is it known that "it is essential that pike stocks are kept under control" – The proposed Plan provides no published scientific evidence to answer this fundamental question regarding the Western Lakes on the basis of the current scientific evidence, and it is requested here that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

3.2.4 PIKE IN IRELAND – CONTINUED LONG TERM STUDIES

Inland Fisheries Ireland's Research Division have proposed additional research on the Western Lakes to progress the research of McLoone et al., 2018. The Research Division state that the research will provide ***"Important additional knowledge of predator-prey and competitive interactions will inform full development of a size-based mathematical model of the lake fish community".***

The Research Division state that ***"this kind of model is used globally to support best practice Management Strategy Evaluation (MSE) that can support managers by exploring the likely impact of candidate fisheries management actions".***

The additional research proposal indicated by the Research Division meets the requirement of two high level objectives of IFI's Corporate Plan 2021-2026 HLO 2 and 3.

- Action 2.2: Implement evidence-based species policies and programmes with a focus on mitigation and adaptation in an era of climate change.
- Action 2.3: Develop modelling tools to support scientific evaluation of candidate fisheries management actions. In the first instance to assist in the management of wild brown trout fisheries.

This submission considers that unlike the proposed 'Long Term Management Plan for the Western Lakes', the continued study does not pre-determine the requirement for any course of action regarding stock management, but instead seeks to scientifically evaluate predator-prey and competitive interactions in candidate fisheries, namely Lough's Corrib, Mask and Carra. In this regard, any stock management should not precede the completion of the proposed continued long-term studies and until water quality and habitat improvement measures are complete, so as not to undermine management interventions directly disconnected to stock management.

The proposed study will take place over 4 years at the total cost of €1,371,536 to include additional stock surveying techniques. Gastric lavage (stomach flushing) as a non-lethal method of obtaining dietary information will be employed on the project (as per HLO1) (McLoone et al., 2018). It is intended that a citizen science aspect of the research will be managed through a series of IFI hosted non-lethal pike angling competitions. The proposal in full is contained in Inland Fisheries Ireland research document **IFI/2021/1-4562**.

Section 3.2.4 - Proposed Management Plan – Submission Item:

1) This submission considers that the continued research proposed by the Research Division (See **IFI/2021/1-4562)** represents an opportunity to build upon the existing research and to inform management, without dismissing the existing findings of McLoone et al., (2018). It is proposed that this research:
   A) Is undertaken in full prior to any stock management decisions taken on the Western Lakes,
   B) That Inland Fisheries Ireland confirms that funding has been secured to complete the research, and
   C) That Inland Fisheries Ireland confirms the precise commencement and completion dates of the study.

3.2.5 IFI RESEARCH DIVISION – ISSUES WITH CURRENT PROPOSAL FOR CITIZEN SCIENCE

Inland Fisheries Ireland's use of 'Citizen Science' is not new e.g. https://www.fisheriesireland.ie/news/press-releases/currane-anglers-are-needed-for-citizen-science-survey-to-examine-fish-stocks

The potential use of the angling community in the Western Lakes to feed data into research that will be scientifically peer-reviewed is considered in the 'Long Term Management Plan for the Western Lakes'. In some locales around Lough Corrib, pike have been treated very poorly with carcasses hung from trees and from signs at slipways such as the examples in the photos. This deep-seated hatred is being fuelled by S59's authorised by Inland Fisheries Ireland.

Facebook pages also exist related to Lough Corrib, that present images of dead and dissected pike; predisposing the neutral angling community to images and comments that reflect a preconceived idea that pike should be managed on Lough Corrib.

The current Section 59 authorisations given to a minority of anglers on the Western Lakes are also done so, without the benefit of Inland Fisheries Ireland having applied best practice evidence-based management (EBM), and without knowledge of the stock size of wild brown trout or pike.

This submission considers that Section 59 authorisations should cease immediately, and that 'Citizen Science' be based entirely upon non-lethal capture and return of pike in the creation of a single unified process to be applied by all anglers of differing stakeholder groups. It is considered in this submission, that such a unified non-lethal approach will encourage a high level of participation across all stakeholder groups and place emphasis on scientific evidence to ***"provide an explicit means by which bias in the system can be minimized"*** as previously discussed as stated by the Research Division of Inland Fisheries Ireland.

Lough Corrib Island – Witnessed by Children

Section 3.2.5 - Proposed Management Plan – Submission Item:

1) This submission considers that the continued research proposed by the Research Division (See **IFI/2021/1-4562)** contains a 'Citizen Science' element. It is proposed here that any engagement with anglers in the collection of samples or during competitions / events of any kind, is informed by detailed information and a Standard Operating Procedure drafted between the Research Division and Pike Angling National Bodies, to include, but not be limited to:
   A) Agreed conditions of engagement;
   B) The creation of a register for anglers – from which anglers can be added, or removed;
   C) Description of all aspects of the process such as non-lethal handling and retention;
   D) Minimum requirement for angling equipment;
   E) Prior IFI Management response to all 45 questions drafted by the Research Division in document entitled **"The role of IFI science in informing policy and management in fisheries";**
   E) Cessation of all IFI Section 59 authorisations to cull pike on the Western Lakes;

3.2.6 IFI ADAPTIVE MANAGEMENT PROPOSALS

Water quality decline is linked to fish species density (e.g. Salmonids and Coarse Fish) and is a significant driver of ecological changes in the Western Lakes. Lough Sheelin in particular, is a prime example of how water quality can shape species density of salmonids and coarse fish, particularly over the past 4 decades.

The proposed plan embraces the concept of 'Adaptive Management', however it does not define how it will monitor and assess the outcome of water quality improvement or the water quality parameters that it will link to the environmental improvement of the Natura 2000 sites and hence, the improvement of salmonid stocks. The sustainability of future salmonid stocks relies upon pristine water quality as a prerequisite and as such, should be the primary management focus of the "long term plan for the Western Lakes".

Section 3.2.6 - Proposed Management Plan – Submission Item:

1) This submission proposes that It will be necessary for Inland Fisheries to detail an 'Adaptive Management Programme' to scientifically research the link between water quality improvements and fish species responses in the Western Lakes and secure specific funding from DECC for enhanced ecological testing and monitoring to facilitate the programme, and that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

3.3 FAILURE OF PLAN TO STATE SALMONID MEASURABLES OR KEY PERFORMANCE INDICATORS

The proposed plan does not detail the measurables and parameters upon which the success of the proposed plan will be measured.

3.3.1 KEY PERFORMANCE INDICATORS & MANAGEMENT STRATEGY EVALUATION

As there is no definition of measurables or parameters the proposed plan has failed to detail any metrics that will be used to assess the success, failure or progression of the proposed plan.

Due to the current practice of artificial stock manipulation by IFI the plan has not detailed how a baseline for any measurables or parameters will be reached.

Due to the current practice of artificial stock manipulation by IFI, the establishment of baseline metrics is severely impacted and therefore compromises the plan.

Baseline metrics can only be established following a lengthy moratorium on all artificial stock manipulation (for all fish species), including stock management operations and the removal of fish (all species) by anglers.

Section 3.3.1 - Proposed Management Plan – Submission Item:

1) This submission considers that the plan, without baseline data is compromised, as its success, failure or progression cannot be quantified due to the absence of baseline data. In order to obtain baseline data it is suggested that the following actions be undertaken:
   A) Cease all artificial stock manipulation by ceasing all stock management operations;
   B) Cease all artificial stock manipulation by introduction of a mandatory catch and release policy for all species;
   C) Implement habitat restoration and enhancement programs to bring salmonid spawning catchment to their maximum carrying capacity for salmonids;
   D) Implement an aggressive program of water quality monitoring, improvement and remediation;
   E) Clearly define parameters based on upon the previous actions to aid in establishing a timeline for stock baseline estimation;

3.4 FAILURE OF PLAN TO PROVIDE OUTLINE OF 'FUNDING' AND 'STAFFING' REQUIRED FOR IMPLEMENTATION

The proposed plan states that Section 11 contains details of ***"the resources required to implement the plan including an outline of funding and staff required is also presented"*** (ref: page 8)

However, Section 11 does not in any way, set out the resources required to implement the plan. In contrast, section 11 states ***"If adequate resources are not engaged in the delivery of the actions, their delivery may not happen or may be delayed".***

This submission considers that the failure to precisely detail the resources and funding required for the plan entirely undermines the validity of the plan.

At a more fundamental level, the plan fails to provide any evidence that the DECC or other relevant funders have approved the necessary allocations required to implement, in particular, the more positive scientific research elements of the plan.

Section 3.4 - Proposed Management Plan – Submission Item:

1) This submission proposes that It will be necessary for Inland Fisheries to detail precisely the resources, funding and staffing levels required for each High-Level Action in the plan and clarification is hereby requested, and that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

2) It is hereby requested that Inland Fisheries Ireland clarifies if the full funding of €1,371,536 has been secured for the continuation of Long-Term Studies on the Western Lakes as outlined in IFI document IFI/2021/1-4562 and confirmation of the commencement and completion of the 4-year research programme, and that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

3.5 ECONOMIC AND ECOLOGICAL DEFICIENCIES RELATED TO THE PLAN REGARDING THE MANAGEMENT OF PIKE – APPARENT OVER REACH OF THE PROPOSED PLAN

The Irish Federation of Pike Angling Clubs and The Irish Pike Society drafted a document specifically for the Pike Policy Review of 2016-2018 which was originally initiated by Inland Fisheries Ireland, following pike angler outcry at Inland Fisheries Ireland's own abuse as shown in publicised video footage, of the previously agreed pike policy of 2012-2014.

The document entitled **"Economic and Ecological Effects of Pike Management Operations Conducted by Inland Fisheries Ireland and Deficiencies in its Justification"**, is attached in Appendix F.

The document sets out many issues that remain to be resolved and to be considered within the context of Inland Fisheries Ireland's general management of our Western Lakes as a national asset.

The direction of travel of the current plan is incredible, when one considers the very fundamental information contained not only in Appendix F (e.g. section 10.4.1 & 10.4.1.1 regarding the lack of response of trout stocks to pike removal), but in the scientific strides made by the Research Division of Inland Fisheries Ireland and by external researchers such as Dr. Pedreschi, over the past 10 years.

The current 'Long Term Management Plan for the Western Lakes' appears to sit 'out of step' with all current scientific knowledge and findings, which lean toward taking a more precautionary approach to our fisheries ecologies and therefore to their management, rather than the apparent over-reach that appears to exist within the proposed plan, particularly regarding stock management and the removal of existing pike and coarse fish bye-laws.

Section 3.5 - Proposed Management Plan – Submission Item:

1) This submission suggests that certain Actions in the plan over-reach such as those related to pike and coarse fish, particularly in any consideration given to the removal of existing conservation bye-laws relating to those species, and therefore a detailed explanation outlining the scientific basis, justification and expected outcome for the ecology of the Western Lakes of such Actions based upon existing scientific research is requested, and should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this, or any future management plan.

3.6 STRATEGIC ENVIRONMENTAL ASSESSMENT - NATURA IMPACT STATEMENT & APPROPRIATE ASSESSMENT

A Strategic Environmental Assessment is mandatory for plans/programmes which are prepared for fisheries or that have been determined to require an assessment under the Habitats Directive (See Directive 2001/42/EC).

Appropriate Assessment (AA) is an impact assessment process that fits within the decision-making framework and tests of Articles 6(3) and 6(4) of the Habitats Directive (See Directive 92/43/EEC).

This submission to Inland Fisheries Ireland regarding their application of the SEA Directive and the Habitats Directive expresses concern that the each of the seven High Level Objectives of the 'Long Term Management Plan for the Western Lakes' inter-alia the High-Level 'Actions' proposed in the plan, will not undergo Appropriate Assessment at High-Level.

This submission proposes that each of the High-Level Objectives and Actions undergo a full Appropriate Assessment by independent consultants. There is a fundamental concern expressed by this submission that the Appropriate Assessment Stage 1 Screening undertaken by INVAS Biosecurity Ltd. concludes that *"the proposed Long-term Management Plan for the Great Western Lakes is likely to contribute to the maintenance or restoration of the favourable conservation condition of habitats and species within Natura 2000 sites*", without establishing how this conclusion was reached or what peer-reviewed scientific research INVAS Biosecurity Ltd. reviewed, in order to reach the conclusion.

It is considered here that a pre-requisite for examining the implementation of any plan in the context of EU Directives should fundamentally have scientific evidence at its core, and in this instance should additionally question if the plan aligns with Inland Fisheries Ireland's own Corporate Plan (2021-2025), particularly Action 2.3 of HLO 02 i.e. to *"Develop fishery management plans in light of best evidence-based research and modelling available"*.

It is the considered position of this submission that the Stage 1 Screening by INVAS Biosecurity Ltd. does not engage the fundamental application of scientific research, particularly related to the artificial manipulation of fish stocks inter-alia the management operations applied, and the likely impacts for faunal diversity in the Western Lakes, within the context of its conclusion.

Section 3.6 - Proposed Management Plan – Overarching Appropriate Assessment Submission Item:

1) It is proposed here that this entire submission and **all** appendices is given in full, to any **current or future consultant or external / internal persons** engaged in undertaking Appropriate Assessment Screening, Natura Impact Statements, Stage 2 Appropriate Assessments or Strategic Environmental Assessment Reports - related to the proposed "Long-term Management Plan for the Great Western Lakes", or any future Western Lakes management plan or project, where stock management is a proposed element of the plan or project on any of the Western Lakes.

3.6.1 INVAS BIOSECURITY LTD PROPOSAL FOR PLAN ACTIONS TO PROCEED TO STAGE 2 NATURA IMPACT STATEMENT & APPRORIATE ASSESSMENT

Stage 1 Screening for Appropriate Assessment was undertaken by INVAS Biosecurity Ltd. The report was completed in July 2022. Following a request made to Inland Fisheries Ireland, the AA screening report was subsequently added to the documentation made available to the public as part of this public consultation. The release of the report is welcomed.

The Stage 1 Screening for Appropriate Assessment prepared by INVAS Biosecurity Ltd. states the following:

> *"the potential for adverse impacts on Natura 2000 sites are uncertain. Potential impacts as a result of the proposed Actions include the accidental spread/dispersal of IAS, petrochemical/silt pollution and the disturbance/destruction of protected habitats and species (including, but not limited to, Atlantic Salmon, Freshwater pearl mussel, Lamprey, Otter, White-clawed crayfish)."*
>
> *"Impacts may occur during or after the implementation of the proposed Actions including the establishment of buffer zones, planting programs for native trees, management of IAS, fish stock management plans and restoration of salmonid habitat".*
>
> *"Based on the above AA Screening a Natura Impact Statement is required in relation to Actions 2.2, 2.3, 4.1. 5.1, 5.2 and 6.1."*

The above comments in the Stage 1 Screening by INVAS Biosecurity Ltd. Indicate that Stage 2 Appropriate Assessment is required for Actions *2.2, 2.3, 4.1. 5.1, 5.2 and 6.1*.

Section 4 of this submission sets out a detailed suite of factors potentially adversely affecting the integrity of the Natura 2000 sites concerned. It is expected, in respect of this submission that each of the factors outlined in Section 4 will be fully and scientifically appraised with the context of completing:

- Any and all Natura Impact Statements
- Any and all Appropriate Assessments
- The Strategic Environmental Assessment Report

3.6.2 INLAND FISHERIES IRELAND REVISION OF DECC / INVAS REVIEWED HLO ACTIONS IN PROPOSED PLAN - SUBSEQUENT TO STAGE 1 APPROPRIATE SCREENING

The Angling Consultative Council of Ireland (ACCI) was advised by the DECC during 2021 and early 2022, that the 'Long Term Management Plan for the Western Lakes' was submitted to the DECC by Inland Fisheries Ireland and was being reviewed with feedback subsequently given to Inland Fisheries Ireland. This feedback was to allow Inland Fisheries Ireland to proceed with subsequent stages of consideration, e.g. public consultation etc.

During the ACCI meeting with the DECC and Inland Fisheries Ireland on May 30th 2022, ACCI members asked for an update on whether or not, an Appropriate Assessment for the plan would be undertaken, prior to the public consultation stage. Inland Fisheries Ireland advised that an Appropriate Assessment would be undertaken and that the public consultation could be postponed until the Appropriate Assessment was complete. A stage 1 Appropriate Assessment Screening was undertaken by INVAS Biosecurity Ltd. and as such, Inland Fisheries Ireland complied with its stated undertaking and supplied the Appropriate Assessment Stage 1 Screening undertaken by INVAS Biosecurity, dated July 2022.

Subsequent to the Appropriate Assessment Stage 1 Screening report undertaken by INVAS Biosecurity Ltd, Inland Fisheries Ireland issued the draft 'Long Term Management Plan for the Great Western Lakes, dated June 2022 (Ref: IFI/2022/1-4618). The Plan was released for public consultation on 9th August 2022, however section 11 (P45-P47) of the draft plan contains a revised suite of Actions, to that contained in the High-Level Objectives originally appraised in the INVAS Report dated July 2022. This presents as a significant cause for concern for a number of reasons as follows:

a) It appears that Inland Fisheries Ireland has two differing and conflicting sets of 'Actions', both of which are contained in the draft plan released for public consultation (i.e. P4-P6 & P45-47) - Why has Inland Fisheries Ireland prepared two different Plans?

b) Which of the two Plans was originally reviewed and approved by the DECC and Minister Eamon Ryan?

c) Who authorised the revisions to the plan reviewed by INVAS Biosecurity Ltd, and on what scientific or other basis were the changes made?

d) Why was INVAS Biosecurity Ltd not given the revised plan, as it clearly pre-dates the completion of the INVAS Report?

e) What precise information was given to INVAS Biosecurity Ltd?

f) Why did Inland Fisheries Ireland not release INVAS Biosecurity Ltd.'s Appropriate Assessment Stage 1 Screening report at the commencement of the public consultation period, per the request at the ACCI meeting of 30th May, but instead wait until the report was requested by the public when the public consultation process was underway?

It is deeply concerning that Inland Fisheries Ireland has revised and apparently predetermined a new direction for 'Actions' within the draft Plan, as presented in section 11 of the Plan.

See Appendix H - *Comparison of INVAS Biosecurity Ltd. Assessed High Level Objectives & 'Actions' with Inland Fisheries Ireland Revised 'Actions' Contained in Section 11 of the 'Long Term Management Plan for the Western Lakes'.*

The revised 'Actions' refer in large part to stock management and to the revision of existing pike and coarse fish bye-laws and therefore contain significant and potentially devastating impacts to the ecology of the western lakes, and to which INVAS Biosecurity Ltd. was not advised of.

In addition, the revisions potentially question the credibility of Inland Fisheries Ireland and the systems and procedures under which the organization is directed and controlled per Inland Fisheries Ireland Corporate Plan 2021-2025, and fundamentally questions compliance with High Level Objective 02, Action 2.3 of the Corporate Plan in relation to how fishery management plans are developed "in light of best evidence-based research and modelling available", particularly to determine strategies and potential outcomes of plans and projects undertaken in Natura 2000 sites.

Section 3.6.2 - Proposed Management Plan – Submission Item:

1) This submission calls for an immediate investigation into who requested and authorised the revisions to the 'Actions' as per section 11 of the 'Long Term Management Plan for the Western Lakes'; the basis (i.e. scientific or other) for the revisions; why INVAS Biosecurity Ltd. was not given the revised 'Actions' at the Appropriate Assessment Screening Stage and why Inland Fisheries Ireland with-held the Appropriate Assessment Screening Report at the outset of the public consultation process?

3.6.3 APPROPRIATE ASSESSMENT GUIDANCE FOR A 'PLAN' OR 'PROJECT' IN NATURA 2000 SITES

In line with the guidance for planning authorities for 'Appropriate Assessment of Plans and Projects in Ireland' (Ref: NPWS, 2009), the Appropriate Assessment (AA) is an impact assessment process that fits within the decision-making framework and tests of Articles 6(3) and 6(4) of the Habitats Directive, and comprises two main elements.

- Firstly, a Natura Impact Statement (NIS) – i.e. a statement of the likely and possible impacts of the plan or project on a Natura 2000 site must be prepared.

This comprises a comprehensive ecological impact assessment of a plan or project; it examines the direct and indirect impacts that the plan or project might have on its own or in combination with other plans and projects, on one or more Natura 2000 sites in view of the sites' conservation objectives.

- Secondly, the competent authority carries out the AA, based on the NIS and any other information it may consider necessary.

The AA process encompasses all of the processes covered by Article 6(3) of the Habitats Directive, i.e. the screening process, the NIS, the AA by the competent authority, and the record of decisions made by the competent authority at each stage of the process, up to the point at which Article 6(4) may come into play following a determination that a plan or project may adversely affect the integrity of a Natura 2000 site.

Case law of the ECJ has established that AA must be ***"based on best scientific knowledge in the field".*** Accordingly, the NIS must be prepared by a person or persons with the requisite ecological expertise and experience, supplemented as necessary by additional expertise and experience (e.g. geology, hydrology, civil engineering or planning), and produced in a scientifically complete, professional and objective manner.

The timing of the AA is critical and it must precede the decision to authorise, adopt or proceed with a plan or project and must inform the overall decision made. The NIS and the AA must be completed prior to any decision being made to authorise a plan or project.

It is considered ***"entirely unacceptable for a planning authority to approve a plan or project conditioned on the undertaking or completion of surveys, research or data-gathering of relevance in assessing the likely effects"*** (NPWS, 2009).

Section 3.6.3 - Proposed Management Plan – Submission Item:

1) This submission considers that 'Actions' e.g. 5.2, 5.3, 7.1, 7.2 contained in the 'Long Term Management Plan for the Western Lakes' are not based on the ***"best scientific knowledge in the field"*** as per ECJ Case Law per NPWS (2009), but are instead "***data-gathering of relevance in assessing the likely effects***" and as such the impacts are uncertain and the Actions should be withdrawn until such a time that scientific research is complete.

3.7 TABLE OF SUBMISSION COMMENTS & PROPOSED AMENDMENT / ADDITIONS TO IFI PLAN 'ACTIONS'

This section contains a review of the Actions proposed in Inland Fisheries Ireland's 'Long Term Management Plan for the Western Lakes'.

The review is set out in 6no. columns as follows:

- **Column 1 – IFI High-Level Objective and relevant Action (See Page 45, 46 & 47 of the Plan)**
- **Column 2 – Proposed IFI Action (See Page 45, 46 & 47 of the Plan)**
- **Column 3 – General Submission Comment on IFI Action**
- **Column 4 - Proposed Submission Amendment to IFI Action and/or Additional Proposed Action**
- **Columns 5 & 6 – Start and Finish of Action**

HLO 1	Stakeholder Engagement				
Action	**Proposed IFI Action**	**General Submission Comment on Action**	**Proposed Submission Amendment to IFI Action and/or Additional Proposed Action**	**Start**	**Finish**
1.1	Identify and engage with established catchment groups, trusts and associations to assist with the progression of common catchment management goals.	Stakeholder groups to be expanded to include national angling organisations	Identify and engage with established catchment groups, trusts, national angling organisations and associations to assist with the progression of common catchment management goals	2022	5 Year Review
1.2	Where such groups have not yet been established, engage local communities, stakeholders and relevant authorities in the protection and development of their river catchments through the establishment of more Catchment Management Associations for the Western Lakes.	Include conservation of fish species within the Action	Where such groups have not yet been established, engage local communities, stakeholders and relevant authorities in the protection and development of their river catchments and conservation of fish species, through the establishment of more Catchment Management Associations for the Western Lakes.	2022	5 Year Review
1.3	Enhance communication mechanisms and networks between IFI, catchment groups and relevant authorities.	Proposed action excludes or at least dilutes angler, stakeholder and tourism interest groups input by focusing on input from those within catchment areas. There is no reference to the most important stakeholders - farmers. While recognising the work of local community groups, the fisheries in question are not the sole preserve of those residing in their vicinity or within their catchment areas. The Western Lakes are national assets. Their development and maintenance is funded by all Irish tax payers and therefore input into this plan cannot be prioritised in the way IFI are currently weighting input e.g. Geographical location of information evenings.	Enhance communication mechanisms and networks between IFI, catchment groups, farming organisations, national species representative bodies, anglers from outside immediate catchment areas, Tourism Ireland and relevant authorities.	2022	Ongoing

TABLE OF SUBMISSION COMMENTS & PROPOSED AMENDMENT / ADDITIONS TO IFI PLAN 'ACTIONS' (HLO 2)

HLO 2	Climate Action & Biodiversity				
Action	**Proposed IFI Action**	**General Submission Comment on Action**	**Proposed Submission Amendment to IFI Action and/or Additional Proposed Action**	**Start**	**Finish**
2.1	Identify manageable factors which will contribute to the climate resilience of sensitive habitats and species.	Agreed	N/A	Started	TBC
2.2	Promote the establishment of significant aquatic buffer zones to enhance biodiversity and ameliorate nutrient and sediment run-off.	Impact Uncertain. Subject to 'Natura Impact Statement' (NIS) and Full 'Appropriate Assessment' (AA) - Ref: SEA Scoping' & 'AA Screening' Reports.	N/A	Started	5 Year Review
2.3	Develop models to inform the strategic planting of native woodlands to mitigate the impacts of elevated water temperatures and increased flood frequency and severity.	Impact Uncertain. Subject to 'Natura Impact Statement' (NIS) and Full 'Appropriate Assessment' (AA) - Ref: SEA Scoping' & 'AA Screening' Reports.	N/A	TBC	TBC

TABLE OF SUBMISSION COMMENTS & PROPOSED AMENDMENT / ADDITIONS TO IFI PLAN 'ACTIONS' (HLO 3)

HLO 3	Water Quality				
Action	**Proposed IFI Action**	**General Submission Comment on Action**	**Proposed Submission Amendment to IFI Action and/or Additional Proposed Action**	**Start**	**Finish**
3.1	Enhance the capacity of IFI to detect and enforce water quality offences by increasing the number of fisheries environmental Officers working in the catchment areas of the Western lakes.	Public sector funding for staff through the DECC may not provide for additional resources, therefore redeployment of existing staff resources may be more appropriate e.g. redeploy staff presently engaged in stock management. E.g. Cessation of stock management on Lough Ennell showed that a change of focus onto water quality and stream enhancement resulted in an improvement in brown trout stocks.	Enhance the capacity of IFI to detect, and enforce water quality and environmental offences on the Western Lakes primarily through: 1) retraining and upskilling of existing staff, and 2) by increasing environmental officer numbers, if funding becomes available.	2022	5 Year Review
3.2	Enhance the current statutory powers of Inland Fisheries Ireland by authorising officers to enforce the relevant provisions of the Habitat Regulations.	Inspection and enforcement of actions within the IFI plan with regard to oversight of their known or uncertain impact on SAC'S & SPA'S are more appropriately a matter for the National Parks and Wildlife Service (NPWS).	Provide an annual reporting mechanism relevant to the plan, directly to the NPWS based upon the NIS and AA prepared for the plan.	2022	Ongoing
3.3	Continue to improve and enhance working relationships with key environmental authorities in the western lake catchments so that information is shared effectively and increased efficiencies, with regard to environmental enforcement, are achieved.	Agreed	N/A	Started	5 Year Review
3.4 (NEW)	Not Currently Considered	There is a need within this Plan to address water quality issues associated with nutrient inputs e.g. such as excessive nutrient loading appearing on Lough Corrib and Lough Carra.	Provide information and assistance with the designation of nutrient sensitive catchments and areas of action for each Western Lake.	TBC	TBC

3.5 (NEW)	Not Currently Considered	HLO 3 as a primary requisite for salmonids fails to deliver an adequate suite of actions to adequately address the water quality issues facing the western lakes e.g. ongoing algae blooms and precise sources of same on Lough Corrib. Evidence establishing the need for more focused attention to water quality and the reasons for it's deterioration over time, are amplified by the recent EU financed LIFE Project, Lough Carra Life, in response to a deterioration of Lough Carra that has reached a point that is unaligned with the importance IFI place on the Western Lakes group.	Engage with Mayo County Council and the project partners of the EU financed LIFE Project, Lough Carra Life to include specific consultation with catchment management groups, with the sole purpose of building a suite of comparative Agri-environmental and climate measures options for each of the Western Lakes, based on the learnings of the LIFE Project.	TBC	TBC
3.6 (NEW)	Not Currently Considered		Engage with EPA to seek elevation of Lough's Corrib, Conn, Cullin, Sheelin, Arrow, Carra & Mask to 'Priority Site' status to increase frequency within the Water Framework Directive of operational and surveillance programmes for physio-chemical, hydro morphological & biological quality elements on Lough's Corrib, Conn, Cullin, Sheelin, Arrow, Carra & Mask to reflect and assist upcoming research into fish stock dynamics.	2023	10 Year Review
3.7 (NEW)	Not Currently Considered	Water quality decline is linked to fish species density (e.g. Salmonids and Coarse Fish) and is a significant driver of ecological changes in the Western Lakes. Lough Sheelin in particular, is an example of how water quality has shaped species density of salmonids and coarse fish over the past 4 decades. The proposed plan embraces the concept of 'Adaptive Management', however it does not define how it will monitor and assess the outcome of water quality improvement or the water quality parameters that it will link to the environmental improvement of the Natura 2000 sites and hence, the improvement of salmonid stocks. The sustainability of future salmonid stocks relies upon pristine water quality as a prerequisite and as such should be the primary management focus of the long term plan for the Western Lakes.	Provide an 'Adaptive Management Programme' to scientifically research the link between water quality improvements and fish species responses in the Western Lakes and secure specific funding from DECC for enhanced ecological testing and monitoring to facilitate the programme.	TBC	Link to WFD

TABLE OF SUBMISSION COMMENTS & PROPOSED AMENDMENT / ADDITIONS TO IFI PLAN 'ACTIONS' (HLO 4)

HLO 4	Invasive Species				
Action	**Proposed IFI Action**	**General Submission Comment on Action**	**Proposed Submission Amendment to IFI Action and/or Additional Proposed Action**	**Start**	**Finish**
4.1	Remove and/or manage harmful invasive species through a strategic stock management and weed management programmes.	Invasive weed species e.g. L. Major have the potential to require considerable resources to be maintained indefinitely and threaten local economies and fisheries - See Morrisey et al.(2020). This submissions proposes that aquatic invasive species such as weed and zebra mussels are treated separately to fish. Note: Impact Uncertain. Subject to 'Natura Impact Statement' (NIS) and Full 'Appropriate Assessment' (AA) - Ref: SEA Scoping' & 'AA Screening' Reports.	Remove and/or manage harmful invasive weed species through strategic weed management and containment programmes.	Started	5 Year Review
4.2	Continue to use digital and conventional media to alert the public about potentially harmful invasive species in the western lakes.	IFI to provide irrefutable scientific evidence prior to engaging or branding particular 'fish' species as invasive. The current definition of "invasive" or "non native to The Western Lakes" within the plan e.g. regarding pike, is unsupported by the best evidence based research available. L. Major remains a significant threat in Lough Corrib to the ecology of the Lough and to angling and other water users. A targeted public media campaign is required.	Continue to use digital and conventional media to alert the public about potentially harmful invasive weed species in the western lakes.	Started	5 Year Review
4.3	Provide biosecurity advice and resources to stakeholder groups to prevent the spread of invasive species in the western lakes.	Agreed	N/A	Started	5 Year Review

4.4	Encourage relevant stakeholder groups to participate in the management of invasive species.	Stakeholder groups are primarily untrained and very likely will not possess adequate public, personal or employers liability insurance to satisfy public sector requirements, nor will stakeholders likely be capable of indemnifying IFI or the DECC in the event of an accident during the performance of such participation. With regard to fish species only, the act of an IFI Action that seeks to encourage one stakeholder to actively kill the fish species that another stakeholder typically releases alive as part of their angling philosophy is deeply concerning and promotes division between angling groups and as such is unwelcome in today's society.	Management of species deemed to be invasive following review of evidence-based management, to be undertaken directly by IFI. Section 59 authorisations by Inland Fisheries Ireland to angling clubs / individuals to cease immediately.	2023 TBC	TBC
4.5	Enhance legislation and increase penalties for the transfer of live fish	Previous DECC comment stated that penalties were adequate. Note: This is an enforcement and education issue with regard to invasive species. IFI has presented no evidence that the emergence of new species in new waterways are linked directly to anthropogenic introduction. Other transfer modes e.g. birds are not adequately researched presently by IFI in a rapidly changing climate / environment.	Seek external advice on resources and available options to improve general fisheries laws enforcement and present suite of options to DECC for review.	2023	5 Year Review
4.6 (NEW)	Not Currently Considered	This plan does not provide specific biosecurity protection measures in action 4.3 for angling or pleasure craft to safely enter and depart from the Western Lakes.	Maintain facilities for angling tourism to the Western Lakes, by installing biosecurity washing stations at all public access entry points on the Western Lakes.	TBC	TBC

TABLE OF SUBMISSION COMMENTS & PROPOSED AMENDMENT / ADDITIONS TO IFI PLAN 'ACTIONS' (HLO 5)

HLO 5	Stock Management				
Action	**Proposed IFI Action**	**General Submission Comment on Action**	**Proposed Submission Amendment to IFI Action and/or Additional Proposed Action**	**Start**	**Finish**
5.1	Produce stock management plans annually, to reduce impacts on salmonids from other fish populations.	1) The Impact of Actions 5.1 & 5.2 are Uncertain. and subject to 'Natura Impact Statement' (NIS) and Full 'Appropriate Assessment' (AA) - Ref: SEA Scoping' & 'AA Screening' Reports. 2) IFI Have not provided definitive scientific evidence to support stock management - Note: IFI actions must be scientifically supported. 3) IFI have not incorporated existing research into the co-existence of pike and trout in the actions proposed in this plan - See: Mc Cloone et al. (2018). 4) IFI are inappropriately proposing to remove existing protection to a potentially native species (i.e. pike) on the Western Lakes - See: Pedreschi et al. (2013). 5) IFI historical records regarding the colonisation of pike on the Western Lakes e.g. Lough Corrib are inconclusive - See IPS correspondence to IFI CEO (2022) .	Cease stock management for pike on the Western Lakes until completion of research (Ref: IFI/2021/1-4562) and production of peer-reviewed research papers - to provide best practice evidence-based management (EBM) decision making on future management options, if scientifically proven to be necessary, for the Western Lakes.	2023	5-10 years (TBC)
5.2	Adjust stock management plans as population models on each of the lakes are refined.		Develop a suite of scientifically supported environment responsive multi-species population modelling options to DECC for each Western Lake, following completion of research (Ref: IFI/2021/1-4562) and production of peer-reviewed research papers.	2023	5-10 years (TBC)
5.3	Enable local stakeholder groups to contribute to stock management and research programmes through a revision of relevant bye-laws		Retain existing pike and coarse fish bye-laws pending completion of definitive scientific evidence of pike predation impact on trout and coarse fish abundance and completion of scientific research into population modelling.	2023	(TBC)
5.4	Develop risk matrix for salmonids based on physical characteristics of each waterbody and the implications of these for predation.	Agreed with added comment regarding bottlenecks and avian and mink predators	Develop risk matrix for salmonids (Salmo salar) based on physical characteristics of each waterbody bottleneck and the implications of these for predation by various fish & avian predators and by mink during the peak run of Annex ii salmon smolts during Spring.	2022	2023

5.5 (NEW)	Not Currently Considered	1) Gillnets for use in stock management (i.e. outside of stock surveys e.g. WFD) are generally opposed by all angling disciplines including a majority of trout anglers - See Curtis, John. (2018). 2) The Impact of gillnets on Annex ii species 'Otter' deserves particular attention in a 'Natura Impact Statement' (NIS) and Full 'Appropriate Assessment' (AA) as during monthly undertaken stock management; gillnets are stretched out over hundreds of metres of shoreline within 80m of shore. This fundamentally contravenes the conservation objectives for Otters e.g. foraging and commuting and acts as potential disturbance of this protected species - See - NPWS Conservation Objectives for Site CO000297. 3) Gillnets for stock management are set in littoral zones of the Western Lakes and potentially act as a transfer mode for invasive weed within SAC'S (i.e. Natura 2000 sites) e.g. L. Major, as the removal of weed requires considerable effort - See Morrisey et al.(2020) - In addition gillnetting has historically taken place in many of the bays now containing L. Major, therefore gillnetting may be directly responsible for the spread of invasive weed into bays around Lough Corrib.	Confine Gill Net operations on the Western Lakes to Water Framework Directive and IFI Research Department Fish Stock Surveys only - Note: Include additional IAP Protocols for Lough Corrib to prevent IAP Spread.	2022	Indefinite

5.6 (NEW)	Not Currently Considered	1) In relation to wild brown trout stocks both pleasure angling and competition angling are cited as a having a significant negative impact where fish are killed for consumption or competition. - See: Mc Cloone et al. (2018). 2) IFI suggest wild brown trout stocks in the named fisheries are "at significant risk". IFI continue to market fisheries such as L. Corrib as the best wild brown trout fisheries in the world. Inviting such angling pressure on a resource that is (as stated by IFI) of primarily conservation and not economic concern is also "a significant risk". 3) Introduce moratorium on trout killing. Post moratorium any angler wishing to take a fish of any species should be subject to a charge within the framework of a tagging scheme similar to that currently employed for Salmon angling. All revenues generated should be ringfenced for development works on the related fisheries.	Introduce moratorium on the killing of wild brown trout by individual anglers and during angling competitions until completion of research (Ref: IFI/2021/1-4562 to assess/ achieve a stock baseline in conjunction with a stock management moratorium.	2023	5-10 years (TBC)

TABLE OF SUBMISSION COMMENTS & PROPOSED AMENDMENT / ADDITIONS TO IFI PLAN 'ACTIONS' (HLO 6)

HLO 6	Habitat Restoration				
Action	**Proposed IFI Action**	**General Submission Comment on Action**	**Proposed Submission Amendment to IFI Action and/or Additional Proposed Action**	**Start**	**Finish**
6.1	Address the salmonid habitat deficits in the western lakes catchments through 3 targeted restoration projects per catchment per year.	Note: Impact Uncertain. Subject to 'Natura Impact Statement' (NIS) and Full 'Appropriate Assessment' (AA) - Ref: SEA Scoping' & 'AA Screening' Reports. The target of '3' restoration projects does not provide sufficient information on the total restoration required on each of the Western Lakes to assess the viability of this target as a contribution to the Natura 2000 site.	Produce a risk based catchment management report, fully considerate of the NIS and Full AA, for all catchments in each of the Western Lakes and based on current scientific data - Report to include designation of nutrient sensitive catchments and a 5-year proposed programme of restoration projects for years 2023 to 2028 to be undertaken by IFI and/or OPW.	2023	5 Year Review
6.2	Streamline administrative processes to bring development projects through planning processes to fruition with maximum efficiency.	Agreed	N/A	Started	2022
6.3	Ensure that all relevant environmental protection processes are in place to avoid damage to other sensitive species and habitats.	Agreed	N/A	Ongoing	Ongoing
6.4	Not Currently Considered	IFI are proposing to introduce wide planted buffer zones along the streams and rivers feeding the Western Lakes to offset against climate change. There is no evidence to suggest the extent of work required, the potential cost, or the planned timeline for completion.	Produce a risk based catchment management report using all existing data, detailing all streams and rivers, length, width, any land take required, projected costs and timeline for completion of climate change buffer zones for each of the Western Lakes.	2023	2023

TABLE OF SUBMISSION COMMENTS & PROPOSED AMENDMENT / ADDITIONS TO IFI PLAN 'ACTIONS' (HLO 7)

HLO 7	Research				
Action	**Proposed IFI Action**	**General Submission Comment on Action**	**Proposed Submission Amendment to IFI Action and/or Additional Proposed Action**	**Start**	**Finish**
7.1	Develop new and refine existing fish stock monitoring programmes (e.g. WFD) to provide the necessary data for specific population models for the western lakes.	Agreed - IFI to provide clarification on what scientific parameters are required to be met by "Developing new and refining existing fish stock monitoring programmes" and confirm the timeline for having a new monitoring protocol in place.	Develop new and refine existing fish stock monitoring programmes (e.g. WFD) to meet new parameters as advised by the IFI Research Division for commencement in Summer 2023 - to provide the necessary data for specific population models for the western lakes.	2022	2023
7.2	Use all available sources of data incl. Stock management and angling returns to feed into population models for the western lakes.	Note: IFI proposed Action 5.1 Impact Uncertain. Subject to 'Natura Impact Statement' (NIS) and Full 'Appropriate Assessment' (AA) - Ref: SEA Scoping' & 'AA Screening' Reports. Per proposed amended Action 5.1, stock management for pike on the Western Lakes to cease for a period of minimum 10 years to provide for the completion of scientific research into population dynamics and models, dietary changes and environmental & water quality levers upon fish stocks.	Investigate and develop a Mobile APP for reporting catch details by all angling disciplines for all species in the western lakes to feed into population models for the Western Lakes.	TBC	TBC
7.3	Continue to develop climate models under current research programmes (CCMP) to improve resilience in catchments and species.	Agreed	N/A	Started	Ongoing

7.4 (NEW)	Not Currently Considered	Inland Fisheries Ireland's Research Division have proposed additional research on the Western Lakes to progress the research of McLoone et al., 2018. The Research Division state that the research will provide "Important additional knowledge of predator-prey and competitive interactions will inform full development of a size-based mathematical model of the lake fish community". the Research Division state that "this kind of model is used globally to support best practice Management Strategy Evaluation (MSE) that can support managers by exploring the likely impact of candidate fisheries management actions". The proposed study will take place over 4 years at the total cost of €1,371,536.	Complete the full research proposal contained in Inland Fisheries Ireland Research Division document IFI/2021/1-4562 - Continued Long Term Studies for Lough's Corrib, Mask, Carra.	Immediate	4-Year Study + Peer review
7.5 (NEW)	Not Currently Considered	The IFI proposed plan fails to consider the possibility that pike on the Western Lakes are linked to a Irish strain that is considered to be significantly genetically depauperate and considerably divergent from British and European sites examined and are linked to a scientifically researched genetic lineage of naturally colonised Irish pike, extending to a time period of 4000-8000 years ago - See Pedreschi et al. (2014). Inland Fisheries Ireland has not progressed it's scientific knowledge of pike and other species e.g. perch in the Western Lakes group since the scientific research undertaken as presented in Pedreschi (2014). Considering the best available scientific evidence, it is considered here that the proposed plan seeks to induce a loss of biodiversity in the Western Lakes by removing a potentially native species i.e. Pike. On the basis of the precautionary principle, the management of pike should cease until further and definitive scientific evidence is obtained to elucidate the colonisation of the Western Lakes by Pike.	Secure specific DECC funding and commence a programme of scientific research specifically designed to determine the colonisation timeline of the Western Lakes by Pike & Perch.	TBC	TBC

7.6 (NEW)	Not Currently Considered	The Western Lakes Long Term Management Plan has been developed primarily on the basis that brown trout are managed preferentially, despite brown trout being the most widespread freshwater fish species in Ireland, are under no threat of extinction and may potentially exert a significant negative impact on species protected under Annex II of the European Habitats Directive i.e. Salmon (Smolts and juvenile fish). The Impact of trout upon these species are uncertain and subject to 'Natura Impact Statement' (NIS) and Full 'Appropriate Assessment' (AA).	Conduct a research programme to assess the predation and competition impact from artificially increasing brown trout stocks, on Annex ii Salmon (Salmo Salary) in spawning and nursery streams, in catchments of Lough's Conn, Cullin & Corrib.	TBC	TBC
7.7 (NEW)	Not Currently Considered	The Western Lakes Long Term Management Plan has been developed primarily on the basis that brown trout are managed preferentially, despite brown trout being the most widespread freshwater fish species in Ireland, are under no threat of extinction and may potentially exert a significant negative impact on Red Listed Mayfly species i.e. (Baetis atrebatinus (Dark Olive), Procloeon bifidum (Pale Evening Dun) and Kageronia fuscogrisea (Brown May Dun). The Impact of trout upon these species are uncertain and subject to 'Natura Impact Statement' (NIS) and Full 'Appropriate Assessment' (AA).	Conduct a research programme to assess the dietary impact on Red Listed Mayfly species from artificially increasing brown trout stocks.	TBC	TBC

7.8 (NEW)	Not Currently Considered	The Long Term Plan for the Western Lakes Table 3.1 sets out the current angling regulations for brown trout on each of the Western Lakes. Currently, daily allowable bag limits are as follows: - Lough Corrib, Mask, Carra - 4 trout/day exceeding 33cm. - Lough Arrow - 4 trout/day exceeding 30cm. - Lough Sheelin - 2 trout/day exceeding 36cm. - Lough Conn, Cullin - No limit The best evidence based research and modelling available from IFI indicates: 1) Some reduction in trout fishing mortality may be slightly more beneficial to trout populations, than an increase in pike removals. 2) Some reduction in trout fishing mortality may be slightly more beneficial to trout populations in the moderate alternative prey resource scenario, than an increase in pike removals. The Impact of the current brown regulations upon the sustainability of the trout population requires investigation and an assessment of the current viability of the trout stock to remain sustainable under current trout regulations.	Conduct a research programme on the best available scientific evidence to assess the impact of angling mortality on the conservation of brown trout stocks on each of the Western Lakes and revise brown trout regulations where necessary.	TBC	TBC

4 FACTORS POTENTIALLY ADVERSELY AFFECTING THE INTEGRITY OF THE SITES CONCERNED

This submission considers that the 'Long Term Management Plan for the Western Lakes' has the potential to adversely affect the conservation objectives and overall ecology of the Natura 2000 sites, including their structure and function and as such are considered to have a 'Potentially Significant Effect'.

A number of 'Potentially Significant' environmental effects will also impact upon human health and the landscape.

It is proposed that each of the impact types reviewed in this section including the respective submission items are fully incorporated, and scientifically assessed by Inland Fisheries Ireland and/or any appointed consultants, during the preparation of Natura Impact Statements, Appropriate Assessments and the Environmental Report prepared in respect of the Strategic Environmental Assessment Scoping Report, **for this and any future Management Plans considered by Inland Fisheries Ireland.**

The impact types on the Natura 2000 sites are deemed to be described as follows:

- Water Quality and Resource;
- Loss of Habitat Area;
- Species Population Density;
- Potential Removal of Native Species;
- Disturbance;
- Population and Human Health;
- Landscape;

4.1 WATER QUALITY AND RESOURCE

There is common consensus among all stakeholders that the improvement and maintenance of excellent water quality through a programme of results led environmental measures on each of the Western Lakes is of immense importance. It is a position which is strengthened by the pressures faced by our lakes and rivers by climate change.

River Basin District Management Plans developed under the Water Framework Directive are a key component of the improvement of the Western Lakes, however where deficiencies exist in those RBD Plans e.g. such as those that failed to predict the scale of the present deterioration of Lough Carra, it is incumbent upon Inland Fisheries Ireland to understand the implications and shortcomings of such plans and to act decisively for change.

Over the past 30 years there appears to be a strong disconnect between Inland Fisheries Ireland's promotion of salmonids and its own ability to affect the imposition of fundamental water quality protection measures on the Western Lakes and thereby prevent the systemic deterioration of water quality, and its impact on salmonids.

The proposed 'Long Term Management Plan for the Western Lakes' is not fundamentally aligned to that common stakeholder consensus that improving and protecting the environment is of paramount importance to salmonids. It instead binds the management of these lakes into the foreseeable future, to uncertain levels of potential economic and ecological damage, by attempting to manipulate fish stocks through culling, as a response mechanism to offset anthropogenically caused environmental stressors. The angling community requires a more scientifically supported approach to the 'Long Term Management Plan for the Western Lakes'.

4.1.1 PLAN NOT CLEARLY ALIGNED TO ENVIRONMENTAL ACTIONS – REF: PROGRAMME FOR GOVERNMENT 2020

On review of the most recent copy of the Programme for Government it is of particular note that under the 'Climate and Biodiversity' heading within the overarching 'Balanced Regional Development - Agriculture and Food' heading - Ref: Department of Taoiseach (2020) there is a clear link between Salmonids and Agriculture.

The 'Climate and Biodiversity' heading states that ***"farmers are the primary custodians of the rural environment and have a vital role to play in addressing the climate and biodiversity crisis".***

The programme for government further states that ***"We will work with farmers to bring about change on every farm in the country in a practical way, giving them an opportunity to benefit from environmental actions and providing them with options for income generation, through alternative land use options"***.

There is a clear inference from the Programme for Government that the agricultural sector is central to the conservation of salmonids. As angling representative bodies, it is reasonable to expect that the 'Long Term Management Plan for the Western Lakes' would therefore align with Programme for Government and seek to elevate the named waters in the plan, above current EU Directives and Statutory Instruments, by introducing a suite of environmental actions, sampling analysis and compliance conformity, to expressly improve water quality within the Western Lakes for the primary benefit of salmonids.

A precedent existed for linking environmental quality to waters capable of supporting salmonids. Lough Corrib was afforded this additional support under 'S.I. No. 293/1988 - European Communities (Quality of Salmonid Waters) Regulations, 1988'. These Regulations prescribed quality standards for salmonid waters and designated the waters to which the regulations would apply, together with the sampling programmes and the methods of analysis and inspection to be used by local authorities to determine compliance with the standards. None of the six remaining waters named in this plan were afforded this designation as waters capable of supporting salmonids.

We believe that the 'Long Term Management Plan for the Western Lakes' fails to address the environmental quality and therefore the ecological sustainability of the respective fisheries for future generations, and instead binds the management of the fisheries to a continued programme of fish removal and artificial stock manipulation. It is

particularly egregious that it is intended to pursue a revision to conservation bye-law 809 (2006) and to promote angler participation to cull pike without any scientific assessment of either its efficacy or appropriateness.

The net effect of the proposed plan is that the natural balance of stocks of all existing fish species in the Natura 2000 sites will remain unknown and that the results of fish stock surveys, carried out by Inland Fisheries Ireland every 3 years as required under the EU Water Framework Directive, will not reflect the true ecological balances within the respective fisheries.

Section 4.1.1 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Item:

1) It is proposed here that the Plan is re-drafted to reflect measures connected specifically to the agricultural sector regarding practices and land use, including measures implied by the Nitrates Directive, Habitats Directive, EU Water Framework Directive, and the Rural Environmental Protection Scheme for such lakes, rivers and tributaries within designated Special Areas of Conservation (SAC's), by introducing a suite of environmental actions, sampling analysis and compliance conformity, to expressly improve the ecology within the waters for the primary benefit of salmonids as implied by the Programme of Government 2020.

2) It is proposed here that the Plan is re-drafted to include a full risk analysis of all environmental stressors acting on the Western Lakes to include, but not limited to the following: agriculture, forestry, industry, domestic waste treatment, municipal water and waste treatment, land drainage, water extraction etc.

3) It is proposed here that Action 3.1 of the Plan is re-drafted to include for the redeployment of staff engaged in stock management to increased environmental detection and enforcement and that the Action 3.1 include for 1) retraining and upskilling of existing staff, and 2) increasing environmental officer numbers, if funding becomes available.

4) It is proposed here that in consideration of submission item.1 of this section, that a new additional Action 3.4 is inserted into the Plan to specifically propose engagement with Mayo County Council and the project partners of the EU financed LIFE Project, Lough Carra Life to include specific consultation with catchment management groups, with the sole purpose of building a suite of comparative Agri-environmental and climate measures options for each of the Western Lakes, based on the learnings of the LIFE Project.

5) It is proposed here that a new additional Action 3.6 is inserted into the Plan to specifically engage with EPA to seek elevation of Lough's Corrib, Conn, Cullin, Sheelin, Arrow, Carra & Mask to 'Priority Site' status to increase frequency within the Water Framework Directive of operational and surveillance programmes for physio-chemical, hydromorphological & biological quality elements on Lough's Corrib, Conn, Cullin, Sheelin, Arrow, Carra & Mask to reflect and assist upcoming research into fish stock dynamics.

6) It is proposed here that a new additional Action 3.7 is inserted into the Plan to specifically provide an 'Adaptive Management Programme' to scientifically research the link between water quality improvements and fish species responses in the Western Lakes and secure specific funding from DECC for enhanced ecological testing and monitoring to facilitate the programme.

4.1.2 PAST & CURRENT ENVIRONMENTAL ISSUES – REQUIREMENT TO RE-FOCUS PLAN ONTO ENVIRONMENTAL ISSUES

Champ et al. (2009) reviewed the use of fish as a management tool in the context of the EU Water Framework Directive. They commented that with regard to reference conditions for Irish lakes that agricultural soils were nutrient deficient in 1950. A programme of soil fertilization had commenced around that time. In addition, major land drainage schemes commenced following the Arterial Drainage Act 1945. Since 1950, most of Irelands forest area has become established.

In the context of the current Plan, it is important to place an appropriate weighting in respect of environmental pressures on the salmonid species, as it is suggested here that to manage fish stocks in response to environmental pressures potentially masks the ecological drivers in our lakes and undermines the sustainability of our Natura 2000 sites.

A non-exhaustive list of notable consequences of environmental pressures is outlined for some of the named lakes in the Plan. Further supporting documents can be referenced if required.

Lough Sheelin

- Bloom-forming species of algae were present in Lough Sheelin in 1952. The lake was noted as tentatively classified as eutrophic with the water remaining clear until extensive growths of filamentous green algae appeared in some bays (Champ, 1979);
- Phosphorus originating from intensive agricultural developments has caused progressive enrichment of Lough Sheelin since the early 1970s (Kelly et al. 2015);
- Recent data (2006 to 2014) indicates that there has been no improvement in the nutrient loadings to the lake (Kelly et al. 2015);
- Wild trout stock supplemented by farm reared trout commencing circa 1978 (Data from Freedom of Information). Farmed trout used for providing salmonid angling opportunity;

Lough Conn

- Arctic char considered extinct in Lough Conn following nutrient enrichment;
- Phosphorous loading exceeded 20000 kg P/annum from agricultural according to the Irish Char Conservation Group Ltd. This exceeded the phosphorous loading of a combination of all other municipal and forestry sources according to the groups reports entitled **"Lough Conn – A Lake in Trouble"** and **"The Lough Conn Char – Now Extinct!"**;
- Lough's Conn & Cullin experienced a significant decline in trout stocks in the 1990's due to pollution and increased nutrient enrichment;

Lough Corrib

- Arctic char considered extinct in Lough Corrib following nutrient enrichment;

- Annex II species Freshwater Pearl Mussel, in the Owenriff river discharging into Lough Corrib has suffered losses to juvenile mussels with the habitat recognised as unsuitable for the recruitment of mussels by the National Parks and Wildlife Service, due to sedimentation and enrichment (NPWS, 2017). It is notable that Inland Fisheries Ireland had an alternative view of the ecological quality of the catchment in 2017 and found that ***"there are little or no major anthropogenic pressures in the catchment"*** (IFI 2018);

- Filamentous algae abundances in the Owenriff river discharging into Lough Corrib have been recorded at 20 times in excess of the recommended levels in the Owenriff river (NPWS, 2017);

- Environmental Deterioration leads Lough Corrib Angling Federation to commission a report entitled **'Lough Corrib – A cause for Concern'** following independent water quality sampling in 1995. This is despite the protection afforded to Lough Corrib by the 'Quality of Salmonid Waters Regulation - S.I. No. 293/1988.

  'The Irish Times' newspaper edition of 10th January 1997 commented on the content of the report that Lands adjoining important lakes in the region should be set aside in the interests of environmental protection. To ensure long term protection, the entire system should be assigned National Park status or designated and protected by ***"enforceable and enforced regulations"***.
  Ref: https://www.irishtimes.com/news/action-sought-to-save-corrib-fishery-1.20412

- Pollution events continue to affect Lough Corrib - A recent report in the Irish Farmers Journal regarding a pollution incident in 2020 stated ***"Galway farm fined over €2,000 following effluent pollution of river"*** and that the ***"incident led to significant damage to the water quality of the Lough Corrib catchment"*** Ref: https://www.farmersjournal.ie/galway-farm-fined-over-2-000-following-effluent-pollution-of-river-628704

- No explanation for Corrib algae – An article in the Connacht Tribune dated 2nd July 2020 stated that environmental scientist Roderick O' Sullivan had stated ***"Oughterard Bay is currently a disgraceful sight – mats of sewage sludge cover the surface; islands of green scum float listlessly with the wind and both shore and pier are festooned with rotting and decaying beds of algae".*** The article stated that Inland Fisheries Ireland and the EPA ***"could not identify the source of the algal bloom"*** Ref: https://connachttribune.ie/no-explanation-for-corrib-algae-154/

Lough Carra

- "The Irish Times" newspaper edition of 7th June 2018 reported that ***"Time is running out for Lough Carra"***.

  The report commented that ***"the marl has been masking the fact that there are too many nutrients entering the lake, from fertiliser, slurry run-off and other sources".*** The report commented that Lough Carra was one of the few lakes in Ireland to be considered ***"high"*** status under the Water Framework Directive and has since been revised to ***"good"*** and that its risk status was under ***"review".*** There were suggestions in the report that the EPA standardised monitoring system didn't consider aspects of Lough Carra's ecology. Ref: https://www.irishtimes.com/news/science/time-is-running-out-for-lough-carra-1.3513993

- Eco Eye on RTE television report that Lough Carra is reaching an environmental ***'tipping point"***.

  The Eco Eye report was highlighted by the "Western People" newspaper edition of 13th January 2021 where it was commented that Ecologist Dr. Cilian Roden said that without a dramatic reversal ***"it is inevitable we will lose this lake sometime in the next 20 years"*** Ref: https://westernpeople.ie/2021/01/13/scientists-warn-pollution-will-destroy-mayo-lake-within-20-years/

Section 4.1.2 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Item:

1) It is proposed here that there is a considerable risk for environmental factors to continue adversely impacting on the environmental quality of the Natura 2000 sites and their salmonid species, and in this regard the consultant appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) should assess if the Plan adequately addresses this risk within the Actions proposed.

2) It is proposed here that Actions 4.1, 4.4, 5.1, 5.2, 5.3, 5.4, 7.2 which currently include measures associated with "stock management" on each of Western Lakes, are removed from the Plan and instead replaced with an appropriate suite of enforceable regulations designed to improve, protect and monitor the water environment in each of the Natura 2000 sites in response to water quality improvement.

4.1.3 EVIDENCE OF STOCK MANAGEMENT POTENTIALLY UNDERMINING THE EU WATER FRAMEWORK DIRECTIVE

Minister Eamon Ryan, Minister for the Environment, Climate and Communications is aware that stock management has been used by Inland Fisheries Ireland to potentially offset the effects of pollution on fish species. The measurement of fish stocks however, is key to assessing the ecological status of the biological quality elements of all European surface water bodies under the EU Water Framework Directive. The three biological elements to be included for fish in lakes are species composition, abundance and age structure (Kelly et al. 2012). It could be argued that **"stock management plans"** artificially manipulate fish species composition and abundance therefore may potentially undermine the integrity of the EU Water Framework Directive in these individual surface waters.

As Green Party Leader, Minister Ryan is uniquely placed to address this matter and to place the focus directly on the environmental pollution issues that have affected salmonids for decades and which are relevant in the context of the EU Water Framework Directive, and to remove the stock management focus that has been allowed to mask the problems facing the sustainability of salmonids in our surface water bodies and Natura 2000 sites.

Minister Ryan received personal communication directly from the Chief Executive Officer of the Shannon Regional Fisheries Board (now Inland Fisheries Ireland), on 17th July 2003 in regard to Lough Sheelin where it was stated that:

"Dr. Martin O' Grady, Senior Research Officer with the Central Fisheries Board has stated that Lough Sheelin is "a unique ecological resource". Unfortunately, the pollution of this lake over 30 years, has caused a serious imbalance in fish populations and it is in an effort to control this imbalance that the board removes fish".

There is a reasonable concern that stock management, is presently, and will continue to be used by Inland Fisheries Ireland as a management tool to assist Ireland's compliance with the ecological status component of our lakes under the EU Water Framework Directive, by:

- Artificially seeking to improve the abundance of native species by systematically reducing the abundance of non-native species;
- Using stock management to achieve a standard of "Good Water Quality" and thereby avoid EU fines at the conclusion of the current derogation periods applicable to the EU Water Framework Directive.

It is considered reasonable to conclude that Action's 4.1, 4.4, 5.1, 5.2, 5.3, 5.4 & 7.2 within the Plan that rely on stock management are not is the best interest of our surface water bodies and the greater Natura 2000 designation of the sites, as there is considerable risk of "stock management plans" being used to intensify fish removal as an offset mechanism, in response to ongoing deteriorating environmental conditions in the Natura 2000 sites.

Section 4.1.3 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Item:

1) It is proposed here that the consultant appointed to prepare the 'Natura Impact Statement' and the 'Appropriate Assessment' for the Plan considers the implications for the integrity of the EU Water Framework Directive in Ireland, of artificially manipulating fish stocks within the Natura 2000 sites and the uncertainty this action places on the three biological elements i.e. fish composition, abundance and age structure, subsequently to be used as indicators in Ireland's EU obligation to achieve a standard of "Good Water Quality" with regard to the named lakes.

2) It is proposed here that Actions 4.1, 4.4, 5.1, 5.2, 5.3, 5.4, 7.2 which currently include measures associated with "stock management" on each of Western Lakes, are removed from the Plan and instead replaced with an appropriate suite of enforceable regulations designed to improve, protect and monitor the water environment in each of the Natura 2000 sites in response to water quality improvement.

3) It is proposed that all future fish stock surveys carried out to satisfy Ireland's obligation with regard to the EU Water Framework Directive on the Western Lakes, are carried out based upon establishing the true impact of the prevailing water quality ecological drivers within the Lakes.

4.2 LOSS OF HABITAT AREA

It is considered here that a specific component the 'Long Term Management Plan for the Western Lakes' relating to the inclusion of brown trout (salmo trutta) in the Plan is not directly connected with or necessary to the management of the Special Areas of Conservation, and that there may be adverse implications of increasing the populations of brown trout through direct habitat competition for food and space in the spawning and nursery streams used by both brown trout (salmo trutta) and Annex II species salmon (salmo salar).

4.2.1 DESIGNATION OF SITES PREFERENTIALLY FOR NON-THREATENED SALMONID BROWN TROUT (SALMO TRUTTA)

Brown trout are the most widespread fish in Ireland and are found in practically every river, stream and lake in the country. https://www.fisheriesireland.ie/fish-species/brown-trout.html

It is considered here that brown trout are not a threatened species. The designation of lakes in Natura 2000 sites to be managed preferentially as wild brown trout fisheries as has been the case historically, now potentially contravenes the EU Habitats Directive. It is clear that if the waters, comprising approximately 27% of the total surface area of lakes within the Irish State are to be managed preferentially for the benefit of one species, i.e. brown trout inter-alia all of the management tools that this entails, the State will be in substantial breach of its obligations under the Habitats Directive to manage such waters in accordance with the needs of several species expressly specified in the Annexes to the Directive including but not limited to Otter, Common Frog, European Eel, several species of mayfly (ephemeroptera), Lamprey, Atlantic Salmon, Irish Freshwater Pearl Mussel and White Clawed Crayfish.

It is noted that a number of these Natura 2000 sites currently receive artificial stock enhancement in the form of farmed trout. As such the proposed Plan also seeks to elevate the protection of these unnatural stocked trout over native and naturalised fish species. This may have an adverse impact on the integrity of Natura 2000 sites.

Section 4.2.1 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Item:

1) It is proposed here that brown trout (salmo trutta) are not directly connected with, or necessary to the management of the Special Areas of Conservation, with potential adverse impact on Annex II species salmon (salmo salar), and as such the consultant appointed should consider this risk in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the 'Long Term Management Plan for the Western Lakes'.

2) It is proposed here that farmed trout are not directly connected with or necessary to the management of the Special Areas of Conservation with potential adverse impact on Annex II species salmon (salmo salar), native or naturalised species and as such the consultant appointed should consider this risk in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the 'Long Term Management Plan for the Western Lakes'.

4.2.2 LOSS OF ANNEX: II, V SALMON SPAWNING & NURSERY HABITAT – RESPONSE TO INCREASE IN BROWN TROUT

Brown trout (salmo trutta) and Annex ii species salmon (salmo salar) often share spawning and nursery habitat in the tributaries of the waters named in the proposed 'Long Term Management Plan for the Western Lakes'.

The proposed Plan seeks to conserve salmonids, though by expressly providing for 'stock management plans' the inference is that the focus of the Plan will be principally to increase the brown trout population in the Natura 2000 sites by removing any fish that might be a predator or competitor of brown trout. However, it is considered in this submission that the Plan may adversely impact on an Annex ii species i.e. salmon, by artificially increasing trout populations beyond the capability of the available habitat for salmonid species generally.

It is considered here that there may be unintended adverse impacts following any potential increase in the trout (salmo trutta) population by increasing the densities of salmonids in spawning and nursery habitats above their natural levels. Inland Fisheries Ireland state that brown trout are territorial, competing for the best feeding location in their river" Ref: https://www.fisheriesireland.ie/fish-species/brown-trout.html#ecology-life-history. Increasing numbers of juvenile trout in a salmon fry habitat may restrict salmon to shallow and fast flowing habitat. It is possible that overall salmon production could be reduced due to salmon being unable to occupy all the available habitat (Hendry & Cragg-Hine, 2003).

In Lough Corrib, population estimates of juvenile salmonids in the Corrib system were assessed in 1980 (Ref: Browne and Gallagher 1981). Lough Corrib is one of the Western Lakes. It was observed in the 1980 population assessment that the survival of salmon in the Cornamona river from 0+ to 1+ was 16% and it was discussed that it was important to have the ideal number of spawning fish and not too many as was suggested appeared to be the case in the Cornamona river. The population assessment further found that 0+ salmon in the Bunowen river were small, and it was suggested that the salmon may be in direct competition with larger 0+ trout. The population assessment did not discuss in detail the modes of competition between salmon and trout. However, it is considered here that it is not unreasonable to suggest that competition for food and space might be a significant factor impacting on the sustainability of salmon populations and that artificially increasing the population of trout may negatively impact on Annex ii species, salmon.

A review of the population estimates for juvenile salmonids i.e. trout and salmon recorded in Browne and Gallagher (1980) and Browne and Gallagher (1981) indicate very striking observations regarding the co-existence of 1+ trout and 1+ salmon. While a correlation is not investigated or implied in either paper, on review of the data sets, there appears to be:

- a considerable reduction or non-capture of 1+ salmon in tributaries where 1+ trout are available;
- a possible adverse impact by 1+ trout on the co-existence and availability of 1+ salmon in nursery / feeding locations;

This would seem to be supported by Inland fisheries Ireland's earlier referred to statement on the territorial nature of brown trout. An important consideration may be that during the study period in circa 1980, an active and ongoing stock management programme for pike was in place by Inland Fisheries Ireland's predecessors, and this in itself may have had implications for salmonid production and species competition.

It is considered here that there may be an adverse impact on the availability of food and therefore the growth rate of salmon in the Special Areas of Conservation (SAC'S) as a consequence of increasing the population of brown trout and in particular larger 1+ or greater brown trout. A reduction in growth rate can have substantial life-history consequences, and capacity to withstand harsh winter conditions, but in the case of sea-migratory salmonids, also for determining life-history tactics, timing of smoltification and time spent at sea (Kaspersson et al. 2013). This may be an important factor as climate change adds additional pressures to salmon stocks within the river environment.

Section 4.2.2 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

1) It is proposed here that there may be an adverse impact on Annex ii species salmon (salmo salar), directly related to an artificially induced increase in brown trout (salmo trutta) populations through competition for food and space on salmon spawning and nursery habitats in the SAC's and as such the consultant appointed should consider this risk in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the 'Long Term Management Plan for the Western Lakes'.

4.3 SPECIES POPULATION DENSITY

The proposed 'Long Term Management Plan for the Western Lakes' seeks to conserve salmonids i.e. Annex ii salmon (salmo salar) and brown trout.

It is considered here that the Plan has the potential to adversely impact on the population density of numerous species in Natura 2000 sites, including protected and red-listed species by potentially failing to recognise the following in the preparation of a 'Natura Impact Statement' and 'Appropriate Assessment':

- If the Plan, in consideration of all other potential impacts, is appropriate in determining the requirement for "stock management plans" in the context of reviewing the current conservation limits of Atlantic Salmon in the Special Areas of Conservation;
- If the Plan has appropriately considered the impact on the whole ecology of the lakes, their food webs and predator prey relationships, by including the requirement for "stock management plans" in Natura 2000 sites generally;
- If the Plan has appropriately considered the impact of increasing brown trout populations in particular, on red-listed mayfly species, from the inclusion of "stock management plans" in the Natura 2000 sites, clearly with the objective of increasing brown trout stocks;
- If the Plan has appropriately considered the current and potential impacts of predation on Annex ii species Atlantic Salmon all species such as Brown Trout, Pike, Cormorants inter-alia predator avoidance tactics used by salmon smolts;

4.3.1 ANNEX: II, V SALMONID (SALMON) – CURRENT CONSERVATION LIMITS AND WEIGHTING OF PLAN RISKS

In Ireland, the Atlantic salmon population are considered vulnerable due to declines in abundance, reduced survival at sea, habitat loss due to hydroelectric schemes, water quality issues, over-fishing and the potential impact of salmon aquaculture. Ref: https://www.fisheriesireland.ie/fish-species/atlantic-salmon.html#conservation-legal-status

As defined in the EU Habitat's Directive, the favourable conservation status of a species is achieved when:

- The population dynamics data on the species concerned indicate that it is maintaining itself on a long-term basis as a viable component of its natural habitats;
- The natural range of the species is neither being reduced nor is likely to be reduced for the foreseeable future;

Annex ii species Atlantic Salmon (salmo salar) is the only relevant protected species contained in the 'Long Term Management Plan for the Western Lakes'. It is considered here that the Strategic Environmental Assessment Report; the Natura Impact Statement and the Appropriate Assessment for the Plan should first:

- Consider if each Special Area of Conservation (SAC) is meeting its conservation limit for Atlantic salmon;
- Assess all freshwater adverse impacts on the potential for salmon to meet its conservation limits in the individual Special Areas of Conservation (SAC);
- Provide advice to the DECC in relation to the weighting of the individual impacts on the conservation limits for Atlantic salmon in the individual Special Areas of Conservation (SAC);

Section 4.3.1 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Item:

1) It is proposed here that the conservation limits for Atlantic salmon are reviewed in the context of all freshwater adverse impacts and that the brief of the consultant appointed should be extended to consider the weighting of all individual risks to include any risk associated with the Plan, and that this review be included in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the 'Long Term Management Plan for the Western Lakes'.

4.3.2 IMPACT ON OVERALL LAKE ECOLOGY OF REMOVING OTHER FISH TO INCREASE SALMONIDS (TROUT, SALMO TRUTTA)

The 'Long Term Management Plan for the Western Lakes' seeks to remove fish species to increase the population of salmonids i.e. Annex ii Salmon (salmo salar) and brown trout (salmo trutta).

Salmon (salmo salar) are an existing species in Lakes Corrib, Conn and Cullin only. Brown trout (salmo trutta) is the species to be protected by the Plan in Lough's Sheelin, Mask, Arrow and Carra. Therefore, it is considered here that "stock management plans" are to be undertaken principally for the supposed benefit of brown trout.

The impact of adopting a management assessment and strategy to expressly benefit brown trout became clear on Lough Corrib in 2012. Stock management i.e. pike removal had taken place each year for the previous 16 years. Two major fish stock surveys carried out directly by IFI - one in 1996 and the other in 2012, showed that in 2012, the population of pike had fallen by 48% and that the population of trout had fallen by 21% by the end of the 16-year period. This strongly indicates that the removal of pike is not guaranteed to result in an increase of salmonids.

The intention of the long-term stock management plan that persisted on Lough Corrib between 1996 and 2012, after a period of cessation of stock management from the late 1980's suggests that it is impossible to predict the actual outcome of any stock management plan. This lack of understanding clearly has implications for the entire ecology within the lakes of the respective Natura 2000 sites.

Changing environmental conditions can also influence the ecology within the lakes. Roach populations can expand and contract in response to nutrient enrichment and can impact on food webs. Pike have been found to have changed their dietary habits to prey upon roach in studied lakes. Current research indicates that there was no evidence to support the hypothesis that trout are currently selectively preyed upon in Irish lakes (Mc Cloone et al. 2019). Invasive zebra mussels, now found in most of the lakes have also impacted upon lake ecology. Lough Sheelin has endured considerable environmental pressures over many years. Removing top predators may have unanticipated and potentially negative effects on target fish stocks in systems experiencing multiple anthropogenic pressures (Shephard et al. 2018).

It is considered here that "stock management plans" may adversely impact on the ecology of the lakes and may not result in the expected outcome of improvement to trout within the lakes in the Natura 2000 sites. As such, this matter needs to be assessed within the Appropriate Assessment.

Section 4.3.2 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Item:

1) It is proposed here that the potential adverse impact on the ecology of the lakes in the Natura 2000 sites of removing fish species as part of "stock management plans" without clear scientific evidence of the functional effectiveness of such plans at the outset, are reviewed by the consultant appointed and that this

review be included in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the 'Long Term Management Plan for the Western Lakes'.

4.3.3 IMPACT OF INCREASED SALMONIDS (TROUT, SALMO TRUTTA) ON RED LISTED MAYFLIES (EPHEMEROPTERA)

Kelly-Quinn & Regan (2012) reviewed the records for 33 species of Irish mayflies (Ephemeroptera) and evaluated their conservation status. The review noted that six species were threatened; two species were near threatened and data on two species was deficient.

A separate search regarding the species in the Natura 2000 sites indicates that Lough Corrib contains three of the species listed by Kelly-Quinn & Regan (2012). These are:

Baetis atrebatinus (Dark Olive) – Endangered

Procloeon bifidum (Pale Evening Dun) – Vulnerable

Kageronia fuscogrisea (Brown May Dun) - Near Threatened

It is known that mayflies are a key component of the diet of salmonid fishes and that anglers replicate various stages of the lifecycle of mayflies to catch trout (salmo trutta).

The 'Long Term Management Plan for the Western Lakes' seeks an increase in the population of trout as part of the objective of the Plan, therefore it is reasonable to suggest that species of mayfly that are endangered and vulnerable are likely to experience an increase in predation pressure from trout, if trout populations rise in response to the Plan.

Brown trout are not endangered, however any potential adverse effect on the mayflies contained in Ireland's red list could have very negative consequences for the survival of the affected species.

Section 4.3.3 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Item:

1) It is proposed here that there may be an adverse impact on red-listed endangered and vulnerable Mayflies (Ephemeroptera), directly related to an increase in brown trout (salmo trutta) as a consequence of the objectives of the 'Long Term Management Plan for the Western Lakes' and as such the consultant appointed should consider this risk in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

4.3.4 LOSS OF ANNEX: II, V SALMON PARR & SMOLTS – TROUT PREDATION ON SALMON

Salmon Watch Ireland (SWI) acknowledge that "Salmon fry are vulnerable to trout and other piscivorous fish within systems and heavy predation may occur". "Parr are affected by predation from certain predator fish including brown trout" Ref: https://salmonwatchireland.ie/project/predation-of-salmonids/

Trout predation on alevin salmon was discussed by the Director of SWI in an online presentation during the Covid19 pandemic, titled "Where have all the Salmon Gone?" It is important to note here that it was stressed by the presenter, that while predation by trout is a factor, there was no implied suggestion that trout be removed.

The National Parks and Wildlife Service NPWS also acknowledge that trout predation takes place on salmon smolts but state that "little is known of the significance of trout predation on salmon smolts in rivers or lakes" (NPWS 2007). The Ness & Beauly Fisheries Trust in Scotland prepared a document in 2017 after having examined peer reviewed papers and communications relating to trout (salmo trutta) as predators of juvenile salmon. The document discussed conclusions by authors that brown trout of 230-320mm in length were ***"serious predators of salmon smolts in Ireland"*** and noted brown trout of the same length consumed salmon fry between April and November in Rossshire. The document referenced unpublished data relating to the River Conon attributing a 20% mortality of salmon smolts being partly attributed to predation by brown trout (Ness & Beauly Fisheries Trust, 2017).

The predation of trout on salmon at the various life stages is recognized but clearly not understood in terms of the individual impact of this species on salmon. The implications for introducing any measure under this proposed Plan that seeks to increase or to maximise the stocks of brown trout (Salmo trutta) could potentially have a negative impact on an Annex ii species i.e. Salmon. As such, further negative impacts may extend to the Annex II fresh water pearl mussels which require salmon as part of their life cycle.

It is therefore considered here that as the Plan has the objective of seeking to increase brown trout stocks as one of the salmonid species, this may give rise to significant effects in Natura 2000 sites containing Annex ii Salmon at times where both species are in close proximity i.e. spawning and nursey rivers and streams connected to the named lakes.

Section 4.3.4 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

1) It is proposed here that there may be an adverse impact on the ecology of the Natura 2000 sites if trout populations are artificially increased in the Special Areas of Conservation (SAC) - by predating to an unknown extent upon Annex ii Salmon at the early life stages and as such, the potential adverse impact on salmon should be considered in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the 'Long Term Management Plan for the Western Lakes'.

2) It is proposed here that the objective of artificially increasing the stocks of brown trout is removed from the 'Long Term Management Plan for the Western Lakes', instead focusing on the natural fish biomasses responding to water environment improvements, as artificially increasing trout may enhance potential risk from predation on salmon alevins, parr and smolts in the spawning and nursery rivers and streams by an increased brown trout (Salmo trutta) population, which may have an adverse impact on the conservation objectives on the Natura 2000 sites.

4.3.5 LOSS OF ANNEX: II, V SALMON PARR & SMOLTS - CORMORANT AND GENERAL BIRD PREDATION ON SALMON

The National Parks and Wildlife Service (2007) stated that predation ***"by birds (cormorants, mergansers and goosanders) takes place on salmon eggs, fry and parr".*** NWPS (2007) comment further that ***"large numbers of cormorants may congregate in the lower sections of rivers and prey heavily on migrating salmon smolts".***

Kennedy and Greer (1988) estimated that predation by cormorants on the River Bush in Northern Ireland accounted for losses of 51 – 66 % of the migrating salmon smolt run. NPWS (2007) state that ***"large numbers of cormorants are regularly seen on the rivers Slaney, Lackagh, Leannon, Nore and Barrow feeding on juvenile fish including juvenile salmon".***

Salmon Watch Ireland (SWI) acknowledge that ***"avian predation is also a factor with Cormorants, various divers and Grey Herons particularly evident in nursery areas"***. It states however that ***"predation rates are lower than on newly emerging fry".*** Ref: https://salmonwatchireland.ie/project/predation-of-salmonids/

The predation of birds on salmon at the various life stages is clearly recognized. Cormorant numbers in particular are considerable on some fisheries and appear overlooked with regard to their overall predation impact. The losses of up to 66% of migrating smolts on the River Bush indicate the potential adverse impact of cormorants during the smolts runs on the tributaries of the named lakes in the 'Long Term Management Plan for the Western Lakes' could be considerable, which could give rise to significant effects on the Natura 2000 sites.

It is of course not suggested here, that cormorant or other bird populations are managed as part of the 'Long Term Management Plan for the Western Lakes'. However, it is reasonable to suggest that the integrity of the Natura 2000 sites should be assessed with regard to the historic and current bird populations and any significant effects posed by avian predators should be considered in the context of preparing the current Natura Impact Statement and Appropriate Assessment, and within the current Plan.

Section 4.3.5 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

1) It is proposed here that all scientific research available regarding avian predation on Annex ii species Salmon be reviewed to include this potential adverse impact on Annex ii salmon in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the 'Long Term Management Plan for the Western Lakes'.

4.3.6 LOSS OF ANNEX: II, V SALMON SMOLTS – PIKE PREDATION ON SALMON

Pike have been targeted by "stock management plans" during the smolt migration period more intensely in recent years, however it is important to note that predation is a natural process that has taken place over hundreds and possibly thousands of years in Ireland. The focus on pike appears to have intensified in response to the general collapse of salmon stocks nationally due to factors acting collectively and principally in the marine environment e.g. impact of sea lice on outgoing smolts and returning salmon.

The National Parks and Wildlife Service (2007) state that Pike (Esox lucius L.) are ***"known to prey on salmon smolts during the spring period".*** Salmon smolts passing through large lakes on their downward migration are ***"frequently recorded in pike stomachs in Lough Corrib on the Corrib system and Lough Conn and Cullin on the Moy system"*** (NPWS 2007). It is known that migrating smolts can time migration runs during dusk. This is thought to be a predator avoidance tactic, however in instances where obstacles are met (e.g. dams etc.), the migration time can be slowed, leaving the smolts open to further predation.

Mc Cloone et. al (2018) answered some on-going questions related to the dietary preference of pike and pike-trout interactions in lakes in Ireland. Monthly sampling of pike caught by electrofishing with diet studied using gastric lavage, was undertaken on Lough Conn and Lough Derravaragh from August 2016 to July 2017. This method reduced the incidence or food regurgitation often associated with netting. It is noteworthy, that with regard to Lough Conn, pike diet samples were taken from a number of river mouths, including the Deel river - a noted salmon river. Samples were also taken from the Pontoon area where smolts would pass before making their way to the River Moy and onwards to sea. The study found that the %IRI for roach was 34.0 and therefore roach was the most important fish prey item for pike captured in Lough Conn during the study period. Of particular interest was the %IRI for trout was 1.5 and a combination of unidentified remains/salmon had a %IRI of 0.5.

The pike dietary findings suggest that the proportion of unidentified remains/salmon does not appear to reflect the level of predation on smolts that might be inferred by the NPWS. The locations chosen by Mc. Cloone et al. (2018) clearly were intended to present a balanced reflection of pike diet by sampling pike close to smolt migration routes.

The inference made by reviewing the findings of Mc. Cloone et al. (2018) is that the percentage of pike within the population that predate upon smolts may be less than thought. Prior to this, Pedreschi et al (2015) found during dietary SIA dietary studies of Irish pike that there was "a high degree of individual dietary variation within populations". This is a critical point to be observed within the context of reviewing the validity of the stock management element of the 'Long Term Management Plan for the Western Lakes'. The implication of applying a stock management element with the objective of reducing the entire population may have both uncertain and considerable negative outcomes for salmonids, by reducing elements of the pike populations, whose dietary habits are directly aligned to predation upon roach and other fish species on Natura 2000 sites. This is an important consideration in any review of the Plan.

Section 4.3.6 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

1) It is proposed here that there may be an adverse impact on the ecology of the Natura 2000 sites if "stock management plans" allow for pike to be removed from lake tributaries as a consequence of the 'Long Term Management Plan for the Western Lakes' without first considering if predation on salmon smolts is negligible based on smolt run patterns and the physical characteristics of the tributary, and as such the consultant appointed should consider this potential risk to the ecology of the lakes from the adoption of a generalised removal of pike in this instance, in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

2) It is proposed here that Actions 4.1, 4.4, 5.1, 5.2, 5.3, 5.4, 7.2, which currently include measures associated with "stock management" on each of Western Lakes, are removed from the 'Long Term Management Plan for the Western Lakes' pending a complete review of all of the best evidence based research and modelling available as per Action 2.3 of Inland Fisheries Ireland's Corporate Plan (2021-2025) by the appointed consultants in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the impact of the Plan in each of the Natura 2000 sites.

4.4 POTENTIAL REMOVAL OF NATIVE SPECIES (PIKE) FROM NATURA 2000 SITES

The proposed 'Long Term Management Plan for the Western Lakes', specifically Actions 4.1, 4.4, 5.1, 5.2, 5.3, 5.4, & 7.2 propose considerable impacts to the pike populations as part of the "stock management plans" and the revision of legislative protection, on each of the Natura 2000 sites.

Pike are regarded by Inland Fisheries Ireland as a non-native species within the context of the EU Water Framework Directive (IFI, 2018), yet scientific research indicates that pike may have first naturally colonized Ireland 8000 years ago (Pedreschi et al. 2014). Inland Fisheries Ireland released a statement on 15th October 2013, that ***"New Study Reveals Pike Native to Ireland"***.

The peer reviewed paper published by Pedreschi et al. in 2014, indicated using DNA evidence that pike may have first colonized Ireland 8000 years ago with a further two colonization events 4000 years and 1000 years ago. The conclusions of the paper were questioned by D. Ensing (2015) who suggested that pike could have been introduced by man 4000 years ago. Pedreschi & Mariani (2015) responded to Ensing in a published paper entitled "Towards a balanced view of pike in Ireland: a reply to Ensing" and stated their contention that Ensing's theory did not fit with the available scientific and historical evidence and that the opinion expressed was "too speculative and unsupported by data".

In 2018, Dr. Pedreschi met with the review group established by Inland Fisheries Ireland to review their current pike management policy on brown trout fisheries. Dr. Pedreschi stated that her research regarding pike colonization was

continuing, albeit slowly, however Dr. Pedreschi confirmed that the additional research using single nucleotide polymorphism (SNPs) was supporting the original conclusions.

It should be stated that although Inland Fisheries Ireland has maintained the non-native designation of pike within the context of the EU Water Framework Directive, and has collected pike samples for future studies, no further actual scientific research has been undertaken by Inland Fisheries Ireland regarding pike in the respective Natura 2000 sites to support the continued non-native position.

In contrast, Dr. Pedreschi stated during the presentation to the Review Group in 2018, that Irish pike ***"are, or are more likely to be native"***, based on the available research. Considering this, there is considerable cause for concern that the current 'Long Term Management Plan for the Western Lakes' may negatively impact upon a potentially native species i.e. pike.

Pedreschi & Mariani (2015) interestingly stated that many ubiquitous freshwater species in Ireland remain to be investigated such as gudgeon, stoneloach, minnow and perch. To our knowledge, no research is planned for any of these Irish species.

Inland Fisheries Ireland has previously referred to archaeological evidence to support a non-native position on the Western Lakes, i.e. Lough Corrib. The completeness of the archaeological evidence has been raised with the CEO of Inland Fisheries Ireland. It is considered in this submission that the current evidence presented by Inland Fisheries Ireland to remove a potentially native species, is not conclusive and that using the precautionary principle, pike should not be removed as part of the 'Long Term Management Plan for the Western Lakes'.

New archaeological evidence of pike bones has been discovered in a grave in Ballyhanna, Co. Donegal in 2020. Evidence of the paper was obtained through a Freedom of Information request to Inland Fisheries Ireland. The small graveyard was excavated during a roadworks scheme. The calibrated dates for human remains in the graves, dated from 679AD to 1654AD, with most individuals laid to rest between 1200AD and 1600AD. It appears that the finding of pike bones is not usual, but the paper provides some insight into why this might be the case in general. The paper states that ***"for methodological and taphonomic reasons fish bones are rarely recovered from archaeological sites".*** Recovery of a pike bone from Ballyhanna, however, was suggestive that fish formed at least part of the diet, however it is unknown how old the pike bone is, therefore it is possible that it could rest anywhere within the timescale discussed in the paper. https://pureadmin.qub.ac.uk/ws/portalfiles/portal/215864227/Diet.pdf

Further information on this matter is available in Appendix E of this submission and in Sections 4 & 5 of Appendix F.

4.4.1 IMPLICATION OF PIKE BEING MISS-CLASSIFIED IN CONTEXT OF EU WATER FRAMEWORK DIRECTIVE

It is considered here that the potential mis-classification of pike as non-native within the context of the EU Water Framework Directive undermines the ecological status of the Natura 2000 sites by:

- Down-grading the ecological status of the Natura 2000 sites by miss-classifying a native species;
- Negatively impacting on Ireland's prospects of complying with the EU Water Framework Directive;
- Seeking to remove a potentially native species without consideration for the potential adverse impacts on the food web and eco-systems in the Natura 2000 sites.

In consideration of the above, it is suggested that there is potential negative impact for the Natura 2000 site should the 'Long Term Management Plan for the Western Lakes' proceed without an assessment of the adverse impact of removing a potentially native species.

Pike is not the only species whose native status has been reviewed using scientific research. Teacher et. Al (2009) used microsatellite DNA to establish the native status of the common frog in Ireland. Reid et. Al (2013) on behalf of the National Parks and Wildlife Service (NPWS) conducted a National Frog Survey of Ireland in 2010/11. Reid et. Al (2013) commented that the ***"origins of frogs in Ireland have been controversial, with early suggestions that they were not native but were introduced from Britain in the 17th century".*** They noted that genetic studies indicated one similar to that found in Britain and a second, distinct group unique to the south-west of Ireland and that the results imply ***"two separate colonization events, probably both in the early postglacial period***", one from the east and one from a Lusitanian refuge in or near county Kerry. Reid et. Al (2013) conclude that it is ***"therefore, considered that the common frog is a longstanding native of Ireland".***

Pedreschi et.al (2015) state that ***"management should indeed take into account the findings of Pedreschi et al. (2014), as they clearly document the existence of different evolutionary lineages of pike in Ireland".***

Section 4.4.1 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

1) It is suggested that the removal of pike as a potentially native species based upon the best available scientific evidence, will have an adverse impact on the integrity of the Natura 2000 sites and as such, the native status of pike in the Western Lakes should be clarified with certainty within the context of the 'Long Term Management Plan for the Western Lakes' and that management of the species should cease on the basis of existing research and that this be considered in the preparation of the Strategic Environmental Assessment Report, the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

2) It is suggested that the native status of perch is reviewed per the comments of Pedreschi & Mariani (2015) and that a scientific research study is undertaken by Inland Fisheries Ireland to examine the colonization of Ireland by perch and that the potential for this species to be native is assessed in the context of the 'Long Term Management Plan for the Western Lakes' in the preparation of the Strategic Environmental Assessment Report, the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

4.5 DISTURBANCE - IMPACT OF GILL NETS USED FOR STOCK MANAGEMENT IN NATURA 2000 SITES

Gill nets are used in Ireland for two distinctly different purposes. The first is to survey fish stocks, such as required under the EU Water Framework. The surveys are of short duration and provide useful overall data on fish stocks – the species, abundance and age profile.

The second type of gill nets are those employed in the act of stock management. These gill nets are used in the lakes named in the 'Long Term Management Plan for the Western Lakes'. They may be employed for a period of four months of the year, depending on the stock management plan drafted by Inland Fisheries Ireland. During 2022, gill nets will be used on Lough Corrib for five months i.e. during February, March, April, October and November. Gill net use on Lough's Conn and Cullin is planned for six months (inclusive of December) Ref: https://www.fisheriesireland.ie/sites/default/files/2022-03/proposed-stock-managment-plan-2022.pdf

Gill nets used for stock management are indiscriminate with regard to the species they catch – pike, cyprinids, salmonids. Birds are also captured. Photos are included (See Section 4.5.3) and Section 17 of Appendix F.

It is considered here that the potential adverse effect of using gill nets, specifically for stock management on a Natura 2000 site should be assessed within the Strategic Environmental Assessment Report, the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

4.5.1 POTENTIAL IMPACT OF STOCK MANAGEMENT GILL NETS ON OTTERS

Annex II of the Habitats Directive provides for protection of the Otter (Lutra Lutra) in a number of the Natura 2000 sites.

A number of Conservation Objectives defined by attributes and targets apply to the conservation of Otters on the Lough Corrib SAC. The target is that there is no significant decline. Attributes applicable to gill netting include:

- Extent of freshwater lake habitat – Target: No significant decline;
- Barriers to Connectivity – Target: No significant increase;

For guidance, See Map 12 of Lough Corrib SAC 000297 i.e. NPWS (2017) and Map 8 of River Moy SAC 002298 i.e. NPWS (2016). The National Parks and Wildlife Service (2017) report notes the following with regard to otter commuting:

- Otters tend to forage within 80m of the shoreline;
- Otters will regularly commute across stretches of open water up to 500m e.g. between islands and between the mainland and islands – It is important that such commuting routes are not obstructed;
- A Commuting buffer of 250m has been applied to the entire perimeter of Lake Corrib (See Map 12) and Lake Conn & Cullin (See Map 8);

Ref:
Lough Corrib -
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000297.pdf

Lough Conn/Cullin -
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002298.pdf

It could be argued that gill netting is an operational matter for Inland Fisheries Ireland and therefore it is not relevant in the context of a Natura Impact Statement or Appropriate Assessment regarding the 'Long Term Management Plan for the Western Lakes', however gill nets have been indelibly linked to the act of stock management over many decades.

Inland Fisheries Ireland may also suggest that Otters are not captured in gill nets. However, regarding Otter commuting, gill nets are principally placed within 80m of the shoreline and individual nets are linked together to provide a gang of nets typically 180m in length or in a number of gangs, depending on the location as decided by Inland Fisheries Ireland, therefore gill nets potentially act as 'disturbance'.

When one considers that gill nets are set for 5-6 months of the year in some of the Western Lakes, one can start to appreciate the potential impact on Otters. Otters may also be attracted to the nets by the trapped fish.

Photographic evidence of partially eaten and damaged fish supports the view that Otters may come into contact with gill nets accidently or otherwise.

As such, the potential adverse impact of gillnets on protected species in Natura 2000 sites is potentially considerable and needs to be assessed.

4.5.2 POTENTIAL IMPACT OF STOCK MANAGEMENT GILLNETS ON BIRDS

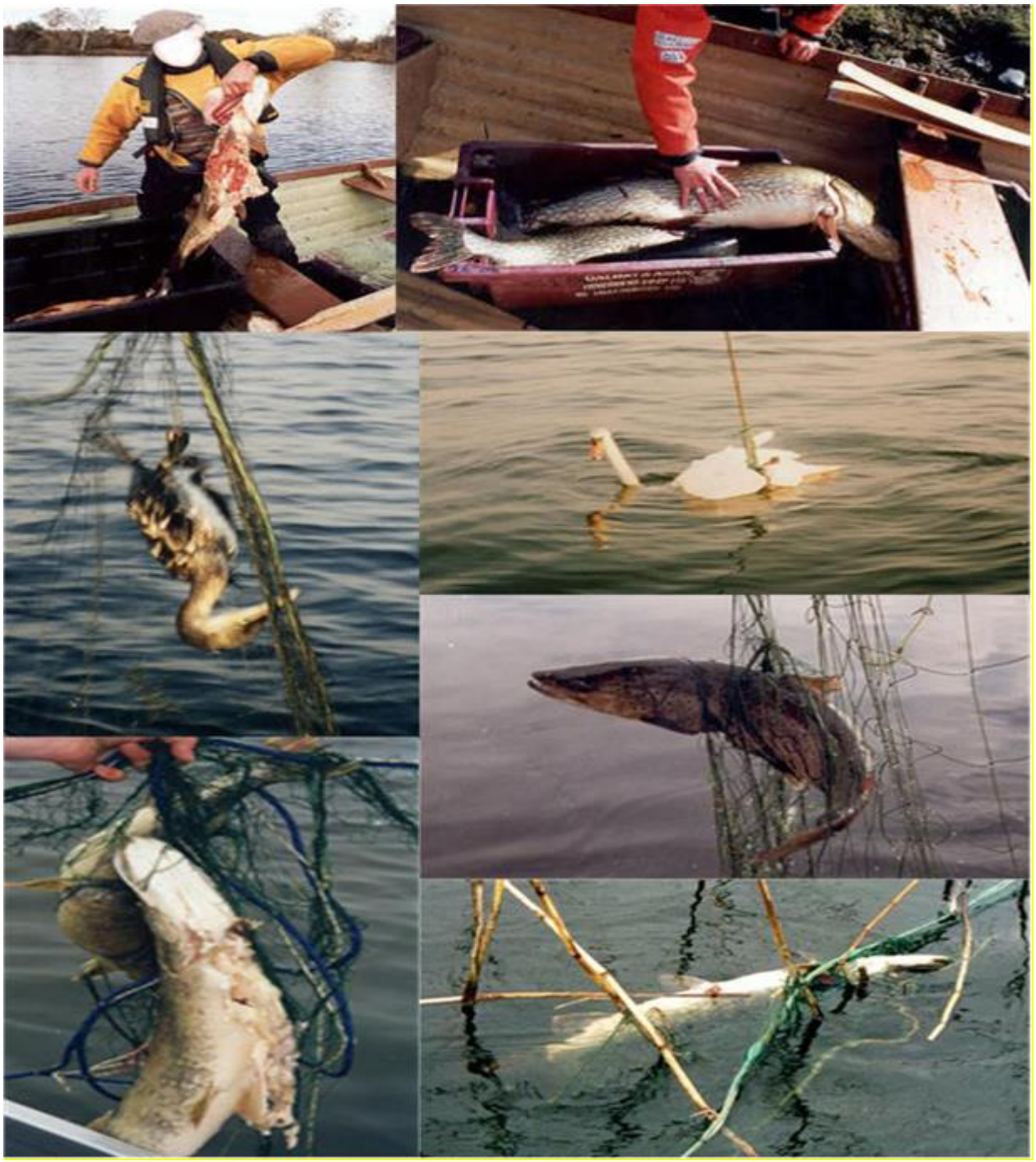
It is considered that the gill netting activities permitted by the 'Long Term Management Plan for the Western Lakes' will lead to disturbance of wintering and breeding birds on the Special Protection Areas and on the Natura 2000 sites generally, as there is considerable risk that the nets being set in littoral zones of the lake along with daily associated activity over a possible six-month period may have an adverse effect on the conservation interests of the sites.

Lough Sheelin SPA is known as a nationally important site for wintering waterfowl such as the protected Pochard (A059), Goldeneye (A067), Great Crested Grebe (A005) and the Tufted Duck (A061).

Lough Corrib SPA is known for the non-exhaustive list of protected bird species such as Shoveler (A056), Pochard (A059), Tufted Duck (A061), Common Scoter (A065), Coot (A125), Golden Plover (A140), Greenland White-fronted Goose (A395), Wetland and Waterbirds (A99). The National Parks and Wildlife Service state that the Lough Corrib SPA is an internationally important site which supports in excess of 20,000 wintering water birds, including the population of Pochard that is, itself, of international importance. Ref: https://www.npws.ie/sites/default/files/protected-sites/synopsis/SY004042.pdf

The conservation objectives relating to birds for the Natura 2000 sites is to maintain or restore the favourable conservation condition of the bird species listed as Special Conservation Interests for the Special Protection Areas, therefore the potential adverse impact of gill nets on conservation interests in these Natura 2000 sites needs to be assessed.

4.5.3 POTENTIAL IMPACT ON SALMONIDS – PRINCIPALLY BROWN TROUT INCLUDING GENERAL PHOTOS



The above photographs are a small selection of the photos available depicting damage to fish and birds from "stock management Plan" gill netting operations. Photos also show otter damage to trapped fish where otters are attracted to struggling fish in the nets.

Dr. P. Fitzmaurice (Inland Fisheries Trust - Internal Document, Circa 1975) – **"Gillnets are very severe on any fish species" … "Apart from the "burn" marks left by the net there is also the problem of fish being manhandled. Both of these agents remove the slime from the fish and subsequently leave the body of the fish open to bacterial and fungal infection"**

Section 4.5 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

1) It is proposed that the use of gill nets in each of the Western Lakes named in the 'Long Term Management Plan for the Western Lakes' may adversely impact on the Conservation Objectives of the Natura 2000 sites with regard to the disturbance of Annex ii Otters in SAC's and protected bird species in SPA's in the context of Plan where they are used to execute "stock management plans" and as such it is proposed that the use of gill nets should cease for the purpose of stock management in the Western Lakes, and that this is reviewed in the Strategic Environmental Assessment Report and by the consultant appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

4.6 POPULATION AND HUMAN HEALTH

It is considered in this submission that there is 'Likely' and 'Significant' potential for impact on human health by the Actions contained in the 'Long Term Management Plan for the Western Lakes'.

4.6.1 STAKEHOLDER MARGINALISATION

Actions 4.4 & 5.3 specifically propose to 'encourage' and 'enable' one stakeholder group e.g. salmonid anglers, to remove and kill fish species of interest to other stakeholders i.e. principally pike angling stakeholders and potentially stakeholders of all coarse fish species. Recent photographs taken around Lough Corrib of pike with the bellies cut open and left hanging from trees and poles suggest that the environment for non-salmonid anglers is becoming more marginalised and deeply concerning, for adults and children. Inland Fisheries Ireland, through the current plan are perpetuating this concerning environment.

In contrast, pike angling and coarse angling stakeholder's practice 'Catch & Release' as part of their angling culture.

In addition, pike anglers recognise the ecological role of pike as an important predator and understand the implications of killing pike and the potential for this to negatively alter the stock dynamics of other fish species.

Inland Fisheries Ireland is also very aware of the link between 'Catch & Release' and pike anglers, and to predator angling stakeholders generally on the Western Lake https://fishinginireland.info/2022/pike-reports/lough-corrib-pike-reports/3-predator-species-all-in-a-days-fishing-for-connacht-predator-anglers/, however the 'Actions' proposed, will further marginalise some stakeholder groups and therefore, should be fully assessed.

Section 4.6.1 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

1) Actions 4.4 & 5.3 of the 'Long Term Management Plan for the Western Lakes' specifically propose to 'encourage' and 'enable' one stakeholder group to remove and kill fish species of interest to other stakeholders, with the significant potential to further marginalise pike and coarse angling stakeholders on the Western Lakes, and as such it is proposed, on the grounds of 'Population and Human Health' that Actions 4.4 & 5.3 are assessed in the Strategic Environmental Assessment Report and by any consultant or body appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

4.7 LANDSCAPE

It is considered in this submission that there will 'Likely' be 'Significant' impacts upon areas of special amenity and adverse visual impacts by the Actions contained in the 'Long Term Management Plan for the Western Lakes'.

4.7.1 IMPACT UPON AREAS OF SPECIAL AMENITY

The Western Lakes are areas of outstanding natural beauty, scientific interest, and recreational amenity value to all angling disciplines, not only to salmonid anglers.

The historical significance that pike anglers place upon the Western Lakes is fuelled by that wonderful body of work entitled 'Mammoth Pike', a book written in the 1970's by the late Fred Buller, an angling historian. Fred Buller captured the imagination of Irish and overseas pike anglers who seek those really big pike in the 30lb to 40lb size bracket, and Ireland's Western Lakes have become the focal point of that search with the added bonus of being Ireland's most challenging and most beautiful fisheries.

The 'National Strategy for Angling Development' publication of 2015 stated that "***current pike management policies may impact negatively on Ireland's reputation as a prime pike angling destination***". https://www.fisheriesireland.ie/sites/default/files/migrated/docman/2015/nsad/NSAD%20Work%20Package%203%20FINAL%2018Nov15.pdf Pike management policies only take place on the Western Lakes, and are engrained within Actions 4.1, 4.4, 4.5, 5.1, 5.2, 5.3 of the 'Long Term Management Plan for the Western Lakes'. However, the Western Lakes represent in excess of 26% of Irelands lake waterbodies, therefore the impact upon Ireland's amenity and upon Ireland's image, is not insignificant.

The impact of Actions 4.1, 4.4, 4.5, 5.1, 5.2, 5.3 also likely affects angler choices and whether they choose to fish the Western Lakes, or more particularly, their choice of whether or not to visit any fishery where pike management is undertaken.

Curtis (2017) found that 61% of trout anglers surveyed during a 'choice experiment' were negatively disposed to gill-netting and that they are 3 times as likely to visit a fishery with no pike controls. This in itself gives some indication that a majority of salmonid anglers surveyed place more importance upon issues, other than 'pike management'.

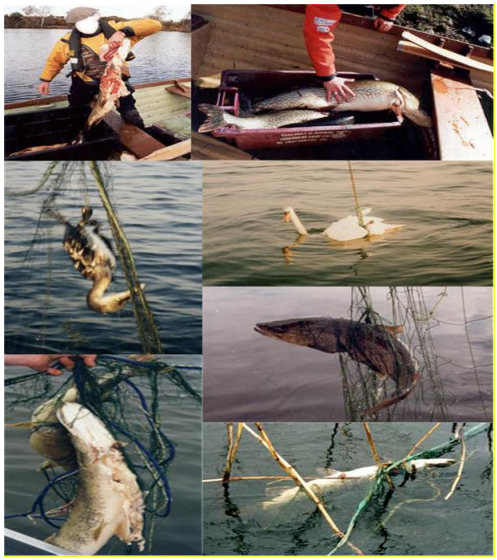
The Western Lakes are an untapped amenity for all anglers has significant untapped domestic and overseas tourism potential, for all angling disciplines to enjoy. Actions 4.1, 4.4, 4.5, 5.1, 5.2, 5.3 of the 'Long Term Management Plan for the Western Lakes' are a significant impact upon that amenity.

Section 4.7.1 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

1) Actions 4.1, 4.4, 4.5, 5.1, 5.2, 5.3 of the 'Long Term Management Plan for the Western Lakes' are likely to have a significant impact upon the Western Lakes and the enjoyment and participation of angling by all angling disciplines, and as such it is proposed, on the grounds of 'Landscape' as an 'Environmental Component' of the Plan, that the 'Impact upon Areas of Special Amenity' of Actions 4.1, 4.4, 4.5, 5.1, 5.2, 5.3 are assessed in the Strategic Environmental Assessment Report and by the consultant / body appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

4.7.2 OCCURRENCE OF ADVERSE VISUAL IMPACTS

The impact of Actions 4.1, 4.4, 4.5, 5.1, 5.2, 5.3 is likely to lead to the occurrence of adverse visual impacts on the Western Lakes and is already doing so. The photographs below indicate what anglers can expect to see on the Western lakes. Pike and coarse anglers, along with numerous salmonid anglers are disgusted by these scenes.



Section 4.7.2 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

1) Actions 4.1, 4.4, 4.5, 5.1, 5.2, 5.3 of the 'Long Term Management Plan for the Western Lakes' are likely to lead to significant 'Adverse Visual Impacts' on the Western Lakes and as such it is proposed, on the grounds of 'Landscape' as an 'Environmental Component' of the Plan that the impact of the 'Occurrence of Adverse Visual Impacts' of Actions 4.1, 4.4, 4.5, 5.1, 5.2, 5.3 are assessed in the Strategic Environmental Assessment Report and by the consultant / body appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

5 THE "BEST SCIENTIFIC KNOWLEDGE"- INTERACTION BETWEEN PIKE AND SALMONIDS, TROUT (SALMO TRUTTA)

The interaction between pike and trout has caused much debate over many decades. Regrettably, much of this debate took place within an environment of narrowly focused data gathering and reports, produced and relied upon over many years by Inland Fisheries Ireland and its predecessors.

An example was the dearth of knowledge available on pike diet over an entire season. A number of Inland Fisheries Ireland reports, concluded most notably during the 1990's that seasonal diet studies of pike e.g. in Lough Corrib should be undertaken to review the stock management decisions taken on the snapshot data available at the time. FOI requests to Inland Fisheries Ireland over a decade later confirmed that the recommended seasonal diet studies were simply not undertaken (See Section 9.4.1.3 of Appendix F). This position existed until 2013 when Inland Fisheries Ireland and UCD undertook a suite scientific research studies on pike, including pike diet.

Inland Fisheries Ireland has thankfully progressed its knowledge and research into pike, having produced a number of peer reviewed papers in the past four years. A number of very important matters have been scientifically investigated. A report launched in 2018 entitled "***Pike (Esox lucius) in Ireland: Developing Knowledge and Tools to Support Policy and Management"*** indicated that pike in Irish waters may have changed their diet preferences. The report looks at new research carried out on Lough Conn, County Mayo and Lough Derravaragh, County Westmeath in 2016 and provides an insight into the dietary habits of pike now that roach are established in many of the fisheries named in the 'Long Term Management Plan for the Western Lakes'. The research also examined if pike and brown trout can co-exist in the same habitat and the conditions for this co-existence.

Retired CEO of Inland Fisheries Ireland, Dr Ciaran Byrne, said at the launch: ***"This research was initiated to answer some on-going questions relating to the dietary preference of pike and the pike-brown trout interactions in lakes across Ireland. Previous studies in this area were carried out more than 50 years ago which is a long time within our changing lake systems"***.

5.1 SCIENTIFIC RESEARCH – EVIDENCE OF A REDUCED PREDATION IMPACT ON TROUT

Mc Cloone et. al (2019) examined the changes in pike diet that have taken place in lakes where roach have become established, and sought to establish if this changed the previously recorded predation on trout on these lakes. One of the test sites was Lough Conn in County Mayo, within the River Moy Special Area of Conservation and a Natura 2000 site included in the 'Long Term Management Plan for the Western Lakes'.

Monthly sampling of pike was undertaken on Lough Conn and Lough Derravaragh from August 2016 to July 2017. Pedreschi et al. (2015) conducted short-term studies of pike diet in a number of Irish lake systems, and highlighted the need for a longer-term seasonal diet study to assess whether diet has been influenced by the colonization of roach. Mc Cloone et. al (2019) used standardised electrofishing to capture pike. Gastric lavage, a non-lethal method, was used to obtain stomach content samples of pike.

Diet information was available from 4667 pike in the historical period and 636 pike from the recent period to represent corresponding size classes. Prey were found in a high proportion of the stomachs of pike in both 'small' and 'large' tested size. The assertion that only large pike were piscivorous was not supported (Mc Cloone et al., 2019).

There was no evidence to support the hypothesis that trout are currently selectively predated by pike in Irish lakes (Mc Cloone et al., 2019). This would appear to question the justification for pike management in the Plan.

The new findings relating to the diet of pike and the dominance of roach in the diet is very important. It would indicate that the Plan must carefully consider any potential "stock management" on a number of grounds:

- Has the Plan considered current research into pike diet in each of the lakes?
- Has the effectiveness of ongoing management actions been assessed with regard to their impact on the ecology of each lake named in the Plan?

Section 5.1 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

1) It is proposed here that there may be an adverse impact on the ecology of the Natura 2000 sites contained in the 'Long Term Management Plan for the Western Lakes', should the dominance of roach found in recent pike diet research not be assessed in the context of proposing a "stock management plan" for each of the Natura 2000 sites and as such, this should be reviewed specifically for each Natura 2000 site in the Strategic Environmental Assessment Report and by the consultant / body appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

5.2 SALMONID CONSERVATION – THE IMPACT OF PREDATOR REMOVAL ON TROUT IN MODIFIED LAKES

Shephard et. al (2018) studied the relationship between removing a predator e.g. pike and what factors may influence the response of salmonid stocks to this measure.

The authors found that on Lough Sheelin, roach as an alternative prey species for pike, had modified the predator-prey interactions between pike and trout. The authors suggested that this now affected the potential efficacy of pike removal as a trout fisheries management tool.

The authors found that on Lough Sheelin, trout abundance declined in years of high chlorophyll a concentration and they suggested that to remove top predators may have unanticipated effects on target fish stocks in systems where there are multiple anthropogenic pressures.

Section 5.2 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

1) It is proposed here that there may be an adverse impact on the ecology of the Natura 2000 sites contained in the 'Long Term Management Plan for the Western Lakes', by removing predators from Natura sites where there are ongoing anthropogenic pressures and as such, this should be reviewed specifically for each Natura 2000 site in the Strategic Environmental Assessment Report and by the consultant / body appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

5.3 SCIENTIFIC RESEARCH – POSSIBLE CO-EXISTENCE OF PIKE AND TROUT IN LARGE WELL-CONNECTED LAKES

Mc Cloone et al. (2018) investigated the factors which combine to provide an environment for the coexistence of pike and brown trout in Irish lakes. The authors recognized that both species are highly valued, particularly by anglers and that pike management in Irish lakes is the subject of considerable debate amongst stakeholders.

The authors examined 522 lakes with current or historical records of containing pike. The authors found that all of the study lakes >600 ha support existing trout and pike stocks and offer angling opportunity for both species. Lake area (ha), mean air temperature, mean and maximum lake depth (m) lake elevation (m), alternative prey and system connectivity were calculated for each fishery from which a model was derived.

In large well-connected lakes with deep areas and acknowledging the statistical uncertainty surrounding the model outputs, it was deemed likely that pike and trout could coexist in such systems, as there is a strong positive effect on lake size in determining the probability of co-existence of S. trutta and E. lucius in individual Irish lakes (Mc Cloone et al., 2018). Only the largest deepest lakes with strong connectivity can be confidently assumed to have a high probability of successful co-existence (Mc Cloone et al., 2018).

All of the lakes contained in the 'Long Term Management Plan for the Western Lakes' exceed 600 ha in area. Most of the iconic wild brown trout lakes in Ireland that contain pike are large, well connected and have deep water refuges. Acknowledging the statistical uncertainty, it is likely that E. Lucius and S. trutta would be able to co-exist in such systems (Mc Cloone et al., 2018).

Section 5.3 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

1) It is proposed here that there may be the potential for adverse impacts on the ecology of the Natura 2000 sites by removing pike from sites where the best evidence based research and population modelling by Inland fisheries Ireland's own published research acknowledges the potential for co-existence of pike and trout, and therefore the co-existence potential based upon the best available scientific evidence should be reviewed in the Strategic Environmental Assessment Report and by the consultant / body appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the 'Long Term Management Plan for the Western Lakes'.

5.3.1 PIKE AND TROUT IN SMALL LAKES – COMMENT ON CO-EXISTENCE AND THE DISPERSAL OF FISH SPECIES

The introduction of pike into low-complexity systems could be devastating to existing trout populations (Mc Cloone et al., 2018). This point is not disputed however the mode of dispersal for any new species is an area where conclusions are immediately drawn that it must be an anthropogenic introduction. This possibly erroneous conclusion may lead to speculative comments upon which management decisions are then founded. One such recent event took place on the Owenriff catchment, which is a tributary of Lough Corrib where pike were not previously recorded, though when precisely pike found their way into the Owenriff system remains unresolved.

Owenriff River Catchment, Co. Galway

Prior to 2009, there were no official records of pike being present in the Owenriff catchment (IFI, 2018). The Irish Times newspaper carried a story on 21st October 2009, depicting the finding of pike as an act of "environmental vandalism". Ref: The Irish Times https://www.irishtimes.com/news/release-of-pike-into-salmon-lakes-an-act-of-vandalism-1.759829 The story drew a response from a well-respected and well known angler and contributor to the now defunct "Irish Angler Digest" magazine in the edition of January 2010, where it was reported that he had personally caught pike and trout during an angling holiday in the Owenriff catchment in September 1994 (A copy of the article is available). Apart from suggesting that the comment regarding "environmental vandalism" may have been inappropriate, it raises the question of how reliable are historical fish stock surveys to advise us of the precise species that exist in a water at a point in time. Regarding the Owenriff catchment, we simply now cannot say with certainty when pike actually first colonised the system, but more importantly it questions the validity of speculating on salmonid stock dynamics within the Owenriff catchment without considering this possibility.

Aughrusbeg Lough, Co. Galway

More recently, Inland Fisheries Ireland on Wednesday on the 11th August 2021 publicised that "Pike have been confirmed in Aughrusbeg Lough, Co. Galway". This is a small and apparently low-complexity water with a low brown trout population based upon EU Water Framework Directive (WFD) fish stock surveys carried out in 2007, 2010 and 2013. The full results of an additional 2021 survey have not been made available as yet. No brown trout were captured in the survey in 2007 (Kelly et al. 2014), which would indicate the difficulty in assessing the existence of new species or the disappearance of existing species without a continuous survey programme and possibly the difficulty of linking poor survey returns with species expiration. A striking feature in the 2010 WFD survey is the existence of rudd (Scardinius erythropthalmus) up to 7+ years old indicating a population of rudd has existed in the lake since for at least 18 years. Kelly et al. (2014) state that archival Inland Fisheries Trust data and angling references indicate that eels and brown trout were the only species present in the lake. This raises the question of how rudd originally colonized Aughrusbeg Lough prior to, or circa 2003, and questions why the apparently new species did not warrant comment in the IFI report of 11th August 2021.

Alternative Mode of Dispersal of Fish Stocks

It is considered here that the appearance of fish in new lakes may not always be by anthropogenic means and that the mode of dispersal may be more complex. Minchin (2007) considered the capability of birds to spread species inadvertently on the body or in the gut. Recent research identified an overlooked dispersal mechanism in fish, providing evidence for bird-mediated dispersal ability of soft-membraned eggs undergoing active development (Lovas-Kiss et al., 2020). This supports previous research specifically in relation to the natural dispersal of pike and perch (Thienmann A., 1950) & (Preusse O., 1925).

It is proposed here that it may be reasonable to consider other more complex but natural modes of dispersal regarding the appearance of new species where they did not apparently exist. This mode is further supported when one considers that Ireland has approx. 165 designated Special Protection Areas (SPA) for over 50 species of water birds. Two SPA's adjacent to the Owenriff river catchment are the Connemara Bog Complex SPA and the Lough Corrib SPA, which itself provides protection for 14 listed bird species.

Section 5.3.1 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

1) It is proposed here that there may be the potential for the ecology of Natura 2000 sites to be naturally altered by bird-mediated modes of dispersal of fish species, the potential of which may be elevated on or near to Special Protection Areas, and as such the potential for the natural dispersal of fish species and all available published research should be reviewed by the consultant / body appointed to prepare the Natura Impact Statement (NIS), the Appropriate Assessment (AA) and Strategic Environmental Assessment Reports regarding any management decisions taken that are relevant to the 'Long Term Management Plan for the Western Lakes' or to any future management plans.

5.4 TROUT AND PIKE FISHERY – SCIENTIFICALLY EVALUATED MANAGEMENT OPTIONS

Fitzgerald et al. (2019) evaluated management options for a combined trout and pike fishery and tested a range of scenarios for management of the pike and trout fisheries, under three different hypotheses about the abundance of non-trout prey availability. Lough Conn was used as a test site due to the availability of pike dietary data and realistic annual trout catch data.

The model outcomes indicated that pike removal may enhance trout stocks in systems with little alternative prey, but that it would be unlikely to be effective in most of the designated trout lakes due to colonisation by roach (Fitzgerald et al., 2019).

The authors commented that actual rates of trout angling were found to impose an important pressure on the modelled trout population. The model behaviors were said "to be robust to realistic levels of uncertainty".

Fitzgerald et al. (2019) commented that in all cases, "the model indicates that a greater biomass of alternative prey (in the same size range as trout) diminishes the predation mortality on trout, which modifies the potential utility of pike removal as a trout conservation tool". The study states this effect "has been observed empirically in one of the designated Irish trout lakes (Lough Sheelin), where non-native roach have become established" and "now constitute an important prey species for pike".

Section 5.4 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

1) It is proposed here that 'Scientifically Evaluated Management Options' aligned to Section 2.3 of Inland Fisheries Ireland's Corporate Plan, and based upon the modelling of alternative prey available for pike, should be prepared for each of the Lakes named in the 'Long Term Management Plan for the Western Lakes' prior to any decision taken to introduce "stock management plans" under Actions 4.1, 4.4, 5.1, 5.2, 5.3, 5.4, 7.2 and that the adverse impact or uncertainty of any option should be reviewed using ecologically sound scientific evidence within the Strategic Environmental Report, and by the consultant appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

6 REFERENCE TO INLAND FISHERIES IRELAND – REVIEW OF POLICY (2018) – MANAGEMENT OF PIKE IN DESIGNATED WILD BROWN TROUT FISHERIES

Every 3 years, Inland Fisheries Ireland (IFI) review management policy such as pike management on waters referred by IFI as designated as wild brown trout fisheries. The management review process considers existing policy, current scientific research and stakeholders views. A steering group is formed for this purpose. The current policy dated August 2014, incorporates all of the lakes named in the 'Long Term Management Plan for the Western Lakes'.

The current policy was reviewed initially in 2012 and enacted in 2014. In 2018, the policy was reviewed again, however on this occasion, the availability of peer reviewed scientific research on pike biology, it's native status and the pike's potential to co-exist with trout (salmo trutta) had improved immeasurably from what was available in 2012.

In November 2018, a set of proposed recommendations were presented for the consideration of the IFI Senior Leadership Team (SLT) by the Chairman of the steering group, Mr. Sean Long. It was anticipated that the recommendations would be reviewed by the SLT and presented to the board of IFI in 2019 by the then IFI CEO, Mr. Ciaran Byrne, with the expectation that a revised policy - based on the new scientific research, would be released in late 2019. At a meeting in Dail Eireann a commitment was given on June 19th 2019 by Minister Sean Canney to both IFPAC and IPS that all stages of the Pike Review would be completed by September 2019. The then Minister specifically instructed the IFI CEO that this work was to be completed and issued to stakeholders.

As of August 2022, IFI have not amended its current policy, therefore any benefit accruing from the valuable suite of new scientific research published since 2013, and the deliberations of the review group, who gave up valuable time to participate in the review, has not been incorporated into any revised policy. In addition, none to the proposed recommendations have been incorporated into the 'Long Term Management Plan for the Western Lakes'.

The failure of the Board of Inland Fisheries Ireland and Senior Management, to close out the Pike Policy Review of 2018 before proceeding onto the current 'Long Term Management Plan for the Western Lakes' displays a considerable lack of engagement with stakeholders, particularly the pike angling stakeholders who participated until the end of the review and gave their time and not inconsiderable personal cost, willingly over 24 months.

This failure does not align with the expected governance of Inland Fisheries Ireland and with the Chairpersons forward in Inland Fisheries Ireland's Corporate Plan 2021-2025 which states that *"Governance comprises the systems and procedures under which organisations are directed and controlled. A robust system of governance enables the organisation to operate effectively and to discharge its responsibilities as regards transparency and accountability to those we serve".*

Section 6 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

It is proposed here that prior to approval or otherwise for any action in the 'Long Term Management Plan for the Western Lakes' by the DECC, that Inland Fisheries Ireland clarifies the following:

a) Has Inland Fisheries Ireland considered the recommendations of the Pike Policy Review Group during the deliberations undertaken for the Plan?

b) Which recommendations of the Pike Policy Review Group have been inserted into the Plan?

c) Do the authors of the 'Long Term Management Plan for the Western Lakes' believe the Plan aligns with IFI's Corporate Governance systems and procedures, and how was that undertaken at a) conceptual stage, and in b) the drafting of the Plan?

d) Provide a scientific report by the Research Division detailing how each Action in the Plan is based on the best evidence-based research and modelling available, as per Action 2.3 of Inland Fisheries Ireland's Corporate Plan (2021-2023);

e) Provide details of the resources and funding required for each Action of the Plan, as per Page 8, paragraph 3 of the Plan;

f) Provide details of the funding source for each individual Action in the Plan and provide confirmation if funding in principal has been secured for each;

g) Provide definitive details and the metrics to be used to show of how Inland Fisheries Ireland intends to measure improvements or otherwise, in each of the Western Lakes;

h) Provide definitive details of the measurable goals / KPI's of the Plan for each of the Lakes in terms of each fish species and the frequency of those KPI's;

7 REFERENCES

Browne, J. & Gallagher, P., "Preliminary Investigation of the Population of Juvenile Salmonids in the Corrib System", Fishery Leaflet, Department of Fisheries and Forestry (Trade and Information Section) 1980

Browne, J. & Gallagher, P., "Population estimates of juvenile salmonids in the corrib system 1980", Fishery Leaflet, Department of Fisheries and Forestry 1981

Champ, W.S.T. (1979) Eutrophication explained and some experiences in Ireland. The Salmon and Trout Magazine No. 215. Pp. 47-51, March 1979

Champ, W., Kelly, F., & King, J. (2009). THE WATER FRAMEWORK DIRECTIVE: USING FISH AS A MANAGEMENT TOOL. Biology and Environment: Proceedings of the Royal Irish Academy, 109B(3), 191-206.

Department of Taoiseach (2020) https://www.gov.ie/en/publication/7e05d-programme-for-government-our-shared-future/ Accessed 9th August 2021.

Ensing, D. (2015) ***Pike (Esox lucius) could have been an exclusive human introduction to Ireland after all: a comment on Pedreschi et al (2014).*** Journal of Biogeography

Fitzgerald, C.J., Shephard, S., McLoone, P., Kelly, F., & Farnsworth, K. (2019). ***Evaluating management options for two fisheries that conflict through predator–prey interactions of target species.*** Ecological Modelling, 410, 108740.

Fitzmaurice, P. (Circa 1975), Resume of Pike Research in Irish Waters and Scientific Data related to Pike Angling (Inland Fisheries Trust, Internal Document).

Hendry K & Cragg-Hine D (2003). Ecology of the Atlantic Salmon. Conserving Natura 2000 Rivers Ecology Series No. 7. English Nature, Peterborough.

IFI (2018) Fish Stock Survey of Selected Lakes and River Sites in the Owenriff Catchment 2017. National Research Survey Programme, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

John Curtis, Pike (Esox lucius) stock management in designated brown trout (Salmo trutta) fisheries: Anglers' preferences, Fisheries Research, Volume 207, 2018, Pages 37-48, ISSN 0165-7836, https://doi.org/10.1016/j.fishres.2018.05.020.

Kaspersson R, Sundström F, Bohlin T, Johnsson JI (2013) Modes of Competition: Adding and Removing Brown Trout in the Wild to Understand the Mechanisms of Density-Dependence. PLoS ONE 8(5): e62517. https://doi.org/10.1371/journal.pone.0062517

Kelly, Fiona & Harrison, Andrew & Allen, Michelle & Connor, Lynda & Rosell, Robert. (2012). Development and application of an ecological classification tool for fish in lakes in Ireland. Ecological Indicators. 18. 608–619. 10.1016/j.ecolind.2012.01.028.

Kelly, F.L., Connor, L., Morrissey, E., Coyne, J., Matson, R., Feeney, R. and Rocks, K. (2014) Water Framework Directive Fish Stock Survey of Aughrusbeg Lough, July/August 2013. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

Kelly-Quinn, M. & Regan, E.C. (2012) Ireland Red List No. 7: Mayflies (Ephemeroptera). National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Kelly, F.L., Connor, L., Morrissey, E., Coyne, J., Feeney, R., Matson, R. and Rocks, K. (2015w) Water Framework Directive Fish Stock Survey of Lough Sheelin, June 2014. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

Kennedy, G.J.A. & Greer,J.E. (1988) ***Predation by cormorants Phalacrocarax carbo (L.), on the salmonid populations of an Irish river***. Aquatic fish management 19, 159-70.

Lovas-Kiss, Ádám & Vincze, Orsolya & Löki, Viktor & Pallér-Kapusi, Felícia & Halasi-Kovács, Béla & Kovács, Gyula & Green, Andy & Lukács, Balázs. (2020). Experimental evidence of dispersal of invasive cyprinid eggs inside migratory waterfowl. Proceedings of the National Academy of Sciences. 117. 10.1073/pnas.2004805117.

Minchin, D. (2007). ***"A checklist of alien and cryptogenic aquatic species in Ireland."*** Aquatic Invasions 2(4): 341-366.

McLoone, P., Fitzgerald, C., O' Reilly, S., Shephard, S. and Kelly, F.L. (2018***) Pike (Esox lucius) in Ireland: Developing Knowledge and Tools to Support Policy and Management.*** National Research Survey Programme, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

McLoone, P., Shephard, S., Delanty, K., Rocks, K., Feeney, R., & Kelly, F. (2018). ***Coexistence of pike Esox lucius and brown trout Salmo trutta in Irish lakes.*** Journal of fish biology, 93(5), 1005–1011. https://doi.org/10.1111/jfb.13811

McLoone, P., Shephard, S., O'Reilly, S., & Kelly, F. (2019). Shifts in diet of an apex predator following the colonisation of an invasive fish. Hydrobiologia, 1-14.

Ness & Beauly Fisheries Trust (2017): Trout (Salmo trutta) as predators of juvenile Atlantic salmon (Salmo salar): a literature review Version 1.1 (24/3/2017) https://beauly.dsfb.org.uk/files/2012/08/Sea-trout-as-predators-v1.1-240317.pdf

NPWS, (2007) ***The status of EU Protected Habitats and Species in Ireland*** (Backing Documents, Article 17 Forms, Maps, Volume 1 (online) available at:
https://www.npws.ie/sites/default/files/publications/pdf/NPWS_2007_Cons_Ass_Backing_V1.pdf

NPWS (2016) Conservation Objectives: River Moy SAC 002298. Version 1. National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO002298.pdf

NPWS (2017) Conservation Objectives: Lough Corrib SAC 000297. Version 1.National Parks and Wildlife Service, Department of Arts, Heritage, Regional, Rural and Gaeltacht Affairs.
https://www.npws.ie/sites/default/files/protected-sites/conservation_objectives/CO000297.pdf

Pedreschi, D., Kelly-Quinn, M., Caffrey, J., O'Grady, M. & Mariani, S. (2014) ***Genetic structure of pike (Esox lucius) reveals a complex and previously unrecognized colonization history of Ireland***. Journal of Biogeography, 41, 548–560.

Pedreschi, Debbi & Mariani, Stefano & Coughlan, J. & Voigt, Christian & O'Grady, M & Caffrey, Joe & Kelly-Quinn, Mary. (2015). Trophic flexibility and opportunism in pike Esox lucius. Journal of fish biology. 87. 10.1111/jfb.12755.

Pedreschi D, Mariani S (2015) ***Towards a balanced view of pike in Ireland: a reply to Ensing***. J Biogeogr 42:607–609

Quigley, D. (2014). ***Did melting ice sheets create temporary low-salinity corridors that facilitated the natural colonisation of Ireland by stenohaline fishes?*** The Irish Naturalists' Journal, 33, 124-137. Retrieved July 20, 2021, from http://www.jstor.org/stable/24394330

Reid, N., Dingerkus, S.K., Stone, R.E., Pietravalle, S., Kelly, R., Buckley, J., Beebee, T.J.C. & Wilkinson, J.W. (2013) ***National Frog Survey of Ireland 2010/11***. Irish Wildlife Manuals, No. 58. National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht, Dublin, Ireland.

Shephard, Samuel & Delanty, Karen & O'Grady, Martin & Kelly, Fiona. (2018)***. Salmonid Conservation in an Invaded Lake: Changing Outcomes of Predator Removal with Introduction of Nonnative Prey***. Transactions of the American Fisheries Society. 148. 10.1002/tafs.10132.

Teacher, A.G.F., Garner, T.W.J & Nichols, R.A. (2009) ***European phylogeography of the common frog (Rana temporaria): routes of postglacial colonisation into the British Isles, and evidence for an Irish refugium***. Heredity 102: 490-496.

Went, A.E.J. (1957) ***The pike in Ireland***. The Irish Naturalists' Journal, 12, 177– 182

Appendix A

(Part) FOI Email 6th October 2016 Re: Original Salmonid Designation Comment

(Redacted in this document)

From: Greg Forde
To: Ciaran Byrne; IFI Heads; Sean Long
Cc: Fiona Mahon; Mary Larkin
Subject: RE: Pike Trout Working Group
Date: 06 October 2016 12:22:29

Hi all,

[redacted]

management option). Also what is the position of a designated wild brown trout fishery..... We no longer have the branded fisheries from Bord Failte (which is where the designation initially came from and was embraced widely) as was the case in the past. Some lakes that were managed

[redacted]

Greg Forde
Ceann na n-Oibríochtaí
Head of Operations

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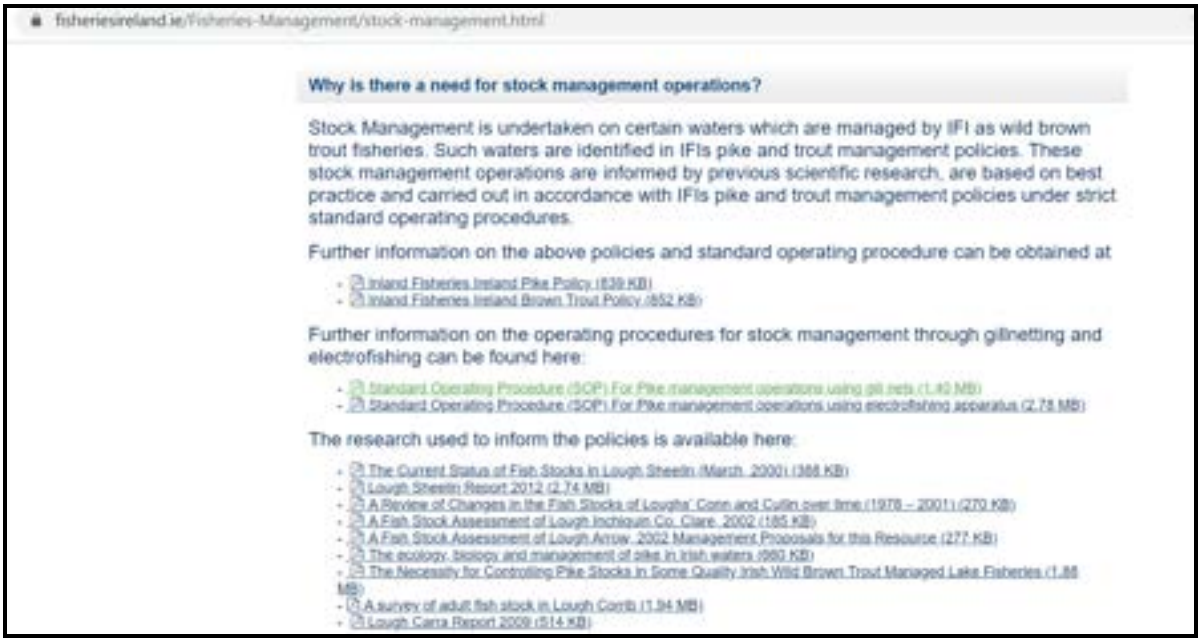
Teach Breac, Earl's Island, Galway, IRELAND.

Appendix B

Current Non-Peer Reviewed Research Supporting Stock Management

Inland Fisheries Ireland Website - Image August 2021



Appendix C

Relevant Peer Reviewed Research of Note Regarding Irish Pike – Post 2013

Fitzgerald, C.J., Shephard, S., McLoone, P., Kelly, F., & Farnsworth, K. (2019). ***Evaluating management options for two fisheries that conflict through predator–prey interactions of target species.*** Ecological Modelling, 410, 108740.

McLoone, P., Fitzgerald, C., O' Reilly, S., Shephard, S. and Kelly, F.L. (2018***) Pike (Esox lucius) in Ireland: Developing Knowledge and Tools to Support Policy and Management.*** National Research Survey Programme, Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24.

McLoone, P., Shephard, S., Delanty, K., Rocks, K., Feeney, R., & Kelly, F. (2018). ***Coexistence of pike Esox lucius and brown trout Salmo trutta in Irish lakes.*** Journal of fish biology, 93(5), 1005–1011. https://doi.org/10.1111/jfb.13811

McLoone, P., Shephard, S., O'Reilly, S., & Kelly, F. (2019). Shifts in diet of an apex predator following the colonisation of an invasive fish. Hydrobiologia, 1-14.

Pedreschi, D., Kelly-Quinn, M., Caffrey, J., O'Grady, M. & Mariani, S. (2014) ***Genetic structure of pike (Esox lucius) reveals a complex and previously unrecognized colonization history of Ireland***. Journal of Biogeography, 41, 548–560.

Pedreschi, Debbi & Mariani, Stefano & Coughlan, J. & Voigt, Christian & O'Grady, M & Caffrey, Joe & Kelly-Quinn, Mary. (2015). Trophic flexibility and opportunism in pike Esox lucius. Journal of fish biology. 87. 10.1111/jfb.12755.

Shephard, Samuel & Delanty, Karen & O'Grady, Martin & Kelly, Fiona. (2018)***. Salmonid Conservation in an Invaded Lake: Changing Outcomes of Predator Removal with Introduction of Nonnative Prey***. Transactions of the American Fisheries Society. 148. 10.1002/tafs.10132.

Appendix D

Summary of 66no. Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items

(Note: To be read in conjunction with full submission and Section descriptions)

3 OVERARCHING SUBMISSION RELATED TO THE PROPOSED 'LONG TERM MANAGEMENT PLAN FOR THE WESTERN LAKES'

The following items are to be read in conjunction with all other Sections in the Submission including all Appendices.

3.1 THE SALMONID DESIGNATION – IS IT FIT FOR PURPOSE?

Section 3.1.1 - Proposed Management Plan – Submission Item:

1) This submission considers that all species can be accommodated on the Western Lakes without compromising the status of the lakes as producers of quality trout and salmon angling – provided only, that measures specifically designed to elevate the importance of the spawning and nursery catchments, and water quality issues, are the primary focus of the plan.

Section 3.1.2 - Proposed Management Plan – Submission Item:

2) This submission considers that the salmonid designation should be reviewed in terms of how Inland Fisheries Ireland links culling to the designation, and as such, this submission proposes that an angling tourism product risk review regarding angling for all species affected in the Western Lakes and also generally to Ireland's angling tourism product takes place, before any plan regarding the Western Lakes is adopted.

Section 3.1.3 - Proposed Management Plan – Submission Item:

3) This submission considers that the plan does not meet Inland Fisheries Ireland's Corporate Plan (i.e. HLO 03 – Action 3.2) objective to manage state owned fisheries for the benefit of all stakeholders, and therefore the plan marginalises non-salmonid stakeholders, and discriminates against pike angling stakeholders in particular, and coarse angling stakeholders generally.

Section 3.1.4 - Proposed Management Plan – Submission Item:

4) This submission considers that DNA evidence suggests that the plan does not meet Inland Fisheries Ireland's Corporate Plan (i.e. HLO 02 – Action 2.3) objective to develop fishery management plans in light of best evidence-based research and modelling available, based upon the possibility that the plan seeks to remove and cull a potentially unique strain of naturally colonised native Irish pike from the Western Lakes, and as such all culling and removal of pike should cease.

5) This submission considers that in light of the conclusions of Pedreschi & Mariani (2015) stating that many ubiquitous freshwater species in Ireland remain to be investigated such as gudgeon, stoneloach, minnow and perch, that scientific research should now be undertaken by Inland Fisheries Ireland to scientifically examine the possible native status of these additional species and that Inland fisheries Ireland should advise of its intentions in this regard.

Section 3.1.5 - Proposed Management Plan – Submission Item:

6) This submission considers that the artificial increase of the brown trout populations above natural capacity on the Western Lakes inter-alia the management culling operations executed on other species in that pursuit, compromises the objectives of the EU Habitats Directive for SPAs, SACs and Natura 2000 sites and puts at risk many of their Qualifying Interests and as such should be reviewed in the context of a Natura Impact Statement and Appropriate Assessment carried out on the Natura 2000 sites.

7) This submission considers that Inland Fisheries Ireland should provide data on biomass, density and length frequency distribution of the current existing trout stocks in each of the Western Lakes and also the optimum trout stock that it considers stocks need to be increased to, or reduced by to ensure a sustainable trout stock in each of the Western Lakes, and that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

8) This submission considers that Inland Fisheries Ireland should provide data on biomass, density and length frequency distribution of the current existing pike stocks in each of the Western Lakes and define what the numerical objectives of the plan are in regard to those stocks, and that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

9) This submission considers that Inland Fisheries Ireland should provide data on biomass, density and length frequency distribution of the current existing perch, roach and bream stocks in each of the Western Lakes and define what the numerical objectives of the plan are in regard to those stocks, and that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

10) This submission considers that Inland Fisheries Ireland have not provided for any additional trout angling conservation regulations within the 'Long Term Management Plan for the Western Lakes' and that Table 1 (P17) of the plan clearly defines a wide variance in current regulation (e.g. 2 fish per day legally killed on Lough Sheelin to unlimited killing of trout per day on Lough Conn and Cullin), reflecting a loose conservation of trout on the Western Lakes, and therefore reflecting the prevalence of trout believed to presently exist on the Lakes, and as such Inland Fisheries Ireland are requested to provide scientifically based reasons for this omission, and that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

Section 3.1.6 - Proposed Management Plan – Submission Item:

11) This submission considers that the proposed plan does not align with Inland Fisheries Ireland's Corporate Plan - HLO 03 – Action 3.2 in the first instance at high-level for the benefit of all stakeholders (See P45, 46 & 47 - Actions 4.1, 4.4, 5.1, 5.3 & 5.4 of the plan). Therefore, it is requested that IFI show how it has engaged with non-salmonid stakeholders (e.g. pike anglers, local businesses such as pike angling guides, pike angler friendly accommodation and local services etc.), to specifically assess community interest and fishery utility impact relating to the artificial and purposeful destruction of their fish stocks within the proposed plan, inter-alia the decreased utility of the fishery?

Section 3.1.7 - Proposed Management Plan – Submission Item:

12) This submission considers that Inland Fisheries Ireland should review historical data relating to habitat destruction and water quality reduction on each of the Western Lakes to establish salmonid population responses related to environmental improvement on each of the Western Lakes.

3.2 DEFICIENCIES IN ALIGNMENT OF THE PLAN TO IFI'S CORPORATE PLAN (2021-2025)

Section 3.2.1 - Proposed Management Plan – Submission Item:

13) This submission considers that the proposed plan does not align with Inland Fisheries Ireland's Corporate Plan - HLO 02 – Action 2.3 in the first instance at high-level (See P45, 46 & 47 - Actions 4.1, 4.4, 5.1, 5.3 & 5.4 of the Plan). Therefore, it is requested that Inland Fisheries Ireland provide definitive scientific comment that shows that the plan has been appraised, based upon evidence-based management (EBM) and shows how the best peer-reviewed scientific evidence available has been used to support each of the individual actions mentioned in this item, and that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

Section 3.2.2 - Proposed Management Plan – Submission Item:

14) This submission considers that the proposed plan has not addressed the "serious concerns" expressed by Inland Fisheries Ireland's Research Division regarding the document entitled **"The role of IFI science in informing policy and management in fisheries"** relating to Action 4.4 and 5.3 (See P46 & P47) of the 'Long Term Management Plan for the Western Lakes'. Therefore, it is requested that Inland Fisheries Ireland's Development Section and Senior Management provide definitive scientific comment on each of the 45 queries raised by the Research Division in the aforementioned document, and that these are made publicly available, prior to proceeding further with the proposed plan, or any future management plans or activities planned for the Western Lakes.

15) The document entitled **"The role of IFI science in informing policy and management in fisheries"** states that the stock size for brown trout and pike "is unknown" on the Western Lakes" and questions "on what basis is culling effort being defined". It is requested here that Inland Fisheries Ireland's Development Section and/or Chief Executive Officer provide the evidence-based research to support culling effort in response to this query regarding pike stock management proposed within the following:
    a) The proposed plan, and
    b) The current 2022 pike management plans presently being enacted on each of the Western Lakes.

16) This submission considers that the proposed plan has not provided any evidence to show that the pike stocks in each of the individual Western Lakes are large and in need of reducing. It is requested here that Inland Fisheries Ireland provide the evidence-based research that has determined that stocks need reducing, for each individual Western Lake.

17) This submission considers that recent international scientific publications from Inland Fisheries Ireland's own Research Division indicate that pike removal may have a neutral or negative impact on brown trout populations in lakes having established roach populations. It is requested here that Inland Fisheries Ireland provide details of peer-reviewed evidence-based research that is being used to justify the removal of pike as a brown trout stock enhancement tool within:
    a) The proposed plan, and
    b) The current 2022 pike management plans presently being enacted on each of the Western Lakes.

18) This submission considers that the proposed plan has not provided any evidence to show what outcome the stock management element of the proposed plan will have on the fish community dynamics and brown trout abundance in each of the Western Lakes. It is requested here that Inland Fisheries Ireland provide details of peer-reviewed evidence-based research to show what improvement in brown trout abundance and salmon and fish community dynamics generally will take place on each of the Western Lakes, in response to:
    a) The proposed plan, and
    b) The current 2022 pike management plans being enacted on each of the Western Lakes.

Section 3.2.3 - Proposed Management Plan – Submission Item:

19) This submission considers that the stock management aspect of proposed plan is not informed by "*best practice evidence-based management (EBM)"* and as such, Actions 4.1, 4.4, 5.1, 5.2, 5.3 & 5.4 (See P46 & P47) of the proposed 'Long Term Management Plan for the Western Lakes' are likely to lead to adverse and uncertain impacts on the Natura 2000 sites and should be removed from the plan. In addition, there has been no evidence provided to show how these risks have and would be considered at High-Level stage in the form of a Natura Impact Statement (NIS) and Appropriate Assessment (AA) specifically for each of the High-Level Actions mentioned in this section.

20) This submission proposes in the first instance, that stock management ceases on each of the Western Lakes pending a review of the application of existing best evidence peer-reviewed research, and the completion of any continued long-term studies (e.g. per IFI document IFI/2021/1-4562) to align any future stock management proposals to Inland Fisheries Ireland's Corporate Plan (2021-2025) - HLO 02 – Action 2.3.

21) This submission requests an answer to the query raised by the IFI Research Division (Appendix G) to IFI Management requesting on what scientific basis is it known that "it is essential that pike stocks are kept under control" – The proposed Plan provides no published scientific evidence to answer this fundamental question regarding the Western Lakes on the basis of the current scientific evidence, and it is requested here that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

Section 3.2.4 - Proposed Management Plan – Submission Item:

22) This submission considers that the continued research proposed by the Research Division (See **IFI/2021/1-4562)** represents an opportunity to build upon the existing research and to inform management, without dismissing the existing findings of McLoone et al., (2018). It is proposed that this research:
A) Is undertaken in full prior to any stock management decisions taken on the Western Lakes,
B) That Inland Fisheries Ireland confirms that funding has been secured to complete the research, and
C) That Inland Fisheries Ireland confirms the precise commencement and completion dates of the study.

Section 3.2.5 - Proposed Management Plan – Submission Item:

23) This submission considers that the continued research proposed by the Research Division (See **IFI/2021/1-4562)** contains a 'Citizen Science' element. It is proposed here that any engagement with anglers in the collection of samples or during competitions / events of any kind, is informed by detailed information and a Standard Operating Procedure drafted between the Research Division and Pike Angling National Bodies, to include, but not be limited to:
A) Agreed conditions of engagement;
B) The creation of a register for anglers – from which anglers can be added, or removed;
C) Description of all aspects of the process such as non-lethal handling and retention;
D) Minimum requirement for angling equipment;
E) Prior IFI Management response to all 45 questions drafted by the Research Division in document entitled **"The role of IFI science in informing policy and management in fisheries";**
E) Cessation of all IFI Section 59 authorisations to cull pike on the Western Lakes;

Section 3.2.6 - Proposed Management Plan – Submission Item:

24) This submission proposes that It will be necessary for Inland Fisheries to detail an 'Adaptive Management Programme' to scientifically research the link between water quality improvements and fish species responses in the Western Lakes and secure specific funding from DECC for enhanced ecological testing and monitoring to facilitate the programme, and that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

3.3 FAILURE OF PLAN TO STATE SALMONID MEASURABLES OR KEY PERFORMANCE INDICATORS

Section 3.3.1 - Proposed Management Plan – Submission Item:

25) This submission considers that the plan, without baseline data is compromised, as its success, failure or progression cannot be quantified due to the absence of baseline data. In order to obtain baseline data it is suggested that the following actions be undertaken:

A) Cease all artificial stock manipulation by ceasing all stock management operations;

B) Cease all artificial stock manipulation by introduction of a mandatory catch and release policy for all species;

C) Implement habitat restoration and enhancement programs to bring salmonid spawning catchment to their maximum carrying capacity for salmonids;

D) Implement an aggressive program of water quality monitoring, improvement and remediation;

E) Clearly define parameters based on upon the previous actions to aid in establishing a timeline for stock baseline estimation;

3.4 FAILURE OF PLAN TO PROVIDE OUTLINE OF 'FUNDING' AND 'STAFFING' REQUIRED FOR IMPLEMENTATION

Section 3.4 - Proposed Management Plan – Submission Item:

26) This submission proposes that It will be necessary for Inland Fisheries to detail precisely the resources, funding and staffing levels required for each High-Level Action in the plan and clarification is hereby requested, and that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

27) It is hereby requested that Inland Fisheries Ireland clarifies if the full funding of €1,371,536 has been secured for the continuation of Long-Term Studies on the Western Lakes as outlined in IFI document IFI/2021/1-4562 and confirmation of the commencement and completion of the 4-year research programme, and that this information should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this or any future management plan.

3.5 ECONOMIC AND ECOLOGICAL DEFICIENCIES RELATED TO THE PLAN REGARDING THE MANAGEMENT OF PIKE – APPARENT OVER REACH OF THE PROPOSED PLAN

Section 3.5 - Proposed Management Plan – Submission Item:

28) This submission suggests that certain Actions in the plan over-reach such as those related to pike and coarse fish, particularly in any consideration given to the removal of existing conservation bye-laws relating to those species, and therefore a detailed explanation outlining the scientific basis, justification and expected outcome for the ecology of the Western Lakes of such Actions based upon existing scientific research is requested, and should be provided to the public prior to the adoption of any management strategy on the Western Lakes in this, or any future management plan.

3.6 STRATEGIC ENVIRONMENTAL ASSESSMENT - NATURA IMPACT STATEMENT & APPROPRIATE ASSESSMENT

Section 3.6 - Proposed Management Plan – Overarching Appropriate Assessment Submission Item:

29) It is proposed here that this entire submission and **all** appendices is given in full, to any **current or future consultant or external / internal persons** engaged in undertaking Appropriate Assessment Screening, Natura Impact Statements, Stage 2 Appropriate Assessments or Strategic Environmental Assessment Reports - related to the proposed "Long-term Management Plan for the Great Western Lakes", or any future Western Lakes management plan or project, where stock management is a proposed element of the plan or project on any of the Western Lakes.

Section 3.6.2 - Proposed Management Plan – Submission Item:

30) This submission calls for an immediate investigation into who requested and authorised the revisions to the 'Actions' as per Section 11 of the 'Long Term Management Plan for the Western Lakes'; the basis (i.e. scientific or other) for the revisions; why INVAS Biosecurity Ltd. was not given the revised 'Actions' at the Appropriate Assessment Screening Stage and why Inland Fisheries Ireland with-held the Appropriate Assessment Screening Report at the outset of the public consultation process?

Section 3.6.3 - Proposed Management Plan – Submission Item:

31) This submission considers that 'Actions' e.g. 5.2, 5.3, 7.1, 7.2 contained in the 'Long Term Management Plan for the Western Lakes' are not based on the ***"best scientific knowledge in the field"*** as per ECJ Case Law per NPWS (2009), but are instead "***data-gathering of relevance in assessing the likely effects***" and as such the impacts are uncertain and the Actions should be withdrawn until such a time that scientific research is complete.

3.7. TABLE OF SUBMISSION COMMENTS & PROPOSED AMENDMENT / ADDITIONS TO IFI PLAN 'ACTIONS'

32) This section contains a review of the Actions proposed in Inland Fisheries Ireland's 'Long Term Management Plan for the Western Lakes'.

The review is set out in 6no. columns as follows:

- **Column 1 – IFI High-Level Objective and relevant Action (See Page 45, 46 & 47 of the Plan)**
- **Column 2 – Proposed IFI Action (See Page 45, 46 & 47 of the Plan)**
- **Column 3 – General Submission Comment on IFI Action**
- **Column 4 - Proposed Submission Amendment to IFI Action and/or Additional Proposed Action**
- **Columns 5 & 6 – Start and Finish of Action**

Please review the complete Section 3.7 within the Submission for a full list of the Actions and other comments.

4 FACTORS POTENTIALLY ADVERSELY AFFECTING THE INTEGRITY OF THE SITES CONCERNED

This submission considers that the 'Long Term Management Plan for the Western Lakes' has the potential to adversely affect the conservation objectives and overall ecology of the Natura 2000 sites, including their structure and function and as such are considered to have a 'Potentially Significant Effect'.

A number of 'Potentially Significant' environmental effects will also impact upon human health and the landscape.

It is proposed that each of the impact types reviewed in this section including the respective submission items are fully incorporated, and scientifically assessed by Inland Fisheries Ireland and/or any appointed consultants, during the preparation of Natura Impact Statements, Appropriate Assessments and the Environmental Report prepared in respect of the Strategic Environmental Assessment Scoping Report, **for this and any future Management Plans considered by Inland Fisheries Ireland.**

The impact types on the Natura 2000 sites are deemed to be described as follows:

- Water Quality and Resource;
- Loss of Habitat Area;
- Species Population Density;
- Potential Removal of Native Species;
- Disturbance;
- Population and Human Health;
- Landscape;

4.1 WATER QUALITY AND RESOURCE

Section 4.1.1 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Item:

33) It is proposed here that the Plan is re-drafted to reflect measures connected specifically to the agricultural sector regarding practices and land use, including measures implied by the Nitrates Directive, Habitats Directive, EU Water Framework Directive, and the Rural Environmental Protection Scheme for such lakes, rivers and tributaries within designated Special Areas of Conservation (SAC's), by introducing a suite of environmental actions, sampling analysis and compliance conformity, to expressly improve the ecology within the waters for the primary benefit of salmonids as implied by the Programme of Government 2020.

34) It is proposed here that the Plan is re-drafted to include a full risk analysis of all environmental stressors acting on the Western Lakes to include, but not limited to the following: agriculture, forestry, industry, domestic waste treatment, municipal water and waste treatment, land drainage, water extraction etc.

35) It is proposed here that Action 3.1 of the Plan is re-drafted to include for the redeployment of staff engaged in stock management to increased environmental detection and enforcement and that the Action 3.1 include for 1) retraining and upskilling of existing staff, and 2) increasing environmental officer numbers, if funding becomes available.

36) It is proposed here that in consideration of submission item.1 of this section, that a new additional Action 3.4 is inserted into the Plan to specifically propose engagement with Mayo County Council and the project partners of the EU financed LIFE Project, Lough Carra Life to include specific consultation with catchment management groups, with the sole purpose of building a suite of comparative Agri-environmental and climate measures options for each of the Western Lakes, based on the learnings of the LIFE Project.

37) It is proposed here that a new additional Action 3.6 is inserted into the Plan to specifically engage with EPA to seek elevation of Lough's Corrib, Conn, Cullin, Sheelin, Arrow, Carra & Mask to 'Priority Site' status to increase frequency within the Water Framework Directive of operational and surveillance programmes for physio-chemical, hydromorphological & biological quality elements on Lough's Corrib, Conn, Cullin, Sheelin, Arrow, Carra & Mask to reflect and assist upcoming research into fish stock dynamics.

38) It is proposed here that a new additional Action 3.7 is inserted into the Plan to specifically provide an 'Adaptive Management Programme' to scientifically research the link between water quality improvements and fish species responses in the Western Lakes and secure specific funding from DECC for enhanced ecological testing and monitoring to facilitate the programme.

Section 4.1.2 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Item:

39) It is proposed here that there is a considerable risk for environmental factors to continue adversely impacting on the environmental quality of the Natura 2000 sites and their salmonid species, and in this regard the consultant appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) should assess if the Plan adequately addresses this risk within the Actions proposed.

40) It is proposed here that Actions 4.1, 4.4, 5.1, 5.2, 5.3, 5.4, 7.2 which currently include measures associated with “stock management” on each of Western Lakes, are removed from the Plan and instead replaced with an appropriate suite of enforceable regulations designed to improve, protect and monitor the water environment in each of the Natura 2000 sites in response to water quality improvement.

Section 4.1.3 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Item:

41) It is proposed here that the consultant appointed to prepare the 'Natura Impact Statement' and the 'Appropriate Assessment' for the Plan considers the implications for the integrity of the EU Water Framework Directive in Ireland, of artificially manipulating fish stocks within the Natura 2000 sites and the uncertainty this action places on the three biological elements i.e. fish composition, abundance and age structure, subsequently to be used as indicators in Ireland's EU obligation to achieve a standard of "Good Water Quality" with regard to the named lakes.

42) It is proposed here that Actions 4.1, 4.4, 5.1, 5.2, 5.3, 5.4, 7.2 which currently include measures associated with "stock management" on each of Western Lakes, are removed from the Plan and instead replaced with an appropriate suite of enforceable regulations designed to improve, protect and monitor the water environment in each of the Natura 2000 sites in response to water quality improvement.

43) It is proposed that all future fish stock surveys carried out to satisfy Ireland's obligation with regard to the EU Water Framework Directive on the Western Lakes, are carried out based upon establishing the true impact of the prevailing water quality ecological drivers within the Lakes.

4.2 LOSS OF HABITAT AREA

Section 4.2.1 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Item:

44) It is proposed here that brown trout (salmo trutta) are not directly connected with, or necessary to the management of the Special Areas of Conservation, with potential adverse impact on Annex II species salmon (salmo salar), and as such the consultant appointed should consider this risk in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the 'Long Term Management Plan for the Western Lakes'.

45) It is proposed here that farmed trout are not directly connected with or necessary to the management of the Special Areas of Conservation with potential adverse impact on Annex II species salmon (salmo salar), native or naturalised species and as such the consultant appointed should consider this risk in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the 'Long Term Management Plan for the Western Lakes'.

Section 4.2.2 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

46) It is proposed here that there may be an adverse impact on Annex ii species salmon (salmo salar), directly related to an artificially induced increase in brown trout (salmo trutta) populations through competition for food and space on salmon spawning and nursery habitats in the SAC's and as such the consultant appointed should consider this risk in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the 'Long Term Management Plan for the Western Lakes'.

4.3 SPECIES POPULATION DENSITY

Section 4.3.1 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Item:

47) It is proposed here that the conservation limits for Atlantic salmon are reviewed in the context of all freshwater adverse impacts and that the brief of the consultant appointed should be extended to consider the weighting of all individual risks to include any risk associated with the Plan, and that this review be included in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the 'Long Term Management Plan for the Western Lakes'.

Section 4.3.2 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Item:

48) It is proposed here that the potential adverse impact on the ecology of the lakes in the Natura 2000 sites of removing fish species as part of "stock management plans" without clear scientific evidence of the functional effectiveness of such plans at the outset, are reviewed by the consultant appointed and that this review be included in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the 'Long Term Management Plan for the Western Lakes'.

Section 4.3.3 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Item:

49) It is proposed here that there may be an adverse impact on red-listed endangered and vulnerable Mayflies (Ephemeroptera), directly related to an increase in brown trout (salmo trutta) as a consequence of the objectives of the 'Long Term Management Plan for the Western Lakes' and as such the consultant appointed should consider this risk in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

Section 4.3.4 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

50) It is proposed here that there may be an adverse impact on the ecology of the Natura 2000 sites if trout populations are artificially increased in the Special Areas of Conservation (SAC) - by predating to an unknown extent upon Annex ii Salmon at the early life stages and as such, the potential adverse impact on salmon should be considered in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the 'Long Term Management Plan for the Western Lakes'.

51) It is proposed here that the objective of artificially increasing the stocks of brown trout is removed from the 'Long Term Management Plan for the Western Lakes', instead focusing on the natural fish biomasses responding to water environment improvements, as artificially increasing trout may enhance potential risk from predation on salmon alevins, parr and smolts in the spawning and nursery rivers and streams by an increased brown trout (Salmo trutta) population, which may have an adverse impact on the conservation objectives on the Natura 2000 sites.

Section 4.3.5 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

52) It is proposed here that all scientific research available regarding avian predation on Annex ii species Salmon be reviewed to include this potential adverse impact on Annex ii salmon in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the 'Long Term Management Plan for the Western Lakes'.

Section 4.3.6 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

53) It is proposed here that there may be an adverse impact on the ecology of the Natura 2000 sites if "stock management plans" allow for pike to be removed from lake tributaries as a consequence of the 'Long Term Management Plan for the Western Lakes' without first considering if predation on salmon smolts is negligible based on smolt run patterns and the physical characteristics of the tributary, and as such the consultant appointed should consider this potential risk to the ecology of the lakes from the adoption of a generalised removal of pike in this instance, in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

54) It is proposed here that Actions 4.1, 4.4, 5.1, 5.2, 5.3, 5.4, 7.2, which currently include measures associated with "stock management" on each of Western Lakes, are removed from the 'Long Term Management Plan for the Western Lakes' pending a complete review of all of the best evidence based research and modelling available as per Action 2.3 of Inland Fisheries Ireland's Corporate Plan (2021-2025) by the appointed consultants in the preparation of the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the impact of the Plan in each of the Natura 2000 sites.

4.4 POTENTIAL REMOVAL OF NATIVE SPECIES (PIKE) FROM NATURA 2000 SITES

Section 4.4.1 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

55) It is suggested that the removal of pike as a potentially native species based upon the best available scientific evidence, will have an adverse impact on the integrity of the Natura 2000 sites and as such, the native status of pike in the Western Lakes should be clarified with certainty within the context of the 'Long Term Management Plan for the Western Lakes' and that management of the species should cease on the basis of existing research and that this be considered in the preparation of the Strategic Environmental Assessment Report, the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

56) It is suggested that the native status of perch is reviewed per the comments of Pedreschi & Mariani (2015) and that a scientific research study is undertaken by Inland Fisheries Ireland to examine the colonization of Ireland by perch and that the potential for this species to be native is assessed in the context of the 'Long Term Management Plan for the Western Lakes' in the preparation of the Strategic Environmental Assessment Report, the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

4.5 DISTURBANCE - IMPACT OF GILL NETS USED FOR STOCK MANAGEMENT IN NATURA 2000 SITES

Section 4.5 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

57) It is proposed that the use of gill nets in each of the Western Lakes named in the 'Long Term Management Plan for the Western Lakes' may adversely impact on the Conservation Objectives of the Natura 2000 sites with regard to the disturbance of Annex ii Otters in SAC's and protected bird species in SPA's in the context of Plan where they are used to execute "stock management plans" and as such it is proposed that the use of gill nets should cease for the purpose of stock management in the Western Lakes, and that this is reviewed in the Strategic Environmental Assessment Report and by the consultant appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

4.6 POPULATION AND HUMAN HEALTH

Section 4.6.1 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

58) Actions 4.4 & 5.3 of the 'Long Term Management Plan for the Western Lakes' specifically propose to 'encourage' and 'enable' one stakeholder group to remove and kill fish species of interest to other stakeholders, with the significant potential to further marginalise pike and coarse angling stakeholders on the Western Lakes, and as such it is proposed, on the grounds of 'Population and Human Health' that Actions 4.4 & 5.3 are assessed in the Strategic Environmental Assessment Report and by any consultant or body appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

4.7 LANDSCAPE

Section 4.7.1 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

59) Actions 4.1, 4.4, 4.5, 5.1, 5.2, 5.3 of the 'Long Term Management Plan for the Western Lakes' are likely to have a significant impact upon the Western Lakes and the enjoyment and participation of angling by all angling disciplines, and as such it is proposed, on the grounds of 'Landscape' as an 'Environmental Component' of the Plan, that the 'Impact upon Areas of Special Amenity' of Actions 4.1, 4.4, 4.5, 5.1, 5.2, 5.3 are assessed in the Strategic Environmental Assessment Report and by the consultant / body appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

Section 4.7.2 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

60) Actions 4.1, 4.4, 4.5, 5.1, 5.2, 5.3 of the 'Long Term Management Plan for the Western Lakes' are likely to lead to significant 'Adverse Visual Impacts' on the Western Lakes and as such it is proposed, on the grounds of 'Landscape' as an 'Environmental Component' of the Plan that the impact of the 'Occurrence of Adverse Visual Impacts' of Actions 4.1, 4.4, 4.5, 5.1, 5.2, 5.3 are assessed in the Strategic Environmental Assessment Report and by the consultant / body appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

5.1 SCIENTIFIC RESEARCH – EVIDENCE OF A REDUCED PREDATION IMPACT ON TROUT

Section 5.1 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

61) It is proposed here that there may be an adverse impact on the ecology of the Natura 2000 sites contained in the 'Long Term Management Plan for the Western Lakes', should the dominance of roach found in recent pike diet research not be assessed in the context of proposing a "stock management plan" for each of the Natura 2000 sites and as such, this should be reviewed specifically for each Natura 2000 site in the Strategic Environmental Assessment Report and by the consultant / body appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

5.2 SALMONID CONSERVATION – THE IMPACT OF PREDATOR REMOVAL ON TROUT IN MODIFIED LAKES

Section 5.2 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

62) It is proposed here that there may be an adverse impact on the ecology of the Natura 2000 sites contained in the 'Long Term Management Plan for the Western Lakes', by removing predators from Natura sites where there are ongoing anthropogenic pressures and as such, this should be reviewed specifically for each Natura 2000 site in the Strategic Environmental Assessment Report and by the consultant / body appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

5.3 SCIENTIFIC RESEARCH – POSSIBLE CO-EXISTENCE OF PIKE AND TROUT IN LARGE WELL-CONNECTED LAKES

Section 5.3 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

63) It is proposed here that there may be the potential for adverse impacts on the ecology of the Natura 2000 sites by removing pike from sites where the best evidence based research and population modelling by Inland fisheries Ireland's own published research acknowledges the potential for co-existence of pike and trout, and therefore the co-existence potential based upon the best available scientific evidence should be reviewed in the Strategic Environmental Assessment Report and by the consultant / body appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the 'Long Term Management Plan for the Western Lakes'.

Section 5.3.1 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

64) It is proposed here that there may be the potential for the ecology of Natura 2000 sites to be naturally altered by bird-mediated modes of dispersal of fish species, the potential of which may be elevated on or near to Special Protection Areas, and as such the potential for the natural dispersal of fish species and all available published research should be reviewed by the consultant / body appointed to prepare the Natura Impact Statement (NIS), the Appropriate Assessment (AA) and Strategic Environmental Assessment Reports regarding any management decisions taken that are relevant to the 'Long Term Management Plan for the Western Lakes' or to any future management plans.

5.4 TROUT AND PIKE FISHERY – SCIENTIFICALLY EVALUATED MANAGEMENT OPTIONS

Section 5.4 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

65) It is proposed here that 'Scientifically Evaluated Management Options' aligned to Section 2.3 of Inland Fisheries Ireland's Corporate Plan, and based upon the modelling of alternative prey available for pike, should be prepared for each of the Lakes named in the 'Long Term Management Plan for the Western Lakes' prior to any decision taken to introduce "stock management plans" under Actions 4.1, 4.4, 5.1, 5.2, 5.3, 5.4, 7.2 and that the adverse impact or uncertainty of any option should be reviewed using ecologically sound scientific evidence within the Strategic Environmental Report, and by the consultant appointed to prepare the Natura Impact Statement (NIS) and the Appropriate Assessment (AA) regarding the Plan.

6 REFERENCE TO INLAND FISHERIES IRELAND – REVIEW OF POLICY (2018) – MANAGEMENT OF PIKE IN DESIGNATED WILD BROWN TROUT FISHERIES

Section 6 - Proposed Management Plan – SEA (NIS/AA) & IFI Submission Items:

It is proposed here that prior to approval or otherwise for any action in the 'Long Term Management Plan for the Western Lakes' by the DECC, that Inland Fisheries Ireland clarifies the following:

a) Has Inland Fisheries Ireland considered the recommendations of the Pike Policy Review Group during the deliberations undertaken for the Plan?

b) Which recommendations of the Pike Policy Review Group have been inserted into the Plan?

c) Do the authors of the 'Long Term Management Plan for the Western Lakes' believe the Plan aligns with IFI's Corporate Governance systems and procedures, and how was that undertaken at a) conceptual stage, and in b) the drafting of the Plan?

d) Provide a scientific report by the Research Division detailing how each Action in the Plan is based on the best evidence-based research and modelling available, as per Action 2.3 of Inland Fisheries Ireland's Corporate Plan (2021-2023);

e) Provide details of the resources and funding required for each Action of the Plan, as per Page 8, paragraph 3 of the Plan;

f) Provide details of the funding source for each individual Action in the Plan and provide confirmation if funding in principal has been secured for each;

g) Provide definitive details and the metrics to be used to show of how Inland Fisheries Ireland intends to measure improvements or otherwise, in each of the Western Lakes;

h) Provide definitive details of the measurable goals / KPI's of the Plan for each of the Lakes in terms of each fish species and the frequency of those KPI's;

Appendix E

Further Information Related to the Native Status of Irish Species

(Correspondence with Inland Fisheries Ireland CEO)

Francis O Donnell,
Inland Fisheries Ireland,
3044 Lake Drive,
Citywest Business Campus,
Dublin,
D24 CK66,
Ireland.

Paul Byrne,
IPS Secretary,
21 Kilcarberry Business Park,
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Dublin 22

Date: 03rd Apr 2022

REF: Pike Origins & Historical References

Dear Francis,

I would like to formally address some of the commentary at recent ACCI meetings relating to pike scientific studies, specifically concerning pike diet and anecdotal references to Irish pike origins. I would like to comment on the Irish Pike origins issues within this communication.

Irish Pike Origins

During the ACCI meeting of 21 December 2021, it was suggested by you as IFI CEO that the absence of a reference to pike in a historical document (West or H-Iar Connaught ,Roderic O'Flaherty, 1684) may require consideration in relation to providing a basis for a claim that pike did not exist in Lough Corrib or Lough Mask prior to 1672.

There are numerous historical references to pike in Ireland that have been further examined in the past 20 years. We have taken the opportunity to comment on some of these in this communication to draw your attention to them.

Additionally, the current advances in scientific research based on microsatellite DNA supports the contention that Ireland has its own largely widespread genetically distinct strain of pike dating back somewhere between 4000 and 8000 years and for which, a process of natural colonisation of Ireland is strongly supported. This research was undertaken by collaboration between UCD and Inland Fisheries Ireland, who had recently signed a MOU to support this type of ground-breaking research. Furthermore, the recent pike policy review group set up in 2017 and chaired by Mr. Sean Long (IFI) was specifically advised by Dr. Debbie Pedreschi, lead researcher of the microsatellite DNA based published paper, that she had carried out further genomic research using Single Nucleotide Polymorphisms (SNPs) and had thus far concluded that the results of the original research are supported by the SNPs findings. Dr. Pedreschi stated during her presentation to the pike policy review group that based upon the current data, *"pike are as likely / more likely to be native per the available data"* – Please see page 4 of "The Management of Pike in Designated Wild Brown Trout Fisheries Policy Review Report - December 2018".

Considering the current findings of scientific research and the subsequent additional genomic research based upon SNP's, we would concur with Dr. Pedreschi that ***"this information is significant for the reappraisal of current management strategies in this economically (angling) and ecologically (top-predator) important species"***.

For the purpose of this communication, a number of relevant historical records and recent findings have been examined to illustrate the likely misconceptions derived from attaching management strategies to historical records:

1) **Evidence of Pike in Lough Corrib Pre-Roderic O'Flaherty, 1684:**

Evidence relating to the presence of a harvestable stock of pike in Lough Corrib existed over two decades prior to the written works of Roderic O Flaherty and was established by Hardiman through historical records. Please see highlighted section of 'The History of Galway Town, Hardiman, 1820 contained in this communication.

This record refers the grant of fishing rights of and in the river of Galway including that of "pike" to Sir George Preston, dated 27th July 1663. Prior to this, on 28th April 1657, the salmon and "all other fishings of the river" were let to Mr. Paul Dodde "for one year for the interest of the state". It is therefore entirely inconceivable that the species to which the rights applied over the period would be speculative and therefore would not have specifically included "pike", if pike did not already inhabit this water.

This knowledge is of considerable importance when one considers that Ireland already had an export trade for pike dating back to the end of the 15th century and from an economic perspective would be of considerable importance to any holder of the fishing rights, no less so than rights held to this current day on fisheries throughout Ireland.

As the reference to Roderic O Flaherty was raised by the IFI CEO we request that the reference cited by Hardiman similarly be communicated by the IFI CEO to the wider ACCI group. For context this should include its basis and most importantly the information that the reference pre dates Roderic O Flaherty's anecdotal claim by over two decades.

Further to Hardiman's reference it should be noted that pikes indigenous status is referenced by one of the oldest trout angling clubs on Lough Corrib, Oughterard Angler & Boatmans Association. "Pike are indigenous to Lough Corrib itself, but not to this river or the spawning lakes upstream."

2) **Evidence of Export of Pike from Ireland in the 15th Century - Support of Ireland's Indigenous Pike Stocks:**

During the 15th and 16th centuries, there was a thriving export business of pike from Youghal to Billingsgate as documented in AK Longfeld's "Anglo Irish Trade". Please see highlighted section of 'The History of Galway Town, Hardiman, 1820 contained in this communication.

Pedreschi et al. 2013 revealed the genetic diversity in Irish pike populations and found that genetic evidence suggests pike may have colonised Ireland in two waves, one in 4000-8000bp and a second later strain in 1000bp. As this evidence suggests that that the colonisation in the South of the country was much later than the 15th century, then it is reasonable to suggest that a pike harvest worthy of export would have had to originate from the Midlands and West of Ireland and that any fishing rights issued would be cognisant of the economic importance of correctly naming the species on individual fisheries to which rights apply, as is the case for Sir George Preston, dated 27th July 1663 on the river of Galway and the connected Lough Corrib, and whose grant was then further confirmed by patent six years later. There is no evidence provided to suggest that the patent differed from the grant of fishing rights or that any species had been removed from the grant as not-existing.

3) Evidence and Comment for Previously Unknown Fish Stocks in Irish Waters:

Roderic O' Flaherty will not have based his opinion on the existence of pike stocks upon any scientific survey methodology and his paper does not indicate how his opinion about pike is supported. This point is significant.

Interestingly, his paper suggests the existence of Rudd, though he calls them 'Roche' and refers to other un-named species as "the like of no value", though he doesn't describe further, the species to which he refers. Rudd shoals can be found very close to shore and in shoals so perhaps this led to the easy capture and recognition of Rudd. It is most interesting that this cyprinid species already existed in Lough Corrib and that its mode of introduction didn't warrant mention. We know that Rudd remains found in County Antrim date back to the iron age (Ref: Barbe & Garrett investigation contained in this communication) and therefore it may be of no surprise that Rudd are and likely were at that time, a widespread Irish species.

Roderic O Flaherty's paper does not provide any supporting evidence for his opinion that pike did not exist. However, absence of evidence is not evidence of absence. For example, Pollan, apparently a species endemic to Ireland were not discovered in Lough Allen until 2007. This would have been despite Pollan engaging in very noticeable shallow water spawning activity for thousands of years!

The question of how Inland Fisheries Ireland views new species found where they were thought not to exist previously, is something that must be considered. The appearance of pollan on Lough Allen did not lead to claims of anthropogenic transfer, yet the appearance of perch, pike or other species where they apparently do not exist previously, inspires unsubstantiated claims in the press and social media of anthropogenic fish movement and legal action, without any apparent consideration of the non-anthropogenic vectors for such movement i.e. by natural means. Numerous scientific authors have researched avian vectors for the movement of fish species.

As such, there is need for wider consideration of the natural vectors leading to the translocation of fish species between water bodies in Irish waters, rather than by selecting an arbitrary point in time beyond which the appearance of new species either by natural or anthropogenic means, leads to species management. In any event, our understanding is that Inland Fisheries Ireland has not established a clear ecologically based point in time that could be confidently used to set the time limits of when fish species could be considered native for Ireland. However, what we do know is that Inland Fisheries Ireland continues to engage in management operations that negatively impact upon a pike strain for which current genetic evidence suggests is likely a native strain representing pike that may have reached Ireland naturally 8000 years ago.

4) Anthropogenic Impact on Habitat & Water Quality – The Real Issues!

A small sample of historical records is included with this communication which clearly illustrate that before the effects of arterial drainage and other anthropogenic pressures, angling for trout was excellent (producing bags of 30 to 40 fish per day per angler), while pike angling was similarly excellent (producing numerous fish to over 30lbs regularly).

The reality is that the future quality of salmonid species will only be secured by calling out and addressing all environmental, spawning habitat and water quality issues affecting the 'Western Lakes' group and lakes and rivers across Ireland.

All other effort expended on artificial manipulation of fish species will ultimately fail salmonid species and the anglers who fish for them. Until this fact is accepted, Inland Fisheries Ireland are failing the salmonid organisations. One only has to acknowledge the anthropogenic pressures the 'Western Lakes' group have endured over many decades and continue to endure e.g. Lough Carra, to understand the real issues!

Please see the following articles extracts contained in this communication - 'Article (Circa 1945) Referenced on Mayo.ie', 'The Angling Excursions of Gregory Greendrake, 1834', 'William Bilton, The Angler in Country Clare, 1833'.

5) The application of genomic microsatellite DNA to establish the native status of an Irish species is not new.

The National Frog Survey of Ireland 2010/11 undertaken by the National Parks and Wildlife Service, Department of Arts, Heritage and the Gaeltacht in the following extract from the report, stated:

"The origins of frogs in Ireland have been controversial, with early suggestions that they were not native but were introduced from Britain in the 17th century (Smith, 1964). However, genetic studies indicate the existence of two distinct clades (Teacher et al., 2009), one similar to that found in Britain and a second, distinct group unique to the south-west of Ireland. These results imply two separate colonization events, probably both in the early postglacial period, one from the east and one from a Lusitanian refuge in or near county Kerry. Similar results have been found for the natterjack toad (Rowe et al, 2006). ***It is, therefore, considered that the common frog is a longstanding native of Ireland".***

The only conclusion to be drawn by comparing frogs and pike in regard to applying a native status is that pike have become the subject of local and political pressure in certain Irish communities and a negative viewpoint is being driven by a very vocal minority, whereas frogs have benefitted from the same genetic research.

This was clearly evident during the recent pike policy review, whereby politics trumped scientific evidence and whereby the review process itself, and the recommendations drafted by the review group, was allowed to be drawn off course and manipulated by the attempted forceful introduction of a disgraceful pike bye-law on the 'Western Lakes' by Minister Sean Kyne of County Galway, on his direction to the Inland Fisheries Section of his department.

The following snapshot was taken from the Inland Fisheries Ireland website. This is more factual than basing management strategies on the opinion of Roderic O'Flaherty, 1684.

The History of Galway Town, Hardiman, 1820: 1 of 1

IV. Fisheries of the River and Bay.

1. *Salmon Fishery.*

Amongst the many natural advantages of which Galway and the surrounding district can boast, the fishings of the bay and river are not the least considerable. The salmon fishery is one of the most valuable in the kingdom,[1] and from a very early period has been a source of emolument. In 1754 the weirs were leased for 20 years, at 130*l.* a year. In 1776 and 1790 they brought 200*l.* yearly, but at the latter period they were worth considerably more: since 1800 they frequently produced upwards of 500*l.* a year, having increased in value in conse-

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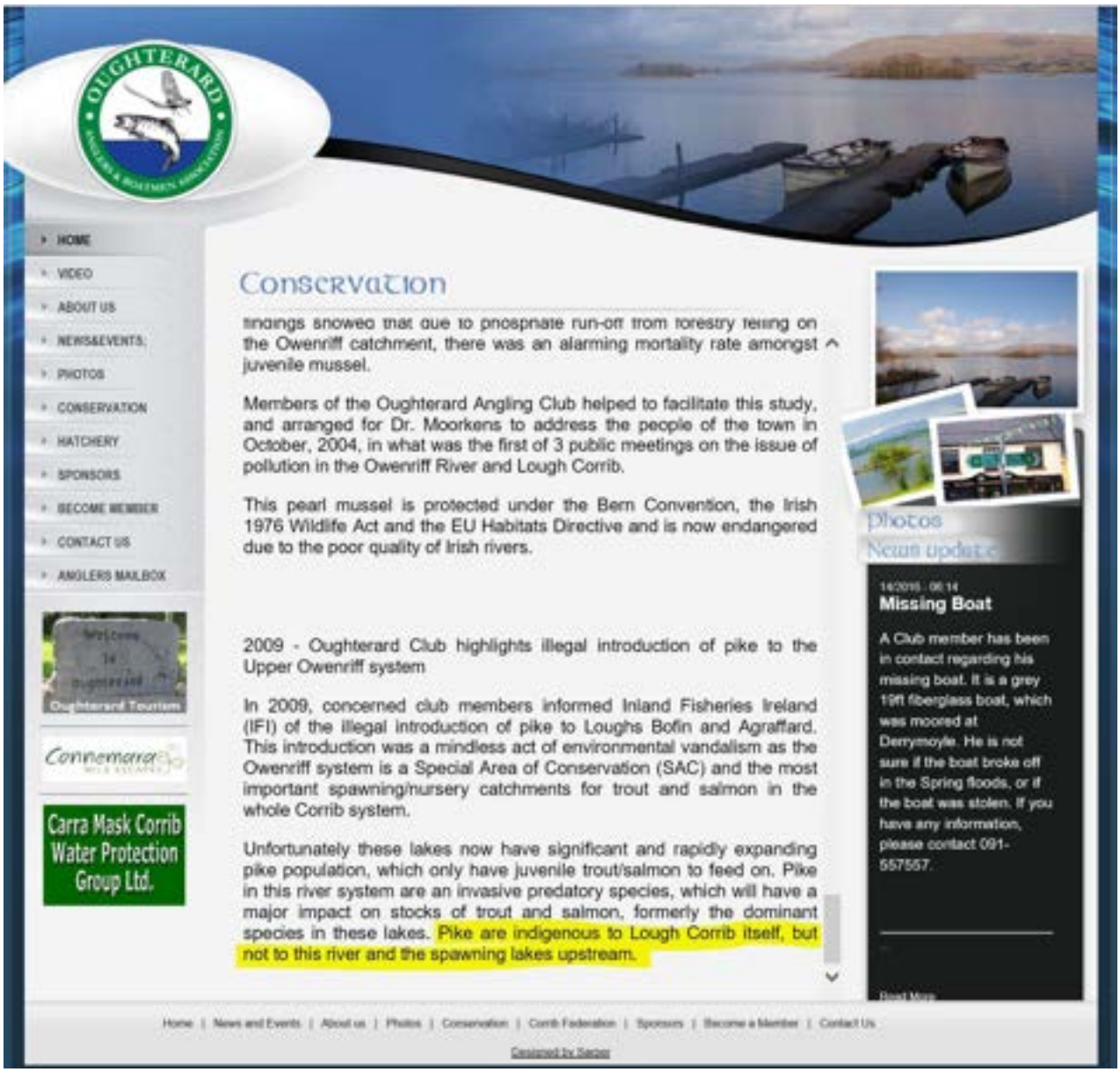
[1] The salmon fishery of Galway originally passed to the earl of Ulster, under the grant of Henry III. and from him descended, with the other possessions of the De Burgoes, to Philippa, the sole heiress and representative of that powerful family, who, in 1368, intermarried with Edmund, earl of March and Ulster, upon whose death, in 1381, it was seized into the king's hands during the minority of their son and heir.—By letters patent of Robert de Vere, earl of Oxford and marquis of Dublin, (to whom the sovereignty of Ireland was committed by Richard II.) dated at Dublin the 16th of January, 1386, the salmon fishery of the town and water of *Galey*, in *Conact*, was granted to Richard Parys, burgess of *Bristeave*, for two years, at 20 marks yearly; and Richard de Burgo, and Henry Blake, of Galvy, burgess, were commanded not to interfere in any manner from thenceforth with the said fishery.—*Rot. Pat.* 10 *Rich. II.*—After this it appears that Walter de Bermyngham, lord of Athenry, acquired some interest in this fishery, for in 1389 he made complaint to the lord justice and council "that certain Irishry of the lower parts of Connaught had fished the water of the said Walter in these parts, where they were accustomed to take salmon against his will, and sell the same to the people and merchants of Galvy, to his great loss."—The sheriff of Connaught, and the bailiffs, provost and commonalty of the town were accordingly commanded, under a penalty, not to buy any of said salmon for the future, but to cause proclamation to be publicly made, that none should thenceforth be bought from those Irishry, and to ascertain who should be found to trangress in that respect, and them to imprison until due amends should be made to said Walter in the premises.—*Rot. Pat.* 13 *Rich. II.*

During the succeeding century the property of the river was sometimes in the De Burgoes, and at other times it appears vested in the crown. In 1520, William de Burgh granted the fishery to the Franciscan friars.—*King* 312.—On 13th Nov. 1521, Henry VIII. granted licence to Jenet Lynch, widow, and Anthony Lynch, merchant, to have three nets upon the river of Galway, between the bridge and the sea, one near the *great rock*, (this rock was afterwards called *Carrig-a-phreaghane* or *the Crow's-rock*, and was covered over when the pier-head was built,) another near Panrise, and the third near Porter's-place, to take salmon and other fish as was customary, and to build one water-mill upon the said water wherever they should think proper; and also to build a public oven in the said town, to bake bread as well for strangers as for the inhabitants, to hold during the king's pleasure, at the yearly rent of 10*s.*—*Finat* 25 *Hen. VIII.*—They afterwards petitioned the king, stating that they had, at great labour and expense, made up the said three nets, and erected the water-mill and public oven; whereupon by a further grant, in the 28th year of his reign, the entire was granted to them and their heirs, by the service of 13*s.* 4*d.* yearly. Henceforth the Lynch family gradually acquired the principal part of the fishings of the river which continued in their possession for a considerable period.—Others of the inhabitants however sometimes obtained similar grants. On 2d Oct. 1532, licence was granted to Richard Martin to have three places upon the river, between the bridge and the sea, for three nets to take salmon and other fish, at 6*s.* 8*d.* yearly.—Thomas Martin had a similar licence to have five places for six nets.—In 1536, Marcus Lynch Fitz-Stephen had a similar licence; and on the 26th Sept. 1538, Roger Challoner, one of the ushers of the king's chamber, had a grant of the water-mill, called Martyn's mill, and the fishings of the river (except the three places demised to Thomas Martyn) escheated to the crown, for forty years, at 20*s.* yearly.—*Rot. Pat.* 30 *Hen. VIII.*

The resident families of Lynch and D'Arcy afterwards became possessed of the fishery, which they enjoyed until 1652. By an adjudication of Cromwell's commissioners, dated 19th Nov. 1656, it was found that the former family had been so seized, but that for this and other properties lost by them in Galway, they obtained a compensation in the county of Clare.—On 28th April, 1657, the salmon and all other fishings of the river, were let to Paule Dodd for one year for the interest of the state, except two parts out of three, formerly belonging to alderman James Darcy, which Dodd claimed in fee simple.—On 27th July, 1663, Sir George Preston, amongst other things, obtained a grant of all the salmon fishery, pike, eel, and other fishings of and in the river of Galway. This grant was afterwards confirmed by patent, dated 25th April, 1669, and was further recognised and secured by the act of settlement. This patentee had two daughters, one of whom married Mr. John Eyre, of Eyrecourt, who, in her right, became entitled to the fishery; and in 1710 their son disposed of his interest to Mr. Edward Eyre, of Galway, in whose family it has ever since continued.

Oughterard Anglers & Boatmans Association (website) 1 of 1



Barbe & Garrett: 1 of 9

THE PIKE IN IRELAND : A (NECESSARY) REVIEW

Part 1: Liús

The Dutch Angling journalist Jan Schreiner is widely regarded as one of the most influential writers of the 20th century. He wrote over 50 books about all kinds of angling and contributed to several angling magazines. After World War II he started writing about the joys and pleasure of fishing, a pastime up to then only known for food supply reasons. Most importantly, his writings lay the foundations for a general belief and acceptance that catch-and-release fishing is a very important aspect, necessary to protect our sport, given the increased pressure of pollution, over fishing etc…

Jan Schreiner was a frequent visitor to the island of Ireland. He loved the country and spent many weeks fishing for salmon, trout, pike, perch, tench, bream etc. He was, and still is, well known, in the Foxford area in particular. In 1973 he wrote "Sport fishing in Ireland", another great example of his fabulous and highly poetic writing style. Yet, when it came to the management of Irish waters, he could be very critical. In this book he spends some time explaining the attitude of the Irish fisheries towards pike. He didn't give them many compliments…Probably the single most important statement in this context was the following : " It would be very interesting if someone someday would dig into all the accepted facts which, despite their very poor foundations, are still generally accepted as truths." A clear allusion to the theories held on by the Irish Fisheries that pike is not a native species and has to be culled on trout waters.

During the gillnetting campaign carried out by the Western Regional Fisheries Board on Loughs Mask, Corrib and Carra in winter 98 and spring 99 a passionate debate took place in the local and national press. One contributor wrote the following in one of his letters : "…pike, a piscovore whose Irish name is 'Gaill Eisc' or foreign fish… should therefore be removed from these lakes…" A short while later I was told by an Irish speaking person living in the Gealtacht that this was incorrect since the Irish for pike was 'liús'.

Since then, my good friend Shane Garrett and I, together with the help of numerous very kind and helpful people, have gone through piles of information and documents, in order to puzzle together the history of Irish pike. We have also focused on arguments brought forward by Irish Fisheries Scientists claiming that pike are of recent introduction. More than one year later and although our work is far from finished, we would like to share our finds, to date, with the interested reader. Indeed, we came across a number of very interesting references.

Let's first of all solve the "gaill iasc – liús" problem. Open any Irish dictionary and you'll see pike being translated as liús. Some dictionaries however mention gaill iasc as well. It appears that gaill iasc is a literary coinage, a creation from the 17th or 18th century. The original word for pike, liús, is much older. Although it is impossible to pinpoint exactly when it was first used it appears that liús dates from somewhere between the 13th and the 15th century, indicating that pike could very well have been on this island much longer than we were always led to believe…

The Irish Fisheries have always seen the gaill iasc theory as a solid base to prove their introduction theory. They have scaled down this theory to the belief that gaill iasc is the Irish word for pike used in some parts of West Mayo. Incorrect again, I'm afraid. In The Irish naturalists Journal, Volume 8, 1942-46, an article "Local names of Irish Fishes" by G.P. Farran is published which mentions Liús for Mayo. Not a mention of gaill iasc. Together with this argument it is often said that pike cannot be native because there are lakes where pike are absent. It appears to me that it is very difficult to defend this argument. There are numerous lakes where no trout or salmon can be found but do we see them therefore as introduced?

Besides; to say that gaill iasc means foreign fish is in itself all too simplistic and incomplete. Whilst iasc means undoubtedly fish, gaill can mean foreign but can also mean "foreigners-" or "Gaul" or "Norseman". The word gaill iasc therefore does not prove at all that pike is an introduced fish species.

Another argument of the introduction theory is that there is no old Irish name for pike. Unlike for species like salmon and trout which both have old Irish names. Sounds solid at first sight but doesn't make sense either I'm afraid. Let's give our salty friend the mackerel a thought. Or the cod maybe. I think everyone will agree that these are native species to the Irish coasts. Yet, they have no old Irish names! One could also look at our feathered friends and notice that a bird like the partridge has no old Irish name, yet is native to this country. In other words, the fact that pike has no old Irish name does not prove anything. Surely not that it is introduced.

Our "find" of the word Liús has proven very important since. The word keeps coming back in different publications and references and it will prove to be very significant indeed as these series of the highly interesting journeys along the history of Irish pike unfolds.

So far for the introduction. In the next article we bring Dr. Went upon stage, and then it gets really interesting!

Text : Frank Barbé and Shane Garrett

THE PIKE IN IRELAND : A (NECESSARY) REVIEW

Part 2 : Went

In 1957 Arthur E.J. Went wrote "The Pike in Ireland". It was published in The Irish Naturalists' Journal. I can recommend the reading of these journals to anyone with an interest in the history of Irish nature and wildlife. A winter's evening by the open fire, fueled with a glass of your favorite drink becomes a real treat when reading through these Journals.

Went was a noted historian who wrote several articles about Irish fish. In the above mentioned publication Went came to the conclusion that "…it would certainly appear that it (the pike that is) is not a native fish." To come to this belief Went sums up a number of references and it has been extremely interesting to look into these in detail. It is important to point out that Went's work is still the main foundation of the pike's introduction theory held on to by the Irish Fisheries.

Part of his introduction theory relies on the absence of an old Irish name for pike. Went also writes that " the more modern name for pike is gailliasc, which literally means strange or foreign fish." In the first article we have shown that both conclusions are incorrect.

It is of extreme importance to note that Went did not investigate the Irish word Liús (meaning pike and presumably dating from somewhere between the 13th and 15th century.). The word Liús appeared several times in articles published in The Irish Naturalists' Journal written by other contributors. It seems highly unlikely that Went did not read these, as he had articles himself in some of these Journals. Did Went ignore "Liús"? If so, why?

We come to the heart of Went's introduction theory when he brings up his key witness Giraldus Cambrensis. Giraldus Cambrensis was a Welsh archdeacon who visited Ireland on two occasions at the end of the twelfth century. He wrote the "Topography of Ireland". Went quotes Cambrensis in his article as follows :

…The rivers and the lakes are rich in fish peculiar to themselves, and especially in fish of three kinds, namely, salmon, trout and mud-eels. … But some fine fish are wanting. I mean pike, perch, roach, gardon and gudgeon. Minnow, loach, bullheads, verones, and nearly all that do not have their seminal origin in tidal rivers are absent also."

Now let's have a look at the original translation of Cambrensis' writing. I quote from the same passage.

"The rivers and the lakes are rich in fish peculiar to themselves, and especially in fish of three kinds, namely, salmon, trout, and mud-eels. But some fine fish, found in other regions, and some magnificent fresh-water fish are wanting. I mean pike, perch, roach, gardon and gudgeon. Minnow, loach, bullheads, verones, and nearly all that do not have their seminal origin in tidal rivers are absent also."

The underlined part of the latter quotation was omitted by Went in his article. I have to stress on the extreme importance of this "mistake" in Went's work. We know that Cambrensis was in parts of the Southeast of the country and he might have travelled inland. When Cambrensis wrote "…found in other regions…", did he mean there was pike etc. in other parts of the country? Why did Went omit this vital passage?

This patent misquotation by Went is the point of discussion here. However, Cambrensis' work should not be given more credit than it deserves. Indeed, some academics have their doubts about the value of Cambrensis' work. One of the reasons being the way in which he described Ireland :

"On the whole the land is low-lying on all sides and along the coast; but towards the centre it rises up very high to many hills and even high mountains.

" We all know that it is just the other way around. Mountains around the coastline (Wicklow-Kerry-Connemara…) and flat in the Midlands. This mistake of his is sufficient to conclude that he did not see great parts of the country. Cambrensis also gave accounts of "a fish with three gold teeth" and "a man that was half an ox". Up to today Giraldus Cambrensis is still regarded as a reliable witness by the Irish Fisheries.

Reading on in Went's article we come across the following passage :

"…we find in A.K. Longfield's 'Anglo-Irish trade' in the 16th century that pike were exported in the early part of that century to some of the smaller towns in the south of England. We do not know, of course, the origin of these fish."

Let's quote from A.K. Longfield's 'Anglo-Irish trade'direct now :

At the end of the fifteenth century and beginning of the sixteenth, however, they (this is the pike) *appear as coming regularly from Youghal, Dungarvan, Cork and Kinsale to the Cornish ports…"*

Three important observations can be made here. Firstly, why did Went question the origin of these Irish pike, exported to England? Whereas it says clearly, in the book where he refers to, that they came from several named Irish towns.

Secondly, Longfield mentions the export of pike to England from Ireland at the end of the fifteenth century. Further in the same book we even find a detailed reference of export of pike from Ireland to England in 1492. Why does Went ignore these pre-sixteenth century references to pike?

Thirdly, if there was a thriving trade of pike in Ireland at the end of the fifteenth century they must have been pretty widespread by then and could hardly have been introduced recently. (If introduced at all!)

Went's article "The Pike in Ireland" contains more references to support his introduction theory. Some of them relate to personal notes of individuals which therefore cannot be looked into. Others still need verification. Yet, it is clear that his work contains serious shortcomings.

And there is something else. Which is, again, of major importance. Arthur E.J. Went worked for the Fisheries Branch of the Department of Agriculture and was a founding trustee of the Salmon Research Trust. People who knew him testify that he was a very dedicated game angler who had no great regards for the fish species called pike. I am told that the latter statement is a very attenuated expression of his feelings towards pike. This gives rise to a serious conflict of interest. With this knowledge in mind, how could (and still can) this study of the Irish pike be the main foundation of the Irish Fisheries' policy towards pike?

Considering the evidence of shortcomings in his work and the obvious conflict of interests should we regard Dr. Went as a reliable source?

In the next article we will loosen some more bricks in the "introduction-wall" the Irish Fisheries have built over the last century as we will make the single most important revelation in our series on the history of pike so far…

Text : Frank Barbé and Shane Garrett

THE PIKE IN IRELAND : A (NECESSARY) REVIEW

Part 3 : Of Pike and Poets

Before getting to the heart of our third article on the history of pike in Ireland we need to clarify an often held misunderstanding. There is no concrete evidence to suggest that pike are an introduced species in Ireland. The introduction theory is based on references that have been regarded over the last century by the Irish Fisheries as conclusive. This is only a theory. In our first two articles we have shown that some of those references are incomplete, incorrect or even misleading. Others we regard as naïve and surely not conclusive enough to classify pike as introduced. One example…

Around 1900 a commercial fisherman on Lough Conn catches a fish which he cannot recognize. Subsequently it is identified as a pike. This incident is one of the reasons why the current Research Department of the Central Fisheries regard pike as introduced. When reading the "Doomsday Book of Mammoth Pike" by Fred Buller, one comes across several specimen pike caught on Lough Conn dating back as far as 1870. (One such specimen is currently on display in the Natural History Museum in Dublin.) In other words, at a time when our commercial fisherman caught the fish he could not identify, other people were claiming 40 and 50-pounders from the same lake! Clearly, pike must have been around for quiet a while if the lake was able to produce such monster fish. The fish determination skills from our friend seem to be in line with the science the Fisheries are serving us.

Let's conclude with a noteworthy passage from the same book :

***Lough Conn, whose big pike and big trout once attracted a certain type of fisherman (the big-fish man) from all over Europe, now caters to those who are content to take a more certain bag of smaller fish (trout). This change is due principally to the systematic destruction of pike."* The book was written in 1979.**

Let's move on and look into another reference on which the introduction theory is based. We quote from a letter we received from Mr. P. Fitzmaurice, Director of Research of the Central Fisheries : "A review of historical Irish annals carried out in the 1950's found no reference to pike in any documentation prior to the 15th Century."

We presume Mr. Fitzmaurice refers to the article "The Pike in Ireland" written by Arthur E.J. Went in 1957. We dealt with Went and the contents of his work in our second article. However, apart from proving that Went's work was incomplete and parts of it incorrect, we also discovered a few more interesting facts that prove Mr. Fitzmaurice's quote highly doubtful.

"Regimen na Sláinte" is a medical text from c. 1420 which contains references to pike. It is an Irish translation of a Latin medical tract which originated in Italy. Interesting to note is that the person who translated the text (in the early 15th century) used the Irish word liús for pike, rather than merely transliterating the Latin lucius. It appears that the Irish translator was already familiar with the Irish word for pike. Since the original Latin text of this work was written in Italy, the references to pike are not directly relevant to the presence or absence of the fish in Ireland. However, the fact that the Irish translator knew of an Irish word for pike seems proof to us that the fish species occurred in Ireland early 15th Century.

For the sceptical ones among us we will back up this theory and take it one step further.

The Irish Grammatical Tracts are a collection of rules of grammar and diction which assisted student poets in learning their craft. We will quote one such short poem which was written ca 1400 :

"do sgoilt giolla gég don ghiús

do bhrég liús na Sionna suas."

It was Chinese to us as well so we got the experts to translate it for us. The translation sounds as follows :

"The young man split a branch of the fir-tree,

he enticed up the pike of the Shannon."

This poem brings us the confirmation that there was indeed pike in Ireland, more precisely in the Shannon, ca 1400 and that no one found this remarkable. That no one found this remarkable leads us to conclude that they were there for quiet a while. It is tempting to draw further conclusions considering the hundreds of kilometers the Shannon covers and the numerous big and small lakes it connects.

The importance of the two above mentioned references taken into account we can rest assured that the claim that there was no (reference to) pike in Ireland before the 15th Century is outdated and incorrect. After all, the review the current Research Department of the Irish Fisheries base themselves on dates from the middle of the 20th Century…

In our final article we come to the conclusion of our series on the history of pike in Ireland. We will approach the pike's history from a few other angles, and bring up a few sources which consider the pike as being native to the Irish country…

Text : Frank Barbé and Shane Garrett

THE PIKE IN IRELAND : A NECESSARY REVIEW

Part 4 : The Esox-Files Conclusions

With this article, we come to the conclusion of our series on the history of pike in Ireland. We should add however that we are currently preparing a special appendix to our story, in which we will focus on conservation. As our research into this intriguing subject has become an ongoing process, updates can be expected. Before we start drawing conclusions about the significance of the contents of our articles, we will first of all look at the pike's history in Ireland from a few other angles.

Native or not?

Although it seems almost sure that pike have spread in certain parts of the island later than in others, nobody has ever provided concrete evidence of its introduction. Indeed, some sources claim pike as being native. In 1950 Robert Lloyd Praeger wrote "The Natural History of Ireland", in which he classifies the pike as an Irish native fish species. One hundred years before that, William Thomson notes pike as being native. Aodh Mac Domhnaill from County Meath wrote a tract on natural history in the same period. Pike is the first fish he mentions as being native. He describes it as "clean, bright and tasty". We know from our last article that pike are proven to be in Ireland over 400 years before that. However, it is still very interesting to see that the pike was an established part of the piscine fauna in Co. Meath in the early 19th century and was not referred to as being introduced but classified native.

Other species in other countries.

In our research we have not limited ourselves to Ireland alone. We have looked around Europe and came across several interesting "incidents" which give hope of unraveling the pike's history here. Our first stop is Spain and we meet two old friends; Arthur Went and Giraldus Cambrensis. The latter was referred to in a publication of The Irish Naturalist' Journal written by Arthur Went in 1949. Went relies on Cambrensis' knowledge but as we already know, both are not "the perfect example of a reliable witness"! Went quotes Cambrensis' who claimed that "no part of Spain produces pike". A cave painting of a pike in Northern Spain drawn in the Stone Ages proves that they were not introduced and that once again Cambrensis and Went had it wrong.

Next we go to Holland where in the 20th Century a discussion took place whether the catfish was an indigenous species that should be protected or whether it was introduced in the late medieval period by monks. It was only in 1979 that fish remains from a number of prehistoric settlements were identified. It appeared that catfish were present in The Netherlands some 4000 years BC. The poor monk who allegedly wobbled his way with laden bucket to the Dutch waterside was innocent…

Closer to home we arrive in England where the tench has been regarded as an introduced species. Tench is a warm water fish which could not have survived the ice-age, allegedly. Recent excavations in Suffolk carried out by the Time Team found not only pike but also tench remains. They were some 400,000 years old! Tench may now be regarded as native over there.

Our trip around Europe brings us home again and even here we can serve you a prefect example of how theories are only theories. The rudd is often classified as an introduced fish species to Irish waters for reasons similar to the English tench. Until

rudd remains popped up in excavations carried out in Portbraddan Cave in Co. Antrim. This find dates from the first half of the 20th Century and puts the presence of rudd in Ireland back to the Iron Age.

We thought it was important to quote these different examples. If only to warn the readers not to pass out if tomorrow pike remains of a couple of thousand years old are found in Ireland. Stranger things have happened…

Some conclusions

Several conclusions can be drawn taking into account the pike's turbulent recent history in Ireland. The first one should be that there is much more work to be done and many more references to be looked into. Numerous people in libraries and universities have told us that there is much more interesting information "out there".

Archaeologists have hardly begun looking into the possible presence of fish remains in excavation sites. Understandably, human artifacts and tidal settlements have always carried the prime interest. Having said that it is very encouraging to see that Aidan O'Sullivan who heads the archaeological Discovery Programme takes a great interest in Lake Settlement. Hopefully they'll think of us when they find a few fish bones!

Derived from this first conclusion we must focus on the Irish Fisheries and the work they have carried out so far in this context. During this series on the history of pike in Ireland and its alleged introduction we have proven clearly on numerous occasions that there is something wrong with the introduction theory. It is not sure at all that pike are introduced and numerous references on which they have built this theory are doubtful, incomplete and even wrong.

This leads to our main conclusion. In one year's research we have found more about the pike's history than the Irish Fisheries did in half a century. Whilst we are surely very dedicated in what we are doing, we are not scientists and do not have for example regular access to National Libraries and Museums. Everything had to happen in our spare time and living in two different countries surely didn't make it easier for us. The Fisheries have their own team of scientists, even their own Research Department. If they didn't manage to find in 50 years what we found in one year then there is something wrong with their ability to carry out their job. If they did know all this but never told anyone and kept building their policies on the introduction theory then there is surely reason for drastic change. It is our opinion however that hardly anyone ever looked for the truth and the few people who did always looked hoping to find nothing. The case against the pike should be dropped on the grounds of lack of evidence. There should be an official review on the pike's history and the cessation of all discriminatory measures against pike until such review is complete. We cannot stress enough the extreme importance of an Independent team of scientists to carry out such research. For far too long, the Irish Fisheries have played witness, judge and jury on their own actions. This cannot be tolerated any longer. More than this an official inquiry into this (and other) mishaps in the Irish Fisheries is needed. We hear that an official inquiry is on the agenda in the North, not the least thanks to Angling Ireland Editor Frank Quigley. Is he up for another battle here down south? We see a very important role here for the angling clubs in Ireland. It is refreshing to see the rapid development of the Irish Pike Society and our hopes lie with them.

Request

Before rounding off we would like to ask anyone who thinks he or she might have interesting information or stories to add to our research to come forward and help us with our quest. Any bit of information, however small it is, is welcome to help complete the puzzle. We can be contacted via email at lius@infonie.fr

Acknowledgement

Summing up a list of all the people who helped us in compiling these articles would force us to write another article! This would lead us too far so everyone who knows he or she contributed is kindly thanked. We wish however to make two exceptions. First of all we would like to thank the Editor of Angling Ireland Frank Quigley who gave us space to show our findings. Anyone reading this should realize how lucky Ireland is, in having a fishing magazine that is not bowing to influential groups like advertisers, clubs or organizations regarding the contents of its articles.

Secondly we would like to mention and thank Nicholas Williams, Head Lecturer of The Irish Department, University College Dublin. He never tired of our requests for information, explanation and translation. He led us to numerous references and other people and without him this story would more than likely never have been written. We would like to finish by quoting Mr. Williams directly : "*More research would, I am sure, yield more evidence that the pike is indigenous.*"…

Written by Frank Barbé and Shane Garrett

ANGLING (Fresh Water): The Corrib is the largest lake in Eire, second in all Ireland to Lough Neagh, & is about 68 sq. miles in area. Nearly 150 islands, those at the north end being thickly wooded, enhance the beauty of the scenery & provide very welcome shelter in squalls & bad weather. It has been said to provide the best all-round free fishing in Great Britain or Ireland. L. Corrib is noted mainly for its brown trout & pike &, to a lesser degree, salmon. It also contains perch &, according to the "Angler's Guide", char, rudd & bream, though these latter three are never mentioned by local anglers.

The potentialities of trout fishing in the Cong or northern, area of the lake are said to be excellent, but constant re-stocking seems very desirable, if not probably essential, since a great many fry are lost owing to the

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ANGLING (Fresh water) - cont'd.

summer-time drying-up of many of the small streams & holes near Cong. The permeable nature of the cavernous limestone rock here is responsible for great losses in fish & fry which find their way into the maze of subterranean channels by which the waters of Loch Mask flow into the Corrib. The benefits derived from the Oughterard Hatchery (trout) are undenied, & numbers of marked trout from there are caught in the northern portion of Corrib, but, in the opinion of Cong anglers, further development on those lines is most desirable, if a high standard of catches is to be maintained. The nearest part of the lake is ½ ml. from Cong.

The best trout fishing is "on the dap", when the Mayfly rises, usually May & June. The first rise generally occurs in the third week of May & the May-flypersists for 3 to 4 weeks. Granted suitable conditions, the trout take avidly to the May-fly & catches of 10 to 20 trout per rod are expected each day. This year, 1945, the May-fly rose unusually early, about 10th May, & has not gone yet (9th June), being now expected to last for perhaps another week (to 15th June).

Next best season for trout is from the end of August through September, when there is a good rise to the Daddy Longlegs. Wet & dry flies also are very effective at this season. There is quite good trolling & wet fly fishing in between seasons.

Wet & dry flies are used in the early part of the year but are not much use before early May. Average weight of brown trout is 1 lb. but catches of fish weighing up to 7 lbs are quite common & fish up to 20 lbs. have been caught. Specimens of 15 lb trout are preserved at the hotels.

Popular flies are: Invicta, Connemara Black, Claret & Jay, &, in Sept., Olive & Green, Golden Olive, Orange & Green & other dry Olive flies - all size 10.

Salmon are not nearly so plentiful as trout, but salmon-fishing is quite fair during May & first week of June. Ordinary salmon flies are suitable. Average weight, about 10 lbs.

Pike & perch are very numerous in the lake & the former are obtainable up to 30 lbs. They (pike) are generally caught on the troll.

Fishing is entirely free on the lake. Accommodation at Cong (Ashford Castle & village).

Cong Angling Association members fish the northern portion of Loch Corrib. Chairman is Mr. Harry Harris, & Secretary is Mr. Micheal Ryan, both of Ryan's Hotel, Cong. Membership Fee: 2/6 per annum.

The Association holds an annual Trout-Angling Competition, Fly, on the Lake, usually 2nd week of May. Entrance fee for competition is 15/- & a size limit of 10" (12" recommended for 1946, but not decided) is imposed in respect of all fish caught. The Association recommends that a size limit be officially imposed by the authorities.

Lough Mask, nearest point of which is about 2½ mls N.E. of Cong, is famous for the sporting gillaroos which it contains in great abundance. These average somewhat smaller than Loch Corrib's trout & are caught mostly on the troll, but the number of fish caught in a day on Loch Mask is generally much greater than on the other lake. The trout rise very well to the wet flies, which are the same as those used on Loch Corrib, viz., Invicta, Connemara Black, Orange & Green, Claret & Gay, Golden Olive, &, in Sept., other dry Olives - all size 10; the Yellow Wasp also is very good on L. Mask.

The May-fly generally is on the rise about one week earlier than on L. Corrib, the first rise usually taking place about the 2nd week of May; it lasts for 3 to 4 weeks - during which catches of 20 to 30 fish per rod per day are not rare. This is the best season on the lake. The Daddy Longlegs is also very effective at end of Aug. & during Sept.

Brown Trout average about ½ lb.

Salmon are not very plentiful, though they are occasionall caught with the usual flies. Average, 10 lbs. Best season for salmon is May/June.

Article (Circa 1945) Referenced on Mayo.ie: 3 of 3

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ANGLING (Fresh Water) - Cont'd.

There is very good pike fishing on L. Mask, as also for perch. Fishing is entirely free.

Accommodation is available at Cong. Angling Club is at Ballinrobe.

Boats & boatmen are so numerous around Cong as to make the task of listing them very arduous. Besides, most of them have working agreements with the local Hotels, where boats & boatmen may be engaged at 15/- (2 rods if desired) per day, plus boatman's lunch.

Cross River: This little river, which flows through Cross (Cong 3 mls) to Lough Corrib, affords really good fishing for trout, averaging 1 lb, though often much larger.

Best season is early spring, when the ordinary river-flies are suitable.

In June & July the wall-fly is effective. Fishing on this stream is free.

Trout angling on Cross River would be greatly improved were the mouth cleared of the accumulated silt which chokes the passage of the water.

Accommodation at Cong, 3 miles.

Cong River & Pools in the neighbourhood: The visible flow of this river & its shorter tributaries is only about ½ ml. &, of this, the portion at Ashford Castle is preserved by Mr. Haggard, Ashford Castle Hotel. The stream contains Brown Trout &, in much smaller numbers, Salmon, Pike & Perch.

Otherwise fishing is free & the river contains some trout weighing up to 5 lbs - averaging about 1 lb.

Best fishing is in the early spring, with ordinary river flies. In June-July the wall-fly is useful. This stream flows by the village, where accommodation is available.

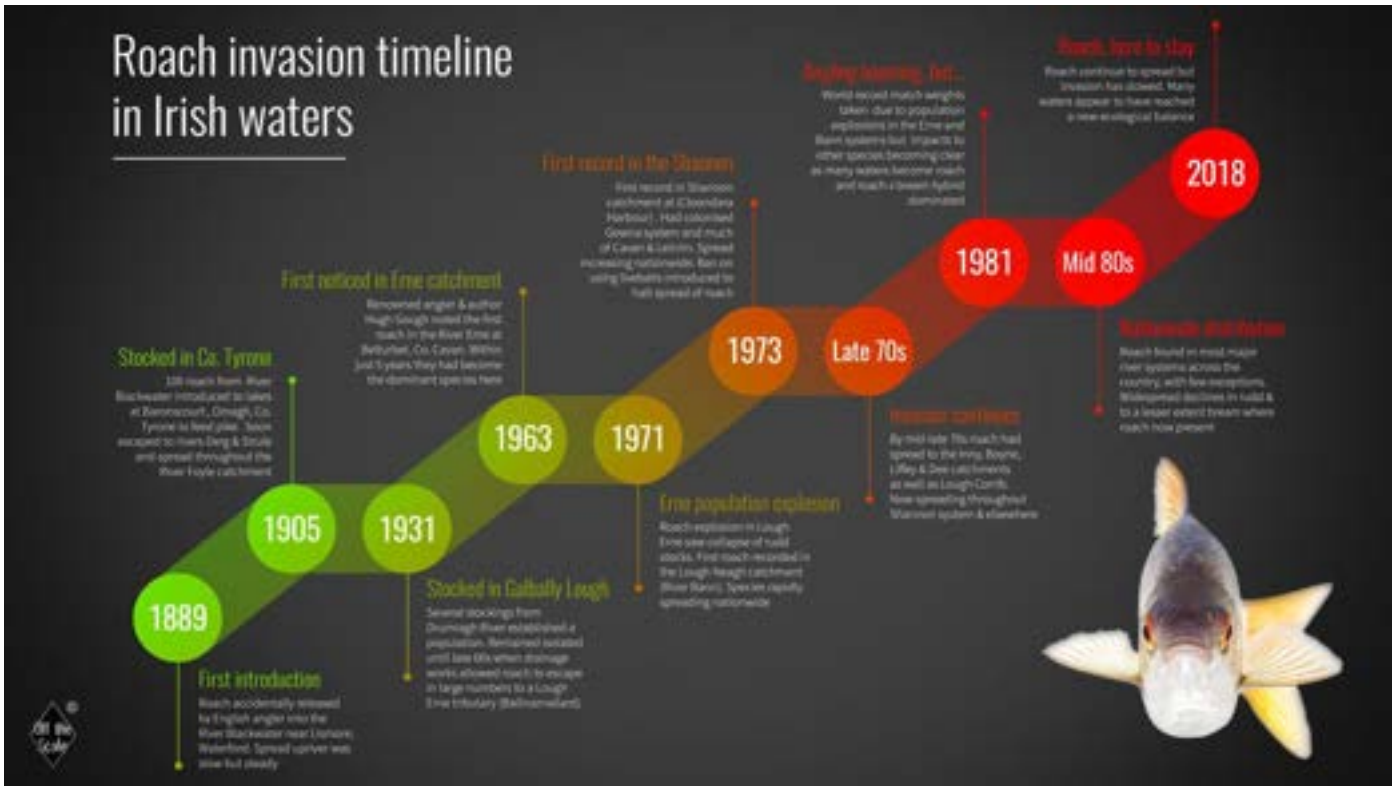
Numerous uprisings of the subterranean channels connecting Lochs Mask & Corrib form big pools, sometimes making small streams until they are swallowed up in the great caverns in the limestone rock. These may be fished for trout under similar conditions as on Cong River. All are free & several of these holes are found within ½ ml of the village.

GOLFING: Ashford Castle Hotel Course (9-hole) - A small course, somewhat more than 2,000 yds long, but considered fairly sporting for its size. It is laid out on the old Deer Park, near the Castle, amidst lovely wooded surroundings on the N.E. shore of Loch Corrib.

Wicklow. A material source of the good angler's pleasure is to watch nature, catch her, in the shape of a fly, on the wing, and work artificially upon the original—that pleasure I will not lessen. Rossmin river differs from the Blackwater in all the strength of contrast; the banks are high, the pools deep, the breadth narrow; and a wind very high, and blowing in a particular direction, is

required to act upon the river, in order to afford sport. At best a stranger will find it difficult to be angled. The flies are required to be a size larger than those of the Blackwater, although the Rossmin is a narrower, and apparently a very inferior river. It abounds in trout of the best description, rising to four, five, and even seven pounds weight, and there are in it pike of a formidable size. The greendrake, in the season, comes upon it in amazing number, and then the angler is sure to have great sport, and to take great trout. Trolling with the Loach, or, as popularly called in Ireland, the *Callaghrion*, and the *Man-keeper*, very large and many pike are caught, and sometimes the *Keerouge*, or clock, is

A note on Roach



Roach were documented as being very well established and widespread across County Clare by William Belton in 1833, 56 years prior to the commonly believed introduction theory.

of grandeur and loveliness with which these scenes abound; and then, while his soul was yet glowing with those characters of beauty, to attempt to transfer them to the written page, and impress upon another's mind a distinct conception of the picture which had so charmed his own. Would any thing but a vague though pleasing image of a magnificent association of rock, and wood, and vale, and mountain, be the result?

I should strenuously advise the tourist, who has leisure, to remain a few days at Glengarriffe, and make himself familiar with its romantic scenery, which, I am conscious, I viewed much too cursorily. In addition to the main features, to which I have alluded, he will find many charming details in the immediate environs, many most interesting excursions at greater or lesser distances, that will amply gratify his love of the picturesque; while, if he be an angler, he may enjoy some amusement in the Lakes of Mount Caha, on the one side, or of Inchigula,

on the other: the former of which are said to contain an abundance of brown trout, the latter some of the largest pike in Ireland.

I lingered long on the hill-side, by Captain White's Castle, to gaze upon the splendid panorama of sea and mountain which the sun, then fast sinking in unclouded radiance towards his ocean-bed, invested with additional charms; clothing the Bay's winding shores in a panoply of golden light, while he cast a deeper and a darker horror over the precipices and gorges of the mountains. I could not tear myself away from the scene, which changed momently under my gaze, and which each change seemed to render still lovelier. Gradually the rich hues of sunset melted into a chaster and more sober light, insensibly blending with the empyreal azure. The gigantic masses of the mountain ranges were projected across the clear heavens with taller height and more defined outline; until, at length, the young moon, with her choral train of attendant stars, modestly entered

Appendix F

Economic and Ecological Effects of Pike Management Operations Conducted by

Inland Fisheries Ireland and Deficiencies in its Justification

(Note: Document Drafted by The Irish Pike Society & The Irish Federation of Pike Angling Clubs

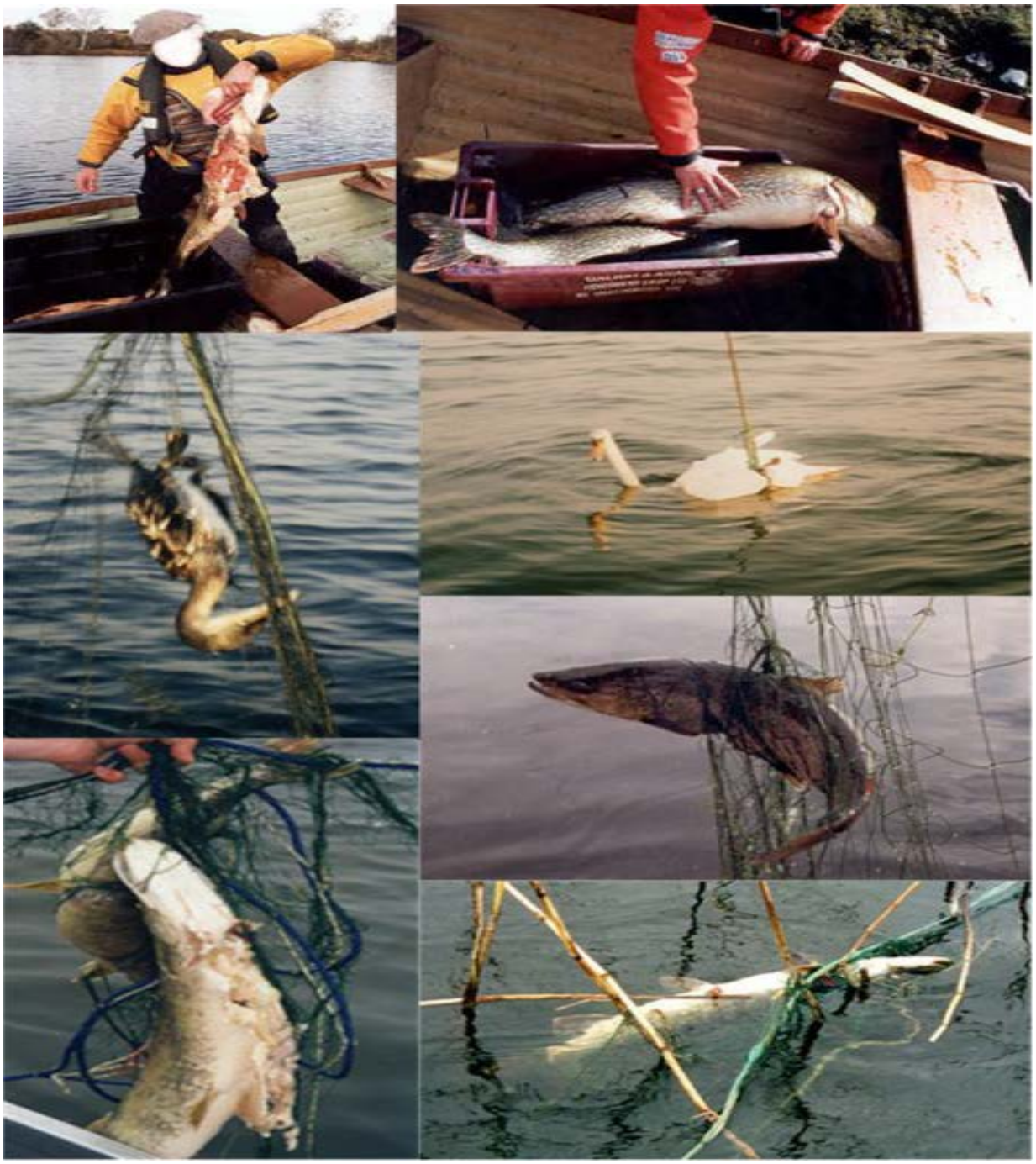
Appended Separately

Considered Highly Relevant to the Economic and Ecological Effects of the

'Long Term Management Plan for the Western Lakes' Proposed by Inland Fisheries Ireland)

Economic and Ecological Effects of Pike Management Operations Conducted by Inland Fisheries Ireland and Deficiencies in its Justification

Document	P160301/030/001



1 REVISION HISTORY

Revision History		
Revision	Author	Notes
1.0	DH & PB	First Issue

Paul Byrne (IPS) & David Hamill (IFPAC) were nominated jointly on behalf of the Irish Pike Society (IPS) and the Irish Federation of Pike Angling Clubs (IFPAC) to prepare this document for submission to Inland Fisheries Ireland. This document represents the views of IFPAC & IPS.

Signed: _____
John Chambers
Chairman
(IFPAC)

Signed: _____
Ian Forde
Chairman
(IPS)

CONTENTS

2 INTRODUCTION

The purpose of this document is to provide an overview of pike management operations by Inland Fisheries Ireland (IFI). The justifications for these operations will be explored and both old and new science and research related to this subject will be compared.

Current Pike Management Policy will be assessed against the wider National Strategy for Angling Development (NSAD).

The economic effect of pike management operations and the resulting effect on national and rural economies will also be examined.

It would be a failing of this document not to state that there exists, considerable resentment of pike by some sections of the angling community in Ireland. It may be that this resentment is founded upon a poor understanding of the role of pike within a fisheries eco-system; a generational continuance of long-held biases against pike as a competitor to the angler for trout; or simply an individually-held hatred of pike. These are indisputable realities that exist in Ireland in 2018 and would appear to have existed since IFI was formed in 1951 as the Inland Fisheries Trust Incorporated (IFT).

IFT itself was formed "*with the objective of developing brown trout Salmo trutta L. angling in Irish waters*" Fitzmaurice, P. (1983). Since 1951, pike culling has been a significant objective of IFI and its predecessors, through to the present day, where pike are still removed by IFI from approximately 20% by area, of our lake water bodies in Ireland. It is perhaps against this back drop that the relationship between IFI and pike should be considered.

3 INLAND FISHERIES IRELAND'S 'CORNERSTONES' FOR PIKE MANAGEMENT OPERATIONS

Inland Fisheries Ireland (IFI) (formerly Central Fisheries Board (CFB) and Inland Fisheries Trust (IFT)) has engaged in the practice of pike management operations since 1951. The methods of gill-netting and electrofishing are used as tools for pike management. The basis for these operations is to reduce predation by pike on trout, on what are termed "designated wild brown trout fisheries" such as Loughs Arrow, Corrib, Mask, Sheelin, Conn, Cullin and Carra.

There are two cornerstones of justification for pike management operations. The first of these stood until 2013 and was based on anecdotal evidence that pike were not native to Ireland. This was proven to be unfounded when research was undertaken by University College Dublin in collaboration with IFI as part of a PhD study. The following is an excerpt from the related press release by IFI, dated 15th October 2013.

> "NEW STUDY REVEALS PIKE ARE NATIVE TO IRELAND"
>
> "Inland Fisheries Ireland welcomes the publication of an important scientific paper relating to one of Ireland's key angling species – pike. The angling industry is estimated to be worth €750m annually to the Irish economy."
>
> "Pike (*Esox lucius*) is a species that was thought to have been introduced by man in the last few hundred years. Results from this informative research have shown that the colonisation history is more complex, with an indication that they may have colonised naturally some thousands of years ago."
>
> The new findings were further welcomed by Minister Fergus O'Dowd at the Department of the Environment who stated: "I welcome the findings from this important investigation and commend the excellent collaboration between UCD and Inland Fisheries Ireland, who have recently signed a MOU to support this type of ground-breaking research".
>
> Dr. Cathal Gallagher, Head of Research and Development for IFI, stated that "These important results will influence IFI's ongoing management strategy for this species. Dr. Gallagher stated that "Further investigations, using new and developing genomic techniques, will be used to endorse these findings".

Sections 4 and 5 of this document take a closer look at the cornerstone of pike management operations as it relates to the native status of Irish pike.

The second justification was that pike fed preferentially on salmonids and so were a threat on fisheries with large stocks of salmonids such as “designated wild brown trout fisheries”. In 2014 this perspective was shown to be unfounded when again new ‘ground-breaking’ information came to light as part of the previously mentioned PhD study.

Sections 6, 7 and 8 of this document take a closer look at the cornerstone of pike management operations as it relates to the diet of Irish pike.

4 PAST RESEARCH RELATING TO THE ORIGINS OF IRISH PIKE

Prior to 2013, no genetic or scientific research was undertaken by IFT, CFB or IFI in order to establish if pike were a native species to Ireland. The origins of pike were in fact poorly understood, and very possibly, poorly examined.

4.1.1 THE BASIS FOR DESIGNATION OF PIKE AS AN INVASIVE SPECIES PRIOR TO 2013 RESEARCH

The designation of Irish pike as non-native by IFI and its predecessors prior to the 2013 research was based largely on anecdotal evidence. In the abstract below, which was released as part of the 2013 research, it is clear that there existed a lack of evidence to support the 'assumption' that pike were not native to Ireland.

Population Genetics & Management of Pike (*Esox lucius* L.) in Ireland

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Abstract

Throughout the northern hemisphere, northern pike (*Esox lucius* L.) is of particular socio-economic value for recreational and commercial fishing. Within Ireland, pike are considered non-native, although a lack of direct evidence leads this to be a contentious issue among stakeholder groups. Historical management of the species has been based upon this assumption, leading to controversial policies such as intensive removal of pike during predator control operations, aimed at protecting native brown trout (*Salmo trutta* L.).

In Ireland pike occur in most freshwater systems, but until now no attempt has been made to investigate relatedness and connectivity among populations. Here I present the first Ireland-wide population genetic investigation, using microsatellite markers, to illustrate the nature of population connectivity in Irish freshwater systems. This study provides evidence of strong sub-structure, which lay the foundation for a reappraisal of current approaches to the management of this species in Ireland.

Keywords: Population genetics, management, pike, *Esox lucius*, microsatellites.

Excerpt from "Genetic Structure of Pike and their History in Ireland" (IFI/2013/1-4148) Pedreschi *et al.* (2014)

The 'assumption' that pike were not native to Ireland has been as mentioned earlier, a cornerstone for over 60 years of pike culling and removal. Section 4 will hopefully give the reader a greater understanding of the basis for this 'assumption' and some of the pitfalls of accepting this assumption without question.

This assumption was extensively researched by Frank Barbe and Shane Garret in 2000. Their findings were published in the 'Angling in Ireland' magazine over a four-month period during that year. Those findings are now considered in this document.

4.1.1.1 THE USE OF LANGUAGE AS A BASIS FOR THE CLASSIFICATION OF IRISH PIKE ORIGINS

One of the primary arguments used by IFI and its predecessors to designate pike as non-native were references derived from the Irish language. The term “gaill iasc” and “liús” have been used in reference to pike with “liús” being “*much older*” according to research carried out by Barbe, F. & Garrett, S. (2000).

Barbe, F. & Garrett, S. (2000) found dictionary references to “gaill iasc” and “liús” but concluded that “*gaill iasc*” is likely a literary coinage, a creation from the 17th or 18th century. They found it impossible to pinpoint exactly when “liús” was first used although they concluded that it appeared that “liús” dates from somewhere between the 13th and the 15th century, indicating that pike were long established in Ireland prior to this period. Furthermore, they found that the word “*gaill*” has multiple meanings ("*foreigners-" or "Gaul" or "Norseman*") whereas “liús” they concluded is much more definitive.

Barbe, F. & Garrett, S. (2000) discussed a secondary argument relating to language and questioned why there appears to be no old Irish name for pike. However, they commented that this cannot be fully proven, as it is possible that it did exist prior to the 13th century but no reference or record has been found. They concluded by stating that there are many native Irish species that do not have old Irish names or for which old Irish names have not yet been discovered. Some examples suggested were “*mackerel*”, “*cod*” and the “*common partridge*”.

4.1.1.2 THE USE OF ANECDOTAL HISTORICAL EVIDENCE AS A BASIS FOR THE CLASSIFICATION OF IRISH PIKE ORIGINS

Another primary argument used by IFI and its predecessors to designate pike as non-native were references derived from the work of AEJ Went who wrote “The Pike in Ireland” in 1957 and which was published in The Irish Naturalists Journal. Went was a noted historian who wrote several articles about Irish fish. In his publication he came to the conclusion that "…*it would certainly appear that it (the pike that is) is not a native fish.*" To come to this conclusion Went sums up a number of references which are now discussed.

Went initially references the language reference to pike of “gaill iasc”. Section 4.1.1.1 details the potential flaw behind this reference and the likely erroneous nature of using language as a basis for the pike’s native/ non-native status. Barbe, F. & Garrett, S. (2000) commented that ***“It is of extreme importance to note that Went did not investigate the Irish word Liús”***. They further commented that “*the word Liús appeared several times in articles published in The Irish Naturalists' Journal written by other contributors*” and posed the question of why the word “liús” was not investigated when AEJ Went “*had articles himself in some of these Journals*” and as such would have been expected to have been aware of the “liús” reference. This question remains unanswered.

Barbe, F. & Garrett, S. (2000) commented that one of Wents' primary references was the work of Giraldus Cambrensis, "*a Welsh archdeacon who visited Ireland on two occasions at the end of the twelfth century*". Cambrensis wrote the "*Topography of Ireland*". Barbe, F. & Garrett, S. (2000) comment that Went (1957) quotes Cambrensis in his article as follows:

…"The rivers and the lakes are rich in fish peculiar to themselves, and especially in fish of three kinds, namely, salmon, trout and mud-eels. … But some fine fish are wanting. I mean pike, perch, roach, gardon and gudgeon. Minnow, loach, bullheads, verones, and nearly all that do not have their seminal origin in tidal rivers are absent also."

Barbe, F. & Garrett, S. (2000) comment that there is an original translation of Cambrensis' writing and that the correct translation is as follows, indicating that some references are omitted from Went's translation:

"The rivers and the lakes are rich in fish peculiar to themselves, and especially in fish of three kinds, namely, salmon, trout, and mud-eels. But some fine fish, found in other regions, and some magnificent fresh-water fish are wanting. I mean pike, perch, roach, gardon and gudgeon. Minnow, loach, bullheads, verones, and nearly all that do not have their seminal origin in tidal rivers are absent also."

The above translation would appear to illustrate that pike and other species were present in the regions visited by Cambrensis in the 12th century, but the facts are unclear.

Barbe, F. & Garrett, S. (2000) further suggest that some academics have their doubts about the value of Cambrensis' work and they therefore appear to be "wary of giving it more credit than it deserves" and cite a number of examples for this opinion in their research work.

Further references in Wents article mention a thriving and established trade in exported pike from Ireland. However Barbe, F. & Garrett, S. (2000) again find the reference to be incomplete.
"…we find in A.K. Longfield's 'Anglo-Irish trade' in the 16th century that pike were exported in the early part of that century to some of the smaller towns in the south of England. We do not know, of course, the origin of these fish."

They submit a direct quote from A.K. Longfield's 'Anglo-Irish trade, as follows:
"At the end of the fifteenth century and beginning of the sixteenth, however, they (this is the pike) appear as coming regularly from Youghal, Dungarvan, Cork and Kinsale to the Cornish ports…"

Barbe, F. & Garrett, S. (2000) make three important observations here. Firstly, why did Went question the origin of Irish pike that were exported to England when it is clearly stated in the book referenced that they came from several named Irish towns?

Secondly, they comment that Longfield mentions the export of pike to England from Ireland at the end of the fifteenth century. Further in the same book there is a detailed reference of export of pike from Ireland to England in 1492, so they ask why Went ignores these pre-sixteenth century references to pike.

Thirdly, they conclude that if there was a thriving trade of pike in Ireland at the end of the fifteenth century then they were widespread by this time and could not have been a recent introduction as intimated by Went and others since.

In respect of Wents own background, they state that Arthur E.J. Went worked for the Fisheries Branch of the Department of Agriculture and was a founding trustee of the Salmon Research Trust. They comment that Went was regarded as a very dedicated game angler who had no great regard for the fish species called pike.

In consideration of the above, one must ask if potentially, a serious conflict of interest existed.

4.1.1.3 FULL TEXT OF BARBE, F & GARRETT, S (2000) RESEARCH

THE PIKE IN IRELAND : A (NECESSARY) REVIEW

Part 1: Lits

The Dutch Angling journalist Jan Schreiner is widely regarded as one of the most influential writers of the 20th century. He wrote over 50 books about all kinds of angling and contributed to several angling magazines. After World War II he started writing about the joys and pleasure of fishing, a pastime up to then only known for food supply reasons. Most importantly, his writings lay the foundations for a general belief and acceptance that catch-and-release fishing is a very important aspect, necessary to protect our sport, given the increased pressure of pollution, over fishing etc....

Jan Schreiner was a frequent visitor to the island of Ireland. He loved the country and spent many weeks fishing for salmon, trout, pike, perch, tench, bream etc. He was, and still is, well known, in the Foxford area in particular. In 1973 he wrote "Sport fishing in Ireland", another great example of his fabulous and highly poetic writing style. Yet, when it came to the management of Irish waters, he could be very critical. In this book he spends some time explaining the attitude of the Irish fisheries towards pike. He didn't give them many compliments...Probably the single most important statement in this context was the following : " It would be very interesting if someone someday would dig into all the accepted facts which, despite their very poor foundations, are still generally accepted as truths." A clear allusion to the theories held on by the Irish Fisheries that pike is not a native species and has to be culled on trout waters.

During the gillnetting campaign carried out by the Western Regional Fisheries Board on Loughs Mask, Corrib and Carra in winter 98 and spring 99 a passionate debate took place in the local and national press. One contributor wrote the following in one of his letters : "...pike, a piscevore whose Irish name is 'Gaill Eisc' or foreign fish... should therefore be removed from these lakes..." A short while later I was told by an Irish speaking person living in the Gaeltacht that this was incorrect since the Irish for pike was 'liús'.

Since then, my good friend Shane Garrett and I, together with the help of numerous very kind and helpful people, have gone through piles of information and documents, in order to puzzle together the history of Irish pike. We have also focused on arguments brought forward by Irish Fisheries Scientists claiming that pike are of recent introduction. More than one year later and although our work is far from finished, we would like to share our finds, to date, with the interested reader. Indeed, we came across a number of very interesting references.

Let's first of all solve the "gaill iasc – liús" problem. Open any Irish dictionary and you'll see pike being translated as liús. Some dictionaries however mention gaill iasc as well. It appears that gaill iasc is a literary coinage, a creation from the 17th or 18th century. The original word for pike, liús, is much older. Although it is impossible to pinpoint exactly when it was first used it appears that liús dates from somewhere between the 13th and the 15th century, indicating that pike could very well have been on this island much longer than we were always led to believe....

The Irish Fisheries have always seen the gaill iasc theory as a solid base to prove their introduction theory. They have scaled down this theory to the belief that gaill iasc is the Irish word for pike used in some parts of West Mayo. Incorrect again, I'm afraid. In The Irish naturalists Journal, Volume 8, 1942-46, an article "Local names of Irish Fishes" by G.P. Farran is published which mentions Liús for Mayo. Not a mention of gaill iasc. Together with this argument it is often said that pike cannot be native because there are lakes where pike are absent. It appears to me that it is very difficult to defend this argument. There are numerous lakes where no trout or salmon can be found but do we see them therefore as introduced?

Besides; to say that gaill iasc means foreign fish is in itself all too simplistic and incomplete. Whilst iasc means undoubtedly fish, gaill can mean foreign but can also mean "foreigners-" or "Gaul" or "Norseman". The word gaill iasc therefore does not prove at all that pike is an introduced fish species.

Another argument of the introduction theory is that there is no old Irish name for pike. Unlike for species like salmon and trout which both have old Irish names. Sounds solid at first sight but doesn't make sense either I'm afraid. Let's give our salty friend the mackerel a thought. Or the cod maybe. I think everyone will agree that these are native species to the Irish coasts. Yet, they have no old Irish names! One could also look at our feathered friends and notice that a bird like the partridge has no old Irish name, yet is native to this country. In other words, the fact that pike has no old Irish name does not prove anything. Surely not that it is introduced.

Our "find" of the word Liús has proven very important since. The word keeps coming back in different publications and references and it will prove to be very significant indeed as these series of the highly interesting journeys along the history of Irish pike unfolds.

So far for the introduction. In the next article we bring Dr. Went upon stage, and then it gets really interesting!

Text : Frank Barbé and Shane Garrett

THE PIKE IN IRELAND : A (NECESSARY) REVIEW

Part 2 : Went

In 1957 Arthur E.J. Went wrote "The Pike in Ireland". It was published in The Irish Naturalists' Journal. I can recommend the reading of these journals to anyone with an interest in the history of Irish nature and wildlife. A winter's evening by the open fire, fueled with a glass of your favorite drink becomes a real treat when reading through these Journals.

Went was a noted historian who wrote several articles about Irish fish. In the above mentioned publication Went came to the conclusion that "...it would certainly appear that it (the pike that is) is not a native fish." To come to this belief Went came up a number of references and it has been extremely interesting to look into these in detail. It is important to point out that Went's work is still the main foundation of the pike's introduction theory held on to by the Irish Fisheries.

Part of his introduction theory relies on the absence of an old Irish name for pike. Went also writes that " the more modern name for pike is gaillúsc, which literally means strange or foreign fish." In the first article we have shown that both conclusions are incorrect.

It is of extreme importance to note that Went did not investigate the Irish word Liús (meaning pike and presumably dating from somewhere between the 13th and 15th century.). The word Liús appeared several times in articles published in The Irish Naturalists' Journal written by other contributors. It seems highly unlikely that Went did not read these, as he had articles himself in some of these Journals. Did Went ignore "Liús"? If so, why?

We come to the heart of Went's introduction theory when he brings up his key witness Giraldus Cambrensis. Giraldus Cambrensis was a Welsh archdeacon who visited Ireland on two occasions at the end of the twelfth century. He wrote the "Topography of Ireland". Went quotes Cambrensis in his article as follows :

...The rivers and the lakes are rich in fish peculiar to themselves, and especially in fish of three kinds, namely, salmon, trout and mud-eels. ... But some fine fish are wanting. I mean pike, perch, roach, gardon and gudgeon. Minnow, loach, bullheads, verveux, and nearly all that do not have their seminal origin in tidal rivers are absent also."

Now let's have a look at the original translation of Cambrensis' writing. I quote from the same passage.

"The rivers and the lakes are rich in fish peculiar to themselves, and especially in fish of three kinds, namely, salmon, trout, and mud-eels. But some fine fish, found in other regions, and some magnificent fresh-water fish are wanting. I mean pike, perch, roach, gardon and gudgeon. Minnow, loach, bullheads, verveux, and nearly all that do not have their seminal origin in tidal rivers are absent also."

The underlined part of the latter quotation was omitted by Went in his article. I have to stress on the extreme importance of this "mistake" in Went's work. We know that Cambrensis was in parts of the Southeast of the country and he might have travelled inland. When Cambrensis wrote "...found in other regions...", did he mean there was pike etc. in other parts of the country? Why did Went omit this vital passage?

This patent misquotation by Went is the point of discussion here. However, Cambrensis' work should not be given more credit than it deserves. Indeed, some academics have their doubts about the value of Cambrensis' work. One of the reasons being the way in which he described Ireland :

"On the whole the land is low-lying on all sides and along the coast; but towards the centre it rises up very high to many hills and even high mountains.

" We all know that it is just the other way around. Mountains around the coastline (Wicklow-Kerry-Connemara...) and flat in the Midlands. This mistake of his is sufficient to conclude that he did not see great parts of the country. Cambrensis also gave accounts of "a fish with three gold teeth" and "a man that was half an ox". Up to today Giraldus Cambrensis is still regarded as a reliable witness by the Irish Fisheries.

Reading on in Went's article we come across the following passage :

"...we find in A.K. Longfield's 'Anglo-Irish trade' in the 16th century that pike were exported in the early part of that century to some of the smaller towns in the south of England. We do not know, of course, the origin of these fish."

Let's quote from A.K. Longfield's 'Anglo Irish trade' direct now :

At the end of the fifteenth century and beginning of the sixteenth, however, they (this is the pike) appear as coming regularly from Youghal, Dungarvan, Cork and Kinsale to the Cornish ports..."

Three important observations can be made here. Firstly, why did Went question the origin of these Irish pike, exported to England? Whereas it says clearly, in the book where he refers to, that they came from several named Irish towns.

Secondly, Longfield mentions the export of pike to England from Ireland at the end of the fifteenth century. Further in the same book we even find a detailed reference of export of pike from Ireland to England in 1492. Why does Went ignore these pre-sixteenth century references to pike?

Thirdly, if there was a thriving trade of pike in Ireland at the end of the fifteenth century they must have been pretty widespread by then and could hardly have been introduced recently. (If introduced at all!)

Went's article "The Pike in Ireland" contains more references to support his introduction theory. Some of them relate to personal notes of individuals which therefore cannot be looked into. Others still need verification. Yet, it is clear that his work contains serious shortcomings.

And there is something else. Which is, again, of major importance. Arthur E.J. Went worked for the Fisheries Branch of the Department of Agriculture and was a founding trustee of the Salmon Research Trust. People who knew him testify that he was a very dedicated game angler who had no great regards for the fish species called pike. I am told that the latter statement is a very attenuated expression of his feelings towards pike. This gives rise to a serious conflict of interest. With this knowledge in mind, how could (and still can) this study of the Irish pike be the main foundation of the Irish Fisheries' policy towards pike?

Considering the evidence of shortcomings in his work and the obvious conflict of interests should we regard Dr. Went as a reliable source?

In the next article we will loosen some more bricks in the "introduction-wall" the Irish Fisheries have built over the last century as we will make the single most important revelation in our series on the history of pike so far....

Text : Frank Barbé and Shane Garrett

THE PIKE IN IRELAND : A (NECESSARY) REVIEW

Part 3 : Of Pike and Poets

Before getting to the heart of our third article on the history of pike in Ireland we need to clarify an often held misunderstanding. There is no concrete evidence to suggest that pike are an introduced species in Ireland. The introduction theory is based on references that have been regarded over the last century by the Irish Fisheries as conclusive. This is only a theory. In our first two articles we have shown that some of those references are incomplete, incorrect or even misleading. Others we regard as naïve and surely not conclusive enough to classify pike as introduced. One example…

Around 1900 a commercial fisherman on Lough Conn catches a fish which he cannot recognize. Subsequently it is identified as a pike. This incident is one of the reasons why the current Research Department of the Central Fisheries regard pike as introduced. When reading the "Doomsday Book of Mammoth Pike" by Fred Buller, one comes across several specimen pike caught on Lough Conn dating back as far as 1870. (One such specimen is currently on display in the Natural History Museum in Dublin.) In other words, at a time when our commercial fisherman caught the fish he could not identify, other people were claiming 40 and 50-pounders from the same lake! Clearly, pike must have been around for quiet a while if the lake was able to produce such monster fish. The fish determination skills from our friend seem to be in line with the science the Fisheries are serving us.

Let's conclude with a noteworthy passage from the same book :

Lough Conn, where big pike and big trout once attracted a certain type of fisherman (the big-fish man) from all over Europe, now caters to those who are content to take a more certain bag of smaller fish (trout). This change is due principally to the systematic destruction of pike." The book was written in 1979.

Let's move on and look into another reference on which the introduction theory is based. We quote from a letter we received from Mr. P. Fitzmaurice, Director of Research of the Central Fisheries : "A review of historical Irish annals carried out in the 1950's found no reference to pike in any documentation prior to the 15th Century."

We presume Mr. Fitzmaurice refers to the article "The Pike in Ireland" written by Arthur E.J. Went in 1957. We dealt with Went and the contents of his work in our second article. However, apart from proving that Went's work was incomplete and parts of it incorrect, we also discovered a few more interesting facts that prove Mr. Fitzmaurice's quote highly doubtful.

"Regimen na Sláinte" is a medical text from c. 1420 which contains references to pike. It is an Irish translation of a Latin medical tract which originated in Italy. Interesting to note is that the person who translated the text (in the early 15th century) used the Irish word lúis for pike, rather than merely transliterating the Latin lucius. It appears that the Irish translator was already familiar with the Irish word for pike. Since the original Latin text of this work was written in Italy, the references to pike are not directly relevant to the presence or absence of the fish in Ireland. However, the fact that the Irish translator knew of an Irish word for pike seems proof to us that the fish species occurred in Ireland early 15th Century.

For the sceptical ones among us we will back up this theory and take it one step further.

The Irish Grammatical Tracts are a collection of rules of grammar and diction which assisted student poets in learning their craft. We will quote one such short poem which was written ca 1400 :

"do sgailt giolla gig don ghiúis

do bhreig lúis na Sionna suas."

It was Chinese to us as well so we got the experts to translate it for us. The translation sounds as follows :

"The young man split a branch of the fir-tree,

he enticed up the pike of the Shannon."

This poem brings us the confirmation that there was indeed pike in Ireland, more precisely in the Shannon, ca 1400 and that no one found this remarkable. That no one found this remarkable leads us to conclude that they were there for quiet a while. It is tempting to draw further conclusions considering the hundreds of kilometers the Shannon covers and the numerous big and small lakes it connects.

The importance of the two above mentioned references taken into account we can rest assured that the claim that there was no (reference to) pike in Ireland before the 15th Century is outdated and incorrect. After all, the review the current Research Department of the Irish Fisheries base themselves on dates from the middle of the 20th Century…

In our final article we come to the conclusion of our series on the history of pike in Ireland. We will approach the pike's history from a few other angles, and bring up a few sources which consider the pike as being native to the Irish country…

Text : Frank Barbé and Shane Garrett

THE PIKE IN IRELAND : A NECESSARY REVIEW

Part 4 : The Essex-Files Conclusions

With this article, we come to the conclusion of our series on the history of pike in Ireland. We should add however that we are currently preparing a special appendix to our story, in which we will focus on conservation. As our research into this intriguing subject has become an ongoing process, updates can be expected. Before we start drawing conclusions about the significance of the contents of our articles, we will first of all look at the pike's history in Ireland from a few other angles.

Native or not?

Although it seems almost sure that pike have spread in certain parts of the island later than in others, nobody has ever provided concrete evidence of its introduction. Indeed, some sources claim pike as being native. In 1950 Robert Lloyd Praeger wrote "The Natural History of Ireland", in which he classifies the pike as an Irish native fish species. One hundred years before that, William Thomson notes pike as being native. Aodh Mac Domhnaill from County Meath wrote a tract on natural history in the same period. Pike is the first fish he mentions as being native. He describes it as "clean, bright and tasty". We know from our last article that pike are proven to be in Ireland over 400 years before that. However, it is still very interesting to see that the pike was an established part of the piscine fauna in Co. Meath in the early 19th century and was not referred to as being introduced but classified native.

Other species in other countries.

In our research we have not limited ourselves to Ireland alone. We have looked around Europe and come across several interesting "incidents" which give hope of unraveling the pike's history here. Our first stop is Spain and we meet two old friends; Arthur Went and Giraldus Cambrensis. The latter was referred to in a publication of The Irish Naturalist' Journal written by Arthur Went in 1949. Went relies on Cambrensis' knowledge but as we already know, both are not "the perfect example of a reliable witness"! Went quotes Cambrensis' who claimed that "no part of Spain produces pike". A cave painting of a pike in Northern Spain drawn in the Stone Ages proves that they were not introduced and that once again Cambrensis and Went had it wrong.

Next we go to Holland where in the 20th Century a discussion took place whether the catfish was an indigenous species that should be protected or whether it was introduced in the late medieval period by monks. It was only in 1979 that fish remains from a number of prehistoric settlements were identified. It appeared that catfish were present in The Netherlands some 4000 years BC. The poor monk who allegedly nobbled his way with laden bucket to the Dutch waterside was innocent....

Closer to home we arrive in England where the tench has been regarded as an introduced species. Tench is a warm water fish which could not have survived the ice-age, allegedly. Recent excavations in Suffolk carried out by the Time Team found not only pike but also tench remains. They were some 400,000 years old! Tench may now be regarded as native over there.

Our trip around Europe brings us home again and even here we can serve you a perfect example of how theories are only theories. The rudd is often classified as an introduced fish species to Irish waters for reasons similar to the English tench. Until rudd remains popped up in excavations carried out in Portbraddan Cave in Co. Antrim. This find dates from the first half of the 20th Century and puts the presence of rudd in Ireland back to the Iron Age.

We thought it was important to quote these different examples. If only to warn the readers not to pass out if tomorrow pike remains of a couple of thousand years old are found in Ireland. Stranger things have happened....

Some conclusions

Several conclusions can be drawn taking into account the pike's turbulent recent history in Ireland. The first one should be that there is much more work to be done and many more references to be looked into. Numerous people in libraries and universities have told us that there is much more interesting information "out there".

Archaeologists have hardly begun looking into the possible presence of fish remains in excavation sites. Understandably, human artifacts and tidal settlements have always carried the prime interest. Having said that it is very encouraging to see that Aidan O'Sullivan who heads the archaeological Discovery Programme takes a great interest in Lake Settlement. Hopefully they'll think of us when they find a few fish bones!

Derived from this first conclusion we must focus on the Irish Fisheries and the work they have carried out so far in this context. During this series on the history of pike in Ireland and its alleged introduction we have proven clearly on numerous occasions that there is something wrong with the introduction theory. It is not sure at all that pike are introduced and numerous references on which they have built this theory are doubtful, incomplete and even wrong.

This leads to our main conclusion. In one year's research we have found more about the pike's history than the Irish Fisheries did in half a century. Whilst we are surely very dedicated in what we are doing, we are not scientists and do not have for example regular access to National Libraries and Museums. Everything had to happen in our spare time and living in two different countries surely didn't make it easier for us. The Fisheries have their own team of scientists, even their own Research Department. If they didn't manage to find in 50 years what we found in one year then there is something wrong with their ability to carry out their job. If they did know all this but never told anyone and kept building their policies on the introduction theory then there is surely reason for drastic change. It is our opinion however that hardly anyone ever looked for the truth and the few people who did always looked hoping to find nothing. The case against the pike should be dropped on the grounds of lack of evidence. There should be an official review on the pike's history and the cessation of all discriminatory measures against pike until such review is complete. We cannot stress enough the extreme importance of an Independent team of scientists to carry out such research. For far too long, the Irish Fisheries have played witness, judge and jury on their own actions. This cannot be tolerated any longer. More than this an official inquiry into this (and other) mishaps in the Irish Fisheries is needed. We hear that an official inquiry is on the agenda in the North, not the least thanks to Angling Ireland Editor Frank Quigley. Is he up for another battle here down south? We see a very important role here for the angling clubs in Ireland. It is refreshing to see the rapid development of the Irish Pike Society and our hopes lie with them.

Request

Before rounding off we would like to ask anyone who thinks he or she might have interesting information or stories to add to our research to come forward and help us with our quest. Any bit of information, however small it is, is welcome to help complete the puzzle. We can be contacted via email at fbar@infonie.fr

Acknowledgement

Summing up a list of all the people who helped us in compiling these articles would force us to write another article! This would lead us too far so everyone who knows he or she contributed is kindly thanked. We wish however to make two exceptions. First of all we would like to thank the Editor of Angling Ireland Frank Quigley who gave us space to show our findings. Anyone reading this should realize how lucky Ireland is, in having a fishing magazine that is not bowing to influential groups like advertisers, clubs or organizations regarding the contents of its articles.

Secondly we would like to mention and thank Nicholas Williams, Head Lecturer of The Irish Department, University College Dublin. He never tired of our requests for information, explanation and translation. He led us to numerous references and other people and without him this story would more than likely never have been written. We would like to finish by quoting Mr. Williams directly : "*More research would, I am sure, yield more evidence that the pike is indigenous.*"...

Written by Frank Barbé and Shane Garrett

4.1.2 SECTION SUMMARY CONCLUSION: PAST RESEARCH RELATING TO THE ORIGINS OF IRISH PIKE

The analysis of the information presented in Section 4.1.1 and its subsections show that prior to 2013 the basis for the designation of Irish Pike as non-native was anecdotal, inaccurate and unscientific. The erroneous classification of Irish pike as non-native lasted for over six decades.

Of particular concern is that the leading fisheries scientists of IFI and its predecessors have apparently accepted this erroneous classification without question. Indeed, the extensive research carried out by Barbe and Garret in 2000 has to our knowledge, never been disputed by IFI or its predecessors, over the past 16 years, yet the pike remains officially 'non-native' to Ireland.

The closing statement of the Barbe, F. & Garrett, S. (2000) research is of particular relevance and reinforces the depth of their research and the external support they received from independent experts within the field of Irish culture and history. **"Secondly, we would like to mention and thank Nicholas Williams, Head Lecturer of the Irish Department, University College Dublin. He never tired of our requests for information, explanation and translation. He led us to numerous references and other people and without him this story would more than likely never have been written. We would like to finish by quoting Mr. Williams directly: "More research would, I am sure, yield more evidence that the pike is indigenous.".**

It is the conclusion of this section that the 'non-native' status of Irish pike based upon past unscientific research is erroneous but also potentially disingenuous.

5 CURRENT RESEARCH RELATING TO THE ORIGINS OF IRISH PIKE

5.1.1 THE ORIGINS OF IRISH PIKE

In 2012, Debbi Pedreschi of University College Dublin (UCD) supported by Professor Stefano Mariani (UCD), undertook a PhD on the population ecology, dietary and trophic status and morphometrics of the freshwater fish pike (Esox Lucius) in Ireland. This ground-breaking research was undertaken by UCD in collaboration with IFI and was supported by the Irish Federation of Pike Angling Clubs. As stated earlier, it was the common belief that pike were introduced to Ireland approximately 400 years ago from England, so the importance of an actual scientific study to examine these beliefs was long overdue. The report on the origins of pike aspect of this study was released in 2013 and was called the **"Genetic Structure of Pike and their History in Ireland"**. This aspect of the study indicated that pike colonised Ireland naturally about 8000 years ago in a similar way to other native species such as trout. The study also paid particular caution to current pike management operations and strategies as a strain of the species was discovered through DNA analysis and found to be unique to Ireland. The study commented that aspects of the management of pike in Ireland were "potentially compromising the integrity of genetic stocks".

The 2013 study was the first of its kind undertaken by IFT, CFB or IFI into the pike species, and used microsatellite DNA studies of pike from Ireland, Great Britain and the European continent to establish the lineage of Irish pike. The results were ground-breaking but of little surprise to the pike-angling public, who had for many years questioned the validity of the previous research discussed in Section 4. The press release issued by IFI on 15th October 2013 stating that "New Study Reveals that Pike are Native to Ireland" signalled that Irish pike may finally enjoy the recognition that the species was denied for many decades.

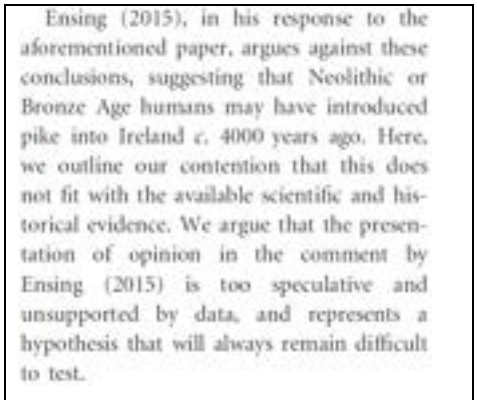
5.1.2 RECENT CHALLENGES TO THE CLASSIFICATION OF IRISH PIKE AS A NATIVE SPECIES

The robustness and depth of research undertaken by Debbi Pedreschi and Prof. Stefano Mariani was illustrated in 2014 when the findings of their report **"Genetic Structure of Pike and their History in Ireland"** were challenged by Dennis Ensing in an article titled **"Pike (*Esox lucius*) could have been an exclusive human introduction to Ireland after all: a comment on Pedreschi *et al.* (2014), Journal of Biogeography".** Dennis Ensing works at the Agri-Food and Biosciences Institute (AFBI) in Belfast, Northern Ireland, which advises DCAL on freshwater fish management policies.

Ensing argued that there was a possible human introduction much earlier than previously hypothesised by Pedreschi *et al.* (2014) Ensing argued that a human introduction occurred as far back as 4000 years ago by Neolithic or Bronze Age humans and that this was a basis for questioning any designation of Irish Pike as native.

In 2015 Pedreschi and Mariani responded in an article titled **"Towards a balanced view of pike in Ireland: a reply to Ensing, Journal of Biogeography"** and effectively removed any doubt in relation to the validity of the study first released in 2014.

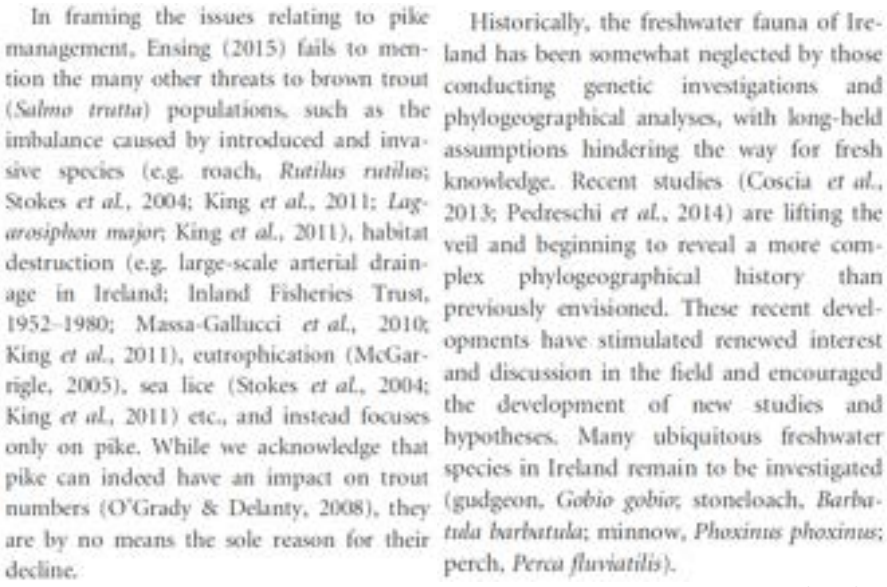
Furthermore, the opinions expressed by Ensing in his paper were considered by Pedreschi and Mariani (2015) to be *"too speculative and unsupported by data"*.



Ensing (2015), in his response to the aforementioned paper, argues against these conclusions, suggesting that Neolithic or Bronze Age humans may have introduced pike into Ireland *c.* 4000 years ago. Here, we outline our contention that this does not fit with the available scientific and historical evidence. We argue that the presentation of opinion in the comment by Ensing (2015) is too speculative and unsupported by data, and represents a hypothesis that will always remain difficult to test.

Excerpt from "Towards a balanced view of pike in Ireland: a reply to Ensing, Journal of Biogeography" Pedreschi (2015)

The response of Pedreschi and Mariani (2015) to Ensing also highlighted how Ensing's article focused on pike as the sole threat to wild brown trout stocks and how Ensing failed to mention the many threats to wild brown trout stocks, tending rather to focus on pike.
Of particular interest is that the response of Pedreschi and Mariani (2015) to Ensing raised the issue of Irish freshwater fauna studies being somewhat neglected and how long-held assumptions can hinder the way for fresh knowledge.



In framing the issues relating to pike management, Ensing (2015) fails to mention the many other threats to brown trout (*Salmo trutta*) populations, such as the imbalance caused by introduced and invasive species (e.g. roach, *Rutilus rutilus*; Stokes *et al.*, 2004; King *et al.*, 2011; *Lagarosiphon major*; King *et al.*, 2011), habitat destruction (e.g. large-scale arterial drainage in Ireland; Inland Fisheries Trust, 1952–1980; Massa-Gallucci *et al.*, 2010; King *et al.*, 2011), eutrophication (McGarrigle, 2005), sea lice (Stokes *et al.*, 2004; King *et al.*, 2011) etc., and instead focuses only on pike. While we acknowledge that pike can indeed have an impact on trout numbers (O'Grady & Delanty, 2008), they are by no means the sole reason for their decline.

Historically, the freshwater fauna of Ireland has been somewhat neglected by those conducting genetic investigations and phylogeographical analyses, with long-held assumptions hindering the way for fresh knowledge. Recent studies (Coscia *et al.*, 2013; Pedreschi *et al.*, 2014) are lifting the veil and beginning to reveal a more complex phylogeographical history than previously envisioned. These recent developments have stimulated renewed interest and discussion in the field and encouraged the development of new studies and hypotheses. Many ubiquitous freshwater species in Ireland remain to be investigated (gudgeon, *Gobio gobio*; stoneloach, *Barbatula barbatula*; minnow, *Phoxinus phoxinus*; perch, *Perca fluviatilis*).

Excerpt from "Towards a balanced view of pike in Ireland: a reply to Ensing, Journal of Biogeography" Pedreschi (2015)

It is worth noting that Pedreschi and Mariani (2015) acknowledged senior scientific staff of Inland Fisheries Ireland for their assistance in compiling the response to Ensing. Therefore, it could be presumed that Inland Fisheries Ireland would support the response of Pedreschi and Mariani to Ensing (2014).

5.1.3 CLASSIFICATION IMPLICATIONS WITH SPECIFIC REFERENCE TO THE EU WATER FRAMEWORK DIRECTIVE

Kelly et al. (2014) summarised that the Water Framework Directive (WFD) (2000/60/EC) came into force in 2000 and was subsequently transposed into Irish law in 2003 (S.I. No. 722 of 2003), with the principal aim of preserving those water bodies where the ecological status is currently 'High' or 'Good', and restoring those water bodies that are currently impaired, to achieve at least 'Good' ecological status in all water bodies by 2015 or by designated extended deadlines. Furthermore, it was stated that a key step in this process is that each Member State must assess the current ecological status of surface water bodies (rivers, lakes and transitional waters) by monitoring a range of physical, chemical and biological quality elements including phytoplankton, macrophytes, phytobenthos, benthic invertebrates and fish.

Inland Fisheries Ireland has been assigned the responsibility by the Environmental Protection Agency (EPA) of delivering the fish monitoring requirements of the WFD in Ireland. The Agri-Food and Biosciences Institute (AFBI) in Belfast has primarily represented Northern Ireland in this regard.

A key aspect of the fish monitoring requirement has been the joint development by IFI & AFBI of an ecological classification tool i.e. 'Fish in Lakes 2' (FIL2). Similar work was carried out for rivers. The 'Fish in Lakes' ecological classification tool was developed during the North-South Shared Aquatic Resource (NS Share) Project in 2008. (Kelly *et al*, 2012b) further developed the classification tool using "*additional data to make it fully WFD compliant*".

It is at this point that it must be made clear that the WFD 'Fish in Lakes' classification tool classifies all freshwater fish species according to their native status. The native status of pike is based upon the notes on pike contained in Went (1949) and takes account of Went (1950), both of which pre-date the scientific research undertaken by Pedreschi *et al*. (2014) using micro-satellite DNA.

It is interesting that Went (1950) states that the rudd (Scardinius erythrophthalmus) ***"is a native species"***, *yet* (Kelly *et al*, 2012b) have re-designated the rudd as ***"non-native"***. The inference here is that the application of Went (1950) as a basis for the establishment of the native status of Irish freshwater species would appear to be contradictory when considered in the context of the WFD, which favours instead only fish tolerant of marine conditions. Regarding pike in Ireland, Minchin (2007) in his compilation of alien and cryptogenic aquatic species in Ireland was unconvinced of the evidence suggesting pike to be alien and instead cited pike and indeed rudd as cryptogenic species.

Kelly et. al (2014), in their WFD Summary Report for 2013, commented on the research of Pedreschi *et al*. (2014) by stating that ***"recent research suggests that pike may have colonised Irish waters naturally, without the intervention of man and therefore be mislabelled as a non-native species (Pedreschi et al., 2013); however, further evidence may be needed to verify this"***. It would be presumed that the **"further evidence"** that **"may"** be needed, would be sought, yet Kelly et al. (2015) in their WFD Summary Report for 2014 maintain the status of pike as non-native, having removed previous comments relating to Pedreschi *et al*. (2014). To our knowledge IFI have not sought ***"further evidence"***, which would lead to concern that the WFD 'Fish in Lakes' classification tool will not be re-examined.

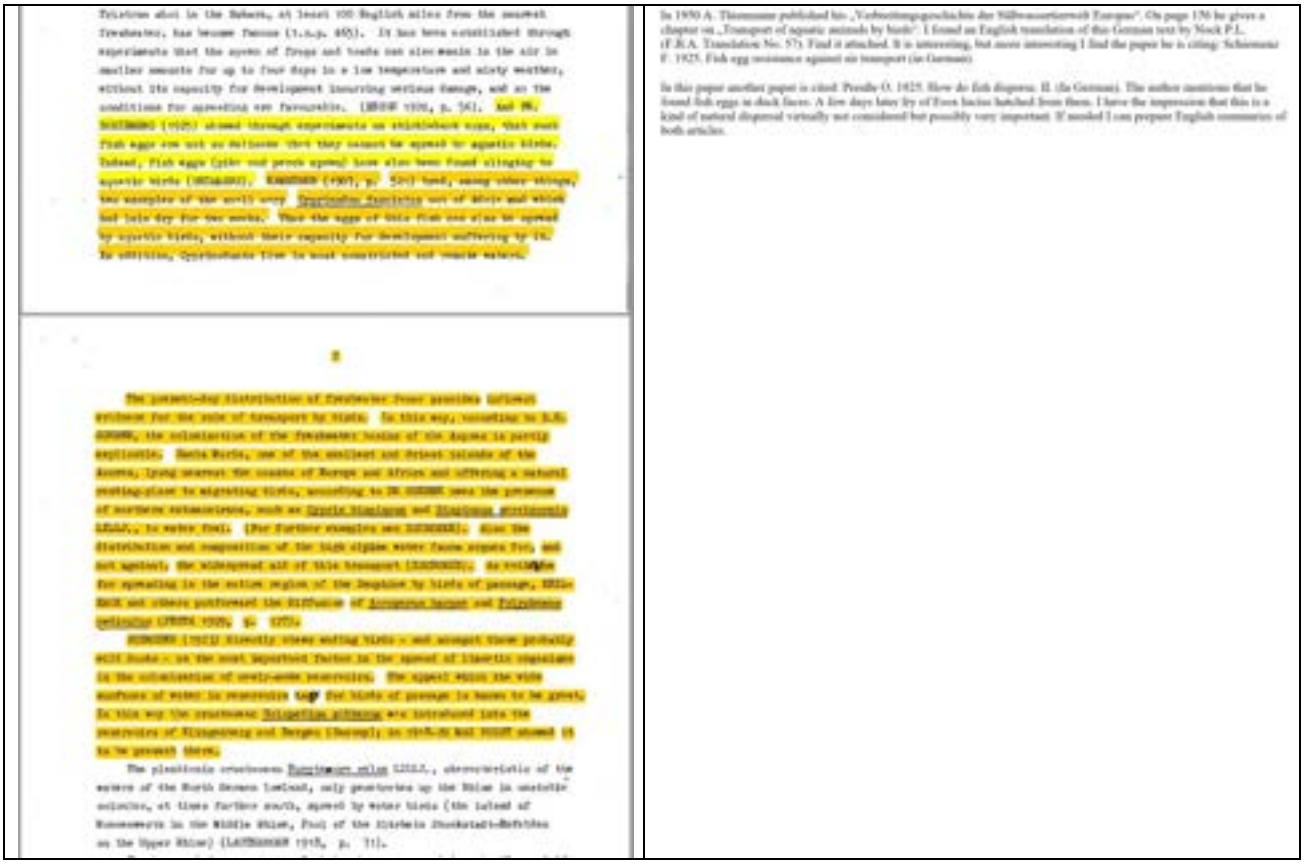
It is clear that to re-classify pike under the WFD as a 'native species', while supported scientifically through the research of Pedreschi *et al*. (2014), is not without complication for the 'Fish in Lakes' classification tool. It may be argued that at present, it necessitates a divergence between the Republic of Ireland and Northern Ireland via the respective representative bodies of IFI and the AFBI, to possibly accommodate two separate classification tools. This matter would be greatly simplified if the AFBI were to endorse the findings of Pedreschi *et al*. (2014). The response of Ensing (2014) to Pedreschi *et al*. (2014) would suggest that the AFBI may not be open to a re-classification of pike. In response to Ensing (2015), however, Pedreschi and Mariani (2015), see section 5.1.2, provided a balanced view of pike, that one would hope would alleviate any concerns that the AFBI might have. As such, there would appear to be no valid reason for IFI to discount the latest and only scientific research available for the re-classification of pike as a native species in the context of the WFD.

5.1.4 THE SPREAD OF FRESHWATER FISH AND FAUNA BY NATURAL MEANS

There exists a substantial body of evidence within the scientific community supporting the spread of freshwater fish and fauna by non anthropogenic means with particular reference to avian transfers.

There are many examples throughout such studies of freshwater bodies that have been formed naturally or created by man (ponds, reservoirs etc.) that are isolated and initially devoid of fish. In many cases, following colonization by water fowl, fish species begin to appear. It has been proven that fish ova from certain species can survive within the down of water fowl for considerable time and be transported over hundreds of kilometers in many cases. Additionally the survival of freshwater organisms, including fish ova, within the digestive systems of water fowl has been proven (van Leeuwen et. al. 2012).

Specifically in relation to pike and perch, studies by Fr. Scheimnz (1925), Kammerer (1907), A Thienmann (1950) and O Preusse (1925) have shown the transfer survivability of ova from these species with live fry successfully hatching from eggs found in duck faeces following transfer from one water body to another.

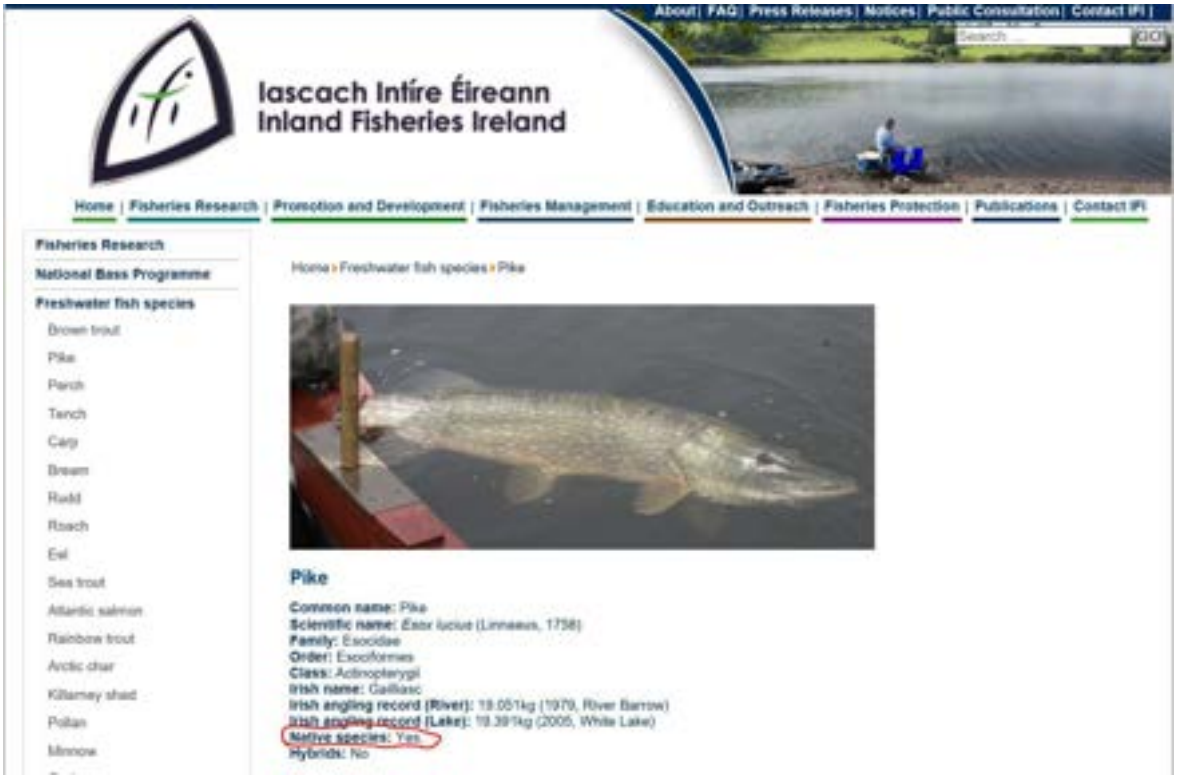


5.1.5 SECTION SUMMARY CONCLUSION: CURRENT RESEARCH RELATING TO THE ORIGINS OF IRISH PIKE

The fact remains that the scientific research of Pedreschi *et al*. (2014) represents the single most important and only piece of scientific research produced on the native status of Ireland's pike since the formation of IFI as IFT in 1951. The depth, robustness and scientific validity of this research has been illustrated by facing and easily discounting challenges posed to it generated by peers and others.

In relation to the EU Water Framework Directive, it is feasible to contest that the failure of IFI to embrace the new scientific research of Pedreschi *et al*. (2014), with or without further corroborating scientific evidence, places at risk, Ireland's successful achievement of at least 'Good' ecological status for all fisheries in Ireland. Furthermore, it would appear to contradict the statement referred to earlier and issued on 15th October 2013 by Dr. Cathal Gallagher, Head of Research and Development for Inland Fisheries Ireland, that "further investigations, using new and developing genomic techniques will be used to endorse these findings". The use of the specific term "endorse" suggests support of the previous findings, not contention.

IFI have expended resources, at a cost to the Irish tax payer, in undertaking research into Irish pike origins through the period 2010 to 2013. The findings of the resulting report **"Genetic Structure of Pike and their History in Ireland"** Pedreschi *et al*. (2014) have yet to be considered in formulation of pike management policy and hence the resources used in this study have yet to deliver any meaningful return to the Irish tax payer.



6 PAST RESEARCH RELATED TO THE DIET OF IRISH PIKE

The release of the report **"The Diet of Pike in Irish Watercourses"** in 2014 by Debbi Pedreschi as part of a PhD, and Pedreschi *et al*. (2015) following peer review, is arguably the single most important and only scientifically-based study into the diet of pike in Irish waters. Subsequent to this study, the investigations into the diet of pike in Irish waters was conducted only by Inland Fisheries Ireland and its predecessors and relied upon snap shot stomach content analysis using a potentially flawed methodology i.e. gill-netting. This is not a term used lightly and will be discussed later in Section 6.

Pedreschi *et al.* (2014b) used a combination of Stable Isotope Analysis (SIA) and Stomach Content Analysis (SCA) to provide a more reliable projection of the diet of pike in Irish watercourses. Of particular interest was that Pedreschi et al. was very cognisant of how complicated the diet of pike in Irish waters can be.

Pedreschi *et al.* (2014b) stated that "*sampling using a dedicated plan rather than opportunistic sampling would also facilitate a wider range of analyses and hypothesis testing, including, for example, comparisons between seasonal variations in diet*". The significance of this particular comment is that to date, the data presented by Inland Fisheries Ireland gained over many decades does not reflect seasonal variation, and has allowed assumptions rather than scientific fact to drive management policy. Proof of the paucity of seasonal sampling has been acknowledged through freedom of information requests to IFI and therefore represents a considerable failing of past research into the diet of Irish pike.

It is important to note that past research continues to be used as the basis for and justification of pike management operations in Ireland by Inland Fisheries Ireland. Some of these apparent justifications will be further discussed in this section.

6.1 THE ECOLOGY, BIOLOGY AND MANAGEMENT OF PIKE IN IRISH WATERS WITH PARTICULAR REFERENCE TO WILD BROWN TROUT LAKE FISHERIES

The current position paper supporting pike management in Ireland is **"The Ecology, Biology and Management of Pike in Irish Waters with Particular Reference to Wild Brown Trout Lake Fisheries"** ref: O'Grady & Delanty (2008). The paper refers to several reports and scientific data to support a programme of continued pike removal from a number of significant fisheries in Ireland known to produce quality trout and pike angling. It is the content of O'Grady & Delanty (2008) that forms the basis for the pike diet examination undertaken in this document as it is felt that there are significant fundamental inaccuracies presented in O'Grady & Delanty (2008) with regard to the impact of pike on trout stocks.

The pie charts shown below in the excerpt from O'Grady & Delanty (2008) show a sample of food items found in pike stomachs in Lough Sheelin over a period of 29 years from 1978 to 2006. This information is the subject of further in depth examination in section 6.2.4 following a freedom of information request to Inland Fisheries Ireland, as this document contests that the information made available for this period exhibits worrying inaccuracies and anomalies that question the reliability of the information presented by IFI to support pike management.

A further excerpt from the presentation made to the Pike Policy Group in 2011 as part of the previous pike review is also included in this section. With regard to both of the excerpts in this section, it can be seen with specific reference to the dietary items in pike >60cm that wild trout constitute 16% of an adult pikes diet. However roach and roach fry have been separated, even though they are the same species. Perch have also been separated into fry and adult fish. It could be assumed that in order to maintain any sort of consistency then trout should also be separated by way of mature and immature fish to give the reader a more accurate picture of the dietary items found. As roach and perch are more numerous, e.g. see excerpt section 6.1 i.e. Table 1 of O'Grady & Delanty (2008) with regard to roach, it appears logical that pike will feed more readily on the more available species. For instance, the total consumption for roach and perch is 47%, nearly three times that of trout. This suggests that trout are not the main food source of pike in Lough Sheelin and while ratios may not reflect the apparent availability of each species to pike as a food source, O'Grady & Delanty (2008) do not explain this anomaly, but instead accept an apparently biased hypothesis that pike prefer trout as a food source. This document attempts to redress this imbalance in current thinking by offering unbiased alternative discussion based upon IFI's own information.

Figure 4a

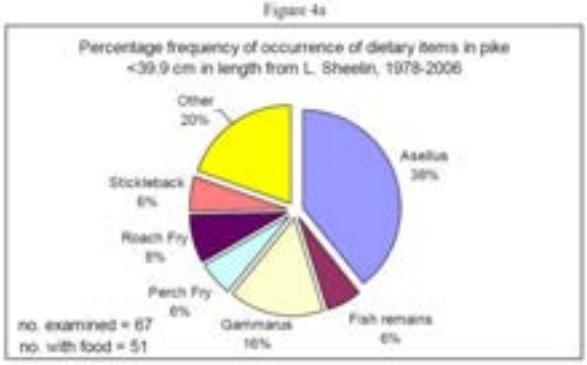


Figure 4b

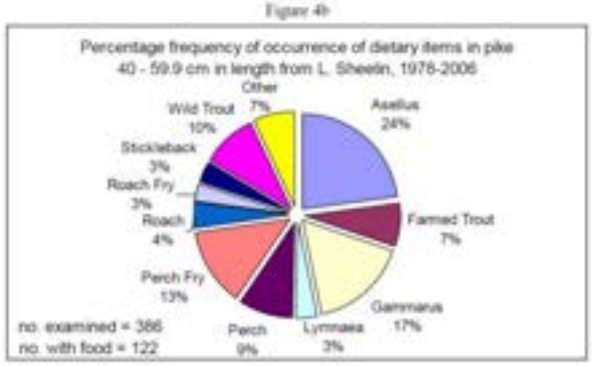
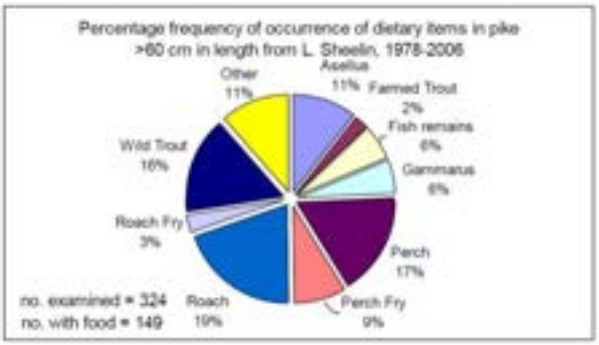
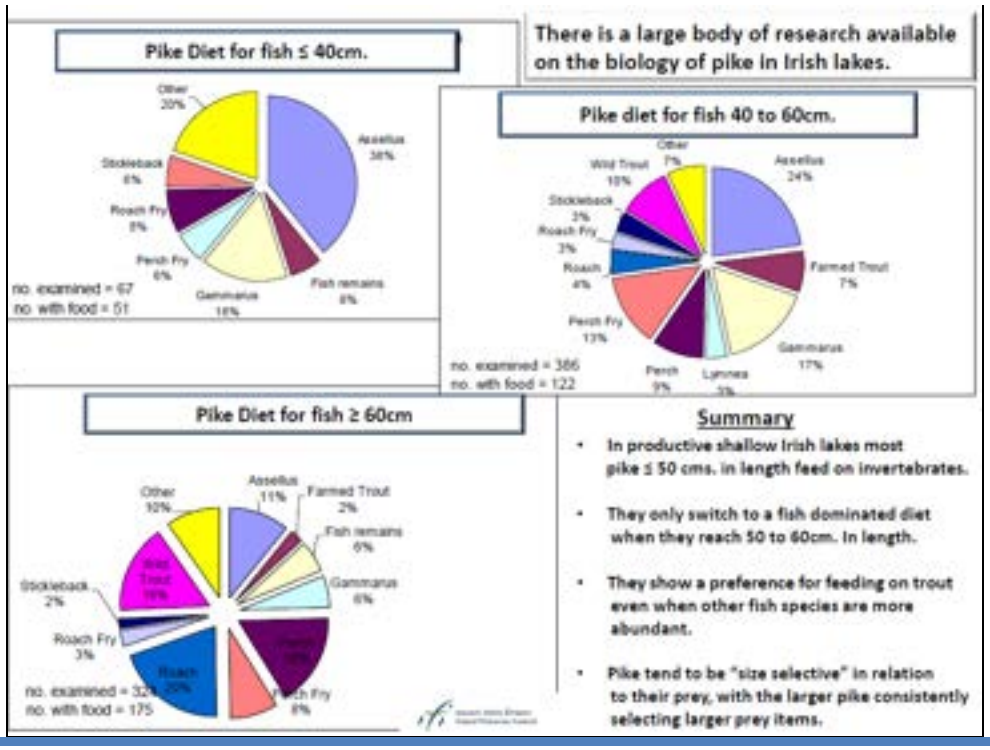


Figure 5a



Excerpt - Figures 4a, 4b and 5a from "The Ecology, Biology and Management of Pike in Irish Waters with Particular Reference to Wild Brown Trout Lake Fisheries" O Grady & Delanty (2008)



Excerpt from "The Necessity for Controlling Pike Stocks in Some Quality Irish Wild Brown Trout Managed Lake Fisheries" -

A presentation to the Pike Policy Group, November 2011

6.1 THE ECOLOGY, BIOLOGY AND MANAGEMENT OF PIKE IN IRISH WATERS WITH PARTICULAR REFERENCE TO WILD BROWN TROUT LAKE FISHERIES CONTD.

Pike dietary studies undertaken prior to the Pedreschi *et al*. (2014b) pike diet research show that in many cases the conclusions of those previous studies are contrary to the data that is supposed to support them. In the table below i.e. excerpt Table 1 of O'Grady & Delanty (2008), it can be seen that as roach populations increased they featured up to seven times more than trout in the diets of the surveyed pike. This appears to contradict the concluding remarks that stated the continuation of predator control was imperative as an increase in pike numbers along with their apparent preference for trout would see trout stocks severely affected.

In contrast to the previous pike studies, the report entitled **"The Diet of Pike in Irish Watercourses"** Pedreschi *et al*. (2014) stated that the research data had shown "***the marked opportunistic nature of individuals that appear to be utilising resources in proportion to their availability in the surrounding environment***". The inference here would appear to be that one must at least be considerate of the opportunistic nature of pike before drawing conclusions to support a theory that pike prey preferentially on any species, including trout.

Table 1. Total numbers of fish captured in survey nets and total number of trout and roach in pike stomachs, from the March gill netting surveys of L. Sheelin, 1980 – 2007

Table 1.	Survey date	1980	1981	1983	1986	2000	2001	2002	2003	2004	2005	2006	2007
	Fish species												
Total No. of fish captured in survey nets	Wild Trout	162	220	90	67	4	4	11	10	7	22	28	4
	Roach	3	18	97	2361	735	611	824	1492	485	47	28	44

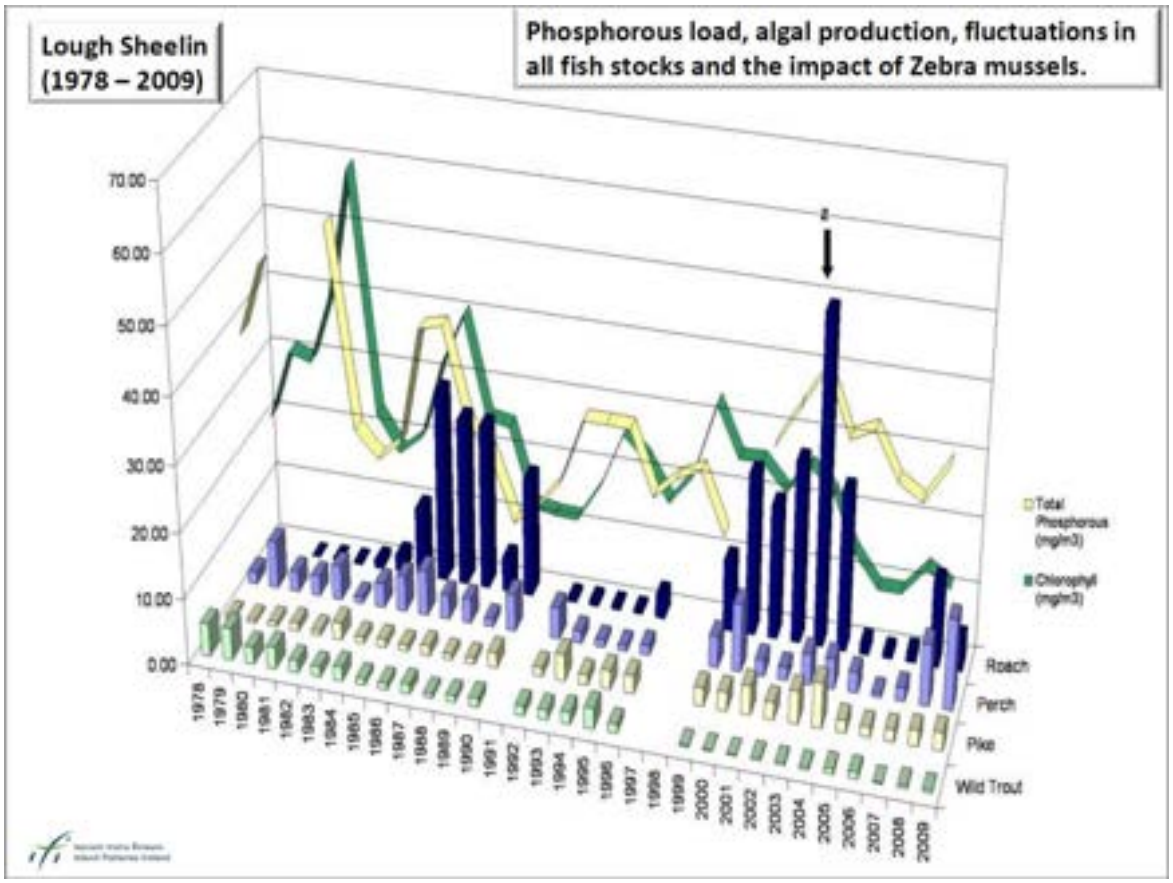
	Survey date	1980	1981	1983	1986	2000	2001	2002	2003	2004	2005	2006	2007
	Fish species												
Total No. of fish in pike stomachs	Wild Trout	6	25	5	4	2	2	2	1	0	2	1	1
	Roach	0	0	2	9	11	14	7	5	7	4	5	6

Excerpt from "The Ecology, Biology and Management of Pike in Irish Waters with Particular Reference to Wild Brown Trout Lake Fisheries" O'Grady & Delanty (2008)

Further evidence of the dependency of a pike population on fish other than trout is illustrated in the following bar graph that was presented to the pike policy review group in 2011. It can be seen that as perch and roach population densities increase and decrease, pike population density follows, yet trout density has remained constant through the same cycles. If pike fed preferentially on trout then the variance in population density with respect to species other than trout should not be so pronounced and should track trout population density rather than roach, perch or others.

Another interesting observation is that it appears that, during periods of high densities of roach in particular trout densities show a marked depression. This would appear to indicate that the population dynamics of all species, and indeed the environmental drivers that naturally dictate species reproduction and survival, are inextricably linked, and as such are critical for inclusion within the context of 'population modelling'.

It is quite clear that the bio-manipulation of pike stocks as part of a pike management policy could have deeper unintended consequences for all species, and in fact be counterproductive when one considers population fluctuations in response to environmental, habitat and other changes within eco-systems.



Excerpt from "The Necessity for Controlling Pike Stocks in Some Quality Irish Wild Brown Trout Managed Lake Fisheries" O'Grady et. al. (2011)

Another misconception that has featured highly in pre-Pedreschi *et al*. (2014) studies is that pike do not feed on pelagic (i.e. suspended over deep water) prey or prey positioned in benthic (bottom) zones. This argument was used to reinforce the assumption of a pikes preference for trout even in waters that contain an abundance of cyprinids, perch and other prey species. The studies centred on the conclusion that pelagic or benthic "positioned" prey were unavailable as food for pike for large portions of the year as pike hunted primarily in shallow-water zones, preferring a hunting habitat of charophyte beds.

In fact, large prey shoals will for long periods of the year lie in, or suspend over very deep water. Pike anglers' experiences over many years and in many fisheries in Ireland and Europe contradict the above assumptions that pike do not feed pelagically. In fact, pike will readily feed in pelagic and benthic zones, necessitating the need for tackle manufacturers to develop specialised equipment required to target those pelagically-feeding pike. As a consequence, numbers of large specimens are caught using pelagic / bottom-fishing techniques. Angling records show that the highest numbers of larger pike are caught in deeper areas year on year through a varied range of fisheries.

6.2 DEFICIENCIES IN SAMPLING, CALCULATION AND DATA GATHERING METHODOLOGY RELATING TO THE STUDY OF PIKE DIET IN IRELAND PRE 2012

The most recent IFI position document used to support pike management is O'Grady & Delanty (2008). The following Sections will detail a number of deficiencies in data gathering, research and supporting evidence contained in that position document, which continues to be used to support pike management in Ireland.

6.2.1 PEER REVIEW

Prior to the release of the ground breaking research i.e. the **"Genetic Structure of Pike and their History in Ireland"** Pedreschi *et al*. (2014) and the **"The Diet of Pike in Irish Watercourses"** Pedreschi *et al*. (2014), both of which are internationally peer-reviewed, there was a dearth of peer reviewed scientific studies in Ireland. It remains a considerable concern that many of the reports produced by or in collaboration with IFT, CFB and IFI relating to Irish pike origins, diet and pike management policy were not internationally peer-reviewed scientific research studies, but were in-house studies and position documents reflecting the opinion of the authors. In contrast to the vast wealth of international knowledge available, Ireland has continued to base policies upon such studies, which is an unacceptable position in the present day. Examples of the wealth of international research information that has been available can be found in the **"Synopsis of Biological Data on the Northern Pike: Esox Lucius" Food and Agricultural Organisation of the United Nations (1988) and Pike, biology and exploitation by Craig, J.F. (1996)**.

6.2.2 STABLE ISOTOPE ANALYSIS AND STOMACH CONTENT ANALYSIS

Pre Pedreschi *et al*. (2014b), Stable Isotope Analysis (SIA) was not used in the study of pike diet in Ireland. As described in Section 7.1.1, SIA provides a much more accurate representation of what a pike consumes over a longer period of time, thus eliminating the deficiencies in stomach content analysis (SCA).

Pre 2014 Stomach Content Analysis (SCA) was the only method used to establish what a pike consumes. As described in Section 7.1.1 SCA is not a suitable method to ascertain what a pike feeds on over a long period of time. SCA provides just a snap-shot in time of what a pike has recently consumed and is currently digesting.

The following Sections illustrate some historical examples of the failings of SCA over time and the erroneous conclusions drawn from past research. References are also made to the variance by different scientific staff and excessive and arguably unsupported overestimates of pike food consumption.

6.2.2.1 HEALY (1956):

O'Grady & Delanty (2008), Section 2.8, refer to the findings of Healy (1956) as supporting evidence for the dominance of trout in the diet of pike in Lough Glore during studies undertaken between 1951 and 1954, ***"despite the presence of a large perch stock"***.

The size of the perch stock at that time should be put into perspective. Healy (1956) states not that there is a large perch stock, but that there ***"should be an adequate supply of perch"***. Healy (1955) also states that in 1951 an estimation of the adult perch stock in Lough Glore was 13,400 fish, 53% of which was removed during 'the scheme for the reduction of coarse fishes' by the end of 1953. Total perch removal from Lough Glore (1950-1954) was 11,504 adults, 407 yearlings, 1,817 perch fry and **"innumerable"** perch eggs.

This perch removal should be viewed against a backdrop of existing and supplemented trout stocks during the same period. Healy (1955), states that when coarse fish removal operations commenced on Lough Glore, ***"large numbers of big trout were netted"***. Healy (1955) also states that during the same operations period that ***"the main spawning stream at Lough Glore has been stocked with 250,000 fry from Lough Owel"***.

The inference here is that, as Lough Glore already contained large numbers of big trout prior to pike management operations, it is only reasonable that a bio-manipulation of fish stocks by removing perch and by adding trout fry that may migrate into Lough Glore, would logically lead to an outcome where trout predation would be inevitable.

The bio-manipulation of fish stocks in Lough Glore, between the years 1951 and 1955 has not been commented on in O'Grady & Delanty (2008).

6.2.2.2 TONER (1959):

O'Grady & Delanty (2008), Section 2.8, refer also to the findings of Toner (1959). Toner states in his research into the food of pike in Lough Corrib, that ***"1,170 pike weighing nearly 5.5 ton, were calculated to have eaten over 46 ton of trout and 11 ton of coarse fish in one year"*** (1954). An alternative analysis of Toner's (1959) findings follows:

1. ***The Maintenance Ratio:***

Pike in Your Waters (2003) noted that the dietary requirements of pike are considered predictable and have been studied by several authors (e.g. Kipling & Frost 1970). It was stated in general terms that a diet comprising between 13oz-1lb of prey fish per pound of pike per annum is needed to merely keep the pike alive (the 'maintenance ration'). Pike in Your Waters (2003) noted that Johnson (1966) listed an average figure equivalent to 1.4lb/lb/year, with a range of 1.3-1.8, whereas Mann (1982) reported an annual value of 0.8/g/g. Fitzmaurice (1983) suggests a significantly higher 'maintenance ration' for pike of "less than 5:1", however Fitzmaurice does not cite any author nor provide any clear evidence in the paper for this conclusion.

2. ***The Food Conversion Ratio:***

Pike in Your Waters (2003) noted that conversion from prey flesh to pike flesh can also be predicted, and suggested the ratio between weight gain and total food consumed during normal growth is often between 1:5 and 1:10. It was further noted that Popova (1978) listed a figure of 1:8.8 and Mann (1982) calculated a ratio of 1:6.6. Fitzmaurice (1983) noted that Johnson (1966a) under experimental conditions obtained a gross conversion factor of 3.4:1 for immature pike. It was further noted that on the basis of including gonadal production for mature pike Johnson (1966b) assumed a figure 84% for both sexes yielding a 'gross conversion' for mature pike of 6.27:1. It is worth commenting at this point that O'Grady *et Al.*, (1996) used Johnson's (1966) gross conversion factor, corrected for gonadal production (i.e. 6.27:1) in order to calculate the weight of fodder fish consumed by an estimated pike population in Lough Corrib in 1995.

3. ***Alternative Analysis of Toner (1959) Total Pike Food Consumption:***

To analyse the projected food consumption of the 1,170 Lough Corrib pike discussed by (Toner 1959), a similar growth rate to that found in O'Grady *et al.*, (1996) has been assumed, as in both cases the pike stocks are considered to represent an undisturbed pike population. An approximate average weight of 4.776kg for each of the 1170 pike is calculated by converting "5.5 tons" (UK, Long) to kilograms. Using both the regression calculation for length / weight relationship (O'Grady *et al.*, 1996, Page 11) and interpolating the growth pattern graph (O'Grady *et al.*, 1996, Page 61, Fig. 26a) for pike in Lough Corrib in 1996, it is determined that each pike of average weight 4,776 grams would each have a total length of 78.3cm. Using the same method, is it possible to back-calculate the average weight and length for the same pike, at an age one year earlier. This yields an average weight of 3,377 grams and a length of 70.8cm or an average weight increase for each pike of 1390 grams (1.39kg) for the year.

4. Calculation:

Using Johnson's (1966) 'Maintenance' and 'Food Conversion' ratios of 1.4lb/lb/year and 6.27:1, respectively, the following total calculations for one year's food eaten to effect a weight gain of 1.39kg per fish for the entire 1,170 pike are made:

(1170 x 1.39 x 6.27) + (1170 x 4.776 x 1.4) = 18,020kg

Converting 18,020kg to tons (UK, Long) = 17.7 ton

5. Conclusion:

The calculations above conclude that the 1,170 pike referred to by Toner (1959) would probably have eaten only 17.7 tons of food. This figure represents a significantly lower food intake, i.e. 31% of Toner's (1959) estimation. The analysis of Toner's (1959) data in the manner performed may have its limitations; however, it is significant, as it nevertheless serves to show the extent of overestimation that appears to exist in Toner's work.

It is noteworthy with respect to Toner's (1959) estimations that it is stated in O'Grady (1995), that ***"the food of pike in Irish waters, apart from Healy's (1956) and Toner's (1959) pioneering work was examined in great detail"***. It would seem that the continued use of this work as corroborating evidence for Inland Fisheries Ireland's pike management policy serves to mislead with respect to the dietary habits of pike. It should be further noted that Healy (1956) refers to an Inland Fisheries Trust report of 1954 stating that 80% (i.e. 936) of the 1,170 pike examined from Lough Corrib for the period March to June 1954 had empty stomachs.

One further comment on Toner's (1959) estimate of pike food consumption is that it represents an average yearly intake exceeding 1000% of the weight of the pike examined. In contrast, Rudzianskiene G. (2001) examined the diet of 257 pike in the Curonian Lagoon, Lithuania, and calculated that the average yearly ration of pike made 243-266% of its total body weight. The current calculation of 31% of Toner's estimate may therefore be high.

6.2.2.3 O'GRADY ET AL. (1996):

O'Grady *et al.* (1996) estimated that the Lough Corrib pike population in 1995 alone ate over 255,000 trout weighing over 118 tonnes. This study was used to support a broader funding application as part of the 'Tourism Angling Measure' (TAM) at that time, part of which was to include the removal of pike from Lough Corrib.

The estimated calculation of trout eaten relied upon a number of assumptions, including the following:

- that the population of pike in Lough Corrib in 1995 was calculable by applying an estimate for the pike population on Lough Sheelin based on CPUE's and lake surface area, and applying this estimate to the CPUE's and lake surface area of Lough Corrib;
- that the diet of pike in Lough Corrib during 1995, did not change seasonally;
- that the biomass of trout to roach (i.e. 80% - 20%) found in pike stomachs in the 1996 Lough Corrib stock survey, was constant for the entire year, 1995;

The calculation of the pike population on Lough Corrib for the year 1995 in the manner performed above, without using supportive mark-recapture techniques to verify the calculation, continues to be a questionable foundation for the estimated 118 tonnes of trout eaten in 1995.

O'Grady *et al.* (1996) calculated the predation of pike on trout in Lough Corrib for 1995 by assuming that pike diet during 1995 did not change seasonally. Section 8 discusses possible factors influencing seasonal feeding and its lack of consideration in scientific reports.

Of note however, is that O'Grady *et al.* (1996) did recommend a study into the seasonal diet of pike on Lough Corrib, presumably to ascertain the accuracy of the original assumption. It is discussed in section 9.4.1.3 that the recommended study was not undertaken by the Central Fisheries Board, nor was it undertaken subsequently by Inland Fisheries Ireland.

The attached excerpt dated 1988, indicates just how seasonally diverse the diet of pike can be expected to be. This information would have been available to the Central Fisheries Board in 1996.

Frost (1954) and Lawler (1965) found that seasonal changes in the diet of the pike appeared to be related to the availability of the fish food. Different species composition in different waters results in diverging pike diets. Lawler (1965) reports that the most important food types eaten in each of several periods during the year in Naming Lake are: May and June - trout-perch (Percopsis omiscomaycus); July - spottail shiner (Notropsis hudsonius); August to September - yellow perch (Perca flavescens); October to March - sticklebacks (Pungitius pungitius and Eucalia inconstans). In Windermere (Frost, 1954), perch (Perca fluviatilis) occur in the pike diet at all times, but predominate from May to October. Char (Salvelinus willughbii) are eaten only in November and December, brown trout (Salmo trutta) to a greater extent from October to February. Sticklebacks (Gasterosteus aculeatus) and minnows (Phoxinus phoxinus) are taken in spring and summer. Such seasonal variations are associated with the changes in habits of the food species.

Excerpt from "Synopsis of Biological Data on the Northern Pike:Esox Lucius" Food and Agricultural Organisation of the United Nations (1988)

Finally, it should be noted that 461 pike were captured during the Spring stock survey on Lough Corrib in 1996. Of the 461 pike captured, 43 pike (i.e. 9%) were recorded as containing trout (FOI/104/07/C). It is the biomass hypothesis that feeds into the considerable tonnage estimate for trout eaten compared to other species. Pedreschi (2014) commented as follows on stomach data regarding trout in pike stomachs in 2011, ***"Trout were encountered in five sites (9 stomachs), and were only important in Lough Sheelin in 2011 (17% IRI), where despite a low occurrence rate of only 7%, their weight contribution to the diet was 48%. This was primarily due to two large relatively undigested trout, highlighting the bias when using only stomach contents"***. It is not the intention here to take the findings of Pedreschi (2014) out of context, however, it is clear that Pedreschi (2014) was aware that biases are possible when using data obtained from stomach content analysis. Regarding the general estimate of 118 tonnes of trout eaten in 1995, a full review of this figure was requested from Inland Fisheries Ireland scientific staff in a high level-meeting with the Irish Federation of Pike Angling Clubs in April 2009. A further request was made by the Irish Pike Society in April 2016 in relation to same.

To date, a full analysis of the methodology and assumptions used to support this tonnage is still awaited from Inland Fisheries Ireland.

6.2.3 TIMING OF SAMPLING

The method of Stomach Content Analysis (SCA) was the primary method (pre Pedreschi *et al*. (2014)) used to establish what a pike had consumed. As SCA provides only a snap-shot in time of pike consumption, the timing of sampling becomes critical, hence the actual sample timing of pre-2014 pike diet results in severe flaws with respect to previous IFI research.

Pre-2014 SCA was in most cases undertaken on pike caught in gill-nets or by electrofishing during annual pike management operations that occur when pike are spawning on "designated wild brown trout fisheries". Pike spawn in shallow bays that predominantly have small rivers or feeder streams entering them, and hence migrate from deep water to these habitats in numbers from late December. Whilst in deep water, pike are feeding predominantly on pelagic or benthic positioned species such as roach, perch, bream and hybrids. Prior to spawning, pike feed more often in order to build condition in preparation for the rigours of spawning. As pike begin spawning as early as late January, the increased food intake usually occurs between October and January.

Trout spawn in many of the small rivers and feeder streams that flow into pike spawning bays. The migration of trout to their spawning rivers and streams usually occurs around November. When spawning is complete, trout migrate back to the lake and re-enter the shallow bays. According to IFI studies, the now spawned trout can stay in the vicinity for quite some time after spawning before dispersing later back into the main body of the lake - O'Grady & Delanty (2012).

2. Most trout migrating to the lake appear to stay in areas near the outfall of their natal river in springtime.

Excerpt from "A Survey of Adult Fish Stocks in Lough Corrib" O Grady et al. (2012)

There is now a period where numbers of pike that are feeding prior to spawning and numbers of fatigued post-spawn trout are in close proximity for a short period of time. At this time, trout - amongst other species - are consumed in small numbers by pike. However, as pike are gillnetted or electrofished very shortly after this time, it is reasonable to assume that SCA only will show that most specimens sampled with food in their stomachs will contain some trout.

At this time of year there is a large timeframe between when a pike consumes a food item and when that item is evacuated (digested) out of the stomach. Water temperatures at this time of year are typically between 2 deg.C and 6 deg.C. Pike metabolism is, like many fish species, determined by their surrounding water temperature, and therefore gastric evacuation can take weeks at this time of year. According to research by Diana (1979a) contained within the **"Synopsis of Biological Data on the Northern Pike: Esox Lucius" - Food and Agricultural Organisation of the United Nations (1988),** the time between meals for pike in January is between days. If a pike consumes a trout in this period, Diana's data highlights how infrequent this occurrence is in this period, and also how wide the window of opportunity is in relation to finding a trout in a gillnetted pike.

Subsequently, the timing of most previous SCA analysis undertaken leads to error, as trout will appear significantly more often in pike diet at this time of year than any other. The assumption that this dietary pattern is constant throughout each year further compounds the errors in past analysis of Irish pike diet.

Daily ration of northern pike for various time-periods sampled during 1976-78 in Lac Sainte Anne (Diana, 1979a)

Time period	Sex	Meal size (kcal/kg)	Time between meals (days)	Daily ration ($kcal/kg\ day^{-1}$)
May	Male	30.4	3.1	9.6
	Female	32.4	2.3	14.0
June	Male	35.0	1.9	18.1
	Female	66.5	2.2	30.9
July	Male	36.5	2.1	11.5
	Female	54.1	2.8	19.2
August	Male	23.1	3.8	6.0
	Female	25.4	2.6	9.8
September	Male	22.5	3.5	6.4
	Female	31.4	4.2	7.5
October	Male	17.4	2.2	7.9
	Female	16.5	1.9	8.6
January	Male	9.8	34.0	0.3
	Female	22.0	23.0	1.0
March	Male	10.9	22.0	0.5
	Female	21.6	26.0	0.8
April	Male	14.8	59.0	0.3
	Female	14.8	59.0	0.3
Winter	Male	10.6	25.0	0.4
	Female	21.8	25.0	0.9
Summer	Male	30.8	2.8	11.4
	Female	47.0	2.7	17.4

Excerpt from "Synopsis of Biological Data on the Northern Pike: Esox Lucius" - Food and Agricultural Organisation of the United Nations (1988)

To date there has been no intensive study into the seasonal variation of pike diet in Irish fisheries. This has arguably resulted in pike management policy being formulated on the basis of SCA conducted at a time that favours the detection of trout in a pike's diet. The most recent research on the diet of Irish pike by Pedreschi *et al.* (2014) recognises and highlights this failing by stating:

"Research should continue to investigate stomach contents on a longer-term sampling plan to see if they better reflect SIA values, and to build stronger estimates of individual specialisation and diet overlap. Sampling using a dedicated plan rather than opportunistic sampling would also facilitate a wider range of analyses and hypothesis testing, including, for example, comparisons between seasonal variations in diet."

6.2.4 SAMPLING ANOMALIES WITH PARTICULAR REFERENCE TO LOUGH SHEELIN (1978 TO 2006)

Using the Freedom of Information legislation in 2008, a 31-year period of raw data from the Lough Sheelin annual stock surveys, which are conducted in March each year, was requested. A 29-year window from 1978 to 2006 is examined in this section, as this particular timeframe is referenced in several documents produced by Inland Fisheries Ireland (See Section 6.1).

The Central Fisheries Board, now Inland Fisheries Ireland, received €500 from the Irish Federation of Pike Angling Clubs for the Freedom of Information request (Ref: FOI/145/08/C). The information provided appeared to be missing significant portions of data, therefore an appeal was forwarded to the Central Fisheries Board in respect of this. The response to the appeal confirmed that "a full review of the information provided" had taken place and "that no additional information is available". It is on the basis of the confirmation that there is no outstanding information, that the review of FOI/145/08/C is conducted in this section as follows.

Pike diet over the 29-year timeframe 1978 to 2006 is examined for:

- Pike >60cm in length;
- Pike from 40cm to 59.9cm and
- Pike <40cm in length.

The above size parameters are chosen and examined here to allow the reader to consider the validity - or otherwise - of the bedrock of research on pike diet used by Inland Fisheries Ireland, to support pike management.

FOI/145/08/C shows that during the 29-year timeframe 2315 pike were captured during the annual Spring surveys. 1716 (i.e. 74%) are recorded on the received data sheets, therefore the remaining 599 pike are, for reasons unknown, excluded from the data sheets. Of the 74% of pike recorded, 22% had food in their stomachs. Of the 22% recorded as having food in their stomachs, 12% were found to contain wild trout, therefore 88% of those stomachs containing food contained something other than wild trout. The basic fact is that percentages alone only tell part of the story. For example, it is a fact that the FOI response indicates that only 46 pike captured in 29 years during the Lough Sheelin Spring surveys are recorded as having eaten wild trout. As stated, this data is the bedrock for pike management in Ireland.

It is considered that the data available for Lough Sheelin between 1978 and 2006 represents the largest collated data base of all Irish fisheries. However, FOI/145/08/C illuminates many failings in that data as a longitudinal study. The examination of FOI/145/08/C, which is presented in the following tables and pie charts, represents the actual raw data base from which Inland Fisheries Ireland draws conclusion with regard to the dietary habits of Irish pike living in fisheries along with wild trout. The data base is based upon a 'snap-shot' look into pike feeding habits at a particular time of year.

The research is conducted with gill-nets, which are known to induce regurgitation of food by fish captured in the nets. There is little evidence to suggest that the research considers external factors such as seasonal spatial distribution of species. Furthermore, the research is not backed up by a corroborating scientific methodology; e.g. Stable Isotope Analysis. To our knowledge, the conclusions stemming from this data base have never been internationally peer reviewed.

It is incumbent on the scientific information that continues to support a pike management strategy in Ireland, costing the Irish Exchequer millions of euros to sustain, to be clear, concise and infallible. The following overview seeks to examine that scientific information.

6.2.4.1 DATA REVIEW FOR PIKE > 60CM IN LENGTH (1978-2006):

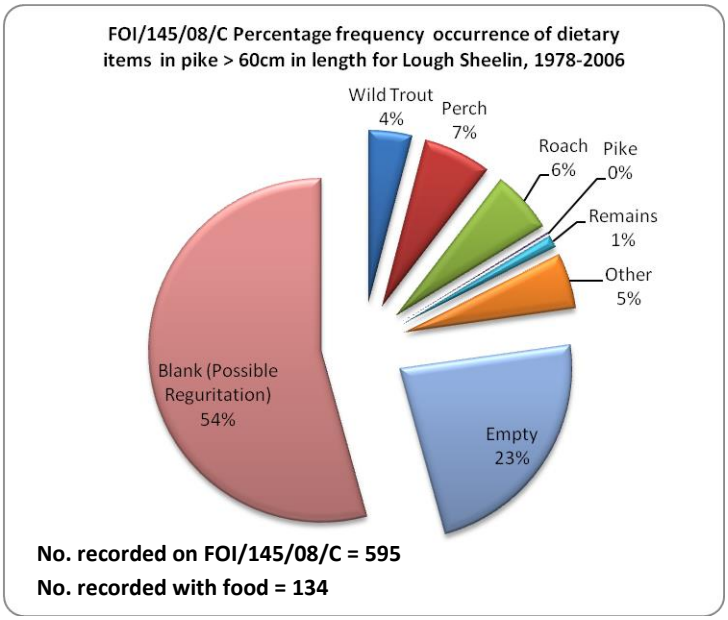
FREEDOM OF INFORMATION REQUEST FOI/145/08/C - STOMACH SAMPLING DATA FOR PIKE >60CM IN LENGTH (1978-2006)											
Year	Annual Spring Survey Y/N	No. of Pike Recorded on Data Sheets	No. of Pike Stomachs Containing a Particular Food Sample								
			Wild Trout	Farmed Trout	Perch	Roach	Pike	Remains	Other	Empty	Blank (No Data)
1978	Y	0	No pike of over 60cm								
1979	Y	7	1	2					1		3
1980	Y	16	3	1					1		11
1981	Y	32	9		2		1			1	20
1982	Y		No data provided for any species with the exception of trout								
1983	Y	49	3		11	2			6	15	12
1984	Y	12	Pike sizes only - No pike stomach sampling data available								12
1985	Y		No data provided for any species								
1986	Y	19	1		3	4				12	0
1987	Y		No data provided for any species								
1988	Y		No data provided for any species								
1989	Y	9	Pike sizes only - No pike stomach sampling data available								9
1990	Y	9	Pike sizes only - No pike stomach sampling data available								9
1991	N		No annual survey								
1992	Y	17	Pike sizes only - No pike stomach sampling data available								17
1993	Y	19	Pike sizes only - No pike stomach sampling data available								19
1994	Y	17	Pike sizes only - No pike stomach sampling data available								17
1995	Y	10	Pike sizes only - No pike stomach sampling data available								10
1996	Y	27	Pike sizes only - No pike stomach sampling data available								27
1997	N		No annual survey								
1998	N		No annual survey								
1999	Y	37	Pike sizes only - No pike stomach sampling data available								37
2000	Y	46	2		7	7		6	11	12	1
2001	Y	60	1		7	6			3	32	11
2002	Y	39	3		1	6			2	10	17
2003	Y	79	1			3		1	2	20	52
2004	Y	31				4			2	23	2
2005	Y	33	Pike sizes only - No pike stomach sampling data available								33
2006	Y	27			7	3				12	5
TOTAL		**595**	**24**	**3**	**38**	**35**	**1**	**7**	**28**	**137**	**324**

Note: Two stomachs are recorded twice - i.e. one containing perch and trout; one containing perch and roach. On an appeal of FOI/145/08/C, the considerable blank columns on the stomach content data sheets was queried, to which a response was received from the Central Fisheries Board (now Inland Fisheries Ireland), to advise upon capture, that ***"pike often evacuate their stomachs"*** and that ***"blank columns reflect empty stomachs".***

COMMENT ON FOI/145/08/C STOMACH CONTENT DATA FOR PIKE >60CMS:

- Inland Fisheries Ireland refers to a sampling period 1978 to 2006. In fact, FOI/145/08/C shows that stomach content data is available for only 11 of those 29 years, i.e. 1979, 1980, 1981, 1983, 1986, 2000, 2001, 2002, 2003, 2004, 2006 (i.e. totalling 405 pike over 60 cm in length).
- There are a further 190 pike >60cm recorded for the years 1984, 1989, 1990, 1992, 1993, 1994, 1995, 1996, 1999, 2005; however stomach sampling data is not provided for these 190 pike, which presumably, if available, would have been made available under FOI/145/08/C.
- No sampling data for any pike was provided for the years 1982, 1985, 1987, 1988, although it is known that a total of 325 pike were captured during the Spring surveys carried out in those years - ref: FOI/145/08/C.
- Spring surveys were not carried out at all in 1991, 1997 and 1998.
- No pike >60cm in length was sampled in 1978; however, only 24 are recorded in all size parameters, of a total of 32 pike captured in the Spring survey - ref: FOI/145/08/C - therefore 25% are unaccounted for.

STATISTICS FOR FOI/145/08/C STOMACH CONTENT DATA FOR PIKE >60CMS:



FACT: Between 1978 and 2006, FOI indicates that only 24 pike stomachs examined in the Spring surveys contained a wild trout!

AMBIGUITY BETWEEN FOI/145/08/C AND INLAND FISHERIES IRELANDS' SCIENTIFIC DATA REPORTS:

- O'Grady & Delanty (2008) – *See Section 6.1* & O'Grady *et al.* (2008) both show that, for pike >60cm captured in the Spring surveys over 29 years, 324 pike were examined, of which 149 contained food. In contrast, FOI/145/08/C shows that in fact, of the 595 pike recorded on the FOI data sheets, only 134 are recorded as containing food. Therefore, the aforementioned documents both include an extra 15 stomachs that are unaccounted for under FOI/145/08/C. To put this into perspective, if one considers that only 24 stomachs in 29 years contained a wild trout, then 15 stomachs unaccounted for is a credible concern.

- Further to the above, a presentation made to the Pike Policy review group in November 2011 was entitled "The Necessity for Controlling Pike Stocks in Some Quality Irish Wild Brown Trout Managed Lake Fisheries". The presentation showed that for pike >60cm captured in the Spring surveys over 29 years, 324 pike were examined, of which 175 contained food - *See excerpt in Section 6.1*. Having discussed in the previous point that FOI/145/08/C proves that only 134 pike stomachs contained food, in this instance it is stated that 175 stomachs contained food, in contrast to the 149 stomachs stated in O'Grady & Delanty (2008) & O'Grady *et al.* (2008). The apparent further inaccuracy contained in the scientific information produced by Inland Fisheries Ireland raises increasing concern as to the general credibility of the information.

6.2.4.2 DATA REVIEW FOR PIKE 40CM TO 59.9CM IN LENGTH (1978-2006)

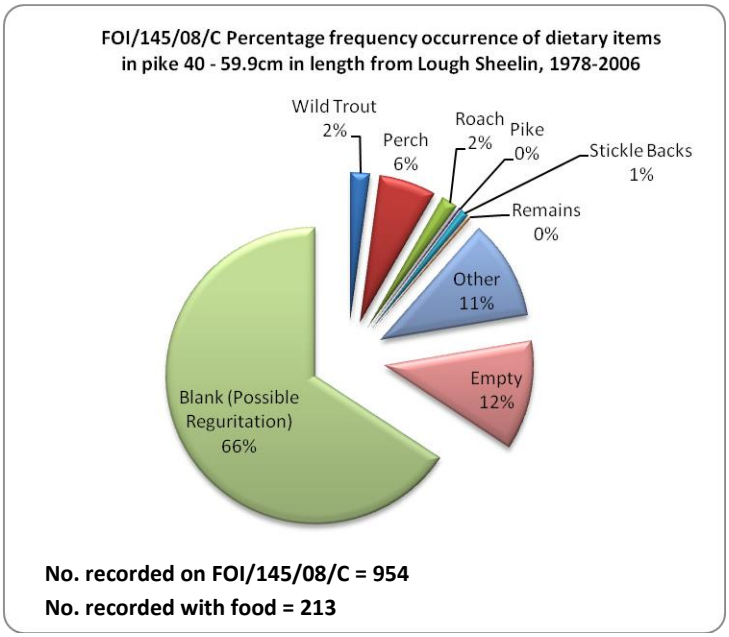
FREEDOM OF INFORMATION REQUEST FOI/145/08/C - STOMACH SAMPLING DATA FOR PIKE 40CM TO 59.9CM (1978-2006)												
Year	Annual Spring Survey Y/N	No. of Pike Recorded on Data Sheets	No. of Pike Stomachs Containing a Particular Food Sample									
			Wild Trout	Farmed Trout	Perch	Roach	Pike	S/Backs	Remains	Other	Empty	Blank (No Data)
1978	Y	20	2	4				4	1	3	6	0
1979	Y	25	1	16	1			2				5
1980	Y	45	3		1			1		10		30
1981	Y	64	11		4		1		1	3		44
1982	Y		No data provided for any species with the exception of trout									
1983	Y	144	2		35	1		1		20	28	57
1984	Y	60	Pike sizes only - No pike stomach sampling data available									60
1985	Y		No data provided for any species									
1986	Y	44	1		8	4				8	22	1
1987	Y		No data provided for any species									
1988	Y		No data provided for any species									
1989	Y	15	Pike sizes only - No pike stomach sampling data available									15
1990	Y	27	Pike sizes only - No pike stomach sampling data available									27
1991	N		No annual survey									
1992	Y	25	Pike sizes only - No pike stomach sampling data available									25
1993	Y	40	Pike sizes only - No pike stomach sampling data available									40
1994	Y	27	Pike sizes only - No pike stomach sampling data available									27
1995	Y	92	Pike sizes only - No pike stomach sampling data available									92
1996	Y	81	Pike sizes only - No pike stomach sampling data available									81
1997	N		No annual survey									
1998	N		No annual survey									
1999	Y	45	Pike sizes only - No pike stomach sampling data available									45
2000	Y	34			1	4				14	14	1
2001	Y	70			3	4		1		14	17	31
2002	Y	35			1	1				2	11	20
2003	Y	19				1	1			3	8	6
2004	Y	10				1				4	3	2
2005	Y	16	Pike sizes only - No pike stomach sampling data available									16
2006	Y	16			5	1				3	5	2
TOTAL		**954**	**20**	**20**	**59**	**17**	**2**	**9**	**2**	**84**	**114**	**627**

Note: Two stomachs recorded as roach contained unidentified cyprinid fry. Stomachs recorded as 'other' contained invertebrates, snails; some stocked farmed trout - i.e. over two years only, 1978/79, frogs, etc. On an appeal of FOI/145/08/C, the considerable blank columns on the stomach content data sheets was queried, for which a response was received from the Central Fisheries Board (now Inland Fisheries Ireland), to advise that upon capture, ***"pike often evacuate their stomachs"*** and that ***"blank columns reflect empty stomachs".***

COMMENT ON FOI/145/08/C STOMACH CONTENT DATA FOR PIKE 40CM TO 59.9CMS:

- Inland Fisheries Ireland refers to a sampling period 1978 to 2006. In fact, FOI/145/08/C shows that stomach content data is available for only 12 of the 29 years, i.e. 1978, 1979, 1980, 1981, 1983, 1986, 2000, 2001, 2002, 2003, 2004, 2006 (totalling 526 pike of between 40cm to 59.9cm in length).
- There are a further 428 pike of between 40cm to 59.9cm recorded for the years 1984, 1989, 1990, 1992, 1993, 1994, 1995, 1996, 1999, 2005; however, stomach sampling data is not provided for these 428 pike, which presumably, if available, would have been made available under FOI/145/08/C.
- No sampling data for any pike was provided for the years 1982, 1985, 1987, 1988, although it is known that a total of 325 pike were captured during the Spring surveys carried out in those years - ref: FOI/145/08/C.
- Spring surveys were not carried out at all in 1991, 1997 and 1998.

STATISTICS FOR FOI/145/08/C STOMACH CONTENT DATA FOR PIKE 40CM TO 59.9CMS:



FACT: Between 1978 and 2006, FOI indicates that only 20 pike stomachs examined in the Spring surveys contained a wild trout!

AMBIGUITY BETWEEN FOI/145/08/C AND INLAND FISHERIES IRELANDS' SCIENTIFIC DATA REPORTS:

- Inland Fisheries Ireland (2011) - See excerpt Section 6.1, O'Grady & Delanty (2008) and O'Grady *et al.* (2008) show that for pike from 40cm to 59.9cms captured in the Spring surveys over 29 years, 386 pike were examined, of which 122 contained food. FOI/145/08/C shows that 954 pike are recorded on the data sheets, of which 213 are recorded as containing food. This anomaly represents the significant difficulty one is presented with when trying to examine and analyse pike dietary data provided by Inland Fisheries Ireland.

  As mentioned previously in this section, only 74% of the pike captured in the 29 years during the Spring surveys are actually recorded in the FOI/145/08/C data sheets. Therefore, it is the contention of this document that the pie chart above represents the most accurate overview of the research data base for pike from 40cm to 59.9cms.

6.2.4.3 DATA REVIEW FOR PIKE <40CM IN LENGTH (1978-2006)

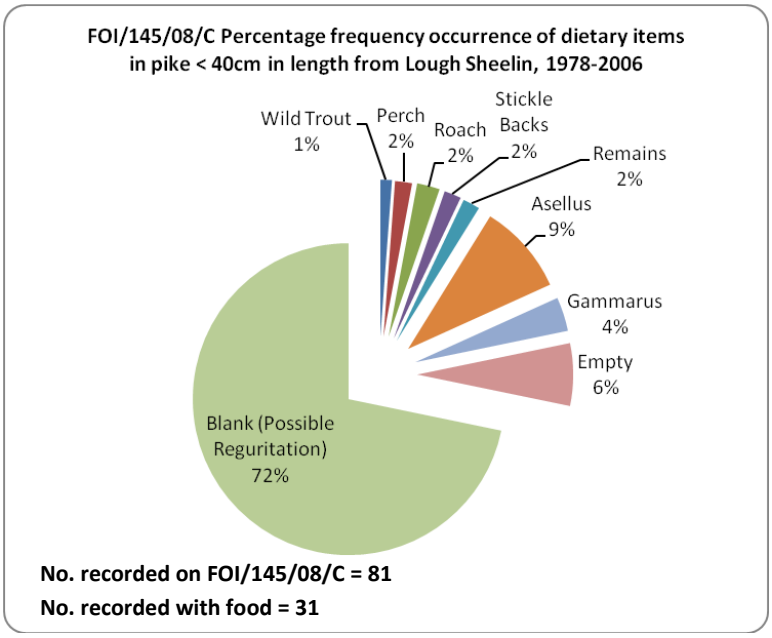
FREEDOM OF INFORMATION REQUEST FOI/145/08/C - STOMACH SAMPLING DATA FOR PIKE <40CM IN LENGTH (1978-2006)												
Year	Annual Spring Survey Y/N	No. of Pike Recorded on Data Sheets	No. of Pike Stomachs Containing a Particular Food Sample									
			Wild Trout	Farmed Trout	Perch	Roach	S/Backs	Remains	Asellus	Gammarus	Empty	Blank (No Data)
1978	Y	4			1		3					
1979	Y	1										1
1980	Y	7							2	1		5
1981	Y	5							1	1		4
1982	Y		No data provided for any species with the exception of trout									
1983	Y	13			1				1	1	3	7
1984	Y	1	Pike sizes only - No pike stomach sampling data available									1
1985	Y		No data provided for any species									
1986	Y	14	2			1		1	4		4	2
1987	Y		No data provided for any species									
1988	Y		No data provided for any species									
1989	Y	0	Pike sizes only - No pike stomach sampling data available									0
1990	Y	12	Pike sizes only - No pike stomach sampling data available									12
1991	N		No annual survey									
1992	Y	10	Pike sizes only - No pike stomach sampling data available									10
1993	Y	11	Pike sizes only - No pike stomach sampling data available									11
1994	Y	15	Pike sizes only - No pike stomach sampling data available									15
1995	Y	13	Pike sizes only - No pike stomach sampling data available									13
1996	Y	14	Pike sizes only - No pike stomach sampling data available									14
1997	N		No annual survey									
1998	N		No annual survey									
1999	Y	4	Pike sizes only - No pike stomach sampling data available									4
2000	Y	5						1	3		1	
2001	Y	3							1	2		1
2002	Y	4							1			3
2003	Y	19				1			3	1	2	12
2004	Y	5				2		1			1	1
2005	Y	6	Pike sizes only - No pike stomach sampling data available									6
2006	Y	1			1							
TOTAL		**167**	**2**	**0**	**3**	**4**	**3**	**3**	**16**	**6**	**11**	**122**

Note: Three stomachs are recorded twice i.e. each contained both Asellus and Gammarus. On an appeal of FOI/145/08/C, the considerable blank columns on the stomach content data sheets was queried, for which a response was received from the Central Fisheries Board (now Inland Fisheries Ireland), to advise that upon capture, ***"pike often evacuate their stomachs"*** and that ***"blank columns reflect empty stomachs".***

COMMENT ON FOI/145/08/C STOMACH CONTENT DATA FOR PIKE < 40CM:

- Inland Fisheries Ireland refers to a sampling period 1978 to 2006. In fact, stomach content data was provided for only 12 of the 29 years, i.e. 1978, 1979, 1980, 1981, 1983, 1986, 2000, 2001, 2002, 2003, 2004, 2006 (totalling 81 pike <40cm in length).
- There are a further 86 pike <40cm recorded for the years 1984, 1989, 1990, 1992, 1993, 1994, 1995, 1996, 1999, 2005; however, stomach sampling data is not provided for these 86 pike, which presumably, if available, would have been made available under FOI/145/08/C.
- No sampling data for any pike was provided for the years 1982, 1985, 1987, 1988 although it is known that a total of 325 pike were captured during the Spring surveys carried out in those years - ref: FOI/145/08/C.
- Spring surveys were not carried out at all in 1991, 1997 and 1998.

STATISTICS FOR FOI/145/08/C STOMACH CONTENT DATA FOR PIKE < 40CMS:



FACT: Between 1978 and 2006, FOI indicates that only 2 pike stomachs examined in the Spring surveys contained a wild trout!

AMBIGUITY BETWEEN FOI/145/08/C AND INLAND FISHERIES IRELANDS' SCIENTIFIC DATA REPORTS:

- Inland Fisheries Ireland (2011) - See excerpt Section 6.1, O'Grady & Delanty (2008) and O'Grady *et al.* (2008) show that for pike from < 40cm captured in the Spring surveys over 29 years, 67 pike were examined, of which 51 contained food. FOI/145/08/C shows that 81 pike are recorded on the data sheets, of which 31 are recorded as containing food. This shows that each of the respective data reports refer to an additional 20 pike as containing food on top of those recorded on the FOI/145/08/C data sheets. This again questions the credibility of the research data presented.

  As mentioned previously in this section, only 74% of the pike captured in the 29 years during the Spring surveys are actually recorded in the FOI/145/08/C data sheets. Therefore, it is the contention of this document that the pie chart above represents the most accurate overview of the research data-base for pike from 40cm to 59.9cms.

6.2.5 THE FAILURE OF GILL-NETS AS A SAMPLING TOOL FOR PIKE DIETARY ANALYSIS

The analysis of pike diet relies on the capture of numbers of specimens, which has been achieved primarily by gill-netting during Pike Management Operations. There are many inherent flaws with this method of capture with respect to Pike dietary analysis.

As mentioned in section 6.2.4, only 22% of pike recorded in FOI/145/08/C data sheets contained food. For those remaining, 15% are recorded as empty and 63% are left blank. As stated, an appeal to FOI/145/08/C was initiated under Freedom of Information to Inland Fisheries Ireland (then Central Fisheries Board), to request clarification as to why stomach content columns were left blank. The response received stated that ***"upon capture in a net, or by rod, pike often evacuate their stomachs"*** and that ***"blank columns reflect empty stomachs".*** The issues of 'empty stomachs' and the 'regurgitation of food' will be discussed in the following sections.

6.2.5.1 EMPTY STOMACHS

The 1978 to 2006 stock sampling took place in Spring, primarily, it appears, to coincide with the pike spawning period. Craig (1996) commented on the migration of pike to their spawning grounds, stating that some river pike travelled 15km to reach their spawning grounds. A spawning migration of pike would likely lead to them being susceptible to capture in survey nets. This spawning period, itself, has been linked to a spawning fast in pike. As such, it may be reasonable to suggest that feeding opportunism rather than selectivity is more likely.

Spring sampling can, by its very nature, allow increased capture of pike than can, for instance, summer sampling conducted under the Water Framework Directive, simply because of the previously mentioned migration. As such, Spring sampling may provide sufficient numbers of pike required to allow an examination of growth rates of individual pike and length frequency studies. Dietary studies are a different and more complicated matter.

Many authors - e.g. Dominguez & Pena (2000), King & Kirrane (1994), O'Grady & Delanty (2003) - link the spawning period to a large percentage of empty stomachs. Dominguez & Pena (2000) found up to 84% empty stomachs in February over six years from 1982 to 1987 in the Esla Basin. O'Grady & Delanty (2003) found 64% empty stomachs in Lough Arrow in 2002. However, empty pike stomachs in Ireland are disregarded in the analysis of pike diet, yet they clearly can represent a considerable unknown quantity. This unknown quantity allows assumptions to be made, based primarily on a small number of stomachs containing food (See Section 6.2.4). The assumption is then applied to the entire pike stock.

As discussed in Section 6.2.2.2, 80% of the Lough Corrib pike stomachs referred in Toner (1959) were empty, yet a projected pike diet for a whole year of over 1000% for 100% of the pike captured, was used as a basis to support the removal of pike. Furthermore, the data flowing from this projection continues to be used by Inland Fisheries Ireland today. The inference here is that the lack of available scientific data stemming naturally from empty stomachs during Spring, while uninformative, should not be disregarded or presumed.

6.2.5.2 REGURGITATION OF FOOD

In contrast to empty stomachs, the regurgitation of food by pike may be relevant in all dietary sampling, particularly when gill-nets are used, irrespective of the season. It is important to note that the dominant sampling method used in the 29-year sampling period on Lough Sheelin during 1978-2006 discussed in section 6.2.4 was gill-netting.

Treasurer (1988), Dominguez & Pena (2000) and Healy (1956) linked regurgitation of food from pike stomachs with being captured using gill-nets. Alternative techniques were promoted by Dominguez & Pena (2000) such as electro-fishing and traps to study the diet of 4,362 pike in Northwest Spain, so as to reduce regurgitation. Treasurer (1988) linked high levels of regurgitation to gill-nets being set overnight and to water temperature, with up to 84% regurgitation found in pike during Summer sampling. It was further suggested that gill-netting is an unsatisfactory capture method, leading to a false estimate of empty stomachs. Treasurer (1988) also suggested that failure to critically appraise regurgitation may mislead, in respect of the predation on prey species.

Regarding the Spring surveys on Lough Sheelin, gill nets are set overnight, and the likelihood of regurgitation is therefore scientifically supported. Although there appears to be no evidence to suggest that Inland Fisheries Ireland has in the past considered the bias of using gill-nets and the resultant regurgitation in the examination of the results, there does now appear to be some acknowledgement that gill-nets do lead to biases. Delanty *et al.* (2016) state in relation to a fish stock survey of Lough Ree carried out in 2014, ***"that many of the pike examined had no food in their stomachs"***. It was stated that ***"this is a common feature of pike caught in gill nets. Many of these fish tend to regurgitate their stomach contents when caught in a net".***

In contrast to Inland Fisheries Ireland's theory that pike feed selectively on trout, Pedreschi (2014) has provided ground-breaking scientific evidence that pike are 'opportunist feeders'. This evidence is based principally upon a scientific technique known as 'Stable Isotope Analysis' (SIA). Paradis *et al.* (2008) discuss the merits of combining Stable Isotope Analysis and 'snap-shot' data in their research. To date, and since 1978, Inland Fisheries Ireland has relied solely on 'snap shot' stomach sampling by capturing fish principally in gill-nets.

The inference here is that the current body of research data into the diet of Irish pike, which has been collected over many decades, has relied principally upon gill-nets to provide that research data - a technique which is clearly inherently flawed.

6.2.6 SECTION SUMMARY CONCLUSION: PAST RESEARCH RELATED TO THE DIET OF IRISH PIKE

It is clear that the study of Irish pike diet prior to the modern research of Pedreschi *et al*. (2014) was inherently flawed due to a number of factors. The investigation and analysis undertaken in section 6 suggests that the scientific research currently supporting pike management in Ireland is based largely upon inaccurate data collation and representation, flawed sampling techniques, and arguably exaggerated conclusions supporting a theory that pike have a preference for feeding on trout.

In Section 6.1 the current Inland Fisheries Ireland position paper is discussed i.e. **"The Ecology, Biology and Management of Pike in Irish Waters with Particular Reference to Wild Brown Trout Lake Fisheries"** O'Grady & Delanty (2008). It is the contention of this document that this position paper inaccurately assumes that pike do not feed pelagically and that they will target trout over any other species, even when other species are significantly more available and accessible to pike as food.

With regard to the study of the diet of pike on Lough Sheelin (1978 – 2006), there is an unquestionable anomaly with regard to how this information is presented in a number of different papers produced by Inland Fisheries Ireland and its predecessors and the actual factual data obtained for that period using Freedom of Information legislation. There is no correlation between the data, and the credibility of the data is therefore open to question.

Of considerable concern is that the **"The Ecology, Biology and Management of Pike in Irish Waters with Particular Reference to Wild Brown Trout Lake Fisheries"** O'Grady & Delanty. (2008), is not an internationally peer-reviewed paper, as appears to be the case with many pike-related position papers and pike dietary studies undertaken by Inland Fisheries Ireland and its predecessors IFI prior to Pedreschi *et al*. (2014).

Regarding O'Grady *et al.* (1996), the resulting estimates of the predation of pike upon trout continue to be presented by Inland Fisheries Ireland as justification for removing pike, yet this estimate relies upon unsubstantiated assumptions. Furthermore, this paper again is an internal report, and the methodology, assumptions relied upon, and calculations have not been subjected to international peer review. It is notable that Inland Fisheries Ireland have not responded to requests for clarification regarding this paper.

Stomach Content Analysis is recognised as having limited applicability in relation to establishing dietary habits, as it can only provide a snap-shot in time of what has been consumed, providing the stomach contents have not already been digested, or ejected. The susceptibility of weakened or dead post-spawning trout to opportunistic pike predation during the Spring sampling periods remains a distinct possibility that has not been studied by IFI. In addition, the absence of a study undertaken by IFI and its predecessors into seasonal variations in pike diet as recommended in O'Grady *et al.* (1996) represents a significant failing with regard to advancing knowledge regarding Irish pike.

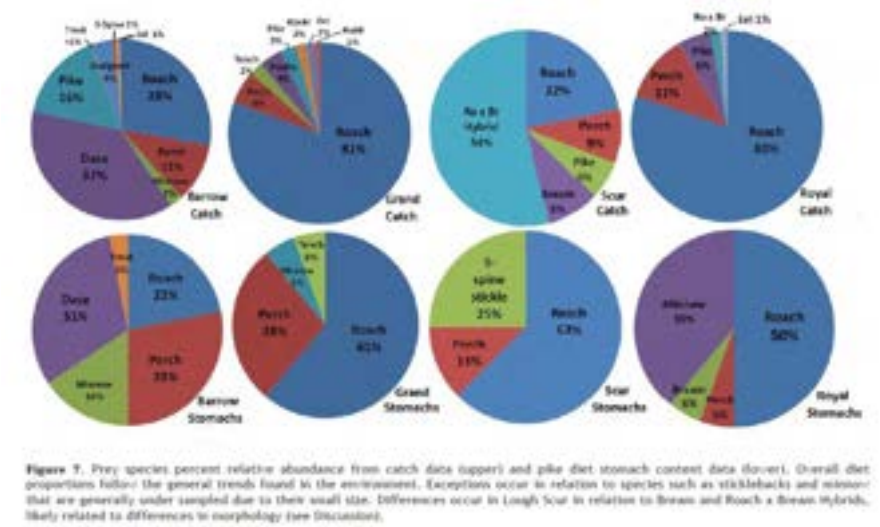
Considering all of the above, there appears to be considerable evidence to suggest that the validity and accuracy of the past research into the diet of pike is open to question, and as such is difficult to describe as acceptable. Furthermore, the use of past research data as a foundation for future scientific studies will likely have a negative impact on the reliability of those studies.

7 CURRENT RESEARCH RELATED TO THE DIET OF IRISH PIKE

A cornerstone of justification for pike management operations is that pike predominantly target and predate on salmonids, even where other prey species are available and more abundant. Recent research has shown this to be unfounded and revealed a number of flaws in the methodology and findings of over six decades of research undertaken by IFT, CFB and IFI relating to the diet of Irish pike.

7.1.1 THE DIET OF PIKE IN IRISH WATERCOURSES

In 2014, a PhD study was undertaken by University College Dublin in collaboration with IFI in order to accurately analyse the diet of pike. The report **"The Diet of Pike in Irish Watercourses"** - Pedreschi *et al*. (2014) highlighted many new characteristics related to pike diet, feeding habits and preferences. As the table below illustrates, the dominance of one prey species over another in a pike's diet is solely dependent on its availability. Therefore, if roach are the most numerous prey species, they will feature as the most targeted prey fish. Similarly if trout are the most numerous prey species, they will feature as the most targeted prey fish. The report goes further in dispelling the bias towards trout as a prey item by stating that pike are mainly opportunistic feeders. As roach and perch numbers are typically higher than trout numbers by a significant multiple, then opportunities to consume these species will arise far more often, as illustrated by the following table.



Excerpt from "The Diet of Pike in Irish Watercourses" - Pedreschi *et al*. (2014)

The report paid caution to current pike management policy and operations in light of this new research.

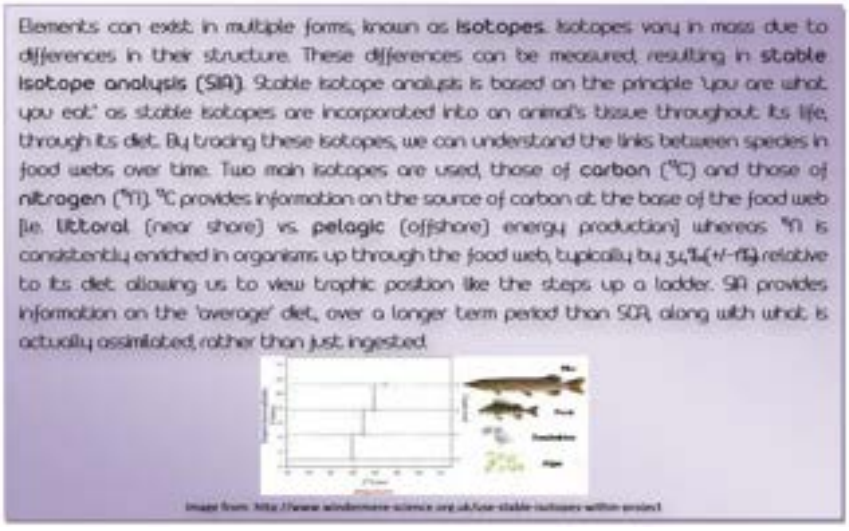
"Managers need data on feeding habits, interactions and competition in order to gain a better insight into community dynamics and manage waterways as ecosystems rather than separate components. This study for the first time provides this information across lake, river and canal habitats, representing a cross-section freshwater ecosystem diversity, and inputting directly into the better conservation and management of this economically and ecologically important species."

7.1.1 THE DIET OF PIKE IN IRISH WATERCOURSES CONTD.

There were two sampling methods used in this study. The first was stomach contents analysis of captured pike. This was a method also used in previous studies. However, as discussed previously, "**stomach contents analysis" (SCA)** gives only a snap-shot in time of what each pike has last consumed, and hence is not reliable in establishing the seasonal variation of what each pike consumes.

Excerpt from "The Diet of Pike in Irish Watercourses" - Pedreschi *et al.* (2014)

The second method employed in this study is known as **"stable isotope analysis" (SIA)**. This method helps to provide a much more expansive and accurate representation of a pike's diet over its lifespan, and hence can go some way to formulating seasonal dietary variation. This study was the first time that SIA was employed in order to study the diet of Irish pike. No previous studies on the subject had used this method, with just SCA and the previously discussed inherent inaccuracies being used to inform and indeed shape pike management policy.



Excerpt from "The Diet of Pike in Irish Watercourses" - Pedreschi *et al.* (2014)

7.1.1 THE DIET OF PIKE IN IRISH WATERCOURSES CONTD.

There were a number of important findings and conclusions resulting from the report **"The Diet of Pike in Irish Watercourses"** - Pedreschi *et al*. (2014), many of which revealed to the reader severe deficiencies and inaccuracies in decades of previous research undertaken by IFI, CFB and IFT. Note that pre-2014 diet research continues to be used to shape pike management policy in Ireland. Some of the most notable findings with respect to the relationship between pike and trout are shown as follows:

Diet and Trophic Variation

As expected, pike do engage in piscivory, with roach and perch being by far the most important prey species across all sites, and within each site, with the exception of Lough Sheelin in 2011 and the River Deel in 2012, where trout and pike respectively, constituted the largest fish proportion of the diet. Contrary to the expected (Kennedy 1969; O'Grady & Delanty 2008), trout made up a small proportion of the overall diet, with predation levels being similar to pike cannibalism levels. This likely reflects the relatively low numbers of trout captured in the sites sampled.

*It is generally acknowledged in the scientific literature that pike prey primarily upon fish once a length of **>10cm** has been attained (Frost 1954; Mittelback & Persson 1998; Beaudoin et al. 1999). In Ireland however, Healy (1956) stated that pike have a preference for fish when **>55cm** length, and noted that in two of the three lakes she examined, pike ate more trout than perch. This may have been due to the greater natural defences of perch (i.e. tough skin and hard spiny fin rays). More recently, O'Grady & Delanty (2008) have also highlighted the piscivorous habits of pike **>60cm**, which is further supported here, and described a preference of pike for eating trout in Lough Sheelin. As a 60cm fish in Ireland is estimated to be 5-6 years old (O'Grady and Delanty 2008), and as relatively few fish have been found to live beyond 6 years in Irish waters (Healy 1956; O'Grady & Delanty 2008), the impact of pike on brown trout may not be as drastic as previously feared, as it seems few individuals reach an age / size suitable for predating primarily on trout. The present study suggests that since the invasion of roach throughout Irish waterways, particularly since the 1970s (IFT Reports; King et al. 2011), a certain amount of predation pressure on trout in may have been alleviated. However, continued monitoring is essential for management purposes, as pike may predate more heavily on trout if roach stocks collapse, which can happen with the introduction of invasive mussels and clams.*

Excerpt from "The Diet of Pike in Irish Watercourses" - Pedreschi *et al*. (2014)

Specialisation

The degree of dietary specialisation within a species will vary according to a range of factors such as abundance, size and behaviour of prey, along with preference and phenotype of the predator (Gurtin 1996). Within this study δ15N values often ranged across nearly a full trophic level within each population, indicating a that a wide prey base is used.

Specialisation and niche overlap values were low, further reflecting that individuals often ate different things from one another. Overall the data indicates a generalist population, and the marked opportunistic nature of individuals that appear to be utilising resources in proportion to their availability in the surrounding environment. The only site that did not present a strong correlation was Lough Scur, probably due to the high proportion of roach x bream hybrids present, which do not seem to be utilised as a food source by pike. This is likely due to the fact that roach x bream hybrids often have a deeper and more flattened body in comparison to roach (Nilsson & Brönmark 2000). Despite their predatory capabilities, pike are generally cautious in the type of prey they pursue, usually selecting the least risky option rather than the most profitable prey (Hart & Hamrin 1988; Nilsson & Brönmark 1999, 2000). Handling time is very important to them as the risk of cannibalism can be high and as such pike tend to choose prey that are the easiest to manipulate and swallow, such as those with a more fusiform shape (e.g. roach instead of bream or hybrids) (Wahl & Stein 1988; Abrahams & Kattenfeld 1997; Robinson and Wilson 1998; Nilsson & Brönmark 1999).

Excerpt from "The Diet of Pike in Irish Watercourses" - Pedreschi *et al*. (2014)

Conclusions

An opportunistic feeding strategy is particularly advantageous in prey-limited temperate lakes (Chapman & Mackay 1990; Beaudoin et al. 1999; Domínguez & Pena 2000; Venturelli & Tonn 2005; 2006; Paradis et al. 2008). The present study has confirmed previous findings that pike are highly plastic in what they can utilise as a food source. This is important, as when conditions are limited in some way, they can ensure their survival through dietary flexibility (Frost 1954; Inskip 1982; Chapman et al. 1989). This flexibility is likely to have been a major factor in enabling them to adapt to a wide range of environments globally, and also enables them to adapt to perturbations through prey switching as certain species become more or less available throughout the year, or as species introductions occur (Frost 1954; Adams 1991; King et al. 2011); an extremely important attribute during these times of changing climate.

Overall it appears that, as a thoroughly efficient predator capable of dispatching any prey within its gape width, pike are inherently opportunistic, selecting only for more fusiform prey to minimise their own exposure risks when predating upon fish (Wahl & Stein 1988; Nilsson & Brönmark 1999; Domínguez & Pena 2000). This study has highlighted an unusual phenomenon in the delay of the ontogenetic dietary switch, widely reported to occur at lengths of 10-12cm (Frost 1954; Raat 1988 and references therein; Mittelback & Persson 1998). Within Ireland, stomach content data indicate that fish are more important in the diet from 40cm, and the primary food item after 60cm, however this is not clearly reflected in stable isotope values, instead a general increase in isotopic values is seen throughout life. It seems likely that as a consequence of the somewhat depaupaurate freshwater fish biodiversity, coupled with large numbers of invertebrate prey, Irish pike continue to prey on invertebrates (predominantly Asellus and Gammarus) throughout their lifetime.

This study has provided important baseline SIA information for this species in Ireland, and updated SCA data. Combined, these findings are particularly relevant in relation to the ongoing management activities, and the data from this study will contribute to policy management and plans. This research also serves to highlight the change in diet of a top predator with the introduction of an invasive species, in this case roach.

Research should continue to investigate stomach contents on a longer term sampling plan to see if they better reflect SIA values, and to build stronger estimates of individual specialisation and diet overlap. Sampling using a dedicated plan rather than opportunistic sampling would also facilitate a wider range of analyses and hypothesis testing, including for example, comparisons between seasonal variations in diet.

Managers need data on feeding habits, interactions and competition in order to gain a better insight into community dynamics and manage waterways as ecosystems rather than separate components. This study for the first time provides this information across lake, river and canal habitats, representing a cross-section freshwater ecosystem diversity, and inputting directly into the better conservation and management of this economically and ecologically important species.

Excerpt from "The Diet of Pike in Irish Watercourses" - Pedreschi *et al*. (2014)

7.1.2 INLAND FISHERIES IRELAND PIKE RESEARCH PROGRAMME 2016

It would be remiss of this document not to acknowledge the announcement by Inland Fisheries Ireland on 9th September 2016 that a new pike research programme has commenced.

IFI have stated that the research programme will "*combine archived IFI data on pike ecology with empirical research on pike feeding and on the feasibility of transferring pike between Irish waters*".

IFI also stated that a "*cutting-edge mathematical model of pike-trout interactions" is to be developed. It has been stated that "this model will take account of existing knowledge relating to the focal species, including population dynamics, life-history strategies, feeding ecology, behaviour and physiology*". It is suggested that the model "*will be designed to simulate the populations of pike and trout in a lake specified by available input data and will be validated using available survey-based time series data from Irish lakes*".

Furthermore, IFI state that "*this research will be supported by additional field work looking at the seasonal variation in the diet of pike*" and that "*Genetics samples of pike will be taken from all waters where pike are recorded during routine IFI surveys on lakes and rivers (on-going), for future analysis*".

Irish pike angling is clearly indebted to the work of Pedreschi *et.al.* (2013) and Pedreschi *et.al.* (2014b) for not only providing the only internationally peer-reviewed scientific research into the origins and dietary habits of Irish pike, but for providing a platform whereby scientific research into Irish pike will finally move into the 21st century.

Whilst it is recognised that IFI research now underway will potentially be very enlightening, it will nevertheless be necessary to cautiously welcome the research, particularly in consideration of conclusions drawn in section 6 in relation to past research. It is notable that "archived IFI data" will be used in the new research. This in itself raises justifiable questions and concerns. Further questions required of this research relate to the 'synergistic' effect on "pike-trout interactions", if one is to provide a reliable mathematical model that considers any fishery holistically, rather than concentrate specifically on just two "focal species".

In the interest of gaining a greater fundamental understanding of the research project currently being undertaken, the Irish Federation of Pike Angling Clubs presented a number of questions directly to IFI. These questions included the following:

1. How long will the project take from start to completion?
2. What are the terms of reference for the project?
3. Is there any independent input into the project methodology and analysis and if so, by whom?
4. How is the project being funded, and what is the estimated cost of the project?
5. Please provide advice on the **"mathematical model"** type that is proposed for this project.
6. Please provide a list of the specific **"archived IFI data on pike ecology"** which this project will be relying upon.
7. Please provide a list of the specific **"empirical research on pike feeding"** which this project will be relying upon.
8. Please explain what presumptions are considered by examining **"the feasibility of transferring pike between Irish waters"**
9. Please forward a precise list of all of the fisheries for which the **"seasonal variation in the diet of pike"** is being examined in this project.
10. On a fishery by fishery basis, please advise on the stomach examination methodology and capture process being used to assess the **"seasonal variation in the diet of pike"**.
11. In terms of **"genetics samples"**, please provide a precise list of the fisheries that this type of sampling applies to in this project.
12. On a fishery by fishery basis please explain the precise scientific analysis that will be applied to the **"genetic samples"** taken; e.g. stable isotope analysis; microsatellite markers, etc.
13. When do you expect to produce preliminary and final reports on the **"seasonal variation in the diet of pike"**?
14. When do you expect to produce preliminary and final reports on the **"genetic sampling"** results?
15. Can you please explain why the project is focusing on **"pike-trout interactions",** solely rather than, for instance, the synergistic effects on trout populations within different fisheries?

As of November 2016, a response to the above questions is awaited from IFI; therefore it is not possible to discuss this research project further at this time.

7.1.3 SECTION SUMMARY CONCLUSION: CURRENT RESEARCH RELATED TO THE DIET OF IRISH PIKE

Pedreschi *et al.* (2014b) presents the most current research into the diet of Irish pike. Using a combination of SIA and SCA, it is without question the most scientifically superior analysis of pike diet undertaken since research began over 60 years ago, and has presented the diet of pike in a balanced and fair manner. However, research discussed in section 6 of this document continues to be used as justification for, and the formulation of, pike management policy in Ireland.

Current research has now shown that pike are opportunistic feeders, and will feed on prey that is most numerous and hence available to them. The previously-held idea that pike specifically target trout as a preferred food item is in effect questioned.

The location of numbers of large pike in pelagic and benthic zones across a variety of water environments highlights the preference of pike to feed on cyprinids and perch that shoal in vast numbers and are hence more available as a food item. Where pike are present and hunting in shallow water zones such as charophyte beds, the most available food source will be consumed.

Previous research assumes that trout will constitute the bulk of prey consumed by pike in these areas. However, as perch and cyprinids occupy these areas in far greater numbers from May to October, they become the most available food source. These conclusions are recent in the Irish context, but it is of particular concern that IFT, CFB and IFI did not recognise, and in effect ignored, such conclusions already drawn by Frost as far back as 1954.

Frost (1954) and Lawler (1965) found that seasonal changes in the diet of the pike appeared to be related to the availability of the fish food. Different species composition in different waters results in diverging pike diets. Lawler (1965) reports that the most important food types eaten in each of several periods during the year in Naming Lake are: May and June - trout-perch (Percopsis omiscomaycus); July - spottail shiner (Notropsis hudsonius); August to September - yellow perch (Perca flavescens); October to March - sticklebacks (Pungitius pungitius and Eucalia inconstans). In Windermere (Frost, 1954), perch (Perca fluviatilis) occur in the pike diet at all times, but predominate from May to October. Char (Salvelinus willughbii) are eaten only in November and December, brown trout (Salmo trutta) to a greater extent from October to February. Sticklebacks (Gasterosteus aculeatus) and minnows (Phoxinus phoxinus) are taken in spring and summer. Such seasonal variations are associated with the changes in habits of the food species.

Excerpt from "Synopsis of Biological Data on the Northern Pike:Esox Lucius" Food and Agricultural Organisation of the United Nations (1988)

Over the past two decades, there has been significant colonisation by cyprinids and vast increases in perch populations on a number of "designated wild brown trout fisheries". The data and evidence presented throughout a number of fishery survey reports (see Section 9.4) illustrates that such newly-established and/or increased populations of cyprinids and perch have a negative effect on brown trout. This effect is amplified as cyprinid and perch populations are subject to severely reduced predation upon them as a result of pike management operations.

One objective of the current research project being undertaken by IFI is to produce a "*cutting-edge mathematical model of pike-trout interactions". If one considers that the population dynamics of all species within a fishery are inextricably linked to each other and to their environment, then one must consider that habitat loss, pollution, over-harvesting, climate change, arterial drainage schemes, over-grazing, bio-manipulation, etc., are critical contributors to the creation of a balanced and considered population model. At this time, further information is awaited.*

IFI have expended resources, at a cost to the Irish tax payer, in undertaking research into pike diet leading to the findings of the resulting report **"The Diet of Pike in Irish Watercourses"** - Pedreschi *et al*. (2014). However, these findings have yet to be considered in the formulation of pike management policy, and hence the resources used in this study have yet to deliver any meaningful return to the Irish tax payer.

8 THE EFFECT ON PIKE DIET OF SPATIAL DISTRIBUTION OF FISH SPECIES

Inland Fisheries Ireland's theory of trout selectivity in the diet of pike appears to assume that all fish species are available in the ratio of their respective biomass to each pike equally at all times of a pike's natural migration through a fishery, and in particular during the pike spawning period in Spring, and as such, pike make a selective choice of food. However, Pedreschi *et al.* (2014b) found pike to be opportunistic feeders. Therefore, how does this finding apply to instances of trout found in pike stomachs?

Gargan & O'Grady (1992) studied the feeding relationships of trout, perch and roach in Lough Sheelin from 1982 to 1984. Perch were recorded feeding in charophyte areas in Spring 1982, but also underwent spawning migrations to shallow water, winter migrations, and were found to be feeding pelagically at times. King & Kirrane (1994) found that survey nets set on Lough Arrow in Spring 1994 caught perch in moderate/large numbers in deep water, with few perch in shallow water, and recorded that ***"this type of spatial distribution represents the norm for a perch stock in an Irish lake at this time of year"***. Gargan & O'Grady (1992) suggested that roach in Lough Sheelin underwent a diel feeding migration but that they were much more restricted in their lake movements in Lough Sheelin. The spatial separation of the roach population was also suggested to reduce competition of roach for food, with both trout and perch.

The potential for seasonal spatial separation between pike and roach during Spring, and the apparent lack of roach found in pike stomachs during the Lough Sheelin Spring surveys 1978-2006 is not easily linked, nor is it discussed in the available scientific reports produced by Inland Fisheries Ireland. However, O'Grady (2006), in a review of Lough Sheelin fish stocks 2000-2006, stated that a reduction in the pike population at that time was of no surprise ***"given the fact that their major food source (roach) is no longer available"***. This comment suggests that pike must feed heavily on roach at some time during the year if a pike population is to be maintained; however, the clear evidence for this has not filtered into current scientific dietary reports. The inference here is that Inland Fisheries Ireland must be at least aware that seasonal influences on pike dietary habits take place, and that these influences detract from any presumed trout predation. It may be likely that such seasonal shifts in pike dietary habits may have some bearing on conclusions stemming from, for instance, the 118 tonnes; sometimes misquoted as 116 or 117 tonnes of trout suggested to have been eaten in Lough Corrib in 1995.

An interesting observation with regard to the 1983 Spring survey on Lough Sheelin is the number of pike stomachs containing perch. This is interesting if one looks at the tables in Sections 6.2.4.1 & 6.2.4.2. It can be seen that pike captured with perch in their stomachs exceeded those with trout by a ratio of 9:1. The ratio of perch to wild trout captured in the Spring survey during 1983 was approximately 1:1. It is recognised that the survey nets do not capture all sizes of fish. Furthermore, it is not intended that confidence is placed in the Spring surveys as representing the entire facts with regard to pike dietary habits. Nevertheless, this example is interesting in that Gargan & O'Grady (1992) commented on the close similarity in diet between trout and perch; therefore it could be argued that such heavy predation on perch, far in excess of their apparent availability in the stock, can only be of benefit to wild trout.

Craig (1996) commented that the ***"consumption of prey by pike is not seasonally constant, but varies on a monthly or possibly on a more frequent basis due to predator opportunities, prey abundances and vulnerabilities and physical conditions".***

The inference here is that the bio-manipulation of fish stocks in Irish fisheries, based upon a theory that pike select trout as a dietary item, may have more complicated factors at play and more consequences than Inland Fisheries Irelands research has shown to date.

9 PARAMETERS FOR SUCCESSFUL BROWN TROUT AND PIKE CO-EXISTENCE

The study of parameters for successful brown trout and pike co-existence was undertaken by Catherine L. Hein et. al. in 2013.

9.1 LAKE AREA

Lake area is defined as a parameter for successful co-existence and Hein's study revealed that these species could co-exist in large lakes where the lake area was greater than 4.5sqkm. All of the designated wild brown trout fisheries in Ireland, where pike management is currently practiced, are far in excess of 4.5spkm in area as the table below shows.

Fishery	Lake Area (sqkm)
Lough Arrow	12.47
Lough Carra	16.19
Lough Corrib	176
Lough Conn	57
Lough Cullin	10.2
Lough Mask	83
Lough Sheelin	19

9.2 LAKE TEMPERATURE

Lake temperature is defined as parameter for successful co-existence and Hein's study revealed that a pikes propensity to catch wild brown trout prey is minimal at water temperatures less than 10degC. The table below shows average seasonal lake temperature for a typical Irish lake with a surface area of 89 square kilometers. The table shows that for approximately 6 months of the year typical lake water temperature is below the parameter discovered in Hein's study. It must also be considered that from May to June, as temperatures increase above 10degC pike feed principally on cyprinids and perch in great numbers as these species are concentrated for annual spawning. Pike consume up to 50% of their annual food intake in this period. As lake temperatures continue to rise from July to September larger pike seek refuge from warm water and aestivate (remain dormant) until lake temperatures begin to fall again.

Depth [m]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.5*	-	5	5.5	9	13	14	16	17	17.5	10.5	-	-
6	-	5	5.5	9	13	14	15.5	17	17.5	10.5	-	-
12	-	5	5.3	9	13	14.5	15.5	17	17	10.2	-	-
18	-	5	5.3	9	13	14.5	15.5	16.5	17	10	-	-
25	-	5	5.5	8.7	11.5	14.5	15.5	16	17	10	-	-
27	-	-	-	-	11.2	14.5	-	-	-	10	-	-
30	-	-	-	8.5	-	-	-	-	-	-	-	-
* Surface.												

9.3 EXISTENCE OF ALTERNATIVE SPECIES

Hein's study states that **"The total number of species in each lake was included to represent alternate prey species, which might dampen the interaction between brown trout and pike.".** Ecological changes in Irelands designated wild brown trout fisheries have seen the proliferation of perch and cyprinid species. The most recent studies of Irish pike diet (Pedreschi, 2014) have revealed that pike will prey upon the most abundant species present in a fishery, typically roach and perch.

10 THE EFFECT OF PIKE MANAGEMENT POLICY ON WILD BROWN STOCKS

The purpose of pike management operations previously executed by IFT, CFB and now IFI is to improve the wild brown trout stock on so-called "designated wild brown trout fisheries". The following sections will illustrate that pike management operations, amongst other factors, have resulted in the opposite effect.

10.1 DAMAGE TO THE MIGRATORY SPAWNING STOCK

As previously described in Section 6.2.3 (Timing of Sampling) trout spawn in many of the small rivers and feeder streams that flow into pike spawning bays. The migration of trout to their spawning rivers and streams usually occurs around November. When spawning is complete, trout migrate back to the lake and re-enter the shallow bays. According to IFI studies, the now spawned trout can stay in the vicinity for quite some time after spawning, before dispersing later back into the main body of the lake - O Grady *et al*. (2012).

Trout spawn in their natal rivers, and hence migrate to the same river year after year, often travelling great distances. The execution of pike management operations results in many mortalities with respect to both pike and trout. This is especially concerning, as the trout returning from their spawning rivers constitute the native migratory spawning stock of that river, and a reduction in their number vastly reduces the trout recruitment potential of their natal river year on year. The effect is further reinforced by the fact that the numbers of trout captured in and around their spawning rivers are decreasing, when in fact they should be increasing due to the removal of pike year on year illustrating that the basic objective of pike management operations does not work, and has a severely negative effect on trout migratory spawning stocks. This may be one of the contributory factors for the reduction in brown trout CPUE noted on a number of "designated wild brown trout fisheries" and described in detail in Section 9.4.

Dáil Éireann - Volume 319 - 15 April, 1980
Written Answers. - Lough Corrib (Galway) Fishing.

337. **Mr. Molloy** asked the Minister for Fisheries and Forestry the number of trout per year caught by the Inland Fisheries Trust on Lough Corrib, County Galway, from 1960 to date.

Minister for Fisheries and Forestry (Mr. Power): The Inland Fisheries Trust remove predators on trout from Lough Corrib in order to improve the lake as a trout fishery. Some trout are unavoidably caught in the nets set for the predators. Trout that survive these operations are returned to the lake. The number taken by the trust each year since 1968, when records were first kept, is as follows:

Year	No. of trout released from nets and returned to lake	No. of trout found dead in nets
1968	1,905	1,130
1969	1,435	1,022
1970	1,224	943
1971	1,025	574
1972	959	552
1973	689	448
1974	775	534
1975	914	589
1976	924	724
1977	674	498
1978	573	358
1979	288	255

338. **Mr. Molloy** asked the Minister for Fisheries and Forestry if the Inland Fisheries Trust have sprayed any of the waters of Lough Corrib, County Galway with rotenone and, if so, why.

Excerpt from Dail records using IFT data showing a 78% decrease in captured trout over 11 years

10.2 INCREASE IN NUMBERS OF JUVENILE PIKE

A vast amount of international research has illustrated that removal of pike (an apex predator) from a fishery is an ineffective form of fishery management. In Ireland, removal of pike is undertaken in order to improve the conditions for survival of wild brown trout. The result of pike management operations as witnessed on the target fisheries and indicated by previous international research (**"Pike in Your Waters"** Broughton, Rickards, Fickling *et al*. (1992)) is that undesirable changes to fish population structures occur. As pike are cannibalistic, they regulate their own numbers. Removal of large numbers of older year classes means no regulation of juvenile pike. Juvenile pike feed as voraciously as any other fish species in their juvenile stage. However, at this time in their lifecycle their main food source is similar to other fish species, including trout, therefore increasing the competition for food between species. As juvenile pike reach a length of approximately 45cm, they become increasingly piscivorous. A proliferation of juvenile pike means a higher number of prey fish species are consumed at a juvenile stage. Studies have shown that pike management operations do not alter the actual pike biomass of a fishery. What they have shown is that numbers of pike increase greatly but specimens reduce in size.

The table below shows data gathered for Lough Corrib by the Inland Fisheries Trust (IFT) for the years 1961 and 1979. It is clear to see that due to pike management operations the pike population has more than doubled, while the total weight of pike or biomass was almost static. Incidentally, trout numbers decreased significantly, highlighting the ineffectiveness of pike management operations as a tool used to improve native wild brown trout stocks. The data clearly supports the substantial international science and research advising against pike management operations and detailing the adverse effects.

Gillnet Captures			
Year	No. of pike Captured	Weight of pike Captured (Tonnes)	No. of trout Captured
1961*	5000	6	3035
1979	13000	6.3	543

***trout data begins at 1968**

10.2 INCREASE IN NUMBERS OF JUVENILE PIKE CONTD.

For more than 50 years the longest and most comprehensive study of pike ecology and behaviour was conducted at Lake Windermere. Various regimes of intensive pike controls have been run and ceased over this period to monitor the effect this has on a fishery and validate related science and research. Below is an excerpt from Frost & Kipling relating to their extended research and aligning directly with modern fisheries science. It is worth noting how accurately these findings are continuously reflected in IFI fishery surveys and the cycle of predator removal following undesirable population explosions of juvenile pike and competitor species to wild brown trout.

After the initial perch population reduction, it was feared that the Windermere pike would consume more trout and that this would be unpopular with sport fishermen. It was therefore decided to reduce the pike population. After various trials gill nets, first of flax and now terylene, of 64 mm bar, were found to catch pike with a minimum of labour, and allow salmonids of up to 3 lbs (1.36 kg) to escape. Gill nets of this mesh have been used each winter from October to February, from 1944–45 to the present, and they catch pike of about 55 cm and over. Because the females grow faster than the males, the nets catch males of 4 years and older, and females of 3 years and older. From 1944 to 1979–80 12 918 pike weighing 37.7 tonnes have been removed from Windermere. Each fish is measured, weighed, sexed and aged and the stomach contents analysed. After the winter gill netting to remove pike, nets continue to be set to tag pike. From 1949 to 1980 4659 pike have been tagged. A high proportion (up to 80% of some batches) are recaught. The pike data have been worked up and published by Frost (1946, 1954), Frost & Kipling (1967), Kipling & Frost (1970) and Le Cren *et al.* (1972). From the data the population numbers and biomass have been calculated. These are illustrated in Fig. 2. The points to note in this figure are: 1) after an initial reduction the number of pike in Windermere has only fallen below the pre-netting level in 1956; 2) the biomass has only exceeded the pre-netting level in one year, 1962. This suggests that the netting has led to Windermere containing more but smaller pike. This is also shown in Table 1; in the later years there are relatively more younger pike in the catches than in the first year of gill netting. Table 2 indicates that the pike are growing faster, although the differences are not large.

Excerpt from "Synopsis of Biological Data on the Northern Pike: Esox Lucius" Food and Agricultural Organisation of the United Nations (1988)

10.3 REDUCED PREDATION ON SPECIES COMPETING WITH WILD BROWN TROUT

As previously described, fisheries where pike management operations are executed experience reduced numbers of both adult pike and trout. Pike and trout are both predators, and so play an important role in maintaining and controlling other fish populations as well as their own. While adult pike are the primary regulator of numbers of juvenile pike, trout will also readily predate on pike, and contribute to controlling the numbers of juvenile pike present. Both pike and trout will predate on species such as roach and perch (O'Grady et al. 2001); however, the effect of this predation is significantly reduced where pike management operations are executed.

Other fish populations (roach, perch, hybrids, bream) can thrive in the absence of predation by adult pike and trout. Spiralling roach and perch populations are recognised by many as one of the biggest threats to wild brown trout populations, as these species compete directly with trout for the same food sources throughout or at certain periods of their life-cycle (O'Grady et al. 2001). In addition, perch can also predate directly on trout. Roach and perch populations can increase dramatically in the absence of a suitably balanced and naturally-controlled predator stock.

The effect of an increased perch and cyprinid population (due to lack of predation as a result of pike management operations) on the food web shared by these species and brown trout is clearly referenced in the 2012 Lough Corrib survey report. The 2012 report states:

"The recovery in the perch population in 2012, compared to 1996, in addition to the increase in roach x bream hybrid and bream numbers and the maintenance of a moderate roach and trout stocks in 2012 means that the standing crop or biomass of fishes feeding on plankton and macro-invertebrates was substantially higher in 2012 compared to 1996."

The fecundity (rate of reproduction) of trout, perch and roach illustrates how quickly trout can be outnumbered by other species. Lack of predation on these species by both trout and pike is compounded, as large numbers of trout and pike are removed during pike management operations.

Species	Fecundity (eggs/kg of body weight)
Trout	900
Perch	45000
Roach	25000 – 1,000,000

10.3.1 ADDITIONAL LOADINGS ON THE FOOD WEB OF TROUT DUE TO PIKE MANAGEMENT OPERATIONS

The following data is shown in order to illustrate the extra loading placed on the food web supporting a trout population in a "designated wild brown trout fishery" where pike management operations are undertaken. In this case, Lough Corrib is used as an example. Prior to assessing this estimate, there are some important points to consider that have been discussed previously in Section 6.2.2.3, the contents of which are shown below for reference.

6.2.2.3 O' GRADY ET AL. (1996):¶

O' Grady et al. (1996) estimated that the Lough Corrib pike population in 1995 alone, ate over 255,000 trout weighing over 118 tonne. This study was used to support a broader funding application as part of the 'Tourism Angling Measure' (TAM), at that time, part of which was to include the removal of pike from Lough Corrib.¶

The estimated calculation of trout eaten relied upon a number of assumptions, including the following: ¶

¶

- that the population of pike in Lough Corrib in 1995 was calculable by applying an estimate for the pike population on Lough Sheelin based on CPUE's and lake surface area, and applying this estimate to the CPUE's and lake surface area of Lough Corrib; ¶
- that the diet of pike in Lough Corrib during 1995, did not change seasonally; ¶
- that the biomass of trout to roach (i.e. 80% – 20%) found in pike stomachs in the 1996 Lough Corrib stock survey, was constant for the entire year, 1995; ¶

¶

The calculation of the pike population on Lough Corrib for the year 1995 in the manner performed above, without using supportive mark recapture techniques to verify the calculation continues to be a questionable foundation for the estimated 118 tonne of trout eaten in 1995.¶

O' Grady *et al.* (1996) calculated the predation of pike on trout in Lough Corrib for 1995 by assuming that pike diet during 1995 did not change seasonally. Section 8 discusses possible factors influencing seasonal feeding and its lack of consideration in scientific reports. ¶

Of note however, is that O' Grady *et al.* (1996) did recommend a study into the seasonal diet of pike on Lough Corrib, presumably to ascertain the accuracy of the original assumption. It is discussed in section 9.4.1.3 that the recommended study was not undertaken by the Central Fisheries Board, nor was it undertaken subsequently by Inland Fisheries Ireland. ¶

¶

The attached excerpt dated 1988, indicates just how seasonally diverse the diet of pike can be expected to be. This information would have been available to the Central Fisheries Board in 1996. ¶

Trout (1954) and Lawler (1965) found that seasonal changes in the diet of the pike appeared to be related to the availability of the fish food. Different species composition in different waters results in diverging pike diets. Lawler (1965) reports that the most important food types eaten in each of several periods during the year in Bunaig Lake are: May and June – trout-perch (Percopsis omiscomaycus); July – sparrel shiner (Notropsis hudsonius); August to September – yellow perch (Perca flavescens); October to March – ninebelbacks (Pungitius pungitius) and Eurasia (unidentified). In Windermere (Frost, 1954), perch (Perca fluviatilis) occur in the pike diet at all times, but predominate from May to October. Char (Salvelinus willughbii) are eaten only in November and December, brown trout (Salmo trutta) to a greater extent from October to February. Stickelbacks (Gasterosteus aculeatus) and minnows (Phoxinus phoxinus) are taken in spring and summer. Such seasonal variations are associated with the changes in habits of the food species. ¶

Excerpt from "Synopsis of Biological Data on the Northern Pike Esox Lucius" Food and Agricultural Organisation of the United Nations (1988)¶

Finally, it should be noted that 461 pike were captured during the spring stock survey on Lough Corrib in 1996. Of the 461 pike captured, 43 pike (i.e. 9%) were recorded as containing trout (FOI/104/07/C). It is the biomass hypothesis that feeds into the considerable tonnage estimate for trout eaten compared to other species. Pedreschi (2014) commented as follows on stomach data regarding trout in pike stomachs in 2011, ***"Trout were encountered in five sites (9 stomachs), and were only important in Lough Sheelin in 2011 (17% IRI), where despite a low occurrence rate of only 7%, their weight contribution to the diet was 48%. This was primarily due to two large relatively undigested trout, highlighting the bias when using only stomach contents"***. It is not the intention here to take the findings of Pedreschi (2014) out of context however it is clear that Pedreschi (2014) was aware that biases are possible when using data obtained from stomach content analysis. Regarding the general estimate of 118 tonne of trout eaten in 1995, a full review of this figure was requested from Inland Fisheries Ireland scientific staff in a high level meeting with the Irish Federation of Pike Angling Clubs in April 2009. A further request was made by the Irish Pike Society in April 2016 in relation to same. ¶

The data and calculations in the following table are the "best minimum estimate" that could be calculated in the absence of mathematical methodology and data from IFI. While potentially incorrect (due to lack of information from IFI), the data and calculations highlight the significant additional loading and level of competition for food when numbers of both predatory pike and trout are eliminated from a fishery through pike management operations.

10.3.1 ADDITIONAL LOADINGS ON THE FOOD WEB OF TROUT DUE TO PIKE MANAGEMENT OPERATIONS CONTD.

Total Trout Stock (kgs)	Avg Size (kgs)
232000	1

Cumulative Total of Pike Removed over 9 Years					
	Year	Consumption Ratio	Captured (kg)	Total Consumption Adult (kg)	Total Consumption Juvenile (kg)
Adult (Gillnets)	2004	4	2104	8417	
Juvenile (Electro)		7	426		2981
Adult (Gillnets)	2005	4	2104	8417	
Juvenile (Electro)		7	426		2981
Adult (Gillnets)	2006	4	1620	6481	
Juvenile (Electro)		7	323		2264
Adult (Gillnets)	2007	4	1849	7395	
Juvenile (Electro)		7	230		1607
Adult (Gillnets)	2008	4	1753	7012	
Juvenile (Electro)		7	285		1995
Adult (Gillnets)	2009	4	2026	8104	
Juvenile (Electro)		7	137		959
Adult (Gillnets)	2010	4	1731	6924	
Juvenile (Electro)		7	364		2548
Adult (Gillnets)	2011	4	1904	7616	
Juvenile (Electro)		7	152		1064
Adult (Gillnets)	2012	4	1103	4412	
Juvenile (Electro)		7	241		1687
Total after 9 years				64778	18086
Trout (contribution to removed pike stock diet, 16% adult, 10% juvenile)				10364	1809

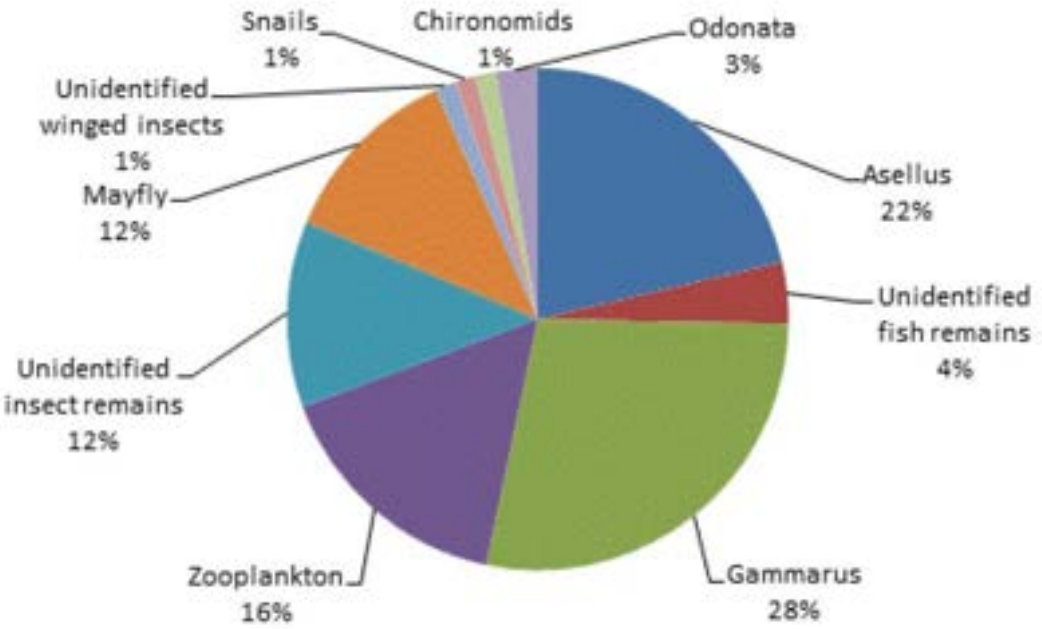
Note: Data unavailable for year 2004 hence 2005 data replicated

Additional Loading on trout food web by roach and perch due to pike removal		
Roach (23% and 7%)(kg)	14899	1266
Perch (24% and 21%)(kg)	15547	3798
Total(kg)		35510

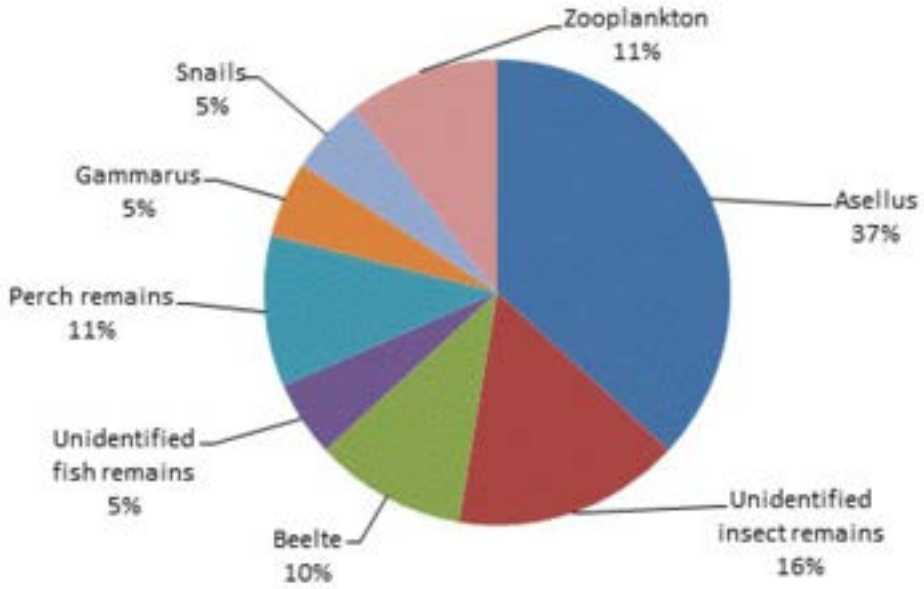
10.3.2 AN EXAMPLE OF DIETARY CROSSOVER BETWEEN PERCH AND WILD BROWN TROUT

Studies undertaken by Dr. P Gargan on Lough Sheelin between 1983 and 1984 highlighted the level of dietary cross over between roach, perch and wild brown trout.

More recently the fishery survey "National Research Survey Programme, Fish Stock Survey of Lough Mask, F. Kelly et. al. 2015" illustrates clearly the level of dietary crossover between the species and the potential impacts of uncontrolled cyprinid and perch populations due to the removal of pike from the fishery.



Diet of perch captured on Lough Mask, June 2015 (% occurrence) n=55



Diet of brown trout captured on Lough Mask, June 2015 (% occurrence) n=19

10.4 REDUCTION IN NUMBERS OF WILD BROWN TROUT ON DESIGNATED WILD BROWN TROUT FISHERIES

The following sections will illustrate how wild brown trout stocks have diminished on designated brown trout fisheries due to various issues, and with particular reference to pike management operations. Additional factors such as pollution, habitat destruction, and poaching will also be discussed where relevant. Species density is measured by calculating the Catch Per Unit Effort (CPUE). CPUE is a widely used method for establishing species density in a fishery, and is calculated by dividing the total number of individuals captured for a particular species by the total number of nets set during a fishery survey.

Accurate data generated through intensive fishery surveys (undertaken by IFT, CFB and IFI) will be used in the following sections. Such data is available for Loughs Corrib, Carra, Conn, Cullin and Sheelin.

Data generated through less intensive fishery surveys for the purposes of the Water Framework Directive will be shown and referenced only where applicable. Such data is available for Loughs Arrow, Mask and Owel. The conclusions and trends for these fisheries are similar to those drawn for the fisheries with more detailed and extensive data sets.

10.4.1 LOUGH CORRIB

There have been two intensive fishery surveys conducted on Lough Corrib. The CPUE (Catch Per Unit Effort) values of both surveys are shown in the following table.

	Year	Trout	Pike	Perch	Roach	Bream	Rudd	Hybrid	Tench	Salmon	Eel
Lough Corrib	2012	1.54	0.94	2.8	5.75	0.13	0	2.52	N/A	0.02	N/A
	1996	1.95	1.84	0.08	4.96	0	0.02	0.25	N/A	0.02	N/A

While the comparisons between the two surveys must take into account slight variations in survey methodology, the 2012 Lough Corrib report attempted to fill in such gaps by back-calculating the 1996 CPUE values in order to bring them into line with the 2012 survey methodology.

This data set is particularly relevant in highlighting the effect of pike management operations on a fishery, as the 1996 survey was conducted at the end of a 10+ year moratorium on pike management operations. In 1997 pike management operations resumed on Lough Corrib.

A first look at the 2012 Lough Corrib report shows that 16 years of intensive pike management operations have had no beneficial effect on the overall wild brown trout population. The CPUE value for pike has decreased significantly by 48.9%. The CPUE value for brown trout has decreased by over 21%. The objective of pike management operations is to reduce predation by pike on trout and hence observe an increase in the trout stock; however, in the case of Lough Corrib trout population density has effectively reduced by almost a quarter since 1996 - even with an almost halving of pike population density in the same period.

The reduced number of pike due to pike management operations has, over the 16-year period, led to a large increase in the numbers of perch, roach and hybrids. As previously described in Section 9.3, these species compete directly with brown trout for food, and, in the case of perch, predate heavily on trout fry and smaller trout as well as their food sources.

The CPUE values for perch increased by 3,400%, roach increased by 15.9%, and hybrids increased by 908%. The increases for perch and hybrids are particularly significant. The 2012 report states:

"The 1996 survey data suggests that at that time roach dominated upper L. Corrib followed by trout, while numbers of pike and then roach were greater in the lower lake. The 2012 survey data follows a different trend with roach along with perch and roach x bream hybrids completely dominating the upper lake. Lower Corrib showed signs that the levels of trout, pike, roach and even perch were similar."

A significant observation relating to perch numbers pre-1986 is made within the survey report. It is interesting to note that pike management operations were active prior to 1986, and perch stocks were reported to be very high at this time possibly due to the reduced number of pike and trout. When pike management operations ceased after 1986, perch numbers dropped considerably as recorded in the 1996 survey; disease was cited as a factor at this time. The resumption of pike management operations in 1997, and recovery from disease, has resulted in a 3400% increase in perch numbers, due in part to severely reduced predation by pike. Perch predate heavily on juvenile trout and compete directly for the same food sources. The 2012 report states:

"A major recovery in perch stocks has taken place with the catch increasing from 21 individuals in the 1996 survey to 699 fish in 2012. Prior to 1986 L. Corrib was known to have large stocks of perch."

Some of the summary findings discussed in the 2012 Lough Corrib report correlate with subjects already discussed in this document.

For example, the 2012 report states:

"Most trout migrating to the lake appear to stay in the areas near the outfall of their natal river in springtime"

This would correlate with the errors in data related to pike diet due to the timing of pike stomach sampling analysis discussed in Section 6.2.3. This also correlates with the risks to the migratory spawning stock of particular trout spawning streams where pike management operations are undertaken, as discussed in Section 9.3.

Significant environmental impacts have occurred on some of the important trout nursery streams. In particular, very poor trout recruitment from the Cross and Black rivers has had a significant impact.

If an improvement in brown trout angling on Lough Corrib is to be realized, a more holistic approach must be taken in assessment of the relationship between trout densities, other fish species, eutrophication, stream habitat degradation, and cropping of trout by anglers. The data and issues discussed have illustrated that trout stocks do not benefit from pike management operations, which have the potential to be highly counterproductive in protecting a balanced and healthy environment in which brown trout can thrive.

Prior to the establishment of the IFT in 1951, and hence any form of state-coordinated predator management on Lough Corrib, the lake boasted the finest trout and pike fishing in Europe. Since the initiation of predator management by IFT, the quality of trout and pike angling has suffered, with the exception of periods of moratorium as recorded between 1986 and 1996. One of the concluding remarks made by Dr. Martin O Grady in the 1996 Lough Corrib report states:

"The size and stock structure of the trout population, as measured in the 1996 survey, represents the ideal in fishery management terms - substantial numbers of young adult fish (< 40cm) many of whom will be large enough to be cropped by anglers in the 1996 and 1997 angling seasons. The numbers of older larger fish (>40cms) will ensure a good spawning population in the following year. The angling catches in both 1996 and 1997 were considered to be good."

10.4.1.1 NOTE ON IMPROVEMENT IN BROWN TROUT POPULATION DENSITY FOR LOWER LOUGH CORRIB OBSERVED IN THE LOUGH CORRIB 2012 SURVEY REPORT

The 2012 Lough Corrib survey report noted an improvement in the CPUE value of brown trout stocks in an area defined as the lower lake. The improvement has been heralded as a success of pike management operations; however, there are some additional factors to consider here.

The area defined as Lower Lough Corrib is shown in the following diagram as Area 5. It is clear that the area defined as the lower lake is quite small in comparison to the lake as a whole. For example, Areas 2 and 3 alone could accommodate three to four times the surface area of Lower Lough Corrib. In this context, the area where improvement has been noted is small when considering the lake as a whole. As previously noted (Section 9.4.1), the overall CPUE value for brown trout on Lough Corrib has decreased by 21%.

It is also important to consider the proximity of Lower Lough Corrib to two of the most important trout spawning streams for the entire catchment. The Abbert and Grange rivers both flow into the Clare river, which empties into the lower section of Lower Lough Corrib. The Abbert and Grange rivers account for 44% of the total trout recruitment for the entire lake. Trout that originate from these catchments predominantly stay in the lower lake, due to the richness of the aquatic environment there. The numbers of trout in the lower lake are further supplemented by trout from the other major contributory catchments, namely the Bealnabrack, Cornamona and Oughterard rivers, as these trout migrate south due to the lack of productive aquatic conditions in the vicinity of their natal catchments O'Grady et al. (2012). It is therefore feasible to assume that any minor improvement in the ability of these catchments to produce trout (in particular the Abbert and Grange rivers) will have a positive effect on the trout population of Lower Lough Corrib.

Figure 2.2. L. Corrib sampling zones (1 to 5) and IFI lake stores/offices.

Figure 4 a. The distribution of trout of Abbert origin in the 2012 lake survey sample.

Figure 4 b. The distribution of trout of Grange origin in the 2012 lake survey sample.

Excerpt from "A Survey of Adult Fish Stocks in Lough Corrib" - O'Grady et al. (2012)

10.4.1.2 NOTE ON LOUGH CORRIB PIKE DIET

During the Lough Corrib 2012 survey pike stomach contents were examined in order to establish dietary patterns. Section 7 of this document illustrates the inherent flaws and inaccuracies that can occur by solely using SCA (Stomach Contents Analysis) as a method to establish dietary patterns. However, the data gathered will be discussed briefly here. The following pie chart shows the dietary patterns of pike in Lough Corrib.

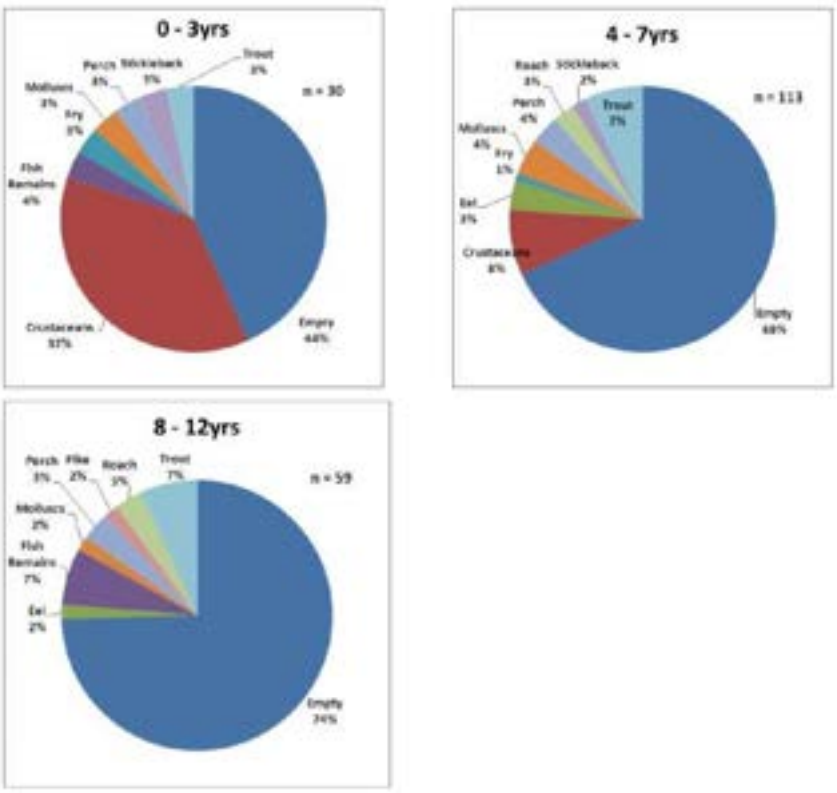


Figure 3.17. The dietary patterns for young (0+ - 3yrs), young adult (4 – 7yrs) and older adult pike in the 2012 Corrib survey.

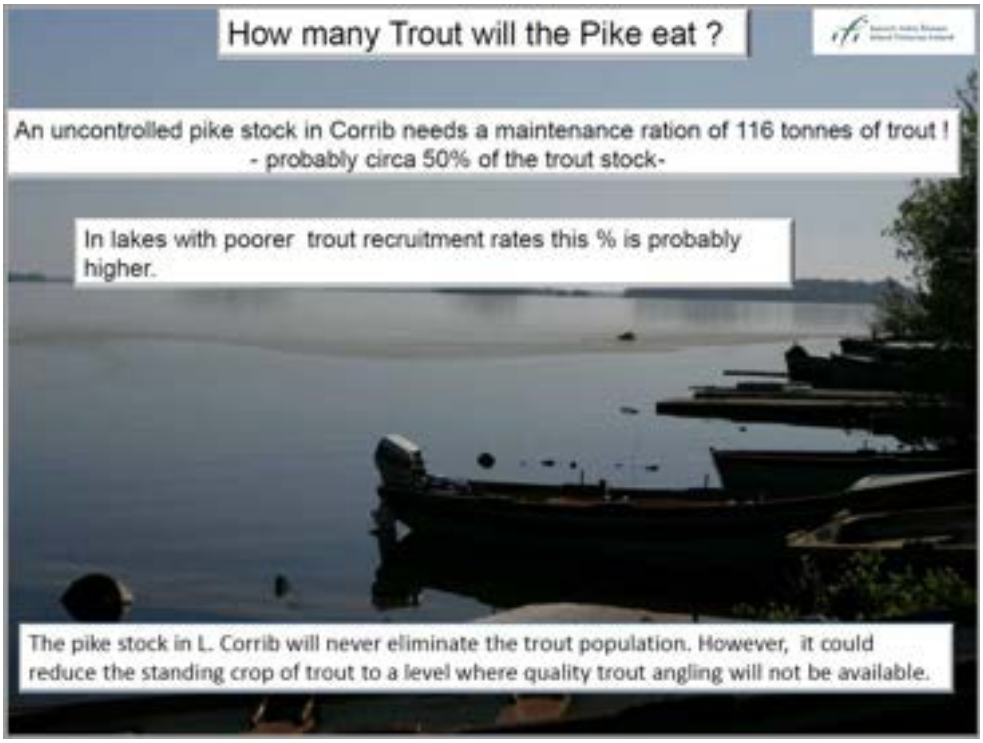
Excerpt from "A Survey of Adult Fish Stocks in Lough Corrib" – O'Grady et al. (2012)

Section 6.1 of this document refers to the misconception throughout IFI Fishery Surveys and pike studies that pike do not hunt pelagically or in benthic zones. This is incorrectly referenced in the Lough Corrib survey report. Pike will readily feed in shallow weedy areas, but the assumption that trout will be the most numerous and hence available food item is incorrect as both perch and cyprinids will occupy these areas in higher numbers at certain times throughout the year (see Section 8: The Effect on Pike Diet of Spatial Distribution of Fish Species). The 2012 report states:

"The bias of the larger pike in preferentially selecting trout as a dietary item is probably a reflection of the distribution of the different prey fishes and the hunting practices of pike - most trout ≥ 30cm will be feeding in shallow weedy areas, the pikes preferred hunting area. In contrast many roach and perch may be feeding either pelagically or in benthic areas with a muddy/sandy bed, zones which are not the favoured hunting areas of pike."

10.4.1.3 INFORMATION DEFICIT FOR LOUGH CORRIB DIETARY ANALYSIS

Of immense importance is that scientific studies and the results presented to the public are founded upon fact and that they are balanced. The slide below presented to the pike policy review group in 2011 continues to be an influential aid to the anti-pike lobby, as well as damaging to the pike itself, as it portrays an unsubstantiated dietary impact of pike upon the trout stock in Lough Corrib (see section 6.2.2.3). The slide is discussed further below, as is the failure to create an appropriate balance in what is a contentious issue that regrettably has allowed disagreement to fester between pike and trout anglers in Ireland over many years, and which Inland Fisheries Ireland have allowed to continue.



Excerpt from "The Necessity for Controlling Pike Stocks in Some Quality Irish Wild Brown Trout Managed Lake Fisheries"
A presentation to the Pike Policy Group, November 2011

Section 6.2.2.3 refers to the estimation of O'Grady *et al*. (1996) that the Lough Corrib pike population in 1995 alone ate over 255,000 trout weighing over 118 tonnes, (not 116 tonnes). As discussed, this estimate was calculated using a biomass theory, hypothesising that the ratio of total trout weight taken from the stomachs of 43 of 461 pike captured, compared to total roach weight, could be applied to the entire year 1995.

O'Grady *et al.* (1996) in 'Section 6' of their report, made a number of management recommendations with regard to Lough Corrib. Some of the recommendations were administrative in nature, in respect of the "Tourism Angling Measure 1994-99" (TAM), under which pike removal was to receive EU funding in response to the respective 1996 report. More importantly, some of the recommendations laudably sought to scientifically research a number of the assumptions (See Section 6.2.2.3) made in O'Grady et al. (1996), which led to the estimation of 118 tonnes of trout eaten.

A Freedom of Information request (i.e. FOI/103/07/W – See below) was made by the Irish Federation of Pike Angling Clubs in 2007. The request sought all relevant records referenced in 'Section 6' of O'Grady *et al.* (1996). The records would include pike stock density reports over a five-year recommended period, a stock survey recommended for 1999 considered necessary to review the effectiveness of the strategy, and, most importantly, a dietary analysis of pike for Summer and Autumn in order to assess, presumably, the validity of assuming that trout made up 80% of the diet of pike in 1995 in the calculation of 118 tonnes.

EXTRACT FROM REQUEST - FOI/103/07/W

With regard to the report produced by the Central Fisheries Board under the EU funded 'Tourism Angling Measure 1994-1999', titled:

'Fish Stock Survey Report for Loughs Corrib, Mask and Carra and Future Management Options for this Fishery Resource' of 3rd July 1996,

and in the interest of understanding the review and conclusions reached on completion of the 'Western Lakes Project' as explicitly recommended under Section 6 within the report and also in the interest of understanding the scientific basis for the current stock management policy on Loughs Corrib, Mask and Carra following completion of the TAM project, the following information is requested:

1. With regard to '6.1 Recommendations (key elements)', please provide a copy of the pike stock density reports for Loughs Corrib, Mask and Carra for each of the intervals for the stated five year period.
2. With regard to '6.5 Recommendations (key elements)', please provide a copy of the "Fish stock survey exercise and results undertaken in "1999 on Loughs Corrib and Mask as part of a review of the effectiveness of the management strategy".
3. With regard to '6.7 Recommendations (key elements)', please provide a copy of the dietery analysis of pike sampled in mid-summer and autumn.
4. Please provide a copy of the status report regarding the 'Western Lakes Project' sent to the EU 'Tourism Angling Measure' funders on completion of the 1994-1999 monitoring and development program.
5. Please provide a copy of all stock analysis and respective reports for all species, undertaken on Loughs Corrib and Mask, since the completion of the 'Western Lakes Project' in 1999 to the present date.

EXTRACT FROM RESPONSE - FOI/103/07/W

The *FOI Act 1997 & 2003* provides for making such records exempt under its exemption provisions. In this case, and in relation to the records you request, the exemption under Section 10 – Refusal on administrative grounds to grant requests under *Section 7.*

"Section 10 – Refusal on administrative grounds to grant requests under *Section 7.*

10.(1) A head to whom a request under section 7 is made may refuse to grant the request if

(a) *The record concerned does not exist or cannot be found after all reasonable steps to ascertain its whereabouts have been taken."*

The response to the Freedom of Information request (i.e. FOI/103/07/W) is significant, as it proves that the scientific research recommended by O'Grady *et al.* (1996) was not undertaken. Furthermore, the authors of O' Grady *et al.* (1996) were the chief scientific staff with Inland Fisheries Ireland (then Central Fisheries Board) at that time, and presumably would have been aware of any impediments, financial or otherwise, that would have prevented the execution of the necessary corroborating scientific research on Lough Corrib.

The scientific research deficit that currently exists with regard to Lough Corrib, notwithstanding some unscientifically conducted pike stomach sampling from time to time, allows the continued uncorroborated or internationally peer-reviewed use of the statement that "*An uncontrolled pike stock in Corrib needs a maintenance ration of 116 tonnes of trout*!".

The inference here is that the current scientific research is simply incomplete, uninformative, and is not based upon robust scientific validation.

10.4.2 LOUGHS CONN & CULLIN

There have been a number of intensive fishery surveys conducted on Lough Conn since 1978. The CPUE (Catch Per Unit Effort) values of these surveys are shown in the following table.

	Year	Trout	Pike	Perch	Roach	Bream	Rudd	Hybrid	Tench	Salmon	Eel
	2005	2.1	1.7	12.1	64.1	N/A	3.3	N/A	N/A	N/A	N/A
	2001	2.5	2.1	23.9	24.4	N/A	16.33	N/A	N/A	0.17	N/A
	1998	1.15	0.7	9.48	0	N/A	0.4	N/A	N/A	0.1	N/A
	1994	4.3	1.8	15.67	0	N/A	0.08	N/A	N/A	0.2	N/A
	1990	6.4	1.18	17.88	0	N/A	0	N/A	N/A	0.2	N/A
	1984	6.84	0.35	3.89	0	N/A	0	N/A	N/A	N/A	N/A
Lough Conn	1978	5.56	0.21	N/A	0	N/A	0	N/A	N/A	N/A	N/A

	Year	Trout	Pike	Perch	Roach	Bream	Rudd	Hybrid	Tench	Salmon	Eel
	2001	1.5	2.9	13.7	91.2	N/A	23.8	N/A	N/A	N/A	N/A
	1998	0.9	1.5	9.1	0.2	N/A	31.4	N/A	N/A	N/A	N/A
Lough Cullin	1994	11.9	5	6.9	0	N/A	4.6	N/A	N/A	N/A	N/A

Loughs Conn and Cullin, like Lough Corrib, have undergone intensive periods of pike management operations over a number of decades. Despite the execution of these operations, the data illustrates a steady decline in trout densities on Lough Conn, with short periods of minor improvement as a result of other factors.

The trend for Lough Conn is similar to other designated wild brown trout fisheries in Ireland. As densities of competitor species (perch/ cyprinids) rise exponentially, trout densities lower. Eutrophication plays a part in reducing the suitability of the lake for high numbers of trout, while cyprinids can thrive in such environments.

The reduced numbers of pike due to pike management operations has been a major contributory factor to a large increase in the numbers of perch, roach and rudd. As previously described in Section 9.3, these species compete directly with brown trout for food, and in the case of perch predate heavily on trout fry and smaller trout. The 2001 survey report (O'Grady, 2001) states:

"There may be competition for food between cyprinids and trout either at the zooplankton and/or macroinvertebrate levels."

A thriving cyprinid population can also have a significant indirect effect on the trout angling on the lake by altering the behaviour of the trout population thus compounding the conclusion that there is no longer quality trout angling available. The 2001 report (O'Grady, 2001) states:

"The presence of large numbers of young cyprinids will provide a food supply for trout ≥ 30 cms in length all year round. Should a significant proportion of the trout population become largely piscivorous then they will be less available (harder to catch) using traditional fly fishing methods. This trend is already evident – 12.2% of the large trout captured in the 2001 L. Conn and Cullin surveys had been feeding on cyprinid fry."

A significant observation relating to pike numbers can be seen in the Lough Conn data, as it is typical of trends recorded in other "designated wild brown trout fisheries". As the densities of perch and cyprinids increase, the pike density also increases, despite the significant drop in trout density. This correlates with the subjects discussed in Section 7, and clearly shows that pike will not specifically target trout, even in the presence of larger numbers of other species.

Significant environmental impacts have occurred on some of the important trout nursery streams of Loughs Conn and Cullin. An extensive sub-catchment enhancement programme was undertaken from 1996 to 1998, which greatly improved the numbers of trout within these rivers and is responsible for the improvement in trout densities in 2001.

"Over the period 1996 to 1998 very extensive fishery enhancement programmes were carried out on all of L. Conn's sub-catchments. A monitoring of the effectiveness of these programmes has shown that the capacity of these rivers and streams to produce trout were significantly increased by these exercises – i.e. recruitment of young trout to the L. Conn population has greatly increased from 1998 to date (2001)."

However, the environmental problems facing the lake itself negated the full potential of these improvements. Predation by pike was not cited as a reason for the decline in trout density due to the "effectiveness" of pike management operations; however, the many negative effects due to such operations were not mentioned in the report.

"One can conclude therefore that the numerical decline in trout numbers in Lough Conn in 2001 is due to a failure of young trout, despite their increasing numbers in L. Conns sub-catchments, to survive in the lake itself. Similarly the increased growth rate of trout can be linked to changes in the lake."

The fish stock survey data indicates that the N.W.R.F.B. pike management programme has been and, still is (2001), successful. The paucity of trout in the lake cannot therefore, in this instance, be linked to increased predation rates by pike.

Young trout in Irish loughs tend to be largely pelagic for at least a year after migrating to the lough feeding principally on zooplankton. It seems most likely therefore that the cultural eutrophication problems in L. Conn have depressed the production of key food items required by young trout thereby limiting their survival."

If an improvement in brown trout angling on Loughs Conn and Cullin is to be realized, a more holistic approach must be taken in assessment of the relationship between trout densities, other fish species, eutrophication, stream habitat degradation, and cropping of trout by anglers. The data and issues discussed have illustrated that trout stocks do not benefit from pike management operations, which have the potential to be highly counterproductive in protecting a balanced and healthy environment in which brown trout can thrive.

10.4.3 LOUGH CARRA: AN EXAMPLE IN IMPROVING BROWN TROUT STOCKS BY ADDRESSING THE REAL ISSUES

There have been a number of intensive fishery surveys conducted on Lough Carra since 1978. The CPUE (Catch Per Unit Effort) values of these surveys are shown in the following table.

	Year	Trout	Pike	Perch	Roach	Bream	Rudd	Hybrid	Tench	Salmon	Eel
	2009	4.4	0.8	1.8	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	2001	6.1	0.7	0.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	1996	4.4	0.8	1.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	1986	2.1	0.9	0.3	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	1981	3.6	0.1	1.4	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	1980	2.7	0.1	0.6	N/A	N/A	N/A	N/A	N/A	N/A	N/A
	1979	1.9	0.2	0.9	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Lough Carra	1978	0.8	0.1	0.1	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Lough Carra is a good example of how brown trout stocks can be improved by addressing the significant and more important issues facing a "designated wild brown trout fishery". Such issues include eutrophication, nursery stream habitat destruction and intensive cropping by anglers.

The data illustrates two periods of stable pike densities on Lough Carra between 1978 to 1981 and again from 1986 to 2009. Perch densities, unlike previously discussed fisheries, have remained low and hence have had no significant impact on trout density.

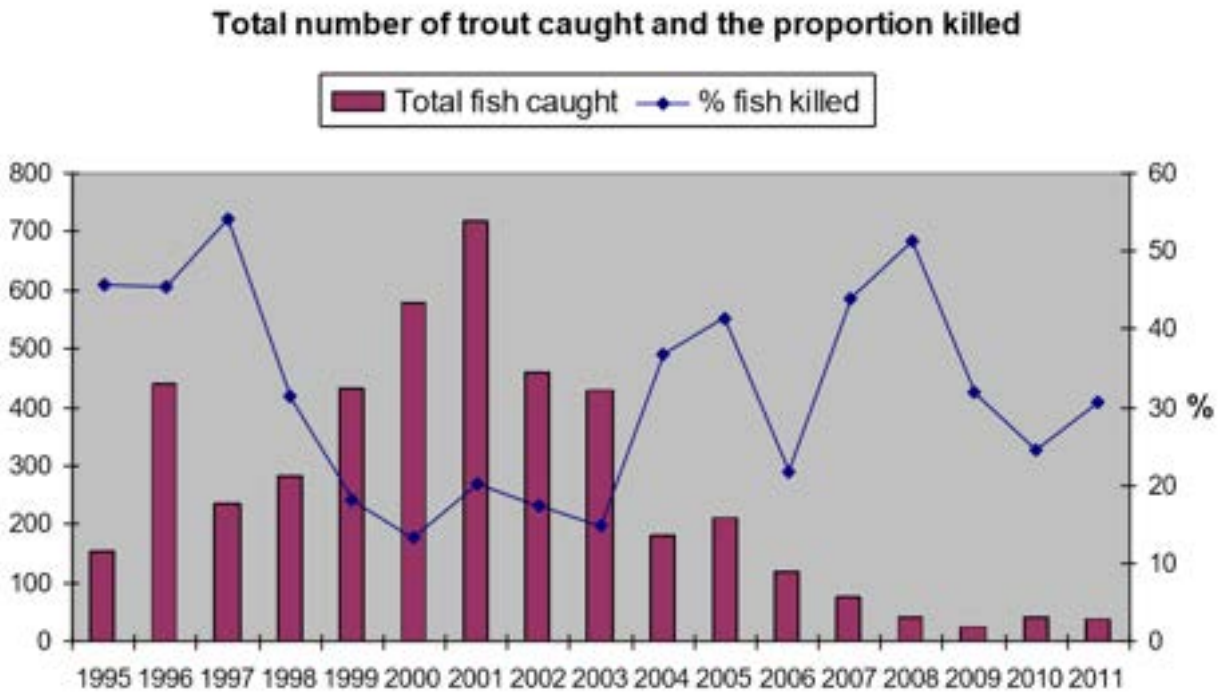
From 1978 to 1981, there was a steady increase in trout density on the lake. The 1986 survey records a significant drop in trout density due to sub-catchment degradation through an arterial drainage scheme. Most "designated wild brown trout fisheries" have at some point been affected by sub-catchment degradation. It is interesting to note that the Western Regional Fishery Board cite this as a reason for trout density decline, but also mention the effect of a higher pike density in the lake on the trout stock. However, from 1986 to 1996 trout density increased to higher levels than any period pre-1986, even though pike densities remained stable at the higher 1986 levels, which would not correlate with findings in the report. The survey report states:

"Lough Carra's stream sub-catchments were subject to an arterial drainage scheme carried out over the period 1981-1985. This probably accounts at least in part, for the decline in the standing crop of trout in the 1986 survey. The decline in numbers at this point in time (1986) may have also been due in part to a decline in controlling pike stocks – pike netting efforts were reduced by 50% from 1985 onwards and ceased completely in 1988. A pike control program was reintroduced in 1992 at a "pre-1985" intensity and has continued to date (O'Grady et al. 1996)."

Again, in the period from 1996 to 2001 trout density increased significantly. This increase was not due to increased levels of pike management, as pike density remained stable. Two factors were responsible for this increase: the first was an extensive sub-catchment restoration programme conducted between 1998 and 2001. The survey report states:

"From 1998 to 2001 a major post-drainage stream enhancement program was carried out on all of the sub catchments to the lake of the Western Regional Fisheries Board."

The second major factor that contributed to the significant increase in trout density between 1996 and 2001 was a vast increase in the amount of trout being caught and released by trout anglers. The table below illustrates clearly the effect on trout numbers, during periods of both low and high catch and release rates. Post-2003, the numbers of trout killed by trout anglers returned to "normal" levels, and contributed to the drop in CPUE value from 6.1 to 4.4 between 2001 and 2009. This data is further validated by assessment of the numbers of trout caught in gill-nets over the same period during annual pike management operations.



Excerpt from "Lough Carra Angling Records" - Chris Huxley (2011)

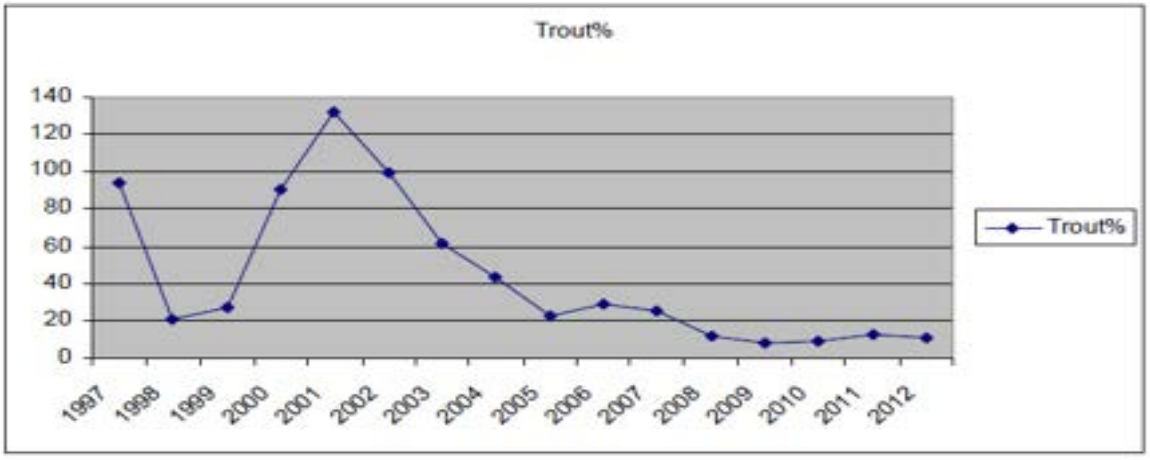


Figure 2. The changes in trout numbers caught during pike culls, shown as a percentage of the number of pike caught.

Excerpt from "Lough Carra Angling Records" - Chris Huxley (2011)

The Lough Carra data clearly illustrates how an erroneous emphasis on pike management operations results in the partial masking of much more significant factors that affect brown trout densities in "designated wild brown trout fisheries". Two major factors when addressed resulted in vast improvement in trout density between 1996 and 2009 even though pike densities were higher than in any other period.

It is interesting to note than in the summary conclusions of the 2009 Lough Carra Survey report the Western Regional Fisheries Board vindicated itself and its management strategy of Lough Carra as a result of the excellent brown trout densities that were recorded. It can be assumed that a large part of the self-vindicated management strategy related to pike management operations. Little emphasis was awarded to the two major factors (sub-catchment enhancement and extensive catch and release of brown trout) that contributed to the rise in trout densities, nor the significance of their overall effect on a fishery compared to the lesser effect of a stable native pike population.

"The large trout stock and limited pike densities recorded in Lough Carra in both the 2001 and the 2009 surveys vindicates the Western Regional Fisheries Boards (WRFB) management strategy in relation to this resource. The successful maintenance of Lough Carra, into the future, as a quality wild brown trout fishery necessitates a continuation of the WRFB's current management strategy."

10.4.4 LOUGH ENNELL: AN EXAMPLE IN IMPROVING BROWN TROUT STOCKS BY ADDRESSING THE REAL ISSUES

Lough Ennell displays a similar trend to Lough Carra following the remediation of ecological factors affecting the lake and restoration of salmonid spawning habitat. It should be noted that pike management operations have not been conducted on Lough Ennell since 1990 and this has not limited the fisheries capacity to produce an abundant trout population. In fact, by addressing the negative environmental and ecological factors affecting the lake and its sub catchments and closure of the Lough Ennell Trout Hatchery, the fishery has reached its maximum potential to produce wild brown trout without the necessity for any form of pike management or control.

"the current largely "undisturbed" pike population, particularly in Lough Ennell, did not prohibit a significant increase in the adult wild trout population in this lake following the Shannon Regional Fisheries Boards successful stream enhancement programme in this fishery. Lake survey C.P.U.E. values for wild trout in Lough Ennell surveys from 2002 and 2006 ranged from 3.4 to 4.0 (Figure 8). The highest wild trout C.P.U.E. value ever recorded in a midland trout lake was 5.0 in Lough Sheelin in 1978 (Figure 6). Given that Lough Ennell has a significantly smaller euphotic zone than Lough Sheelin it is likely that a C.P.U.E. value for wild trout in Lough Ennell of 4.0 reflects this waters optimum trout carrying capacity." O Grady/ Delanty, 2008.

Note: The comment by O Grady 2008 in relation to Lough Sheelin is incorrect. IPS/ IFPAC have established that the trout density or CPUE for Lough Sheelin included both wild and farmed/ stocked trout therefore incorrectly elevating the trout CPUE value for Lough Sheelin. The correct maximum value for Lough Sheelin is approximately 3.68 therefore Lough Ennell, a fishery where pike management is not practised, holds the highest trout population density value for any midland lake and is substantially higher than Loughs Corrib, Mask, Conn and Cullin.

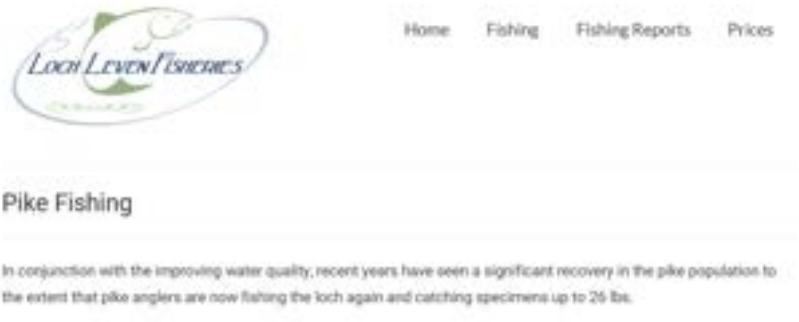
10.4.5 LOCH LEVEN: AN EXAMPLE IN IMPROVING BROWN TROUT STOCKS BY ADDRESSING THE REAL ISSUES

The most famous of all wild brown trout fisheries, Loch Leven in Scotland, has had a very similar history to many of Irelands wild brown trout fisheries. Responsibility for managing the fishery is with Loch Leven Fisheries who describe the Lochs history.

"Nowadays, catch records are not comparable as the majority of trout are caught & released but recent seasons have seen a discernible recovery in catches following several decades of decline. The factors behind that decline most probably relate to the deterioration in water quality that accompanied amongst other things increased population within the catchment area and more intensive agricultural practices. Measures introduced since Scum Saturday (13th June 1992) when a blue-green algal bloom created national headlines, have seen water quality improve dramatically as levels of phosphates / nitrates going into the loch have fallen over 60% from pre 1992 levels.
In former centuries, Loch Leven was about four miles long and three miles wide. But in December 1830 a drainage scheme was completed that dropped the water level of the loch by up to nine feet and reduced its area by almost a quarter. The scheme also involved cutting a new channel for the outflowing River Leven and creating sluices to control the flow of water from the loch.
The appearance of the loch before the drainage can be gauged by the visitor at the old churchyard of Kinross. Originally the water lapped at the foot of the churchyard wall. On Castle Island, when Mary, Queen of Scots was imprisoned there in the 1560s, the loch reached the battlements. Today the loch reveals seven islands, but prior to the drainage there were but four: St Serf's, Castle, the Reed Bower and Roy's Folly. Most of the loch is now very shallow, with the exceptions of two 60-foot holes to the east of Scart Island and around the western and southern sides of St Serfs. Before 1830, the large area known as "The Shallows" was more than twice its present depth.
This massive alteration has had major effects on the fish populations of Loch Leven. Salmon, and possibly sea trout, ran the old River Leven: they are gone. So too is the charr which, presumably, could not tolerate the shallower water. The pike too also almost became extinct here, but not because of the drainage: it was exterminated to protect the trout stocks (in 1903 14,000 pike were removed by netting). However recent seasons have also shown signs that the pike population could be on the rise again, so too the perch, both of which is encouraging as it confirms the loch is returning to rude health."

Similar to Loughs Carra and Ennell the remediation of negative environmental factors has seen the Lochs trout population recover to a very high level. Additionally pike and pike angling is actively promoted.

Loch Leven Fisheries (2014). **"What the survey suggests is that, last autumn, they found just under 900 fish per hectare which measured 40mm or more in size. Although these will predominantly be brown trout, it will also include pike & perch as the hydroacoustic equipment does not differentiate between species. CEH quite reasonably tells us not to place undue weight on the absolute numbers (ie 900 fish per hectare) but they are pretty confident about the trend which suggests the fish population has doubled since 2011 and quadrupled since 2009"**



The majority of Loch Leven is shallow and weedy, this environment has presented no difficulty for pike and trout to co-exist and based on recent evidence the trout population has expanded without pike management operations in place.

10.4.6 SECTION SUMMARY CONCLUSION: THE EFFECT OF PIKE MANAGEMENT POLICY ON WILD BROWN STOCKS

The philosophy behind pike management operations on “designated wild brown trout fisheries” is that removal of an apex predator (pike) from the fishery should reduce predation by pike on brown trout and hence improve the trout angling potential of the fishery. However, as detailed in Section 9.4, the execution of pike management operations over extended periods of time has not had the desired effect and has in fact been one of many contributory factors in the decline of brown trout stocks on such fisheries. Pike management operations take the focus of anglers off the real issues affecting brown trout stocks, and presents stakeholders with the easiest opportunity to show that something is being done to conserve the species. Issues that are far more difficult to combat and control but have a far more significant impact on brown trout stocks are given less focus. For Inland Fisheries Ireland, the management of pike populations is in effect far easier to execute and manage as opposed to dealing with stream degradation and enhancement, habitat restoration, eutrophication, drainage schemes, flood relief schemes and many other high-impact issues affecting brown trout populations and recruitment.

Arterial drainage schemes have decimated sub-catchments of many brown trout fisheries. Outside of the Shannon and Lee hydroelectric schemes, the Corrib-Clare arterial drainage scheme conducted through the 1950s and 60s is cited as having the most significant ecological impact on Ireland’s natural river heritage. The scheme decimated the trout and salmon recruitment potential of this catchment, which includes the Abbert and Grange rivers, which currently account for 44% of trout recruitment to Lough Corrib. However, there remains an expectation that trout angling on Lough Corrib should be as it was pre-1950, and that the issue is primarily pike and not destruction of trout nursery streams. Works have been undertaken over a number of years that have led to parts of the catchment being restored, but significant current and future challenges remain, such as widening the Clare river to facilitate the Claregalway flood relief scheme. Schemes such as this undertaken in the past have had a far more significant impact on brown trout stocks than an unmanaged and naturally-balanced pike stock could ever have, as was the case prior to 1951.

Intensive cropping of trout by anglers, and in particular during catch and kill trout competitions, has a severely detrimental effect on trout populations. The case for catch and release and the resulting higher trout densities is clearly illustrated in Section 9.4.3 in the Lough Carra data. This is validated by the numbers of trout caught in gill-nets during pike management operations, as can be seen in the table below showing higher numbers of trout during the period of high catch and release rates from 1998 to 2003.

Compounding the apparent poor angling returns for brown trout are the changing feeding habits of trout on some “designated wild brown trout fisheries”. The appearance of invasive species such as zebra mussels and roach have contributed to changing feeding habits of brown trout, thus making them less available to anglers, a trend reflected in the Lough Conn data.

The main issues negatively affecting brown trout populations have been discussed in this section. Over six decades of pike management operations have resulted in poorer brown trout densities, a fact highlighted by trout densities and catch returns during periods of moratorium on predator management. In the light of this information and the weight of awareness and knowledge of far more impactful issues previously discussed, pike management operations continue on “designated wild brown trout fisheries”.

11 THE DESTRUCTION OF SALMONID SPAWNING HABITAT ON LOUGH CORRIB'S CROSS RIVER

The Cross and Black rivers were once two of the primary trout spawning rivers for the north-eastern part of Lough Corrib. As detailed in section 9.4.1, the contribution to the Lough Corrib trout population of both these rivers has vastly reduced, "***The poor contribution of the Cross and Black rivers (a combined figure of 8%) may be responsible for the decline in trout numbers in the north-eastern part of the lake noted since the 1996 survey"*** **O'Grady (2012**).

The eastern side of Lough Corrib comprises mainly agricultural land, which is used predominantly to farm cattle. It could be assumed that nutrient enrichment and poor water quality would be responsible for the degradation of fish and invertebrate populations on the river; however, the river exhibits excellent water quality characteristics. Excessive macrophyte growth along the river, particularly towards the mouth, would suggest that there are input influences from nitrates and phosphates at work.

Macroinvertebrate samples show that despite the clarity and cleanliness of the water many expected macroinvertebrate groups are not present, namely *Tricoptera*, *Ephemeroptera* and *Plecoptera* spp. Specimens from each group occur at sites closer to the lake outflow; however, locations in the upper river are all but devoid of specimens.

The upper Cross River, where one would expect to find spawning trout at the appropriate times, has been subjected to heavy modification to a point where it is canalised for a lot of sections. The straightening and extensive dredging that occurred on this waterway to aid with agricultural land drainage has so dramatically altered the habitat that the expected macroinvertebrate communities have been damaged. A lot of pool, riffle and glide habitats have been removed from the upper river, resulting in a substrate that can only support a limited range of said invertebrates.

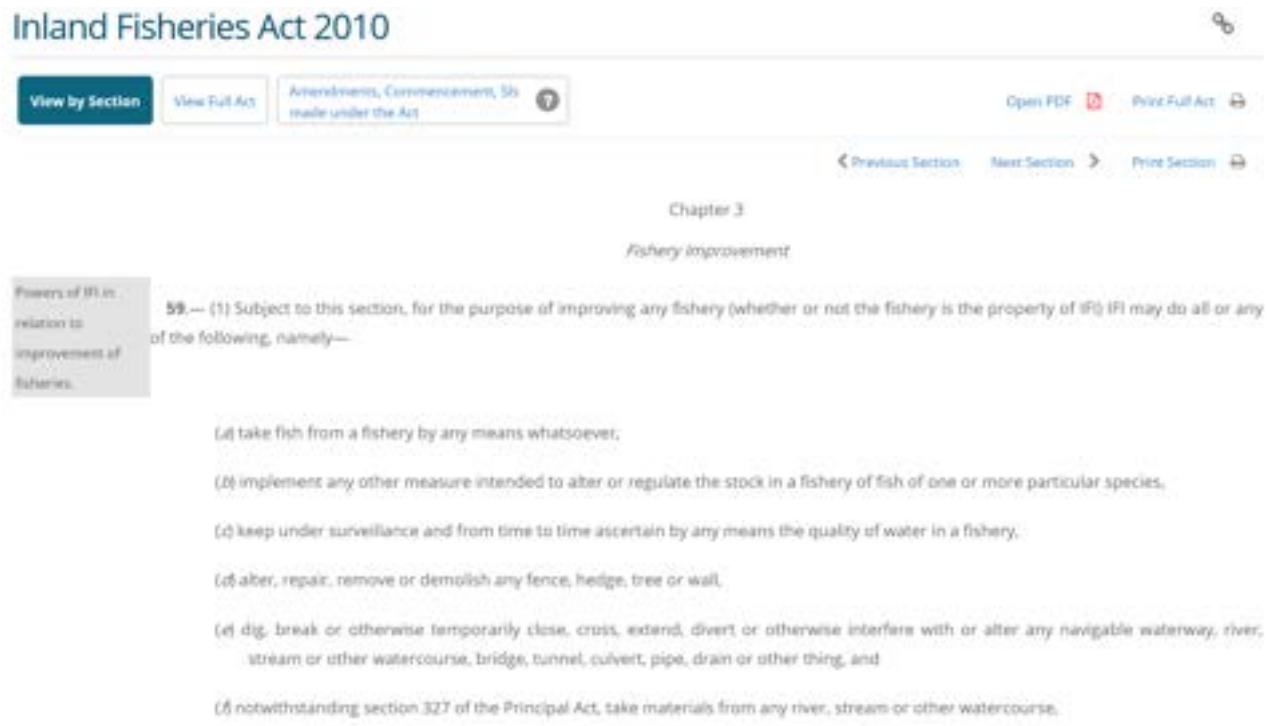
The habitat that some of these invertebrates need to survive is exactly the same as the habitat trout need for spawning. Extensive removal of gravel from the river through the dredging for drainage has ensured that there are not sufficient spawning beds for adequate trout recruitment; hence the north-east Corrib trout declines. Trout can only spawn where there is suitable habitat for them to spawn.

Noting the data and examples shown in section 9.4, it can be assumed that the modification of numbers of sub-catchments surrounding "designated wild brown trout fisheries" has led to the same situation as that of the Cross river and hence has been of the highest significance with respect to declining trout populations.

12 SECTION 59: THE LEGISLATION RELATED TO PIKE MANAGEMENT OPERATIONS

The legislative mechanism that allows Inland Fisheries Ireland to remove fish from a watercourse is Section 59 of The Inland Fisheries Act 2010. In relation to "designated wild brown trout fisheries" Section 59 is used with respect to pike management operation undertaken by IFI and also to grant what are termed "Section 59 Exemptions". Section 59 Exemptions are granted to mainly trout angling clubs and bodies in order for them to execute pike culls without being in breach of pike bye-law number 809 (2006) which is designed to protect pike over 50cm in length and limit the taking of pike to one individual under 50cm per day. Such culls commonly take the form of angling competitions outside of the normal trout angling season. Culls that take place inside the trout angling season are commonly called "mixed grills" as essentially anything that is caught is killed in. Such competitions/ culls are commonly known as catch and kill events, and through issuance of Section 59 exemptions are essentially endorsed by Inland Fisheries Ireland.

The first statement in Section 59 legislation states **"(1) Subject to this section, for the purpose of improving any fishery (whether or not the fishery is the property of IFI) IFI may do all or any of the following, namely-"**. This statement raises particular concerns, as actions undertaken using Section 59 legislation have the primary objective of improving the target fishery. Section 9 of this document has clearly shown that decades of pike management operations undertaken within the bounds of Section 59 (and its predecessors) have not realised an improvement in trout stocks on "designated wild brown trout fisheries".



Inland Fisheries Act 2010

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Chapter 3

Fishery improvement

Powers of IFI in relation to improvement of fisheries.

59.— (1) Subject to this section, for the purpose of improving any fishery (whether or not the fishery is the property of IFI) IFI may do all or any of the following, namely—

(*a*) take fish from a fishery by any means whatsoever,

(*b*) implement any other measure intended to alter or regulate the stock in a fishery of fish of one or more particular species,

(*c*) keep under surveillance and from time to time ascertain by any means the quality of water in a fishery,

(*d*) alter, repair, remove or demolish any fence, hedge, tree or wall,

(*e*) dig, break or otherwise temporarily close, cross, extend, divert or otherwise interfere with or alter any navigable waterway, river, stream or other watercourse, bridge, tunnel, culvert, pipe, drain or other thing, and

(*f*) notwithstanding section 327 of the Principal Act, take materials from any river, stream or other watercourse.

Excerpt from "The Irish Statute Book"

13 THE COST OF PIKE MANAGEMENT OPERATIONS

13.1 COST OF OPERATIONS

Using available data*obtained using the Freedom of Information Act, the cost of pike management operations averages €146,560 per year. The number of pike removed average at 9958 specimens per year.

The objective of pike management operations undertaken using Section 59 on "designated wild brown trout fisheries" is to protect the trout population and improve trout angling returns. Changes in the trout population of these fisheries are measured using CPUE (Catch per unit effort), which is calculated using data from fishery surveys. As shown in Section 9, the CPUE values for trout on "designated wild brown trout fisheries" have been in decline for some time despite continued pike management operations.

Pike management operations are undertaken annually, hence the associated operational costs are incurred annually, in addition to lost tourism angling revenues. Fishery surveys are not undertaken annually (e.g. Lough Corrib, 16 years between surveys), hence there is no way to establish whether the execution of and expenditure on pike management operations have delivered their stated objective. This results in the Irish tax payer funding pike management operations for extended periods of time without transparency or visibility of whether their investment has delivered its intended return.

Currently there is no valid cost benefit analysis to justify pike management operations carried out by Inland Fisheries Ireland.

Recent fishery surveys undertaken by Inland Fisheries Ireland on "designated wild brown trout fisheries" have in general shown declining trout populations, as shown in Section 9.

13.1 COST OF OPERATIONS CONTD.

ANNUAL PIKE REMOVAL COSTS 2005-2009 *(Five Select Fisheries)*

		Wrfb						Nwrfb		Shrfb	
		Lough Corrib		Lough Mask		Lough Carra		Lough Conn/Cullin		Lough Sheelin	
		Electro fishing	Gillnets	Electro fishing	Gillnets	Electro fishing	Gillnets	Electro fishing	Gillnets	Electro fishing	Gillnets
2005	No. Pike	5,277	1,408	1,789	1,336			165	1,119	200	0
	Total Weight lb	939	4,639	759	6,128			434	4,918	800	0
	Total Cost €	5,456.00	17,219.00	10,098.00	26,053.00			482.00	33,804.00	27,800.00	0.00
	Cost per Pike	1.03	11.97	5.64	19.50			2.92	30.03	139.00	0.00
	Cost/lb €	5.81	3.71	13.30	4.25			1.11	6.87	34.75	0.00
2006	No. Pike	7,752	2,182	948	1,219			0	526	310	0
	Total Weight lb	713	3,572	696	3,667			0	2,319	1,066	0
	Total Cost €	10,384.00	30,445.00	6,009.00	22,179.00			0.00	7,386.00	34,800.00	0.00
	Cost per Pike	1.34	13.95	6.34	18.19			0.00	14.05	109.67	0.00
	Cost/lb €	14.54	8.52	8.63	6.22			0.00	3.18	31.34	0.00
2007	No. Pike	1,234	2,243	1,758	953	417	390	11	1,113	0	875
	Total Weight lb	506	4,078	1,459	4,814	284	1,039	46	6,717	0	2,700
	Total Cost €	15,732.00	48,966.00	12,142.00	30,175.00	3,089.00	7,330.00	96.00	22,482.00	12,000.00	44,800.00
	Cost per Pike	12.75	21.83	6.87	21.17	8.03	18.54	8.72	20.20	12,000.00	66.37
	Cost/lb €	31.09	12.01	8.32	4.19	7.39	6.96	2.09	3.35	0.00	16.59
2008	No. Pike	924	2,289	1,347	771	189	697	38	1,503	0	2,400
	Total Weight lb	626	3,864	1,923	4,515	223	1,803	264	12,129	0	9,600
	Total Cost €	9,561.53	24,891.00	13,087.87	21,965.70	1,538.90	11,438.33	1,307.00	23,370.00	0.00	48,800.00
	Cost per Pike	10.35	10.97	9.70	28.49	8.14	16.41	37.34	15.55	0.00	19.50
	Cost/lb €	15.27	6.44	6.80	4.87	6.90	6.34	4.95	1.93	0.00	4.86
2009	No. Pike	180	1424	1443	832			177	1133	0	1403
	Total Weight lb	163.34	4310.78	803.75	3987.25			627	6156	0	4015
	Total Cost €	4042.67	23796.01	10457.66	25608.25			5472	25272	0.00	67200
	Cost per Pike	22.46	16.71	7.25	30.78			30.91	22.3	0.00	47.9
	Cost/lb €	24.77	5.52	13.01	6.42			8.59	4.1	0.00	16.73

Note: (Wrfb - Western Regional Fisheries Board); (Nwrfb - North Western Regional Fisheries Board); (Shrfb - Shannon Regional Fisheries Board)

Total Combined Electrofishing and gillnetting Cost for 2005 = **€120,912** —— (11,324 pike removed @ (€10.68 per pike) or (€6.49 per lb)
Total Combined Electrofishing and gillnetting Cost for 2006 = **€110,379** —— (12,936 pike removed @ (€8.53 per pike) or (€9.24 per lb)
Total Combined Electrofishing and gillnetting Cost for 2007 = **€185,722** —— (8,804 pike removed @ (€21.10 per pike) or (€8.58 per lb)
Total Combined Electrofishing and gillnetting Cost for 2008 = **€153,940** —— (10,135 pike removed @ (€15.19 per pike) or (€4.40 per lb)
Total Combined Electrofishing and gillnetting Cost for 2009 = **€161,848** —— (6,592 pike removed @ (€24.55 per pike) or (€8.06 per lb) —— (Correct to 31st July)

Note: During years 2005 to 2009 Inclusive - 49,791 Pike were removed at a Cost of €732,801or €14.71 per Pike from the specific fisheries tabled.
(By gillnets alone 25,635 Pike were removed at a Cost of €551,076.29 or €21.50 per Pike removed - Average weight of gillnetted Pike was 3lb 11oz)

Note: Pike weights and numbers for Loughs Mask/Carra for 2005, 2006 and 2009 are combined under Lough Mask heading

***More current data has been requested under the Freedom of Information Act for years 2010 to present.**

13.2 ECONOMIC IMPACT TO THE IRISH TAX PAYER

The negative economic impacts of pike management operations are wide and varied, but generally affect areas where alternative opportunities for revenue and employment are limited, such as rural towns and communities. Such areas have typically not felt the effect of the general recovery in the Irish economy in recent years. Pike management operations further limit employment and revenue opportunities in these areas outside of the main tourist season, as thousands of domestic and international pike anglers stay away in protest and on the assumption that their target quarry is very limited.

As opposed to some other fish species, pike do not require management in order to function in a fishery and reach an acceptable size and number to attract anglers. It is true that pike populations fare best when neglected. However, IFI are investing year on year on management that has no beneficial effect to pike or any other species, and in fact vastly reduces the attractiveness of Ireland's pike-angling product. Pike management policy endorses the widely-held idea that Ireland's fishery management policies are in fact anti-pike.

Angling as a whole contributes €836,000,000 to the Irish economy and supports over 11,000 jobs directly. There is a contribution from pike angling of 12.2% or €102,000,000. In terms of placement pike angling is the fourth largest contributor to overall angling revenues with brown trout third, sea angling second and salmon and sea trout angling the largest contributor. However, as detailed in the IFI commissioned report **"The Economic Contribution of Pike Angling in Ireland 2015"** pike angling is vastly underrepresented with significant potential for growth through a more focused management approach for the benefit of pike. In this independent report there is recognition that currently the potential of pike angling revenue is severely limited due to negative pike management policy. IFI states in its own market research (2015) in the National Strategy for Angling Development that: ***"current pike management policies may impact negatively on Ireland's reputation as a prime pike angling destination",*** and additionally, the potential for pike as an asset for angling tourism with a status as ***"the number one sport fish in Germany, France, the Netherlands and Italy"*** and that pike fishing is ***"also quite popular amongst anglers in the UK".*** A positive change in management policy would see pike angling revenue contribution increase greatly as large numbers of anglers return and hence elevate its contributory position. This is supported by data from both domestic and international anglers alike.

14 IFI CONTRAVENTION OF POLICY, MODERN RESEARCH AND COMPARATIVE ANALYSIS

14.1 IFI CONTRAVENTION OF ECONOMIC AND NATIONAL ANGLING RELATED POLICY

Through review of the various policies and intent of Inland Fisheries Ireland, it is apparent that the organisation's actions on the ground do not align. In relation to Fisheries Protection, the public message conveyed by IFI through various media is "*Inland Fisheries Ireland is charged with ensuring the protection and conservation of our fisheries resource, both the fish and their habitats. IFI's area of responsibility covers both inland waterways and out to the twelve mile limit off the coast. The species protected include all freshwater fish, sea bass and certain molluscs*." Inland Fisheries Ireland kills and disposes of more freshwater fish than any other individual or organisation in Ireland.

In 2013, at a cost of €110,000 to the Irish tax payer, IFI commissioned the **"Socio-Economic Survey of Recreational Anglers"**. The report recognised the value of all angling disciplines to the Irish economy, and highlighted recommendations and changes. In the same period, the **"Inland Fisheries Ireland Pike Policy"** document was being reviewed by IFI and various stakeholders through a review committee structure. Mid-way through this process, IFI decided to stand down the Pike Policy Review committee. The **"Inland Fisheries Ireland Pike Policy"** was released in 2014, and did not integrate recommendations made within the Socio-Economic study or the Pike Policy review committee. IFI have stated publicly that their pike Policy was endorsed by the pike angling stakeholder on the review committee, when in fact this is not the case. Further concessions on pike policy were agreed with the pike angling stakeholder earlier in the review process, but not honored by IFI.

The **"National Strategy for Angling Development"** (NSAD) is the first comprehensive national framework for the development of Ireland's angling resource. The development of this strategy has come at a cost to the Irish tax payer, and its implementation will cost €25,000,000 over a 5-year period. IFI's current pike management operations would appear to be odds with the NSAD on many fronts.

A key strategic objective of the NSAD is to enhance Ireland's international reputation as a key destination in the angling world. Current Pike Management Policy and Operations are a major obstacle to this and are recognised as such across the NSAD main target markets of the UK and mainland Europe. Continued implementation of current pike management policy supports the widely-held opinion that some Irish fishery management policies are archaic, outdated, and at odds with modern research and international best practice, and hence provide no benefit for the target fishery.

14.1 IFI CONTRAVENTION OF POLICY CONTD.

A key action measure in the NSAD is to "Encourage stakeholder engagement and involvement in fisheries development and management". Using the recent Pike Policy review as an example, it is unclear as to how this will be successfully implemented by IFI when stakeholder input is not valued, considered or implemented.

Implementation of the NSAD is proposed to occur in a structured step-by-step approach. The continued practice of Pike Management Operations would appear to directly oppose the intent at the very beginning of this process.

Excerpt from "The National Strategy for Angling Development" (2015)

14.2 IFI CONTRAVENTION OF PIKE MANAGEMENT POLICY & SOP'S

With respect to Pike Management Policy IFI purport to operate within guidelines and standard Operating Procedures. The two most relevant SOPs are **"Inland Fisheries Ireland Standard Operating Procedure (SOP) for Pike Management Operations using Gill-nets"** and **"Inland Fisheries Ireland Standard Operating Procedure (SOP) for Pike Management Operations using Electrofishing Apparatus"**. It has been a long-standing opinion that the SOPs (past and present) have rarely been adhered to. Much evidence from anglers and the general public supports this, and in recent years many IFI staff have been photographed and filmed executing Pike Management Procedures in an improper and barbaric way. The recent IFI review of both SOPs was initiated by damning evidence filmed in March 2015 on Lough Conn and released on social media one year later by a member of the public.

https://www.youtube.com/watch?v=QLLoUmk4CnE
https://www.youtube.com/watch?v=qEzcIXuUnAM

Correct execution of pike management SOPs were intended to facilitate the return of pike over a certain length to their waters, with smaller individuals removed and disposed of. In some cases, pike over a certain length were to be transferred to other "more suitable" waters. Simple measuring devices are mainly absent on management vessels, raising questions as to how a determination is made on length. The video evidence released on social media suggests that loop holes in the IFI SOPs were being used whereby pike that should have been returned were indeed retained in the bottom of boats or barrels with insufficient water for hours at a time. When staff attempted to return the pike, they were already dead, but as an attempt has been made to return them there was no contravention of the SOP - hence no repercussions for IFI or its staff.

The recently updated SOPs do not garner much support. They remain open to contravention by staff, as determinations of fish to be returned are entirely subjective and at the discretion of the senior officer. IFI face many challenges here, as typically senior staff endorsing and undertaking pike management operations are informing field staff with erroneous data on the pike's role within the target fishery. This is a major obstacle to overcome if proper implementation of SOPs is to occur; field staff are unfairly left open to criticism and intense scrutiny by members of the public as they execute ill-informed policies endorsed at more senior levels in IFI.

Irrespective of whether the current SOPs can be followed or not, they have no place in modern fishery management, and by consigning them to the past IFI could solve many public relations issues and reclaim much support from the angling public and their peers internationally.

15 THE PRACTICE OF GILL-NETTING, ELECTROFISHING AND PIKE MANAGEMENT OPERATIONS

15.1 GILLNETTING

Gill-netting involves the use of fine nets to trap and entangle fish and eventually cause death. With respect to the use of gill-netting for IFI pike management operations, the main target species is pike; hence the gill-nets are placed in shallow bays from February to May each year in order to capture egg-laden females and spawn-bound males en route to spawn in reed beds and shallow margins. The method is entirely indiscriminate by nature. Many species of fish are caught in gill-nets and recent evidence suggests that high numbers of brown trout perish in addition to pike, perch, roach, bream and salmon. As gill-nets are typically laid in areas that are “food rich” for water birds and mammals, much additional wildlife risks becoming entangled and dying. Species include ducks, grebes, herons, swans, water hens, otters, mink, and indeed any living creature that potentially comes into contact with the gill-net.

Gill-nets are also a concern for Public Health and Safety, as typically they are poorly marked and cannot be easily seen in the water. Gill-nets have the capacity to entangle swimmers and various other water users with dire consequences. Boat users are also at serious risk, as engines can easily become entangled and hence disabled, therefore stranding the occupants or in bad weather conditions potentially causing a boat to capsize.

15.2 ELECTROFISHING

Electrofishing involves the use of electric current passed through the water column between two electrically conductive rod; fish or animals in the area are stunned as they pass through the electric field. Whilst some fish do survive this process, it is quite often fatal for larger specimens such as pike. Scientific evidence suggests that significant spinal damage occurs in longer fish species such as pike and trout when affected by electrofishing resulting in a high mortality rate later. To avoid this, specific specialised training is required in order to set up the electrical equipment correctly for conditions at the start of the operation and for the duration of the operation.

15.3 INTERNATIONAL BEST PRACTICE

Inland Fisheries Ireland purports to implement pike management operations to the same standards as international best practice. Internationally, the use of gill-netting and electrofishing as methods of species control are deemed necessary, and in most cases only permitted, where the target species is non-native - pike are native to Ireland.

Internationally Loch Leven in Scotland is known as the best wild brown trout fishery in the world, a reputation it has held for over a century. Pike are present in Loch Leven with pike angling promoted at the fishery which now also boasts world class pike and perch fishing. Pike are not managed or culled by Loch Leven Fisheries.

15.4 RETURNING PIKE CAPTURED DURING PIKE MANAGEMENT OPERATIONS

IFI pike management policy calls for the return of pike exceeding a certain length. Evidence suggests that this does not presently occur and has not in the past occurred, in the intended way. Using available data and taking Lough Corrib as an example, the tables shown below illustrate that an average return rate of just 0.39% is executed during pike management operations.

No. of pike Captured			
Year	Electrofishing	Gillnets	Total
2008	924	2269	3193
2009	180	1424	1604
2010	1583	1773	3356
2011	918	786	1704
2012	942	2087	3029

Pike captured annually averaged over 5 years	2577

No. of pike Returned			
Year	Electrofishing	Gillnets	Total
2008	0	10	10
2009	0	20	20
2010	0	8	8
2011	0	9	9
2012	0	3	3

Pike returned annually averaged over 5 years	10

The data shown shows that an average of just 10 pike per year are returned to Lough Corrib during pike management operations. Considering the data set as a whole, between 2008 and 2012 12,886 pike were captured and just 50 returned. Pike that are returned are allegedly Floy-tagged by IFI.

15.3 RETURNING PIKE CAPTURED DURING PIKE MANAGEMENT OPERATIONS CONTD.

On waters where return rates are purported to be higher, such as Lough Mask, a worrying statistic emerges. For more than a decade, it has been recognised that the quality of pike fishing on Lough Mask has collapsed. However, it remains practised by a few local dedicated individuals who do not have to travel long distances or invest in overnight accommodation for resulting poor returns. Allegedly IFI Floy-tag captured specimens that are then released back into Lough Mask. With such vastly reduced and hence localised pike populations, it is reasonable to assume that some of these pike would be recaptured by legitimate means (rod and line) or at a minimum recaptured in subsequent stock surveys or pike management operations. However, there have been no recaptures of Floy-tagged specimens recorded since the tagging regime began on both Loughs Mask and Corrib. This raises many concerns such as:

1) Are pike over a certain length returned at all (as required by IFI SOPs) and if so are they actually tagged?
2) Are pike that are captured tagged and released, but soon after perish due to injuries caused by gill-nets and/or electrofishing?

Studies of pike and pike movement referenced in the **"Synopsis of Biological Data on the Northern Pike (1988)"** show a considerable rate of recapture of tagged pike for years after initial tagging.

Gill netting	No returned or relocated
2010	12
2011	54
2012	14
2013	16*
2014	23

* 32 in first FOI response see above

L Mask - 2010 Gill netting (n = 12)

Date	Length	Weight	Floy Tag No.	Receiving Waters
27/01/2010	94	n/a	2700	Mask
28/01/2010	96	n/a	2699	Mask
29/01/2010	102	n/a	2698	Mask
05/02/2010	104	n/a	4649	Mask
05/02/2010	95	n/a	2687	Mask
16/02/2010	102	n/a	2696	Mask
03/03/2010	98	n/a	4601	Mask
03/03/2010	112	n/a	4602	Mask
04/03/2010	98	n/a	2651	Mask
12/03/2010	94	n/a	4456	Mask
12/03/2010	98	n/a	4457	Mask
24/03/2010	93	n/a	4603	Mask

Number of Lough Mask pike returned or relocated for year 2010

16 SUMMARY

It is clear that pike management operations have a wide range of negative effects on both the angling community and the general public as a whole. The negative economic impact on rural communities will continue until policy changes and a more sustainable and balanced strategy is employed.

Pike management policy is divisive among the various angling groups and disciplines within Ireland. Such conflict is highly counterproductive and undesirable at a time when anglers and state agencies need to work together harmoniously to protect our fisheries and habitats against threat. Poaching, illegal fishing, pollution, habitat restoration, and climate change are just a few of the many challenges facing our fisheries. Anglers as a group are one of the most important guardians of the natural environment; they are the eyes and ears of our waterways, and can only afford them maximum protection when unified.

Evidence supports the view that pike management policy has not had its intended effect on fisheries. This is indicated by a reduction in stocks of wild brown trout, whilst pike populations are severely reduced. This raises the question as to what research has been undertaken to ascertain the root cause of the decline of this important and valuable species in fisheries where pike management is executed annually. More likely causes are degradation of trout spawning habitat in important feeder streams and increases in populations of competitor species (roach, perch) due to decreased predation. Degradation of trout spawning habitat has been a major problem nationally, and there is an ongoing battle against such factors as pollution, encroachment and enrichment. IFI execute habitat restoration and stream enhancement projects in many areas of the country. Local angling clubs contribute significantly in this area also, by funding and executing such works themselves on their local waters. IFI would generate much good-will and support by abandoning pike management operations and the wasteful utilisation of resources to execute it while redirecting those resources to tackle the real problems facing important wild brown trout populations.

The continuation of pike management operations results in the destruction of one of Ireland's natural resources at significant expense to the Irish economy.

17 REFERENCE

Barbe, F. & Garrett, S. (2000). The pike in Ireland: a (necessary) review. *Angling in Ireland Magazine,* September to December. Available at:http://homepage.eircom.net/~sheelin/IPSPikeInIre.html (accessed 14 September 2016).

Craig, J.F. (1996). Pike, biology and exploitation. London, Chapman & Hall, Fish and Fisheries Series 19: 298 pp.

Delanty, K., O'Grady, M.F., O'Briain, R., Feeney, R., Cooney, R. and Coghlan, B. (2016). National Research Survey Programme. Inland Fisheries Ireland, 3044 Lake Drive, Citywest Business Campus, Dublin 24. A Report on a Scientific Survey of Adult Fish Stocks in Lough Ree, 2014.

Diana (1979) – Food and Agricultural Organisation of the United Nations (1988). Synopsis of Biological Data on the Northern Pike:Esox Lucius.

Domínguez, J., & Pena, J. C. (2000). Spatio-temporal variation in the diet of northern pike (Esox lucius) in a colonised area (Esla Basin, NW Spain). Limnetica, 19, 1-20

Ensing (2015) Pike could have been an exclusive human introduction to Ireland after all: a comment on Pedreschi et al. (2014) Journal of Biogeography, **42**, 604-607.

Fitzmaurice, P. (1983). Some aspects of biology and management of pike (Esox Lucius L.) stocks in Irish Fisheries, J. Life Sciences, RDS 161-173.

Food and Agricultural Organisation of the United Nations (1988). Synopsis of Biological Data on the Northern Pike:Esox Lucius.

Gargan, P.G. & O'Grady, M.F., (1992): "Feeding Relationships of trout salmo trutta L., Perch Perca fluviatilis L., and Roach Rutilus rutilus (L.) in Lough Sheelin, Ireland", Department of Agriculture and Fisheries [Fisheries Division] Irish Fisheries Investigations Series A;35

Healy, A. (1955). Report on scheme for the reduction of coarse fishes. Fisheries Branch, Department of Agriculture Dublin Journal, Vol. 51, 1954-1955.

Healy, A. (1956). Pike (Esox lucius L.) in three Irish lakes. Scient. Proc. R. Dubl. Soc. 27, 51-63.

Huxley, Chris. (2011) "Lough Carra Angling Records", www.loughcarra.org

Inland Fisheries Ireland. (2011). The Necessity for Controlling Pike Stocks in Some Quality Irish Wild Brown Trout Managed Lake Fisheries. A presentation to the Pike Policy group, November 2011.

Johnson, L. (1966). Consumption of food by resident population of pike, Esox lucius, in Lake Windermere. J. Fish. Res. Bd. Canada 23: 1523-1535.

Johnson, L. (1966a). Experimental determination of food consumption of pike, Esox Lucius, growth and maintenance. J. Fish. Res. Bd Can. 23 (10), 1495-1505.

Johnson, L. (1966b). Consumption of food by the resident population of pike, Esox Lucius, in Lake Windermere. J. Fish. Res. Bd Can. 23 (10), 1525-1535.

Kelly, F.L., Connor, L., Matson, R., Feeney, R., Morrissey, E., Coyne, J. and Rocks, K. (2014) Sampling Fish for the Water Framework Directive - Summary Report 2013. Inland Fisheries Ireland, Citywest Business Campus, Dublin 24, Ireland.

Kelly, F.L., Connor, L., Matson, R., Feeney, R., Morrissey, E., Coyne, J. and Rocks, K. (2015) Sampling Fish for the Water Framework Directive - Summary Report 2014. Inland Fisheries Ireland, Citywest Business Campus, Dublin 24, Ireland.

Kelly, F.L., Harrison, A.J., Allen, M., Champ, W.S.T, Rosell, R.S., Connor, L., 2008. Task 6.9. Classification Tool for Fish in Lakes. Final Report. North-South Shared Aquatic Resource (NS Share) Project.

Kelly, F.L., Harrison, A.J., Allen, M., Connor, L. and Rosell, R. (2012b) Development and Application of an Ecological Classification Tool for Fish in Lakes in Ireland. *Ecological Indicators*, **18**, 608-619.

King, J.J., Kirrane, M (1994). Lough Arrow Fish Stock Survey. Central Fisheries Board, Internal Report.

Kipling, C. & Frost, W.E. (1970). A study of mortality, population numbers, year class strengths, production and food consumption of pike, Esox lucius L., in Windermere from 1944 to 1962. J. Anim. Ecol. 39: 115-157.

Mann, R.H.K. (1982). The annual food consumption and prey preferences of pike (Esox lucius) in the River Frome, Dorset. J. Anim. Ecol. 51: 81-95.

Minchin, D. (2007) A checklist of alien and cryptogenic aquatic species in Ireland. Aquatic Invasions, 2, 341–366

O'Grady, M.F. (1995). The necessity for pike culling in managing Ireland's premier salmonid lake fisheries. Central Fisheries Board, Internal Report.

O'Grady, M.F., Gargan, P., Byrne, C., Igoe, F., O' Neill, J. (1996). A Fish Stock Survey Report for Loughs Corrib, Mask and Carra and Future Management Options for the Fishery Resource. Central Fisheries Board, Internal Report, 3rd July, 1996.

O'Grady, M.F. & K. Delanty. (2003). A Fish Stock Assessment of Lough Arrow, 2002. Central Fisheries Board, Internal Report.

O'Grady, M.F. (2006). A summary Report on the Fluctuations in Fish stocks in Lough Sheelin from 2000 to 2006. Central Fisheries Board, Internal Report.

O'Grady, M.F. & K. Delanty. (2008). The Ecology, Biology and Management of Pike in Irish Waters with Particular reference to Wild Brown Trout Lake Fisheries. Central Fisheries Board Internal Position Paper, 52pp.

O'Grady, M.F., Kelly, M. and O' Reilly, S. (2008). Brown Trout in Ireland. Irish Freshwaters Fisheries Ecology & Management Series, Number 6, Central Fisheries Board, Dublin, Ireland, pp. 112.

O'Grady, M. & K. Delanty. (2012). A Survey of Adult Fish Stocks in Lough Corrib, 2012

Paradis, Y., Bertolo, A., & Magnan, P. (2008). What do the empty stomachs of northern pike (Esox lucius) reveal? Insights from carbon (δ13C) and nitrogen (δ15N) stable isotopes. Environmental biology of fishes, 83(4), 441-448.

Pedreschi, D., Kelly-Quinn, M., Caffrey, J., O'Grady, M. and Mariani, S. (2014) Genetic Structure of Pike (Esox Lucius) Reveals a Complex and Previously Unrecognized Colonization History of Ireland. Journal of Biogeography, 41, 548-560.

Pedreschi, D., Mariani, S., Caffrey, J., O'Grady, M., Voigt, C. & Kelly-Quinn, M. (2014). The Diet of Pike in Irish Watercourses. Layman's Report, Inland Fisheries Ireland.

Pedreschi, D., Mariani, S., Coughlan, J., Voigt, C. C., O'Grady, M., Caffrey, J. and Kelly-Quinn, M. (2015), Trophic flexibility and opportunism in pike *Esox lucius*. J Fish Biol, 87: 876–894. doi:10.1111/jfb.12755

Pedreschi, D., Mariani, S., Caffrey, J., O'Grady, M., Voigt, C. & Kelly-Quinn, M. (2014b). Trophic flexibility and diet of pike (*Esox lucius* L.) in Ireland. Layman's Report, Inland Fisheries Ireland.

Pedreschi, D. and Mariani, S. (2015), Towards a balanced view of pike in Ireland: a reply to Ensing. J. Biogeogr., 42: 607–609. doi:10.1111/jbi.12472

Rudzianskiene G. (2001). The choice of nutritional objects by predatory fishes according to the changes in their species composition in 1994-1998. The analysis of research. Acta Zoologica Lituanica, 11(1): 53-72.

Toner, E.D. (1959). Predator and Prey Relationships. *Salmon and Trout Magazine*, May 1959, 104-110.

Treasurer, J. W. (1988). Measurement of regurgitation in feeding studies of predatory fishes. J. Fish Biol. 33, 267–271.Went, A.E.J., (1949). Giraldus Cambrensis' notes on Irish Fish. Irish Naturalists J. 9 (9), 221–224.

Went, A.E.J., (1949). Giraldus Cambrensis' notes on Irish Fish. Irish Naturalists J. 9 (9), 221–224.

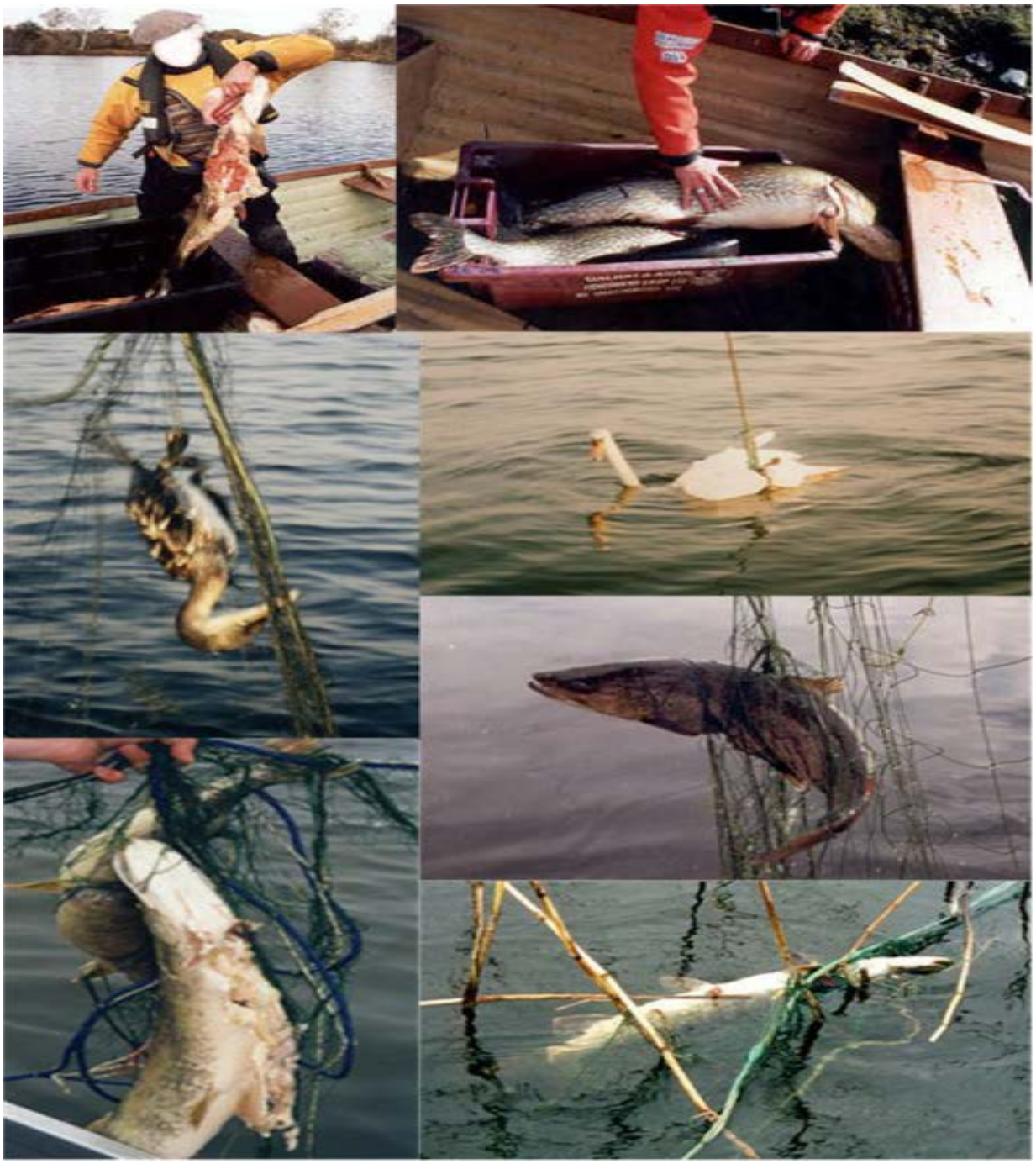
Went, A.E.J., (1950). Notes on the introduction of some freshwater fish into Ireland. J. Department Agric. Dublin 47, 119–124.

Went, A.E.J. (1957). The Pike in Ireland. Irish Naturalists Journal 12: 177–82.

18 IMAGES

Addendum to Economic and Ecological Effects of Pike Management Operations Conducted by Inland Fisheries Ireland and Deficiencies in its Justification

Document	P160301/030/002



1 REVISION HISTORY

Revision History		
Revision	Author	Notes
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CONTENTS

2 INTRODUCTION

This document defines additions and changes to document P160301/030/001 - Economic and Ecological Effects of Pike Management Operations Conducted by Inland Fisheries Ireland and Deficiencies in its Justification Revision 1.0.

2.1 LIST OF CHANGES

1) Addition of new Section 4.1.1.3 – Full Text of Barbe, F & Garrett, S (2000) Research.

2) Edit of Section 4.1.2 – Section Summary Conclusion: Past Research Relating to the Origins of Irish Pike.

3) Addition of new Section 5.1.4 – The Spread of Freshwater Fish and Fauna by Natural Means.

4) Renumber and edit of existing Section 5.1.4 to 5.1.5 - Section Summary Conclusion: Current Research Relating to the Origins of Irish Pike.

5) Addition of new Section 9 – Parameters for Successful Brown Trout and Pike Co-Existence. Section numbering for all sections after new Section 9 incremented by 1.

6) Addition of new Section 10.3.2 – An Example of Dietary Crossover Between Perch and Wild Brown Trout.

7) Addition of new Section 10.4.4 – Lough Ennell: An Example in Improving Brown Trout Stocks by Addressing the Real Issues.

8) Addition of new Section 10.4.5 – Lough Leven: An Example in Improving Brown Trout Stocks by Addressing the Real Issues.

9) Edit of Section 15.3 – International Best Practice. Section number formerly 14.3.

2.2 DOCUMENT CHANGES

2.2.1.3 – 4.1.1.3 FULL TEXT OF BARBE, F & GARRETT, S (2000) RESEARCH

THE PIKE IN IRELAND : A (NECESSARY) REVIEW

Part 1: Lúis

The Dutch Angling journalist Jan Schreiner is widely regarded as one of the most influential writers of the 20th century. He wrote over 50 books about all kinds of angling and contributed to several angling magazines. After World War II he started writing about the joys and pleasure of fishing, a pastime up to then only known for food supply reasons. Most importantly, his writings lay the foundations for a general belief and acceptance that catch-and-release fishing is a very important aspect, necessary to protect our sport, given the increased pressure of pollution, over fishing etc....

Jan Schreiner was a frequent visitor to the island of Ireland. He loved the country and spent many weeks fishing for salmon, trout, pike, perch, tench, bream etc. He was, and still is, well known, in the Foxford area in particular. In 1973 he wrote "Sport fishing in Ireland", another great example of his fabulous and highly poetic writing style. Yet, when it came to the management of Irish waters, he could be very critical. In this book he spends some time explaining the attitude of the Irish fisheries towards pike. He didn't give them many compliments...Probably the single most important statement in this context was the following : " It would be very interesting if someone someday would dig into all the accepted facts which, despite their very poor foundations, are still generally accepted as truths." A clear allusion to the theories held on by the Irish Fisheries that pike is not a native species and has to be culled on trout waters.

During the gillnetting campaign carried out by the Western Regional Fisheries Board on Loughs Mask, Corrib and Carra in winter 98 and spring 99 a passionate debate took place in the local and national press. One contributor wrote the following in one of his letters : "...pike, a piscovore whose Irish name is 'Gaill Eisc' or foreign fish... should therefore be removed from these lakes..." A short while later I was told by an Irish speaking person living in the Gaeltacht that this was incorrect since the Irish for pike was 'liús'.

Since then, my good friend Shane Garrett and I, together with the help of numerous very kind and helpful people, have gone through piles of information and documents, in order to puzzle together the history of Irish pike. We have also focused on arguments brought forward by Irish Fisheries Scientists claiming that pike are of recent introduction. More than one year later and although our work is far from finished, we would like to share our finds, to date, with the interested reader. Indeed, we came across a number of very interesting references.

Let's first of all solve the "gaill iasc – liús" problem. Open any Irish dictionary and you'll see pike being translated as liús. Some dictionaries however mention gaill iasc as well. It appears that gaill iasc is a literary coinage, a creation from the 17th or 18th century. The original word for pike, liús, is much older. Although it is impossible to pinpoint exactly when it was first used it appears that liús dates from somewhere between the 13th and the 15th century, indicating that pike could very well have been on this island much longer than we were always led to believe....

The Irish Fisheries have always seen the gaill iasc theory as a solid base to prove their introduction theory. They have scaled down this theory to the belief that gaill iasc is the Irish word for pike used in some parts of West Mayo. Incorrect again, I'm afraid. In The Irish naturalists Journal, Volume 8, 1942-46, an article "Local names of Irish Fishes" by G.P. Farran is published which mentions Liús for Mayo. Not a mention of gaill iasc. Together with this argument it is often said that pike cannot be native because there are lakes where pike are absent. It appears to me that it is very difficult to defend this argument. There are numerous lakes where no trout or salmon can be found but do we see them therefore as introduced?

Besides; to say that gaill iasc means foreign fish is in itself all too simplistic and incomplete. Whilst iasc means undoubtedly fish, gaill can mean foreign but can also mean "Invigoure-" or "Gaul" or "Norseman". The word gaill iasc therefore does not prove at all that pike is an introduced fish species.

Another argument of the introduction theory is that there is no old Irish name for pike. Unlike for species like salmon and trout which both have old Irish names. Sounds solid at first sight but doesn't make sense either I'm afraid. Let's give our salty friend the mackerel a thought. Or the cod maybe. I think everyone will agree that these are native species to the Irish coasts. Yet, they have no old Irish names! One could also look at our feathered friends and notice that a bird like the partridge has no old Irish name, yet is native to this country. In other words, the fact that pike has no old Irish name does not prove anything. Surely not that it is introduced.

Our "find" of the word Liús has proven very important since. The word keeps coming back in different publications and references and it will prove to be very significant indeed as these series of the highly interesting journeys along the history of Irish pike unfolds.

So far for the introduction. In the next article we bring Dr. Went upon stage, and then it gets really interesting!

Text : Frank Barbé and Shane Garrett

THE PIKE IN IRELAND : A (NECESSARY) REVIEW

Part 2 : Went

In 1957 Arthur E.J. Went wrote "The Pike in Ireland". It was published in The Irish Naturalists' Journal. I can recommend the reading of these journals to anyone with an interest in the history of Irish nature and wildlife. A winter's evening by the open fire, backed with a glass of your favorite drink becomes a real treat when reading through these Journals.

Went was a noted historian who wrote several articles about Irish fish. In the above mentioned publication Went came to the conclusion that "...it would certainly appear that it (the pike that is) is not a native fish." To come to this belief Went came up a number of references and it has been extremely interesting to look into these in detail. It is important to point out that Went's work is still the main foundation of the pike's introduction theory held on to by the Irish Fisheries.

Part of his introduction theory relies on the absence of an old Irish name for pike. Went also writes that " the more modern name for pike is gaillúsc, which literally means strange or foreign fish." In the first article we have shown that both conclusions are incorrect.

It is of extreme importance to note that Went did not investigate the Irish word Liús (meaning pike and presumably dating from somewhere between the 13th and 15th century.). The word Liús appeared several times in articles published in The Irish Naturalists' Journal written by other contributors. It seems highly unlikely that Went did not read these, as he had articles himself in some of these Journals. Did Went ignore "Liús"? If so, why?

We come to the heart of Went's introduction theory when he brings up his key witness Giraldus Cambrensis. Giraldus Cambrensis was a Welsh archdeacon who visited Ireland on two occasions at the end of the twelfth century. He wrote the "Topography of Ireland". Went quotes Cambrensis in his article as follows :

...The rivers and the lakes are rich in fish peculiar to themselves, and especially in fish of three kinds, namely, salmon, trout and mud-eels. ... But some fine fish are wanting. I mean pike, perch, roach, gardon and gudgeon. Minnows, loach, bullheads, verveux, and nearly all that do not have their seminal origin in tidal rivers are absent also."

Now let's have a look at the original translation of Cambrensis' writing. I quote from the same passage.

"The rivers and the lakes are rich in fish peculiar to themselves, and especially in fish of three kinds, namely, salmon, trout, and mud-eels. But some fine fish, found in other regions, and some magnificent fresh-water fish are wanting. I mean pike, perch, roach, gardon and gudgeon. Minnows, loach, bullheads, verveux, and nearly all that do not have their seminal origin in tidal rivers are absent also."

The underlined part of the latter quotation was omitted by Went in his article. I have to stress on the extreme importance of this "mistake" in Went's work. We know that Cambrensis was in parts of the Southeast of the country and he might have travelled inland. When Cambrensis wrote "...found in other regions...", did he mean there was pike etc. in other parts of the country? Why did Went omit this vital passage?

This patent misquotation by Went is the point of discussion here. However, Cambrensis' work should not be given more credit than it deserves. Indeed, some academics have their doubts about the value of Cambrensis' work. One of the reasons being the way in which he described Ireland :

"On the whole the land is low-lying on all sides and along the coast; but towards the centre it rises up very high to many hills and even high mountains.

" We all know that it is just the other way around. Mountains around the coastline (Wicklow-Kerry-Connemara...) and flat in the Midlands. This mistake of his is sufficient to conclude that he did not see great parts of the country. Cambrensis also gave accounts of "a fish with three gold teeth" and "a man that was half an ox". Up to today Giraldus Cambrensis is still regarded as a reliable witness by the Irish Fisheries.

Reading on in Went's article we come across the following passage :

"...we find in A.K. Longfield's 'Anglo-Irish trade' in the 16th century that pike were exported in the early part of that century to some of the smaller towns in the south of England. We do not know, of course, the origin of these fish."

Let's quote from A.K. Longfield's 'Anglo-Irish trade' direct now :

At the end of the fifteenth century and beginning of the sixteenth, however, they (this is the pike) *appear as coming regularly from Youghal, Dungarvan, Cork and Kinsale to the Cornish ports..."*

Three important observations can be made here. Firstly, why did Went question the origin of these Irish pike, exported to England? Whereas it says clearly, in the book where he refers to, that they came from several named Irish towns.

Secondly, Longfield mentions the export of pike to England from Ireland at the end of the fifteenth century. Further in the same book we even find a detailed reference of export of pike from Ireland to England in 1492. Why does Went ignore these pre-sixteenth century references to pike?

Thirdly, if there was a thriving trade of pike in Ireland at the end of the fifteenth century they must have been pretty widespread by then and could hardly have been introduced recently. (If introduced at all!)

Went's article "The Pike in Ireland" contains more references to support his introduction theory. Some of them relate to personal notes of individuals which therefore cannot be looked into. Others still need verification. Yet, it is clear that his work contains serious shortcomings.

And there is something else. Which is, again, of major importance. Arthur E.J. Went worked for the Fisheries Branch of the Department of Agriculture and was a founding trustee of the Salmon Research Trust. People who knew him testify that he was a very dedicated game angler who had no great regards for the fish species called pike. I am told that the latter statement is a very attenuated expression of his feelings towards pike. This gives rise to a serious conflict of interest. With this knowledge in mind, how could (and still can) this study of the Irish pike be the main foundation of the Irish Fisheries' policy towards pike?

Considering the evidence of shortcomings in his work and the obvious conflict of interests should we regard Dr. Went as a reliable source?

In the next article we will loosen some more bricks in the "introduction-wall" the Irish Fisheries have built over the last century as we will make the single most important revelation in our series on the history of pike so far...

Text : Frank Barbé and Shane Garrett

2.2.1.3 – 4.1.1.3 FULL TEXT OF BARBE, F & GARRETT, S (2000) RESEARCH CONTD.

THE PIKE IN IRELAND : A (NECESSARY) REVIEW

Part 3 : Of Pike and Poets

Before getting to the heart of our third article on the history of pike in Ireland we need to clarify an often held misunderstanding. There is no concrete evidence to suggest that pike are an introduced species in Ireland. The introduction theory is based on references that have been regarded over the last century by the Irish Fisheries as conclusive. This is only a theory. In our first two articles we have shown that some of those references are incomplete, incorrect or even misleading. Others we regard as naïve and surely not conclusive enough to classify pike as introduced. One example...

Around 1900 a commercial fisherman on Lough Conn catches a fish which he cannot recognize. Subsequently it is identified as a pike. This incident is one of the reasons why the current Research Department of the Central Fisheries regard pike as introduced. When reading the "Doomsday Book of Mammoth Pike" by Fred Buller, one comes across several specimen pike caught on Lough Conn dating back as far as 1870. (One such specimen is currently on display in the Natural History Museum in Dublin.) In other words, at a time when our commercial fisherman caught the fish he could not identify, other people were claiming 40 and 50-pounders from the same lake! Clearly, pike must have been around for quiet a while if the lake was able to produce such monster fish. The fish determination skills from our friend seem to be in line with the science the Fisheries are serving us.

Let's conclude with a noteworthy passage from the same book :

Lough Conn, whose big pike and big trout once attracted a certain type of fisherman (the big-fish man) from all over Europe, now caters to those who are content to take a more certain bag of smaller fish (trout). This change is due principally to the systematic destruction of pike." The book was written in 1979.

Let's move on and look into another reference on which the introduction theory is based. We quote from a letter we received from Mr. P. Fitzmaurice, Director of Research of the Central Fisheries : "A review of historical Irish annals carried out in the 1950's found no reference to pike in any documentation prior to the 15th Century."

We presume Mr. Fitzmaurice refers to the article "The Pike in Ireland" written by Arthur E.J. Went in 1957. We dealt with Went and the contents of his work in our second article. However, apart from proving that Went's work was incomplete and parts of it incorrect, we also discovered a few more interesting facts that prove Mr. Fitzmaurice's quote highly doubtful.

"Regimen na Sláinte" is a medical text from c. 1420 which contains references to pike. It is an Irish translation of a Latin medical tract which originated in Italy. Interesting to note is that the person who translated the text (in the early 15th century) used the Irish word lúis for pike, rather than merely transliterating the Latin lucius. It appears that the Irish translator was already familiar with the Irish word for pike. Since the original Latin text of this work was written in Italy, the references to pike are not directly relevant to the presence or absence of the fish in Ireland. However, the fact that the Irish translator knew of an Irish word for pike seems proof to us that the fish species occurred in Ireland early 15th Century.

For the sceptical ones among us we will back up this theory and take it one step further.

The Irish Grammatical Tracts are a collection of rules of grammar and diction which assisted student poets in learning their craft. We will quote one such short poem which was written ca 1400 :

"do sgailt giolla géig don ghiúis

do bhrúig lúis na Sionna suas."

It was Chinese to us as well so we got the experts to translate it for us. The translation sounds as follows :

"The young man split a branch of the fir-tree,

he enticed up the pike of the Shannon."

This poem brings us the confirmation that there was indeed pike in Ireland, more precisely in the Shannon, ca 1400 and that no one found this remarkable. That no one found this remarkable leads us to conclude that they were there for quiet a while. It is tempting to draw further conclusions considering the hundreds of kilometers the Shannon covers and the numerous big and small lakes it connects.

The importance of the two above mentioned references taken into account we can rest assured that the claim that there was no (reference to) pike in Ireland before the 15th Century is outdated and incorrect. After all, the review the current Research Department of the Irish Fisheries base themselves on dates from the middle of the 20th Century...

In our final article we come to the conclusion of our series on the history of pike in Ireland. We will approach the pike's history from a few other angles, and bring up a few sources which consider the pike as being native to the Irish country...

Text : Frank Barbé and Shane Garrett

THE PIKE IN IRELAND : A NECESSARY REVIEW

Part 4 : The Essex-Files Conclusions

With this article, we come to the conclusion of our series on the history of pike in Ireland. We should add however that we are currently preparing a special appendix to our story, in which we will focus on conservation. As our research into this intriguing subject has become an ongoing process, updates can be expected. Before we start drawing conclusions about the significance of the contents of our articles, we will first of all look at the pike's history in Ireland from a few other angles.

Native or not?

Although it seems almost sure that pike have spread in certain parts of the island later than in others, nobody has ever provided concrete evidence of its introduction. Indeed, some sources claim pike as being native. In 1950 Robert Lloyd Praeger wrote "The Natural History of Ireland", in which he classifies the pike as an Irish native fish species. One hundred years before that, William Thomson notes pike as being native. Aodh Mac Domhnaill from County Meath wrote a tract on natural history in the same period. Pike is the first fish he mentions as being native. He describes it as "clean, bright and tasty". We know from our last article that pike are proven to be in Ireland over 400 years before that. However, it is still very interesting to see that the pike was an established part of the piscine fauna in Co. Meath in the early 19th century and was not referred to as being introduced but classified native.

Other species in other countries.

In our research we have not limited ourselves to Ireland alone. We have looked around Europe and come across several interesting "incidents" which give hope of unravelling the pike's history here. Our first stop is Spain and we meet two old friends; Arthur Went and Giraldus Cambrensis. The latter was referred to in a publication of The Irish Naturalist' Journal written by Arthur Went in 1949. Went relies on Cambrensis' knowledge but as we already know, both are not "the perfect example of a reliable witness"! Went quotes Cambrensis' who claimed that "no part of Spain produces pike". A cave painting of a pike in Northern Spain drawn in the Stone Ages proves that they were not introduced and that once again Cambrensis and Went had it wrong.

Next we go to Holland where in the 20th Century a discussion took place whether the catfish was an indigenous species that should be protected or whether it was introduced in the late medieval period by monks. It was only in 1979 that fish remains from a number of prehistoric settlements were identified. It appeared that catfish were present in The Netherlands some 4000 years BC. The poor monk who allegedly wobbled his way with laden bucket to the Dutch waterside was innocent....

Closer to home we arrive in England where the tench has been regarded as an introduced species. Tench is a warm water fish which could not have survived the ice-age, allegedly. Recent excavations in Suffolk carried out by the Time Team found not only pike but also tench remains. They were some 400,000 years old! Tench may now be regarded as native over there.

Our trip around Europe brings us home again and even here we can serve you a perfect example of how theories are only theories. The rudd is often classified as an introduced fish species to Irish waters for reasons similar to the English tench. Until rudd remains popped up in excavations carried out in Portbraddan Cave in Co. Antrim. This find dates from the first half of the 20th Century and puts the presence of rudd in Ireland back to the Iron Age.

We thought it was important to quote these different examples. If only to warn the readers not to pass out if tomorrow pike remains of a couple of thousand years old are found in Ireland. Stranger things have happened....

Some conclusions

Several conclusions can be drawn taking into account the pike's turbulent recent history in Ireland. The first one should be that there is much more work to be done and many more references to be looked into. Numerous people in libraries and universities have told us that there is much more interesting information "out there".

Archaeologists have hardly begun looking into the possible presence of fish remains in excavation sites. Understandably, human artifacts and tidal settlements have always carried the prime interest. Having said that it is very encouraging to see that Aidan O'Sullivan who heads the archaeological Discovery Programme takes a great interest in Lake Settlement. Hopefully they'll think of us when they find a few fish bones!

Derived from this first conclusion we must focus on the Irish Fisheries and the work they have carried out so far in this context. During this series on the history of pike in Ireland and its alleged introduction we have proven clearly on numerous occasions that there is something wrong with the introduction theory. It is not sure at all that pike are introduced and numerous references on which they have built this theory are doubtful, incomplete and even wrong.

This leads to our main conclusion. In one year's research we have found more about the pike's history than the Irish Fisheries did in half a century. Whilst we are surely very dedicated in what we are doing, we are not scientists and do not have for example regular access to National Libraries and Museums. Everything had to happen in our spare time and living in two different countries surely didn't make it easier for us. The Fisheries have their own team of scientists, even their own Research Department. If they didn't manage to find in 50 years what we found in one year then there is something wrong with their ability to carry out their job. If they did know all this but never told anyone and kept building their policies on the introduction theory then there is surely reason for drastic change. It is our opinion however that hardly anyone ever looked for the truth and the few people who did always looked hoping to find nothing. The case against the pike should be dropped on the grounds of lack of evidence. There should be an official review on the pike's history and the cessation of all discriminatory measures against pike until such review is complete. We cannot stress enough the extreme importance of an Independent team of scientists to carry out such research. For far too long, the Irish Fisheries have played witness, judge and jury on their own actions. This cannot be tolerated any longer. More than this an official inquiry into this (and other) mishaps in the Irish Fisheries is needed. We hear that an official inquiry is on the agenda in the North, not the least thanks to Angling Ireland Editor Frank Quigley. Is he up for another battle here down south? We see a very important role here for the angling clubs in Ireland. It is refreshing to see the rapid development of the Irish Pike Society and our hopes lie with them.

Request

Before rounding off we would like to ask anyone who thinks he or she might have interesting information or stories to add to our research to come forward and help us with our quest. Any bit of information, however small it is, is welcome to help complete the puzzle. We can be contacted via email at fbar@infonie.fr

Acknowledgement

Summing up a list of all the people who helped us in compiling these articles would force us to write another article! This would lead us too far so everyone who knows he or she contributed is kindly thanked. We wish however to make two exceptions. First of all we would like to thank the Editor of Angling Ireland Frank Quigley who gave us space to show our findings. Anyone reading this should realize how lucky Ireland is, in having a fishing magazine that is not bowing to influential groups like advertisers, clubs or organizations regarding the contents of its articles.

Secondly we would like to mention and thank Nicholas Williams, Head Lecturer of The Irish Department, University College Dublin. He never tired of our requests for information, explanation and translation. He led us to numerous references and other people and without him this story would more than likely never have been written. We would like to finish by quoting Mr. Williams directly : "*More research would, I am sure, yield more evidence that the pike is indigenous.*"...

Written by Frank Barbé and Shane Garrett

2.2.1.4 – 4.1.2 SECTION SUMMARY CONCLUSION: PAST RESEARCH RELATING TO THE ORIGINS OF IRISH PIKE

The analysis of the information presented in Section 4.1.1 and its subsections show that prior to 2013 the basis for the designation of Irish Pike as non-native was anecdotal, inaccurate and unscientific. The erroneous classification of Irish pike as non-native lasted for over six decades.

Of particular concern is that the leading fisheries scientists of IFI and its predecessors have apparently accepted this erroneous classification without question. Indeed, the extensive research carried out by Barbe and Garret in 2000 has to our knowledge, never been disputed by IFI or its predecessors, over the past 16 years, yet the pike remains officially 'non-native' to Ireland.

The closing statement of the Barbe, F. & Garrett, S. (2000) research is of particular relevance and reinforces the depth of their research and the external support they received from independent experts within the field of Irish culture and history. **"Secondly, we would like to mention and thank Nicholas Williams, Head Lecturer of the Irish Department, University College Dublin. He never tired of our requests for information, explanation and translation. He led us to numerous references and other people and without him this story would more than likely never have been written. We would like to finish by quoting Mr. Williams directly: "More research would, I am sure, yield more evidence that the pike is indigenous.".**

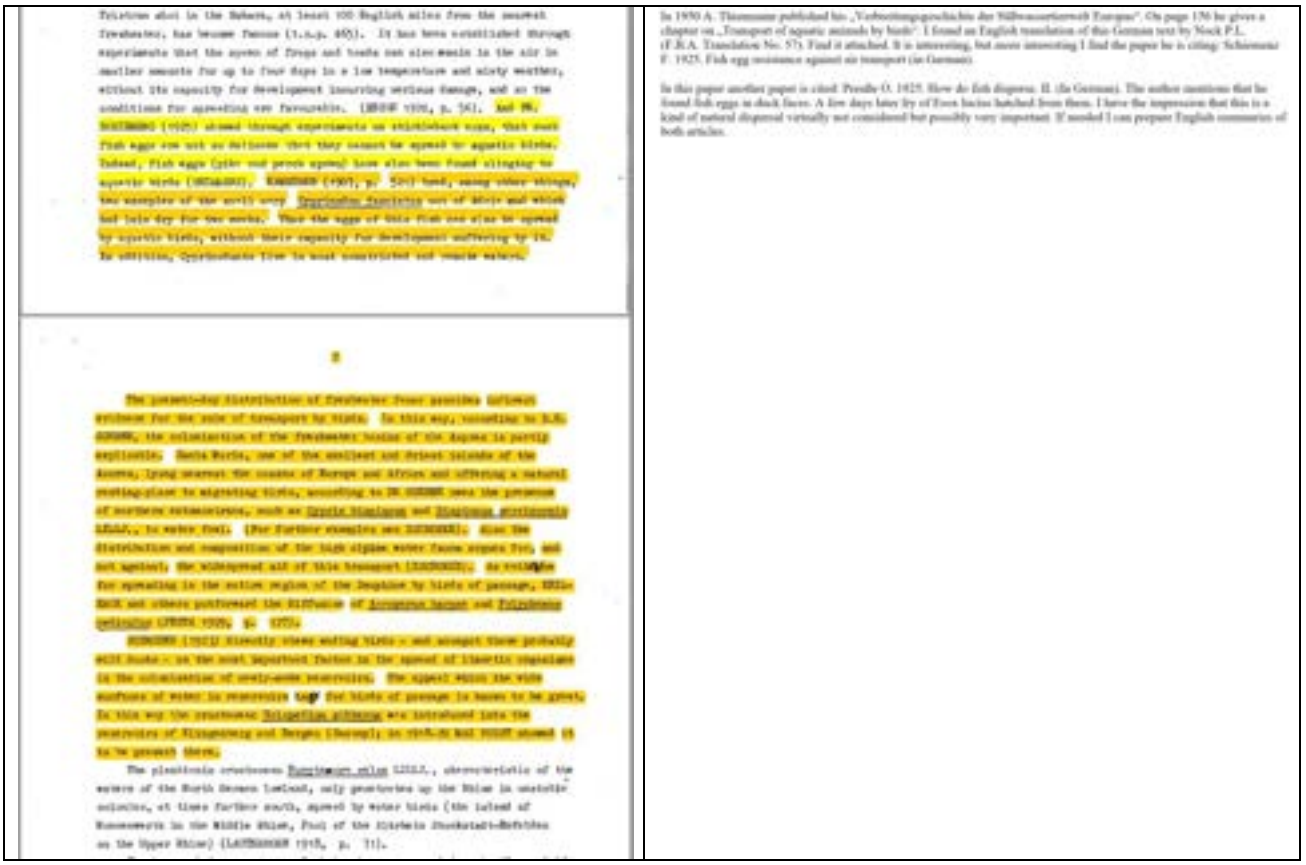
It is the conclusion of this section that the 'non-native' status of Irish pike based upon past unscientific research is erroneous but also potentially disingenuous.

2.2.1.5 – 5.1.4 - THE SPREAD OF FRESHWATER FISH AND FAUNA BY NATURAL MEANS

There exists a substantial body of evidence within the scientific community supporting the spread of freshwater fish and fauna by non anthropogenic means with particular reference to avian transfers.

There are many examples throughout such studies of freshwater bodies that have been formed naturally or created by man (ponds, reservoirs etc.) that are isolated and initially devoid of fish. In many cases, following colonization by water fowl, fish species begin to appear. It has been proven that fish ova from certain species can survive within the down of water fowl for considerable time and be transported over hundreds of kilometers in many cases. Additionally the survival of freshwater organisms, including fish ova, within the digestive systems of water fowl has been proven (van Leeuwen et. al. 2012).

Specifically in relation to pike and perch, studies by Fr. Scheimnz (1925), Kammerer (1907), A Thienmann (1950) and O Preusse (1925) have shown the transfer survivability of ova from these species with live fry successfully hatching from eggs found in duck faeces following transfer from one water body to another.



2.2.1.6 – 5.1.5 SECTION SUMMARY CONCLUSION: CURRENT RESEARCH RELATING TO THE ORIGINS OF IRISH PIKE

The fact remains that the scientific research of Pedreschi *et al*. (2014) represents the single most important and only piece of scientific research produced on the native status of Ireland's pike since the formation of IFI as IFT in 1951. The depth, robustness and scientific validity of this research has been illustrated by facing and easily discounting challenges posed to it generated by peers and others.

In relation to the EU Water Framework Directive, it is feasible to contest that the failure of IFI to embrace the new scientific research of Pedreschi *et al*. (2014), with or without further corroborating scientific evidence, places at risk, Ireland's successful achievement of at least 'Good' ecological status for all fisheries in Ireland. Furthermore, it would appear to contradict the statement referred to earlier and issued on 15th October 2013 by Dr. Cathal Gallagher, Head of Research and Development for Inland Fisheries Ireland, that "further investigations, using new and developing genomic techniques will be used to endorse these findings". The use of the specific term "endorse" suggests support of the previous findings, not contention.

IFI have expended resources, at a cost to the Irish tax payer, in undertaking research into Irish pike origins through the period 2010 to 2013. The findings of the resulting report **"Genetic Structure of Pike and their History in Ireland"** Pedreschi *et al*. (2014) have yet to be considered in formulation of pike management policy and hence the resources used in this study have yet to deliver any meaningful return to the Irish tax payer.

IFI must now recognise their own basic principles relating to fishery management as quoted by Dr. Joe Caffrey, (2008).

"P198 - However, it is the policy of the Fisheries Boards in Ireland to preserve our indigenous and naturalised fishes and to prohibit the introduction of non-native and potentially invasive species (National Policy for the Management, Development and Conservation of Coarse Fish Species in Ireland, Central Fisheries Board, in preparation).

P202 - Over the past century, only a few non-native fish species have become invasive in Ireland. Roach were first introduced to the Munster Blackwater in the south of Ireland in 1889 (Went 1950; Fitzmaurice 1984). The initial spread of this species was slow, but by the mid-1970s roach were becoming invasive and increasingly widespread in Ireland. Currently, roach are present in most river catchments in the country and may now be considered to be naturalised.

P203 - "It is current policy within the Fisheries Boards in Ireland to develop, manage and protect our native and naturalised fish species and to actively monitor and control the Introduction and spread of non-native species".

2.2.1.7 - 9 PARAMETERS FOR SUCCESSFUL BROWN TROUT AND PIKE CO-EXISTENCE

The study of parameters for successful brown trout and pike co-existence was undertaken by Catherine L. Hein et. al. in 2013.

2.2.1.7.1 9.1 LAKE AREA

Lake area is defined as a parameter for successful co-existence and Hein's study revealed that these species could co-exist in large lakes where the lake area was greater than 4.5sqkm. All of the designated wild brown trout fisheries in Ireland, where pike management is currently practiced, are far in excess of 4.5spkm in area as the table below shows.

Fishery	Lake Area (sqkm)
Lough Arrow	12.47
Lough Carra	16.19
Lough Corrib	176
Lough Conn	57
Lough Cullin	10.2
Lough Mask	83
Lough Sheelin	19

2.2.1.7.2 9.2 LAKE TEMPERATURE

Lake temperature is defined as parameter for successful co-existence and Hein's study revealed that a pikes propensity to catch wild brown trout prey is minimal at water temperatures less than 10degC. The table below shows average seasonal lake temperature for a typical Irish lake with a surface area of 89 square kilometers. The table shows that for approximately 6 months of the year typical lake water temperature is below the parameter discovered in Hein's study. It must also be considered that from May to June, as temperatures increase above 10degC pike feed principally on cyprinids and perch in great numbers as these species are concentrated for annual spawning. Pike consume up to 50% of their annual food intake in this period. As lake temperatures continue to rise from July to September larger pike seek refuge from warm water and aestivate (remain dormant) until lake temperatures begin to fall again.

Depth [m]	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.5*	-	5	5.5	9	13	14	16	17	17.5	10.5	-	-
6	-	5	5.5	9	13	14	15.5	17	17.5	10.5	-	-
12	-	5	5.3	9	13	14.5	15.5	17	17	10.2	-	-
18	-	5	5.3	9	13	14.5	15.5	16.5	17	10	-	-
25	-	5	5.5	8.7	11.5	14.5	15.5	16	17	10	-	-
27	-	-	-	-	11.2	14.5	-	-	-	10	-	-
30	-	-	-	8.5	-	-	-	-	-	-	-	-
* Surface.												

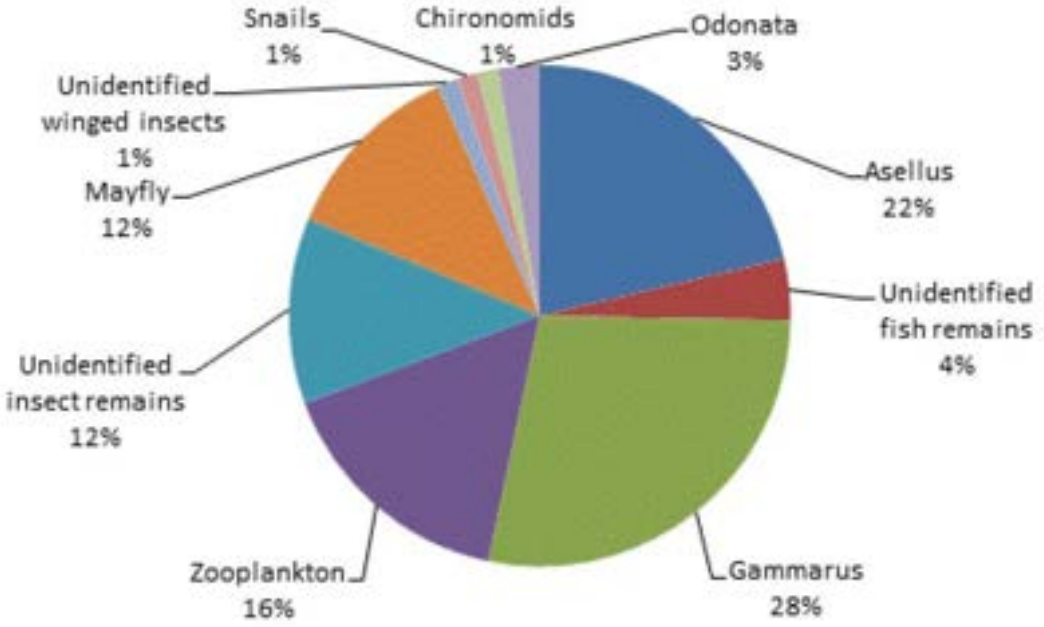
2.2.1.7.3 9.3 EXISTENCE OF ALTERNATIVE SPECIES

Hein's study states that **"The total number of species in each lake was included to represent alternate prey species, which might dampen the interaction between brown trout and pike.".** Ecological changes in Irelands designated wild brown trout fisheries have seen the proliferation of perch and cyprinid species. The most recent studies of Irish pike diet (Pedreschi, 2014) have revealed that pike will prey upon the most abundant species present in a fishery, typically roach and perch.

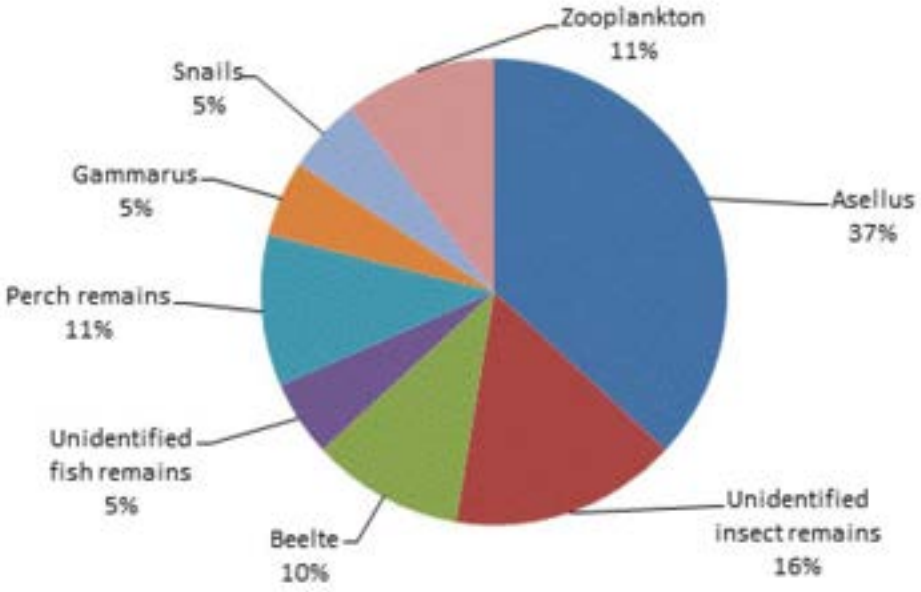
2.2.1.8 – 10.3.2 AN EXAMPLE OF DIETARY CROSSOVER BETWEEN PERCH AND WILD BROWN TROUT

Studies undertaken by Dr. P Gargan on Lough Sheelin between 1983 and 1984 highlighted the level of dietary cross over between roach, perch and wild brown trout.

More recently the fishery survey "National Research Survey Programme, Fish Stock Survey of Lough Mask, F. Kelly et. al. 2015" illustrates clearly the level of dietary crossover between the species and the potential impacts of uncontrolled cyprinid and perch populations due to the removal of pike from the fishery.



Diet of perch captured on Lough Mask, June 2015 (% occurrence) n=55



Diet of brown trout captured on Lough Mask, June 2015 (% occurrence) n=19

2.2.1.9 10.4.4 - LOUGH ENNELL: AN EXAMPLE IN IMPROVING BROWN TROUT STOCKS BY ADDRESSING THE REAL ISSUES

Lough Ennell displays a similar trend to Lough Carra following the remediation of ecological factors affecting the lake and restoration of salmonid spawning habitat. It should be noted that pike management operations have not been conducted on Lough Ennell since 1990 and this has not limited the fisheries capacity to produce an abundant trout population. In fact, by addressing the negative environmental and ecological factors affecting the lake and its sub catchments and closure of the Lough Ennell Trout Hatchery, the fishery has reached its maximum potential to produce wild brown trout without the necessity for any form of pike management or control.

"the current largely "undisturbed" pike population, particularly in Lough Ennell, did not prohibit a significant increase in the adult wild trout population in this lake following the Shannon Regional Fisheries Boards successful stream enhancement programme in this fishery. Lake survey C.P.U.E. values for wild trout in Lough Ennell surveys from 2002 and 2006 ranged from 3.4 to 4.0 (Figure 8). The highest wild trout C.P.U.E. value ever recorded in a midland trout lake was 5.0 in Lough Sheelin in 1978 (Figure 6). Given that Lough Ennell has a significantly smaller euphotic zone than Lough Sheelin it is likely that a C.P.U.E. value for wild trout in Lough Ennell of 4.0 reflects this waters optimum trout carrying capacity." O Grady/ Delanty, 2008.

Note: The comment by O Grady 2008 in relation to Lough Sheelin is incorrect. IPS/ IFPAC have established that the trout density or CPUE for Lough Sheelin included both wild and farmed/ stocked trout therefore incorrectly elevating the trout CPUE value for Lough Sheelin. The correct maximum value for Lough Sheelin is approximately 3.68 therefore Lough Ennell, a fishery where pike management is not practised, holds the highest trout population density value for any midland lake and is substantially higher than Loughs Corrib, Mask, Conn and Cullin.

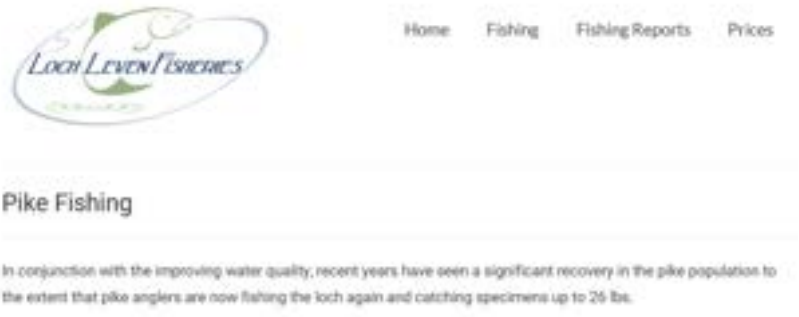
2.2.1.10 - 10.4.5 LOCH LEVEN: AN EXAMPLE IN IMPROVING BROWN TROUT STOCKS BY ADDRESSING THE REAL ISSUES

The most famous of all wild brown trout fisheries, Loch Leven in Scotland, has had a very similar history to many of Irelands wild brown trout fisheries. Responsibility for managing the fishery is with Loch Leven Fisheries who describe the Lochs history.

"Nowadays, catch records are not comparable as the majority of trout are caught & released but recent seasons have seen a discernible recovery in catches following several decades of decline. The factors behind that decline most probably relate to the deterioration in water quality that accompanied amongst other things increased population within the catchment area and more intensive agricultural practices. Measures introduced since Scum Saturday (13th June 1992) when a blue-green algal bloom created national headlines, have seen water quality improve dramatically as levels of phosphates / nitrates going into the loch have fallen over 60% from pre 1992 levels.
In former centuries, Loch Leven was about four miles long and three miles wide. But in December 1830 a drainage scheme was completed that dropped the water level of the loch by up to nine feet and reduced its area by almost a quarter. The scheme also involved cutting a new channel for the outflowing River Leven and creating sluices to control the flow of water from the loch.
The appearance of the loch before the drainage can be gauged by the visitor at the old churchyard of Kinross. Originally the water lapped at the foot of the churchyard wall. On Castle Island, when Mary, Queen of Scots was imprisoned there in the 1560s, the loch reached the battlements. Today the loch reveals seven islands, but prior to the drainage there were but four: St Serf's, Castle, the Reed Bower and Roy's Folly. Most of the loch is now very shallow, with the exceptions of two 60-foot holes to the east of Scart Island and around the western and southern sides of St Serfs. Before 1830, the large area known as "The Shallows" was more than twice its present depth. This massive alteration has had major effects on the fish populations of Loch Leven. Salmon, and possibly sea trout, ran the old River Leven: they are gone. So too is the charr which, presumably, could not tolerate the shallower water. The pike too also almost became extinct here, but not because of the drainage: it was exterminated to protect the trout stocks (in 1903 14,000 pike were removed by netting). However recent seasons have also shown signs that the pike population could be on the rise again, so too the perch, both of which is encouraging as it confirms the loch is returning to rude health."

Similar to Loughs Carra and Ennell the remediation of negative environmental factors has seen the Lochs trout population recover to a very high level. Additionally pike and pike angling is actively promoted.

Loch Leven Fisheries (2014). **"What the survey suggests is that, last autumn, they found just under 900 fish per hectare which measured 40mm or more in size. Although these will predominantly be brown trout, it will also include pike & perch as the hydroacoustic equipment does not differentiate between species. CEH quite reasonably tells us not to place undue weight on the absolute numbers (ie 900 fish per hectare) but they are pretty confident about the trend which suggests the fish population has doubled since 2011 and quadrupled since 2009"**



The majority of Loch Leven is shallow and weedy, this environment has presented no difficulty for pike and trout to co-exist and based on recent evidence the trout population has expanded without pike management operations in place.

2.2.1.11 - 15.3 INTERNATIONAL BEST PRACTICE

Inland Fisheries Ireland purports to implement pike management operations to the same standards as international best practice. Internationally, the use of gill-netting and electrofishing as methods of species control are deemed necessary, and in most cases only permitted, where the target species is non-native - pike are native to Ireland.

Internationally Loch Leven in Scotland is known as the best wild brown trout fishery in the world, a reputation it has held for over a century. Pike are present in Loch Leven with pike angling promoted at the fishery which now also boasts world class pike and perch fishing. Pike are not managed or culled by Loch Leven Fisheries.

Lough Corrib Trout CPUE

1954 – 64 2nd major arterial drainage scheme. First was in 1800s, many of the founding statement of Corrib clubs from 1820 on state that they have been founded due to the issues and reducing quality of salmonid spawning habitat. They are established to guard and maintain such habitats. This is post first major arterial drainage scheme. Why was there a sudden need to establish clubs to safeguard and restore spawning habitat post arterial drainage?

Trout CPUE after resumption of pike management 1997 to 2012. No data for this 16 year period. Significant increases in roach, perch and hybrid populations. 24% drop in trout CPUE despite 48% drop in pike CPUE over the same period. Arctic charr confirmed as extinct from Lough Corrib due to changing ecological and climatic conditions. Ref: *Evidence for the recent extinctions of two Arctic charr Salvelinus alpinus (L.) populations in the West of Ireland, F. Igoe, M O Grady, C. Byrne, P. Gargan, W. Roche, J. O'Neill. 2001*

1967 – 73 continuance of arterial drainage. **No roach present in catchment.**

1974 – 79 trout CPUE post arterial drainage **with** pike management. **No roach present in catchment**. Range 1.4 – 3.0, Avg 2.12

1980 – 86 trout CPUE **with no** pike management, limited arterial drainage until 86. **Roach present in catchment.** Range 1.5 – 2.4, Avg 1.97

1987 – 90 trout CPUE post rod licence dispute i.e. **no trout angling for 2 years with no pike management! Highest level since 1972. Shows effect of angler cropping on trout population even with a balanced pike population present.** Range 3.3

1991 – 96 trout CPUE post return of trout angling after rod licence dispute **with no** pike management. Return of arterial drainage around 89. CFB and OPW begin working together to minimise effects and implement improvement on streams during works. Possible reason for low values 91 to 94 aswell as high cropping rates after rod licence dispute (Note steady increase in rod days from 91 to 94 number of 5980, highest ever recorded rod days on the lake taken from 1965 to 1994 data set). 1996 sees full return of undisturbed adult pike population. Trout CPUE is in upper range of pre and post pike management from 74 to 86 at a value of 1.96. **No evidence of increased trout CPUE due to pike management.**

M O Grady states pike population under control

M O Grady states partial recovery in pike population

M O Grady full recovery in pike population

Pike actively managed until from 1959 to 1979

No pike management

Pike management for previous 16 years

Appendix G

The role of IFI science in informing policy and management in fisheries by

Research Division, Inland Fisheries Ireland

(Note: Document Obtained under Freedom of Information –

Appended as considered Highly Relevant to the Development and Scientific Validity of the

'Long Term Management Plan for the Western Lakes' Proposed by Inland Fisheries Ireland)

The role of IFI science in informing policy and management in fisheries

The website of Inland Fisheries Ireland (IFI) states that the Research Division (RD) is involved in a broad range of fisheries research, including 'many applied fisheries management projects dealing with diverse pressing issues'. It is also noted that the RD is tasked with the provision of advice to the relevant parent Department. This governmental advisory role 'has increased significantly in recent years with advice offered on the management of most inland fresh water species and in relation to a range of fisheries related questions'.

The research and advice function of IFI RD is consistent with the purpose of similar groups worldwide, who strive to provide independent and unbiased scientific understanding which can inform policy and management. A close analogy is the Environmental Research and Development responsibility of the Irish EPA, which supports environmental research to 'identify pressures, inform policy and provide solutions in the areas of climate, water and sustainability'. Similarly, the UK agency CEFAS aspires to be 'the government's marine and freshwater science experts, working for healthy and productive oceans, seas and rivers and safe and sustainable seafood'. CEFAS claim that 'Innovative, world-class science is central to our mission'.

The provision of robust science by RD places IFI in a solid position to implement best practice evidence-based management (EBM). EBM aims to explicitly use the current, strongest evidence in management and decision-making, where the first principle is to employ published peer-reviewed scientific research that bears on whether and why a particular management practice is likely to work. The emphasis on scientific evidence provides an explicit means by which bias in the system can be minimised. This principle strongly contrasts EBM with weaker management alternatives based on subjective perception, i.e., hearsay, opinion, belief or advocacy. The key is that the scientific method represents an objective, transparent and reproducible framework for developing true understanding of the natural systems for which we are responsible.

Importantly, management and conservation are societal activities undertaken for people by people. As such, it is not absolutely necessary that managers implement actions consistent with scientific evidence. It may sometimes be decided to advance policy motivated more by political expediency, e.g., to reflect the perspectives of powerful advocacy groups. The critical factor in such a case is to acknowledge with absolute clarity where the departure from evidence takes place, and why it was deemed appropriate.

Pike project - Summary outcomes

Key findings from the Inland Fisheries Ireland (IFI) pike project were published as four peer-reviewed papers in international scientific journals. These journals are highly-regarded and report science that strongly informs fisheries and environmental policy worldwide. The papers have been well received, including winning an international award for scientific excellence. The set of publications highlight limitations and avenues for future research, but provide a solid foundation for evidence-based fisheries management at IFI.

International peer-reviewed scientific papers

(1) McLoone, P., Shephard, S., Delanty, K., Rocks, K., Feeney, R. and Kelly, F., 2018. Coexistence of pike Esox lucius and brown trout Salmo trutta in Irish lakes. Journal of Fish Biology, 93: 1005-1011. (3 Citations 2020)

Abstract: *An environmental study of pike Esox lucius recorded their presence in 522 Irish lakes and that they coexisted with brown trout Salmo trutta in 97 of these. Statistical models, accounting for spatial non- 2 independence among lakes, suggested that lakes with greater area, maximum depth and stream connectivity show a higher probability of coexistence. Introductions of E. lucius are likely to have negative effects on S. trutta stocks in small isolated lakes, but coexistence may be possible in larger systems.*

(2) McLoone, P., Shephard, S., O'Reilly, S. and Kelly, F., 2019. Shifts in diet of an apex predator following the colonisation of an invasive fish. Hydrobiologia 837: 205-218. (2 Citations 2020)

Abstract: *Roach is an invasive cyprinid fish species that has been introduced to many Irish lakes, causing broad changes in fish community dynamics. This paper examines whether roach invasion is associated with temporal change in the diet of pike in colonised systems. The seasonal diet of pike in three Irish lakes was compared between a historical (pre-roach) data set collated on a monthly basis in the 1960s and 1970s, and recent samples collected monthly over 1 year in 2016–2017. Statistical models indicated a significant increase between sampling periods in the probability of observing cyprinids in pike stomachs, and corresponding significant decreases in the probability of observing perch or brown trout. Small pike were significantly less likely than large pike to have salmonid prey in their stomach. There were seasonal effects on diet, with invertebrates and sticklebacks being consumed more in Winter–Spring compared to Autumn–Summer. In the recent period, prey selection indices indicated positive selection for roach and negative selection for perch; indices for trout tended towards neutrality. The dietary shift in pike following the establishment of roach may have alleviated predation pressure on native trout (and perch), with implications for food web structure in invaded lakes.*

(3) Shephard, S., Delanty, K., O'Grady, M. and Kelly, F., 2019. Salmonid Conservation in an Invaded Lake: Changing Outcomes of Predator Removal with Introduction of Nonnative Prey. Transactions of the American Fisheries Society, 148: 219-231. (2 Citations 2020)

Robert L. Kendall Award for Best Paper in Transactions of the American Fisheries Society

Abstract: *Culling of predators is a traditional tool in inland fisheries management. There is a long history of removing Northern Pike Esox lucius from certain Irish lakes in an attempt to enhance Brown Trout Salmo trutta fisheries. In recent decades, some of these systems have experienced on-going warming, eutrophication, and the establishment of large populations of a nonnative cyprinid, the Roach Rutilus rutilus. Availability of this abundant new fish prey resource may have modified predator–prey interactions between Northern Pike and Brown Trout and consequently the potential efficacy of Northern Pike removal as a trout fisheries management tool. Statistical analysis of long-term fish survey data (1978–2015) and Northern Pike removal data (1980– 2014) from Lough Sheelin, Ireland, indicated*

that the Northern Pike diet (stomach contents) changed significantly after the Roach invasion. There was a strong reduction in the proportion of Northern Pike stomachs containing trout, and the incidence of Roach in Northern Pike stomachs increased. Northern Pike removal was found to have a generally positive effect on abundance of Brown Trout in the following year, but this positive effect became neutral or negative at intermediate and peak levels of Roach abundance (>33rd percentile of annual survey CPUE). Brown Trout abundance also declined in years of high chlorophyll-a concentration. Removal of top predators may have unanticipated effects on target fish stocks in systems with multiple anthropogenic pressures.

(4) Fitzgerald, C.J., Shephard, S., McLoone, P., Kelly, F.L. and Farnsworth, K.D., 2019. Evaluating management options for two fisheries that conflict through predator–prey interactions of target species. Ecological Modelling, 410: 1-1. (1 citation 2020).

Abstract: *When one wild species is food for another and both have their hunting enthusiasts, then conflict can arise. This is particularly true and complicated in fishing, where trophic links are strongly influenced by body size ratios, alternative prey are available, populations are strongly density dependent and all their parameters are hard to quantify. We examine this problem with a specific example of trout-pike interaction in Irish lakes using a multi-species size-structured population model, set within a quantitative management action assessment framework. We use an informal Bayesian uncertainty analysis to account for empirical imprecision and test a range of stakeholder suggested scenarios for management of the pike and trout fisheries, under three different hypotheses about the abundance of non-trout prey availability. Trout fishing always diminished adult trout biomass. Fishing for pike always increased trout biomass but less effectively as biomass of alternative (to trout) prey increased. Adult pike cannibalism was found to significantly alleviate predation pressure on trout when alternative prey was not plentiful, less so when it was.*

Main scientific findings and considerations

McLoone et al. (2018)

A total of 522 Irish lakes were investigated, including 97 systems where brown trout coexist with northern pike. This is a really substantial dataset with good geographic coverage of the country. Statistical models suggested that relatively large, deep lakes with strong stream connectivity are likely to support coexistence of pike and trout. However, pike introductions to small low-complexity systems have potential for strong negative impacts on resident trout populations. Statistical uncertainty in the results may make it difficult to predict the likelihood of coexistence in a given lake.

McLoone et al. (2019)

The seasonal diet of pike in three Irish lakes was compared between a historical (pre-roach) data set collated on a monthly basis in the 1960s and 1970s, and recent samples collected monthly over one year in 2016–2017. The main aim of this paper was to assess whether the diet of an aquatic top predator (pike) changed after the arrival of an invasive prey fish (roach).The study dataset provided extremely valuable, long-term and seasonal insight into the dietary habits of pike in Irish lakes. The analysis assumed that differences in pike diet between historical and recent

sampling periods can be quantified, even though (1) only one of the lakes covers both periods, and (2) there are no relative abundance data for fish populations in the historical period.

The results indicated a profound temporal shift in the diet of pike in Loughs Derravaragh and Sheelin: perch and trout were the dominant fish prey in in the early period, while roach are now most important. Invertebrates were common in the diet of pike in both study lakes, but pike also fed on fish from very early stages in their life history.

Prey selectivity indices indicated that there were more roach and less perch in pike stomachs than would have been expected from the relative abundance of these species in the lakes, while the number of trout in pike stomachs reflected lake abundance. This result implies that pike now 'prefer' roach. It could be speculated that this dietary shift has alleviated predation pressure on trout. There were inevitable limitations surrounding the use of a 50-year old historical dataset: it was difficult to account precisely for total numbers of prey consumed in the early period, and there were no records of ambient prey abundance at that time. In addition, only one of the lakes had data for both study periods. However, results showed that the arrival of roach has been associated with a strong shift in pike diet from trout and perch in the historical period to current dominance by cyprinids.

Shephard et al. (2019)

The scientific literature reveals that the acceptability of predator control is often subjective and culling programs may be unsuccessful or have unintended consequences. The effectiveness of such actions should be evaluated based on available data and systematic monitoring. This study conducted statistical analysis of long-term fish survey data (1978–2015) and Northern Pike removal data (1980–2014) from Lough Sheelin. The results showed a strong temporal reduction in the proportion of pike stomachs containing trout, and a corresponding increase in the incidence of Roach. Similar results have been found in Lake Windermere. This marked shift in pike diet from trout to roach was associated with contrasting effects of pike removal on survey abundance of trout in the following year: pike removal had some positive effect on trout in years of 'low' roach abundance, little effect at 'mid' abundance and possible negative effects at 'high' roach abundance.

This result exemplifies the complexity of fish community dynamics and the likelihood that intuitive management interventions may have unexpected and potentially negative impacts. Abundant Roach populations seem to intermittently reduce pike predation pressure on trout in Lough Sheelin and modify the potential utility of pike removal as a trout conservation tool in the system. There may be 4 more utility in a focused program that addresses possible key predation bottlenecks, such as individual pike targeting juvenile trout out-migrations from natal streams.

Fitzgerald et al. (2019)

The papers above are robust empirical investigations that make consistent conclusions about coexistence of pike and trout, temporal changes in pike diet and likely implications for management. These findings were used to inform a mathematical model, developed to express key features in the population dynamics of trout and pike, including predation by pike on trout and on alternative prey species. This size-based model has a very strong foundation in

ecological theory, and follows a similar structure to models used widely in ecological investigations of marine fish communities and fisheries impacts.

Pike removals and the regulation of trout angling pressure were the management tools most frequently suggested by stakeholders for enhancing brown trout abundance. Management scenarios or action were represented in the new model through a combination of trout removal and pike removal mortality rates. Availability of alternative prey was specified as three levels ('scarce', 'moderate', 'plentiful') to address the potential effect(s) of roach abundance on tested management scenarios. The model scenarios supported empirical evidence that the likely effect of pike removal on trout populations will change strongly with the abundance of alternative prey, and is likely to be ineffective where roach are abundant. The model also suggested that angling is likely to have a stronger impact on trout populations than pike predation.

These results had considerable associated uncertainty, which mainly reflected extrapolation of pike and trout stock-recruitment relationships from other systems, e.g., Lake Windermere. An important unknown element is how trout and roach interact; interspecific competition between these two species may be mitigated by pike predation on roach

Summary conclusions

The ecology of the designated Irish trout Lakes has changed markedly since the 1960s, when these systems were reasonably pristine and the fish community was dominated by brown trout and pike. The lakes currently experience impacts from agricultural run-off, invasive species, angling and other human pressures. These factors probably interact to influence the fish community and the relative abundance of particular species. The impact of invasive roach populations is likely to be particularly important.

In this complex environment, the effect of removing a predator such as pike is difficult to predict and may be negative. The IFI studies suggest that pike removal may have benefited trout in the simpler fish communities occupying healthier lake systems in the past. This management practice is likely to be much less effective in the current impaired situation.

Specific recommendations following scientific findings and management implications

1. The current process-based mathematical model of pike-trout interactions needs to be (1) extended to include a size-based roach population, and then (2) placed within a formal fisheries MSE framework. This full framework will support a feedback loop between adaptive management options and fish community status.

2. The MSE needs to be supported by annual empirical and model-based fish (pike and trout) stock assessments to evaluate conservation status, i.e., healthy/overfished.

3. These assessments require fisheries-independent survey CPUE, with records of fish size, maturity and gillnet selectivity.

4. A critical data gap is knowledge of pike and trout angler effort and catch. A voluntary reporting programme built around a group of enthusiastic anglers could provide a CPUE range. This estimate could then be extrapolated to the whole fishery based on periodic catch and effort surveys by IFI staff, i.e., how many boats fishing and fish caught in a day.

5. An important initiative might be case-study lakes (e.g., Sheelin and Conn), where comprehensive annual assessments would be conducted, including (1) fisheries-independent gillnet surveys, (2) voluntary angler CPUE for pike and trout, and (3) on-going environmental monitoring. These programs could be strongly supported by local interest groups.

6. A precautionary approach to fisheries management might (1) fix pike removal at the average of the most recent three years, and (2) reduce daily angler bag limits for pike and trout to one or two fish per day, until there was sufficient evidence that higher exploitation rates would not damage stock.

Queries on new pike management proposal from IFI development

The development section at Inland Fisheries Ireland has recently proposed implementing a programme in which anglers participate in culling of pike. This proposal does not seem to have any scientific foundation, and seems unlikely to provide information that will inform on the state of brown trout or pike stocks or predator-prey interactions between these species. Notably, the document lacks any consideration of authentic scientific evidence on this topic, including the recent and highly-relevant world-class research actually published by IFI staff. Some specific high-level but extremely serious concerns with the proposal are provided below.

General comments

1. **Recent international scientific publications from IFI (see summary above) highlight that pike removal may have a neutral or negative impact on brown trout populations in lakes having established roach populations. What recent scientific evidence is being used to justify the removal of pike as a brown trout stock enhancement tool?**

2. Does the proposed programme does fulfil the principles of citizen science? If not, should the programme be re-named to accurately convey that it is an angler culling programme?

3. A monthly study of the diet of pike has already been undertaken in Lough Conn – results have been peer-reviewed and published in international scientific journals. How will the proposed additional work convince international reviewers that it represents an advance on the published findings?

4. Will it be necessary to conduct an ethical review prior to involving anglers in culling of fish?

5. Who will provide training in appropriate methods of euthanization? There is an existing requirement that IFI staff be appropriately trained to euthanize pike for stock management purposes; this expertise would also be required for citizen scientists.

6. Existing IFI evaluations have prioritized the Owenriff catchment as per IFI rehabilitation plan and existing EU petition. Lough Carra has also been highlighted due to a low number of alternate prey species. There also needs to be greater protection for Loughs Melvin and Leane; these lakes must be protected from introduction of pike.

7. Other angling groups, e.g., the Irish Federation of Pike Angling clubs (IFPAC) asked for a cessation of S59 pike fishing competitions during the recent policy reviews. Does the proposed culling project adequately consider the needs of all lake stakeholders?

8. Which variables will contribute to the proposed 'stock management dataset'?

9. How will these data be curated and analysed?

10. How will the results be used to inform a scientifically robust brown trout management programme based in peer-reviewed research and international best-practice?

11. Has a feasibility study been conducted to support selection of systems where culling will occur? How many of the lakes occur in SACs?

12. The draft S59 authorisation mentions tributaries – should these also be listed here?

13. Is designation as a 'brown trout fishery' sufficient to impose a culling programme?

14. On what scientific basis is it known that it is 'essential that pike stocks are kept under control'?

15. Is there any evidence that without such control 'much of the efforts to develop spawning habitat are negated by the impact of a large pike stock on the adult trout stock'? Is there evidence that the pike stock is 'large'?

16. Stock size is unknown for brown trout and pike in the target lakes. On what basis is culling effort being defined?

17. How will targeting 'key times at specific locations' provide an unbiased estimate of overall pike predation pressure on brown trout stocks?

18. - How will rod and line sampling be designed to ensure that it provides an unbiased sample of spatial, seasonal and ontological components of the pike population?

19. - How will the new data 'assist in the planned management of stocks'?

20. The principles of Citizen Science require clear objectives, e.g., a defined mechanism by which removing pike from a multi-species fish community will result in increased abundance of brown trout.

21. The principles also state that projects will generate new understanding and have a genuine scientific outcome. How will the proposed culling programme generate science that will pass international peer review as a sound basis for Irish fisheries policy and management?

22. The principles also indicate that citizen science projects must also consider and control for limitations and biases. How is this being addressed in the current proposal, e.g., has a statistically robust sampling design been defined?

23. What 'very specific conditions' will be required for angler participation in the programme?

24. How many pike will be removed, and what is the scientific justification for this number?

25. Culling fish and removing stomachs requires some expertise, and has significant welfare implications. How will it be ensured that an adequate and best-practice training programme is implemented?

26. Why is it important to collect pike across all seasons? Is this requirement a contradiction of the previously mentioned focus on spawning periods and locations?

27. Is there bias associated with targeted sampling, as opposed to using a randomized sampling strategy?

28. Is there a risk of misreporting associated with separating pike stomachs from fish?

29. Analysing fish stomachs in a robust and unbiased manner is a highly skilled and time-consuming process. Has an appropriate and acceptable method been proposed and priced? Is this method consistent with international best-practice and likely to produce results that will convince reviewers of IFI science and policy?

30. What protocol will be used to ensure that stomach contents are recorded accurately and to a sufficiently low level, i.e., to invertebrate species?

Queries on new pike S59 authorisation from IFI development

1. 'Competitor species' and 'coarse fish' are not mentioned in the IFI Development proposal. What is scientific rationale for this very significant addition in the S59 authorisation?

2. What is the scientific justifying an increase in the number of pike and other coarse fish species to be removed?

3. How does this sampling add value giving a national WFD fish sampling programme based on sound international scientific principles?

4. How much of an increase in fish removal is planned, and what additional/different outcome will this have for fish community dynamics and brown trout abundance in the management lakes?

5. What is the scientific basis for the proposed dates (February to June 2021)? Do these dates contradict the aspiration for sampling across the entire year as indicated in the proposed pike management plan?

6. Why does the document require recording of 'length and/or weight'? Are these to different metrics considered to provide the same and equally useful information?

7. Are there ethical implications for involving anglers in a government culling programme? How will it be ensured that all fish are euthanized in a manner consistent with the requirements of the Health Products Regulatory Body (HPRA), which evaluates the use of animals in scientific research?

8. How are stomach samples to be removed?

9. How will samples be transported, e.g., what sort of bags, freezing protocol and acceptable storage period? Note that freezing must occur immediately, or samples degrade.

10. Is there any scientific rationale for the numbers of anglers to be involved and the corresponding number of pike to be culled?

11. Where and how will anglers remove stomachs? Has a consistent, scientifically-justified and ethically acceptable protocol been defined?

12. Samples from fish stocks must be collected in a random and unbiased design in order to represent useful 'scientific information'. How does the current sampling plan capture seasonal, spatial and ontogenetic differences in pike diet, especially regarding piscivory?

13. How will the information derived from the proposed programme contribute to the 'rational management of fish stocks'?

14. The Clare River is not listed in the IFI Development proposal. Why is it mentioned in the draft S59 authorisation?

15. Have the risks associated with *Lagarosiphon major* been adequately considered?

Appendix H

Comparison of INVAS Biosecurity Ltd. Assessed High Level Objectives & 'Actions' with Inland Fisheries Ireland Revised 'Actions' Contained in Section 11 of the 'Long Term Management Plan for the Western Lakes'

Action	Long Term Management Plan for The Western Lakes - Section 11.1 (Timelines)	Long Term Management Plan for The Western Lakes - Executive Summary (Table 1.1)	INVAS Appropriate Assessment Stage 1 Screening of the Long Term Management Plan for the Great Western Lakes - Section 3 (Table 3.1)	Comment
Note: The Actions outlined below in Column B have been highlighted Red where IFI Have Revised The Actions, Post INVAS AA Screening. The Text Highlighted Red indicates Original Wording that has been Revised, Post INVAS AA Screening.				
Section Introduction From Related Document	The actions required to achieve each of the High level objectives of this plan are listed in table 11.1 below along with the timelines for the delivery of the actions. These timelines depend on the provision of appropriate resources to carry out the actions. If adequate resources are not engaged in the delivery of the actions, their delivery may not happen or may be delayed.	Historically, a number of large limestone lakes in the west of Ireland have been managed preferentially as wild brown trout fisheries. In accordance with Inland Fisheries Ireland (IFI)'s most recent policy direction and their statutory remit for the management of Ireland's inland fisheries resources, seven lakes, primarily in the West of Ireland, are managed as salmonid waters. The emphasis of proposed management programmes for these lakes will be to protect, conserve and, where possible, enhance their natural attributes and native biodiversity which will, in turn, optimise their potential as sustainable wild brown trout and, in some cases, Atlantic salmon fisheries. IFI's interest in eels (EC Regulation (Council Regulation 1100/2007) for the recovery of the eel stock) , Arctic Char which are now only found in Lough Mask and Ferox Trout is also reflected in the plan. Through a series of targeted actions, connected to an overall strategy, IFI will coordinate programmes under 7 categories of High-Level Objectives (HLO). Each HLO aligns to IFI's Corporate Plan (2021 to 2025) and is summarised below with the associated series of actions:	Through a series of targeted actions, connected to an overall strategy, IFI will coordinate programmes under 7 categories of High-Level Objectives (HLO). A modified version of Table 1 from the Long-term Management Plan for the Great Western Lakes is reproduced here to provisionally determine if an action is likely to have any potential impacts on the integrity of any Natura 2000 site. A determination is then made as to whether a site should be further assessed due to the potential for uncertain or adverse impacts.	

HLO 1	Stakeholder Engagement			
Action	**Long Term Management Plan for The Western Lakes - Section 11.1 (Timelines)**	**Long Term Management Plan for The Western Lakes - Executive Summary (Table 1.1)**	**INVAS Appropriate Assessment Stage 1 Screening of the Long Term Management Plan for the Great Western Lakes - Section 3 (Table 3.1)**	**Comment**
1.1	Identify and engage with established catchment groups, trusts and associations to assist with the progression of common catchment management goals.	Identify and engage with established catchment groups, federations, Clubs, trusts and associations to assist with the progression of common catchment management goals.	Identify and engage with established catchment groups, federations, Clubs, trusts and associations to assist with the progression of common catchment management goals.	IFI Proposal differs from INVAS Appropriate Assessment and does not consider the views of national federations, clubs and all lake stakeholders.
1.2	Where such groups have not yet been established, engage local communities, stakeholders and relevant authorities in the protection and development of their river catchments through the establishment of more Catchment Management Associations for the Western Lakes.	Where such groups have not yet been established, engage local communities, stakeholders and relevant authorities in the protection, development and conservation of their river catchments through the establishment of more Catchment Management Associations for the Western Lakes.	Where such groups have not yet been established, engage local communities, stakeholders and relevant authorities in the protection, development and conservation of their river catchments through the establishment of more Catchment Management Associations for the Western Lakes.	IFI Proposal differs from INVAS Appropriate Assessment and omits conservation objectives.
1.3	Enhance communication mechanisms and networks between IFI, catchment groups and relevant authorities.	Enhance communication mechanisms and networks between IFI, other relevant stakeholder groups, state agencies, farming organisations, academic institutions, local communities and catchment groups.	Enhance communication mechanisms and networks between IFI, other relevant stakeholder groups, state agencies, farming organisations, academic institutions, local communities and catchment groups.	IFI Proposal differs from INVAS Appropriate Assessment and now omits the views of national federations, clubs and all lake stakeholders.
HLO 2	**Climate Action & Biodiversity**			
Action	**Long Term Management Plan for The Western Lakes - Section 11.1 (Timelines)**	**Long Term Management Plan for The Western Lakes - Executive Summary (Table 1.1)**	**Appropriate Assessment Stage 1 Screening of the Long Term Management Plan for the Great Western Lakes - Section 3 (Table3.1)**	**Comment**
2.1	Identify manageable factors which will contribute to the climate resilience of sensitive habitats and species.	Identify manageable factors which will contribute to the climate resilience of sensitive habitats and species.	Identify manageable factors which will contribute to the climate resilience of sensitive habitats and species.	
2.2	Promote the establishment of significant aquatic buffer zones to enhance biodiversity and ameliorate nutrient and sediment run-off.	Promote the establishment of significant aquatic buffer zones to enhance biodiversity and ameliorate nutrient /sediment run-off.	Promote the establishment of significant aquatic buffer zones to enhance biodiversity and ameliorate nutrient /sediment run-off.	
2.3	Develop models to inform the strategic planting of native woodlands to mitigate the impacts of elevated water temperatures and increased flood frequency and severity.	Develop models to inform the strategic planting of native woodlands to mitigate the impacts of elevated water temperatures and increased flood frequency and severity.	Develop models to inform the strategic planting of native woodlands to mitigate the impacts of elevated water temperatures and increased flood frequency and severity.	

HLO 3	Water Quality			
Action	**Long Term Management Plan for The Western Lakes - Section 11.1 (Timelines)**	**Long Term Management Plan for The Western Lakes - Executive Summary (Table 1.1)**	**Appropriate Assessment Stage 1 Screening of the Long Term Management Plan for the Great Western Lakes - Section 3 (Table3.1)**	**Comment**
3.1	Enhance the capacity of IFI to detect and enforce water quality offences by increasing the number of fisheries environmental Officers working in the catchment areas of the Western lakes.	Enhance the current statutory powers of Inland Fisheries Ireland by authorising officers to enforce the relevant provisions of the Habitat Regulations.	Enhance the current statutory powers of Inland Fisheries Ireland by authorising officers to enforce the relevant provisions of the Habitat Regulations.	IFI Proposal differs from INVAS Appropriate Assessment and reduces responsibilities relating to Habitat Regulations.
3.2	Enhance the current statutory powers of Inland Fisheries Ireland by authorising officers to enforce the relevant provisions of the Habitat Regulations.	Enhance the capacity of IFI to detect and enforce water quality offences by increasing the number of Fisheries Environmental Officers working in the catchment areas of the Western lakes.	Enhance the capacity of IFI to detect and enforce water quality offences by increasing the number of Fisheries Environmental Officers working in the catchment areas of the Western lakes.	IFI Proposal differs from INVAS Appropriate Assessment.
3.3	Continue to improve and enhance working relationships with key environmental authorities in the western lake catchments so that information is shared effectively and increased efficiencies, with regard to environmental enforcement, are achieved.	Continue to improve and enhance working relationships with key environmental authorities in the western lake catchments so that information is shared effectively and increased efficiencies, with regard to environmental enforcement, are achieved.	Continue to improve and enhance working relationships with key environmental authorities in the western lake catchments so that information is shared effectively and increased efficiencies, with regard to environmental enforcement, are achieved.	
3.4	Removed	Provide information and assistance with the designation of nutrient sensitive catchments and areas for action.	Provide information and assistance with the designation of nutrient sensitive catchments and areas for action.	IFI Proposal differs from INVAS Appropriate Assessment as it has been totally omitted by IFI.
HLO 4	**Invasive Species**			
Action	**Long Term Management Plan for The Western Lakes - Section 11.1 (Timelines)**	**Long Term Management Plan for The Western Lakes - Executive Summary (Table 1.1)**	**Appropriate Assessment Stage 1 Screening of the Long Term Management Plan for the Great Western Lakes - Section 3 (Table3.1)**	**Comment**
4.1	Remove and/or manage harmful invasive species through a strategic stock management and weed management programmes.	Remove and/or manage harmful invasive species through strategic stock management and weed management programmes.	Remove and/or manage harmful invasive species through strategic stock management and weed management programmes.	
4.2	Continue to use digital and conventional media to alert the public about potentially harmful invasive species in the western lakes.	Continue to use digital and conventional media to alert the public about potentially harmful invasive species in the western lakes.	Continue to use digital and conventional media to alert the public about potentially harmful invasive species in the western lakes.	
4.3	Provide biosecurity advice and resources to stakeholder groups to prevent the spread of invasive species in the western lakes.	Provide biosecurity advice and resources to stakeholder groups to prevent the spread of invasive species in the western lakes.	Provide biosecurity advice and resources to stakeholder groups to prevent the spread of invasive species in the western lakes.	
4.4	Encourage relevant stakeholder groups to participate in the management of invasive species.	Encourage relevant stakeholder groups to participate in a range of conservation activities including the management of invasive species.	Encourage relevant stakeholder groups to participate in a range of conservation activities including the management of invasive species.	IFI Proposal differs from INVAS Appropriate Assessment and omits conservation objectives.
4.5	Enhance legislation and increase penalties for the transfer of live fish	Enhance legislation and increase penalties for the transfer of live fish	Enhance legislation and increase penalties for the transfer of live fish	

HLO 5	Stock Management			
Action	**Long Term Management Plan for The Western Lakes - Section 11.1 (Timelines)**	**Long Term Management Plan for The Western Lakes - Executive Summary (Table 1.1)**	**Appropriate Assessment Stage 1 Screening of the Long Term Management Plan for the Great Western Lakes - Section 3 (Table3.1)**	**Comment**
5.1	Produce stock management plans annually, to reduce impacts on salmonids from other fish populations.	Produce stock management plans annually, to reduce impacts on salmonids from other fish populations.	Produce stock management plans annually, to reduce impacts on salmonids from other fish populations.	
5.2	Adjust stock management plans as population models on each of the lakes are refined.	Adjust stock management plans as population models on each of the lakes are refined.	Adjust stock management plans as population models on each of the lakes are refined.	
5.3	Enable local stakeholder groups to contribute to stock management and research programmes through a revision of relevant bye-laws	Enable local stakeholder groups to contribute to population modelling and research programmes (through citizen science).	Enable local stakeholder groups to contribute to population modelling and research programmes (through citizen science).	IFI Proposal differs from INVAS Appropriate Assessment and Implies that a Government endorsed angler culling program is supported in a further attempt to revise national bye-laws and to discriminate and marginalise all non-salmonid stakeholders.
5.4	Develop risk matrix for salmonids based on physical characteristics of each waterbody and the implications of these for predation.	Develop risk matrix for Atlantic salmon and trout based on physical characteristics of each waterbody and the implications of these as survival bottlenecks.	Develop risk matrix for Atlantic salmon and trout based on physical characteristics of each waterbody and the implications of these as survival bottlenecks.	IFI Proposal differs from INVAS Appropriate Assessment by applying a Pre-determined over-arching approach to promoting predation as the primary risk to salmonids rather than other aspects of the waterbody or physical environment that can be addressed and in addition, does not define the species for which predation is considered e.g. avian, trout, pike, mink, etc in the revised Action direction.
HLO 6	**Habitat Restoration**			
Action	**Long Term Management Plan for The Western Lakes - Section 11.1 (Timelines)**	**Long Term Management Plan for The Western Lakes - Executive Summary (Table 1.1)**	**Appropriate Assessment Stage 1 Screening of the Long Term Management Plan for the Great Western Lakes - Section 3 (Table3.1)**	**Comment**
6.1	Address the salmonid habitat deficits in the western lakes catchments through 3 targeted restoration projects per catchment per year.	Address the salmonid habitat deficits in the western lakes catchments through targeted restoration projects.	Address the salmonid habitat deficits in the western lakes catchments through targeted restoration projects.	IFI Proposal differs from INVAS Appropriate Assessment by capping the number of proposed restoration projects without providing any detail on the how this number has been reached, or the time or the funding required to complete the full restoration of all of the Western Lakes.
6.2	Streamline administrative processes to bring development projects through planning processes to fruition with maximum efficiency.	Streamline administrative processes to bring development projects through planning processes to fruition with maximum efficiency.	Streamline administrative processes to bring development projects through planning processes to fruition with maximum efficiency.	
6.3	Ensure that all relevant environmental protection processes are in place to avoid damage to other sensitive species and habitats.	Ensure that all relevant environmental protection processes are in place to avoid damage to other sensitive species and habitats.	Ensure that all relevant environmental protection processes are in place to avoid damage to other sensitive species and habitats.	

HLO 7	Research			
Action	**Long Term Management Plan for The Western Lakes - Section 11.1 (Timelines)**	**Long Term Management Plan for The Western Lakes - Executive Summary (Table 1.1)**	**Appropriate Assessment Stage 1 Screening of the Long Term Management Plan for the Great Western Lakes - Section 3 (Table3.1)**	**Comment**
7.1	Develop new and refine existing fish stock monitoring programmes (e.g. WFD) to provide the necessary data for specific population models for the western lakes.	Continue to refine existing fish stock monitoring programmes (e.g. WFD) to provide the necessary data for fish population models for the western lakes.	Continue to refine existing fish stock monitoring programmes (e.g. WFD) to provide the necessary data for fish population models for the western lakes.	IFI Proposal differs from INVAS Appropriate Assessment.
7.2	Use all available sources of data incl. Stock management and angling returns to feed into population models for the western lakes.	Use all available sources of data incl. Stock management and angling returns to feed into fish population models for the western lakes.	Use all available sources of data incl. Stock management and angling returns to feed into fish population models for the western lakes.	
7.3	Continue to develop climate models under current research programmes (CCMP) to improve resilience in catchments and species.	Continue to develop climate models under current research programmes (CCMP) to improve resilience in catchments and species.	Continue to develop climate models under current research programmes (CCMP) to improve resilience in catchments and species.	
	Removed	Develop a bespoke research programme with recommendations for the future conservation of all sub-species of wild brown trout.	Develop a bespoke research programme with recommendations for the future conservation of all sub-species of wild brown trout.	IFI Proposal differs from INVAS Appropriate Assessment as it has been omitted by IFI.

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