IP(19)15rev

NASCO Implementation Plan for the period 2019-2024

EU – Ireland
(Revised version submitted 4 November 2019)

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The main purpose of this Implementation Plan is to demonstrate what actions are being taken by the Parties / jurisdictions to implement NASCO's Resolutions, Agreements and Guidelines.

In completing this Implementation Plan please refer to the ***Guidelines for the Preparation and Evaluation of NASCO Implementation Plans and for Reporting on Progress****, CNL(18)49.*

Questions in the Implementation Plan are drawn from the following documents:

- *NASCO Guidelines for Management of Salmon Fisheries, CNL(09)43 (referred to as the 'Fisheries Guidelines');*
- *Report of the Working Group on Stock Classification, CNL(16)11;*
- *Minimum Standard for Catch Statistics, CNL(93)51 (referred to as the 'Minimum Standard');*
- *Revised matrix for the application of the six tenets for effective management of an Atlantic salmon fishery, WGCST(16)16[1];*
- *NASCO Plan of Action for the Application of the Precautionary Approach to the Protection and Restoration of Atlantic Salmon Habitat, CNL(01)51;*
- *NASCO Guidelines for Protection, Restoration and Enhancement of Atlantic Salmon Habitat, CNL(10)51 (referred to as the 'Habitat Guidelines');*
- *Williamsburg Resolution, CNL(06)48;*
- *Guidance on Best Management Practices to address impacts of sea lice and escaped farmed salmon on wild salmon stocks (SLG(09)5) (referred to as the 'BMP Guidance');*
- *Guidelines for Incorporating Social and Economic Factors in Decisions under the Precautionary Approach (CNL(04)57); and*
- *Road Map' to enhance information exchange and co-operation on monitoring, research and measures to prevent the spread of G. salaris and eradicate it if introduced', NEA(18)08.*

[1] This document can be obtained from the NASCO Secretariat; email hq@nasco.int

Party:	**European Union**
Jurisdiction / Region:	**Ireland**

1. Introduction

1.1 What are the objectives for the management of wild salmon? *(Max 200 words)*

Give the core national objectives guiding the legislation for your jurisdiction

It is the Irish Government's strongly held view that our salmon stock is a national asset, which must be conserved and protected, as well as being exploited as a resource, by us all on a sustainable and shared basis. The Irish Government acknowledges the status of salmon as set out in Directive 92/43/EEC (Annex II & V) and the requirement to protect and conserve this species.

Government policy is to conserve the inland fisheries resource through effective corporate governance of the agencies operating under the aegis of the Department of Commmunications, Climate Action & Environment (DCCAE) and to facilitate exploitation of the resource on an equitable and sustainable basis.

The Government's strategic objectives are ***:***

- *to ensure the effective conservation, primarily through Inland Fisheries Ireland and the Loughs Agency, of inland fish habitats and stocks.*
- *to encourage the sustainable development, through appropriate investment and support within resource constraints, of the commercial and recreational fishing resource*
- *for all stocks to meet and exceed biologically based Conservation Limits with only the surplus above the Conservation Limits being available for harvest; and*
- *to deliver effective legislative and regulatory framework and value for money management for the inland fisheries sector.*

1.2 What reference points (e.g. conservation limits, management targets or other measures of abundance) are used to assess the status of stocks? *(Max 200 words)*

(Reference: Sections 2.4 and 2.5 of the Fisheries Guidelines)

The principal development of the statistical techniques and subsequent model use to establish CLs (Conservation Limits) for all Irish rivers occurred within the context of the EU-funded concerted action SALMODEL (a co-ordinated approach to the development of a scientific basis for management of wild salmon in the North-East Atlantic). Details of the model specification are given in Prevost *et al*., (2003) and their application to Irish rivers in Ó Maoiléidigh *et al*., (2004) and (McGinnity *et al.,* 2012). These data, combined with individual river data on salmon weight, proportion of 1SW & MSW fish, and national data on male:female ratios and fecundity allow individual CLs to be generated for each salmon river.

Scientific advice is provided annually on 144 rivers with regard to attainment of river-specific CLs. Estimates from fish counter or raised rod catches allow an estimate of stock size to be calculated which is assessed against individual river CLs. Management then allocate rivers into three categories, open for harvest, open for catch & release-only angling and closed based on the scientific advice. No harvest of salmon is permitted in rivers or commercial fisheries in river estuaries not meeting CL.

1.3 What is the current status of stocks under the new classification system outlined in CNL(16)11?

Stock Classification Score	Salmon Classification Category	No. rivers
0	Not at Risk	11
1	Low Risk	16
2	Moderate Risk	32
3	High Risk	85
N/A	Artificially Sustained	
N/A	Lost	
N/A	Unknown	

Additional comments:

1.4 How is stock diversity (e.g. genetics, age composition, run-timing, etc.) taken into account in the management of salmon stocks? *(Max 200 words)*

All Irish salmon stocks are managed on a catchment by catchment basis and assessed for 1SW and 2SW components. Specific advice is provided for 16 2SW stocks which contribute significantly to important known spring fisheries which need to be managed separately. This helps to preserve the genetics of the early run fish.

Annual and daily bag limits restrict the overall numbers of fish which can be taken in a given period to avoid overfishing on specific run components of the stock. Prior to the 12th of May annually a maximum of one spring salmon per day and a maximum of three spring salmon in total up to 12th May can be retained by anglers as a further conservation measure. Only one salmon per day can be retained per day by anglers in September as a conservation measure. Additional seasonal restrictions (open date in spring generally varies by catchment) only allow exploitation during the "open" season, the closure date for recreational salmon fisheries is 30th September. Commercial salmon fisheries are not permitted to operate before May 12th as a conservation measure on the spring fish stock component.

Extensive genetic analysis and genotyping of salmon stocks in Ireland has been completed and has led to unique genetic identification of all Irish salmon stocks, except for three rivers (R. Nore, Suir & Barrow), which are closely related in genetic terms. This genetic analysis has led to differentiation of stocks in any remaining mixed-stock fisheries. Where genetics of stocks in smaller rivers adjacent to larger rivers are similar using current Genetic Stock Identification techniques, stocks are considered as single stock for management purposes.

1.5 To provide a baseline for future comparison, what is the current and potential quantity of salmon habitat? *(Max 200 words)*
(Reference: Section 3.1 of the Habitat Guidelines)

The current quantity of accessible salmon habitat is 11,743 hectares. Four major hydro-electric facilities impede upstream movement of salmon and the total wetted area of salmon habitat when the area upstream of these four stations is included is 16,720 hectares. While these hydro-stations do have fish passage facilities, the rivers are not considered to hold self-sustaining salmon populations.

1.6 What is the current extent of freshwater and marine salmonid aquaculture?

Number of marine farms	19 in 2018 (number may change due to fallowing and

	year class of salmon present)
Marine production (tonnes)	19,300 tonnes
Number of freshwater facilities	12
Freshwater production (tonnes)	Unknown
Append one or more maps showing the location of aquaculture facilities and aquaculture free zones in rivers and the sea.	

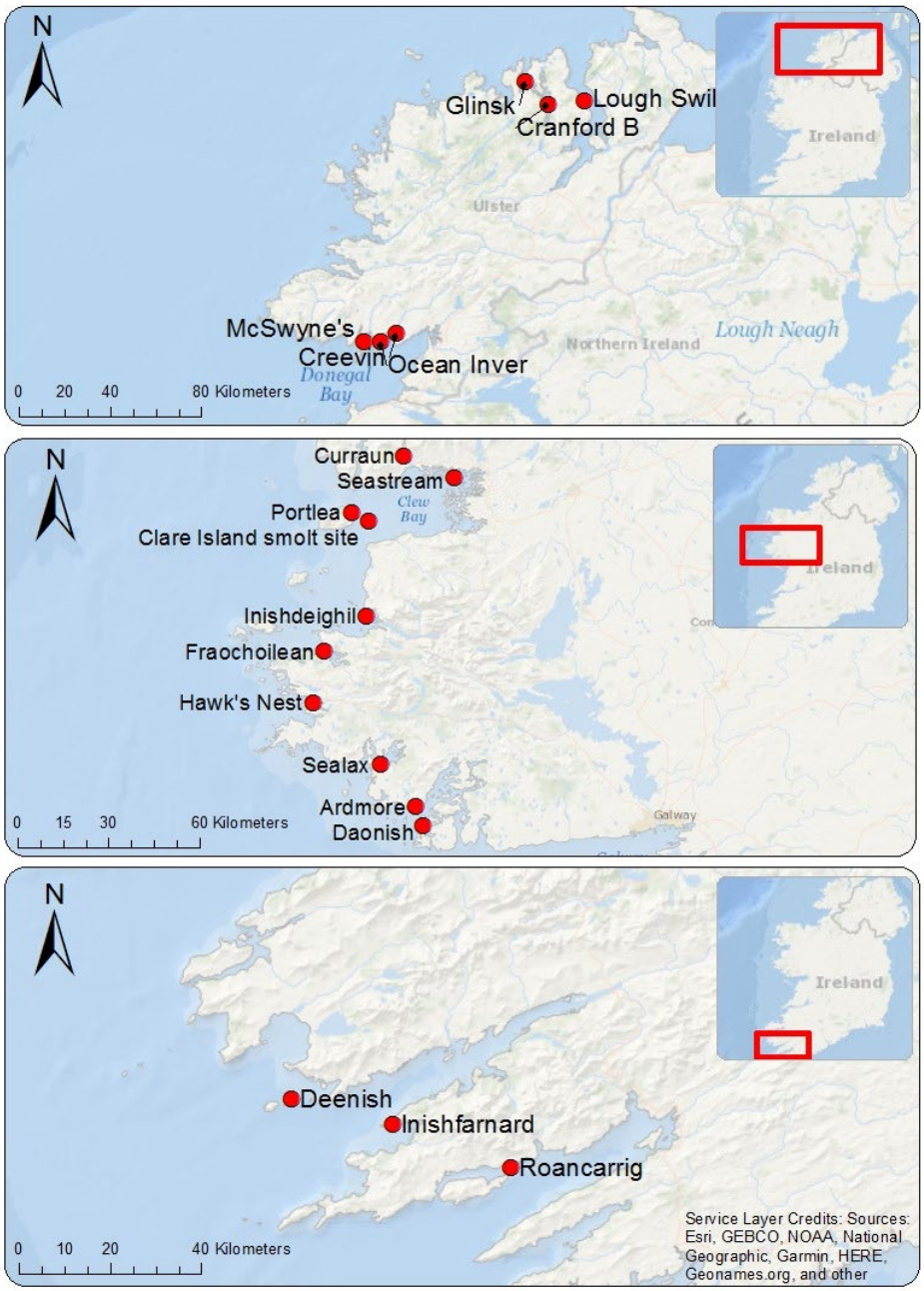

Figure 1. Location of Ireland's marine salmon farms in the North-West, West and South-West.

1.7	**Please describe the process used to consult NGOs and other stakeholders and industries in the development of this Implementation Plan.** *(Max 200 words)*
The technical elements Ireland's Implementation plan were drafted and circulated to NGO's, government departments and stakeholders for feedback. Consultation feedback has been considered for inclusion in the final released plan.	

2.	**Management of Salmon Fisheries:** *In this section please review the management approach to each of the fisheries in your jurisdiction (i.e. commercial, recreational and other fisheries) in line with the relevant NASCO Resolutions, Agreements and Guidelines. For Parties / jurisdictions that prosecute mixed-stock fisheries, there should at least one action related to their management.*
2.1	**What are the objectives for the management of the fisheries for wild salmon?** *(Max. 200 words)*
The objectives of fisheries management is for all stocks to meet and exceed biologically based Conservation Limits with only the surplus above the Conservation Limits being available for harvest. *Government policy is to conserve the inland fisheries resource through effective corporate governance of the agencies operating under the aegis of the Department and to facilitate exploitation of the resource on an equitable and sustainable basis.* *The Governments strategic objectives are to:* *• Ensure the effective conservation, primarily through Inland Fisheries Ireland and the Loughs Agency, of inland fish habitats and stocks.* *• Deliver effective legislative and regulatory framework and value for money management for the inland fisheries sector.*	
2.2	**What is the decision-making process for the management of salmon fisheries, including predetermined decisions taken under different stock conditions (e.g. the stock levels at which regulations are triggered)?** *(Max. 200 words)* *(This can be answered by providing a flow diagram if this is available.)* *(Reference: Sections 2.1 and 2.7 of the Fisheries Guidelines)*
The scientific and management process for provision of catch advice is set out below. Once estimates of average spawners, average catch, and river-specific CL have been derived for the most recent five-year period, a forecast of returns is made for the following year. Harvest options are provided along with the associated probability of meeting the CL at various catch options. Following the procedure used by ICES, the harvest option that provides a 0.75 probability level (or 75% chance) of meeting the CL for a given stock is recommended by scientists. Where there is no harvest option which will provide a 75% chance of meeting the CL, then a harvest (commercial or rod) is not recommended. An objective of the catch advice is to ensure that harvest fisheries only take place on river stocks meeting and exceeding their CL. The means to achieve this objective is to only allow harvest fisheries which can specifically target single stocks which are meeting their CLs. The scientific advice is provided to IFI for their consideration by an independent Technical Expert Group on Salmon (TEGOS). Management recommendations on the open, catch and release or closed status of salmon rivers, available surplus, appropriate management regime, open	

season, fishing methods etc. are proposed by IFI. Following consultation with the Department, the annual salmon management legislation is drafted and placed before the public for consultation. Following a 30 day public consultation period the Minister publishes the legislation for all fisheries before January 1st.

2.3 (a) Are any fisheries permitted to operate on salmon stocks that are below their reference point (e.g. Conservation Limits)? If so, (b) how many such fisheries are there and (c) what approach is taken to managing them that still promotes stock rebuilding? *(Max 200 words)*
(Reference: Section 2.7 of the Fisheries Guidelines)

(a) No harvest fisheries are permitted on salmon stocks below conservation limit. Catch & release-only rod fisheries are permitted in rivers meeting >50% of CL

(b) N/A

(c) N/A

2.4 (a) Are there any mixed-stock salmon fisheries? If so (b) how are these defined, (c) what was the mean catch in these fisheries in the last five years and (d) how are they managed to ensure that all the contributing stocks are meeting their conservation objectives? *(Max. 300 words in total)*
(Reference: Section 2.8 of the Fisheries Guidelines)

(a) There are currently two managed mixed-stock fisheries in Ireland, Killary Harbour and Castlemaine Harbour.

(b) In the case of the Killary Harbour (Ballinakill District) fishery, there are two contributing stocks (Delphi and Erriff) both of which are meeting and exceeding their CLs in 2019. The TEGOS provide advice on the Killary common embayment based on the CL being met on both rivers simultaneously.

In 2010, the Minister of State at the Department of Communications, Energy & Natural Resources requested advice on how a commercial salmon fishery could be operated on stocks in Castlemaine Harbour in a sustainable manner, maximising the opportunities for commercial fishing whilst ensuring that stocks are not overexploited. In this context, a pilot fishery was operated in Castlemaine Harbour in 2010 to determine the composition of the various stocks in the fishery. The results indicated that at least 94% of the catch in the fishery comprised salmon stocks from three rivers entering Castlemaine Harbour (Laune, Caragh and Maine). All three rivers have been above CL since 2011 and a mixed-stock fishery has operated since that time. Advice is provided annually on this common embayment fishery based on all three rivers simultaneously achieving their CLs.

(c) Killary Harbour mean catch 2014-2018: 243 salmon (0.7t).
Castlemaine Harbour mean catch 2014-2018: 690 salmon (1.9t).

(d) The objective of the catch advice is to ensure that harvest fisheries operate only in estuaries where contributing stocks meet and exceed CLs. Where a potential mixed-stock commercial fishery exists, the estimate of available salmon surplus is first calculated on each contributing stock to the potential mixed-stock fishery. An analysis in undertaken to ensure that the conservation limit will be met simultaneously in each river if a mixed-stock fishery is to operate. This effectively reduces the combined available surplus for all rivers in a mixed-stock fishery. This process ensures that if a mixed-stock fishery operates, there is a high probability that the CL will be met in all contributing rivers simultaneously.

2.5 How are socio-economic factors taken into account in making decisions on

management of salmon fisheries? *(Max. 200 words)*
(Reference: Section 2.9 of the Fisheries Guidelines)

In evaluating management options, conservation of the salmon resource does take precedence over socio-economic factors and only fisheries meeting CLs and with a harvestable surplus are allowed retain salmon. The allocation of any surplus to stakeholders (i.e. anglers and commercial net fishermen) is based on consultation between IFI and the stakeholders concerned. These proportions are usually based on historical catch information.

IFI will support the NASCO evaluation of the value of salmon as part of the State of the Salmon report planned as part of the International Year of the Salmon deliverables.

A socio-economic programme is planned with the Economic & Social Research Institute which will inform decisions regarding management of salmon fisheries.

2.6 What is the current level of unreported catch and what measures are being taken to reduce this? *(Max. 200 words)*
(Reference: Section 2.2 of the Fisheries Guidelines and the Minimum Standard)

Under the current legislation supporting the Carcass Tagging and Logbook Scheme, all fishermen must record details of landings (commercial, angling including catch and release). For the purposes of reporting illegal unreported catch to NASCO, a national figure of 10% is used based on observations from fishery inspectors. There is no systematic appraisal of unreported catch.

Following the closure of the Irish mixed-stock fishery at sea in 2006, there is more focus on improving data from inshore fisheries and recreational fisheries. Logbook returns for commercial fishermen are 100% while returns are available for approximately 70% of anglers. A correction factor is used to raise the reported rod angling catch to account for unreturned angling logbooks. This correction factor raises reported rod catches by approx.. 20%. All anglers who do not return logbooks are written to as a means of improving logbook returns and a proportion are taken to court annually and fined for non-return of logbooks.

Since the closure of the mixed-stock fishery the few remaining commercial fisheries are based in fisheries above their CL. These are in the main inshore close to or in the estuarine portion of identified rivers. IFI maintains a very close watch on these fisheries and allocates individual carcass tags on a restricted basis based on the utilisation of the previous issued allocation. All salmon harvested by whatever means must have a carcass tag attached.

2.7 Has an assessment under the Six Tenets for Effective Management of an Atlantic Salmon Fishery been conducted? If so, (a) has the assessment been made available to the Secretariat and (b) what actions are planned to improve the monitoring and control of the fishery? (c) If the six tenets have not been applied, what is the timescale for doing so? *(Max. 200 words)*
(Reference: Six Tenets for Effective Management of an Atlantic Salmon Fishery, WGCST(16)16)

Yes,

(a) Ireland's assessment under the Six Tenents was made available to NASCO in January 2017.

(b)

Control and enforcement measures are in place under powers granted in *Sections 57* and *Section 69* of the *Inland Fisheries Act 2010*. Around 130 IFI Fisheries Officers monitor compliance with the regulations 'on the ground' throughout the state. A diverse range of methods are used for anti-poaching patrols including boats, kayaks, Personal Water Craft (PWCs), all-terrain vehicles, bicycles, vehicles and foot patrols. In addition to the use of traditional patrol methods, the availability of advanced surveillance equipment including night vision scopes, infra-red heat sensing scopes and enhanced optical surveillance have proven instrumental in the apprehension of a number of illegal operators. In 2017, 187,426 fishery staff man hours were spent on protecting Ireland's Fishing Resource. Protection patrols were carried out on lakes, rivers, estuaries and at sea, with a total of 35,630 inspections of licence holders. This protection was largely related to salmon but fishery patrols were also targeted at other fish species. In total, 264 nets were seized measuring 14,055 metres, 128 Fixed Charge Notices were issued for fishery offences and 82 prosecutions were initiated.

Sanctions for non-compliance with the regulations are specified under *Section 57* and *69* of the *Inland Fisheries Act 2010*.

To improve the monitoring and control of the fishery, IFI have committed to replacing the offshore Rigid Inflatable Boat (RIB) fleet which will be fully operational in 2019. This fleet will be capable of patrolling the entire coastline of the Republic of Ireland from shore to the 12 mile limit. In all 12 new boats will be commissioned by April 2019.

(d) N/A

2.8 Identify the threats to wild salmon and challenges for management associated with their exploitation in fisheries, including bycatch of salmon in fisheries targeting other species.

Threat / challenge F1	Illegal catches, both at sea and within rivers, remains a concern and an impediment to stock recovery.
Threat / challenge F2	Over-reporting of rod catches is of concern as catch data are used as the primary source of population (i.e. returns) information for catch advice models on the majority of rivers. Over-reporting of catch will lead to a higher expectation of returns in forecasts and therefore an over-optimistic outcome in terms of attainment of CLs and mask the true extent of stock recovery. Under-reporting of catches will lead to lost catch harvest opportunities or a less optimistic outcome with regard to attainment of CLs and will also mask the true extent of stock recovery.
Threat / challenge F3	Awareness of the critical status of salmon stocks in Ireland

2.9	**What SMART actions are planned during the period covered by this Implementation Plan (2019 – 2024) to address each of the threats and challenges identified in section 2.8 to implement NASCO's Resolutions, Agreements and Guidelines and demonstrate progress towards achievement of its goals and objectives for the management of salmon fisheries?**

Action F1:	Description of action:	Protection against illegal fishing is a high priority in Ireland and the state invests a considerable amount of resources on these activities (Fishery Inspectors, Navy, Garda etc). The new RIB fleet and closely working with the Aer Corps and Navy will assist significantly in eradicating any offshore netting – however should significant returns of salmon materialise the probability of some unscrupulous fishermen making efforts to catch fish illegally remains. This is further countered by the careful monitoring of restaurants, smokeries and hotels for the occurrence of wild fish that have not come from a legal source. The following recent investment by IFI will greatly assist in achieving SMART actions regarding curtailment of illegal fishing: New offshore RIB fleet; new technologies including use of drones; Covert cameras; high power telescopes; thermal imaging etc.. Greater concentration on training of staff and facilities to get RIBs closer to launch points. IFI measure many metrics including man hours in fisheries protection; number of patrols; number of nets seized; length of net; number of individuals apprehended; number of fines issued; number of prosecutions undertaken etc. IFI ability to achieve all this has been strengthened by the investment in the new technologies and boats over the last two years. IFI produce an annual "Protection Plan" which is strongly focused on salmon protection; the plan for 2019 has increased focus on salmon protection as a support for the "International Year of the Salmon". IFI also have a very mobile reactionary staff who can respond to threats or reported incidences of illegal activity and a 24 hour hotline operates that can alert staff at any stage to illegal threats. IFI is looking for additional funding in 2019 to expand the drone patrolling programme and get added high resolution thermal cameras to aid identifying targets in undergrowth close to rivers. IFI, subject to funding will secure additional technological equipment in 2019 to further support fisheries protection operations. Specific, measurable and timely actions on fishery protection in 2019 are as follows; • 6,584 man hours on fishery protection sea patrols • 24,517 man hours on fishery protection coastal/estuary patrols • 58,613 man hours on fishery protection river patrols

		• 783 boat patrols on fishery protection • 19,561 vehicle patrols on fishery protection • 135 kayak patrols and 38 drone patrols • 881 inspections of commercial salmon licence holders • 14657 inspections of recreational angler licence holders This level of activity in fishery protection is expected in each year of the five years over the 2019-2024 period.
	Planned timescale (include milestones where appropriate):	On-going annually.
	Expected outcome:	Increased protection of the salmon resource and a reduction in illegal fishing activities leading to stabilisation and/or increases of salmon stocks nationally.
	Approach for monitoring effectiveness & enforcement:	Number of incidence of illegal fishing at sea and in rivers, number of illegal nets seized, number of prosecutions issued. Improvement in the status of rivers.
	Funding secured for both action and monitoring programme?	Yes
Action F2:	Description of action:	IFI is actively promoting the returns of accurate information from anglers through the national carcass tagging and logbook scheme. This scheme facilitates the identification of inaccurate information and allows some follow-up to redress the issue. Legal advice awaited re vires under the fisheries and ecommerce acts. IFI also regularly inspect angler and commercial fishermen logbooks to ensure compliance.
	Planned timescale (include milestones where appropriate):	Ongoing. IFI intends to deliver electronic licences and logbooks by the end of 2021.
	Expected outcome:	On line system in place, facilitating greater returns of logbooks and increase in uptake of licences
	Approach for monitoring effectiveness & enforcement:	Reports issue in relation to the % of logbook returned and these reports are evaluated. A proportion of non-return of licences are pursued through the courts. Use of the system will allow for quicker analysis of data and identification of any issues arising leading to better and more timely management decisions regarding the protection and conservation of salmon.
	Funding secured for both action and	Yes

	monitoring programme?	
Action F3:	Description of action:	IFI's International Year of the Salmon Promotional Plan is in place and will be delivered in 2019 and will leave legacies into the future. IFI have an education and outreach programme which will raise awareness of the critical state of salmon stocks.
	Planned timescale (include milestones where appropriate):	Ongoing. All promotional output for IYOS is intended to have some sustainability. The Education and Outreach programme is a long term programme as is the Something Fishy programme which is delivered annually to 5th and 6th class students.
	Expected outcome:	Raised awareness of the critical state of salmon stocks nationally.
	Approach for monitoring effectiveness & enforcement:	Measures are in place in the International Year of the Salmon Promotional Plan to assess effectiveness of the plan. IFI are constantly monitoring the effectiveness of the education and outreach programme.
	Funding secured for both action and monitoring programme?	Yes
		Choose an item.

Copy and paste lines to add further actions which should be labelled F5, F6, etc.

3.	**Protection and Restoration of Salmon Habitat:** *In this section please review the management approach to the protection and restoration of habitat in your jurisdiction in line with the relevant NASCO Resolutions, Agreements and Guidelines.*
3.1	**How are risks to productive capacity identified and options for restoring degraded or lost salmon habitat prioritised, taking into account the principle of 'no net loss' and the need for inventories to provide baseline data?** *(Max. 200 words)* (*Reference: Section 3 of the Habitat Guidelines)*

The risks to productive capacity are identified and options for restoring degraded or lost salmon habitat are prioritised by a range of programmes set out below:

Risk Identification:

- Salmonid River Surveys
- National salmon counters programme
- Catchment-wide Electro-fishing (juvenile salmon)
- Analysis of Aerial Photography Database
- Monitoring for EU Habitats Directive Fish Species (incl. salmon)
- Water Framework Directive (WFD) fish Monitoring
- Climate Change Mitigation Monitoring (focus on salmonids)

Each of the programmes outlined above help identify the risks to productive capacity and prioritise options for restoring degraded or lost salmon habitat. Inventories on the risk to productive salmon habitat and baseline data are compiled through the programmes set out above. IFI have access to

the data collected on a river-specific basis and remedial works are undertaken having reviewed information from the range of available sources in the programmes set out above.

Restoration options:

- Salmon and Sea trout Conservation Stamp Funding Programme (restoration programmes)
- River Shannon nature like pass for a major hydro-station
- National Programme for maintenance and Rehabilitation of Drained Rivers
- Rehabilitation work undertaken by Fishery Owners / Angling Clubs
- Mitigation for Infrastructural Programmes Nationally

Each of the programmes outlined offer options o support the restoration of degraded or lost salmon habitat.

3.2 How are socio-economic factors taken into account in making decisions on salmon habitat management? *(Max. 200 words)*
(Reference: Section 3.9 of the Habitat Guidelines)

Regardless of the socio-economic implications of any given project, there is a clear policy in place to protect salmon and its habitat in Ireland. The function of IFI are to conserve, protect, manage and develop the inland fisheries resource (including salmon) and general Government policy is to conserve the inland fisheries resource in its own right and to facilitate exploitation of the resource on an equitable and sustainable basis. These objectives mean that the salmon resource must be given adequate protection when the socio-economic implications of any project are being considered.

When a proposed development is within or adjacent to a Special Area of Conservation (SAC), an initial Natura Impact Screening (NIS) is required. Based on the outcome of this assessment, the requirement for a full NIS may be required. Any developments outside the Natura 2000 Network require an environmental impact assessment. However, the socio-economic requirements of flood risk management in Ireland takes priority and where this occurs, mitigation is required such as modification of fish passage to ease upstream migration. A recent example is the Bandon flood relief scheme where major channel modification in response to recent large-scale flooding was undertaken and habitat rehabilitation plans and new fish passes were included in the programme.

3.3 What management measures are planned to protect wild Atlantic salmon and its habitats from (a) climate change and (b) invasive aquatic species? *(Max. 200 words each)*
(Reference: Section 3.2 of the Habitat Guidelines)

(a) Climate Change

IFI have initiated an evidence-based assessment programme to determine the impact of climate change on the Irish fisheries sector in both freshwater and estuarine environments, with the aim being to inform and build capacity for fisheries conservation and protection measures (mitigation strategies). Specific fisheries policy development is one of the deliverables of the programme.
The Irish Government approved Ireland's first statutory National Adaptation Framework (NAF) in December 2017.

The following lead management measure to address the issue of IAS in Ireland which is pertinent to protecting wild Atlantic salmon and its habitats is set out in Ireland's River Basin Management Plan (RBMP) 2018-2021, notably that:

- EU Regulation (1143/2014) on "the prevention and management of the introduction and spread of invasive alien species" will be implemented. Clear governance arrangements for

managing aquatic IAS in Ireland, including the assignment of responsibilities and development of agreed co-ordination mechanisms, will be put in place.

In addition, IFI have already been at the forefront in planning and implementing management measures to specifically protect native species and habitats from the threat posed by aquatic invasive species. Central to this is an ongoing applied research and weed management programme specifically to address the extensive infestation of invasive Curly-leaved waterweed in Lough Corrib. This lake is Ireland's second largest, it is designated a Special Area of Conservation under the EU Habitats Directive. The Corrib system is a prime Atlantic salmon fishery with annual returns averaging *c*. 17,000 salmon in recent years.

3.4	**Identify the main threats to wild salmon and challenges for management in relation to estuarine and freshwater habitat.**
Threat / challenge H1	Ireland's River Basin Management Plan (RBMP) 2018-2021 (https://www.housing.gov.ie/sites/default/files/publications/files/rbmp_report_english_web_version_final_0.pdf) identifies the significant pressures impacting on water bodies at a national level and identifies corresponding actions that will be taken to address these. The key pressures considered to pose threats / challenges to Atlantic salmon are set out below. **Water Quality** **Agricultural production** and domestic waste-water treatment systems are key sources of rural diffuse and point-source pollution. Agriculture has been identified as a significant pressure in 780 (53%) of the 1,460 water bodies identified as *At Risk* of not meeting their environmental objective. **Domestic waste-water** treatment systems were also identified as a further significant pressure in a rural context, with 166 (11%) water bodies identified as *At Risk* from this pressure. **Forestry** is a significant pressure in 238 (16%) water bodies identified as *At Risk*.
Threat / challenge H2	**Hydromorphological Threats** Threats to the natural Hydromorphological character of rivers is a significant pressure in 345 (24%) water bodies identified as *At Risk* as identified in Ireland's River Basin Management Plan 2018-2021. IFI has identified the need to improve the assessment of barriers along rivers (e.g. weirs and dams) that may be impacting on a range of migratory fish species
Threat / challenge H3	**Climate Change** Climate change has been identified by IFI as one of the greatest threats facing the fish populations and structure in the medium to long-term. Ireland's climate is changing at a scale and rate of change consistent with regional and global trends. This change is predicted to continue and to increase over the coming decades with an expected rise in mean annual temperatures of up to 2.5°C by 2055. Impacts from climate change are likely to be more severe where stream and lake habitats are degraded or fragmented and less severe where habitats are robust and interconnected. Any changes to water quality or quantity will be

	aggravated by climate change and any existing water quality problems (e.g. we might expect an increase in catastrophic events such as fish kills). Impacts of climate change on fish can also be caused by increasing invasive species population size and distribution, changes in competition and predation rates and increases in disease risk and occurrence of parasites.
Threat / challenge H4	**Invasive Alien Species** Certain IAS have the potential to negatively impact wild salmon habitat in the freshwater or estuarine environment in Ireland through both direct and indirect means.

Copy and paste lines to add further threats/challenges which should be labelled H5, H6, etc.

3.5 What SMART actions are planned during the period covered by this Implementation Plan (2019 – 2024) to address each of the threats and challenges identified in section 3.4 to implement NASCO's Resolutions, Agreements and Guidelines and demonstrate progress towards achievement of its goals and objectives for the Protection, Restoration and Enhancement of Atlantic Salmon Habitat?		
Action H1:	Description of action:	Ireland's River Basin Management Plan (RBMP) 2018-2021 sets out, on a national level, corresponding actions that will be taken to address identified pressures. **Action 1. Agricultural Pollution** The integrated Governmental approach to the enforcement of the Nitrates Action Programme (2018–2021) will be implemented with the aim of protecting and improving water quality. There will be increased targeting of inspections by local authorities based on water quality results and the outputs of the RBMP characterisation process. It is envisaged that a Nitrates Action Programme plan for the period 2022-2024 will follow the current plan. **Action 2 Domestic Waste Water Pollution** The National Inspection Plan for Domestic Waste Water Treatment Systems (2018– 2021) will continue with over 4,000 inspections carried out by local authorities over this period. It is envisaged that a further plan from 2022-2024 will follow. Over the period 2017–2021, Irish Water will invest approximately €1.7 billion in waste-water projects, programmes and asset maintenance. This investment will include €880 million for 255 major waste-water treatment projects, €350 million for capital investment in collection systems in 41 areas and €465 million for capital maintenance and national upgrade programmes. Further investment is envisaged post-2021.

	Planned timescale (include milestones where appropriate):	Irelands River Basin District Management Plan 2018-2021 lists measures that have commenced or will commence during this period. Some measures will be implemented by 2024 and others by 2027 and beyond.
	Expected outcome:	Significant improvement in water quality nationally. The River Basin Management Plan for Ireland 2018-2021 sets out detailed expected outcomes concerning achievement of improved water quality, including upgrade of urban waste water treatment plants and increased investment in Ireland's waste water infrastructure. These include 726 water bodies to achieve general water quality improvements and 152 water bodies to experience improved water quality status.
	Approach for monitoring effectiveness & enforcement:	The EPA monitor and publish periodic reports on water quality status nationally and progress on achieving the objectives of the Water Framework Directive. This is the principal indicator to measure the efficacy of the Nitrates Action Programme and domestic wastewater actions and associated water quality initiatives. Irish Water periodically publish details of investment plans, capital maintenance and national upgrade programmes in their annual reports and related publications. The Local Authorities, Waters Programme (LAWPRO) are responsible for undertaking and enforcing WFD Programmes of Measures and are carrying out a significant number of investigative assessments in identified areas for action. IFI undertake annual fish monitoring in designated water bodies for WFD reporting. These results are reported annually.
	Funding secured for both action and monitoring programme?	Expected
Action H2:	Description of action:	**Hydromorphological threats.** **Action 1. Barriers** The IFI Barriers programme (2019 to 2021) will identify, assess and document barriers to fish migration on a national basis. Barriers will be ranked according to the risk they pose to fish migration. The inventory will form the basis of a prioritised restoration programme to be implemented between 2022 and 2027. **Action 2. Rehabilitation of Drained Rivers** Under the 1945 Arterial Drainage Act, the Office of Public Works is obliged to carry out maintenance work on the network of arterially-drained channels. Annually, the OPW undertakes maintenance on approximately 2,000 km of channels in its network, following the environmental drainage maintenance procedures to minimise environmental impact. The guidance provides potential for

		significant retention of riparian habitat and also for alteration of instream hydromorphology in appropriate locations. Progress on this action will be reported.
	Planned timescale (include milestones where appropriate):	Action 1: 2019 to 2021. Supported by detailed project plan and milestones. Action 2: Annual plan and targets generated.
	Expected outcome:	Improvement in salmon habitat quality and fish passage.
	Approach for monitoring effectiveness & enforcement:	***Action 1:*** The IFI Barriers programme will report annually on numbers of Barriers to fish passage identified and assessed. ***Action 2***: The OPW will report annually on the KMs of drained channels maintained using the environmental drainage maintenance procedures.
	Funding secured for both action and monitoring programme?	Yes
Action H3:	Description of action:	IFI have initiated an evidence-based assessment programme to determine the impact of climate change on the Irish fisheries. This programme will establish index catchments for fisheries-related climate change research and associated fisheries policies will be developed.
	Planned timescale (include milestones where appropriate):	IFI's evidence-based programme will be long-term, but initially 2019 to 2023.
	Expected outcome:	IFI – Series of vulnerability risk assessment maps for key fish species including salmon and informed targeted measures. Mitigation measures to protect vulnerable fish species such as Atlantic salmon.
	Approach for monitoring effectiveness & enforcement:	IFI – A work programme has been developed with a series of deliverables and will be monitored through a steering group within IFI. Details project plans and deliverables will be reviewed annually.
	Funding secured for both action and monitoring programme?	Expected
		Choose an item.

Action H4:	Description of action:	**Invasive Species** Action 1. The EU Regulation (1143/2014) on "the prevention and management of the introduction and spread of invasive alien species" will be implemented. Action 2. Development and evaluation of survey techniques to assess the extent of infestation of Curly-leaved waterweed in Lough Corrib and monitor the efficacy of control measures undertaken there.
	Planned timescale (include milestones where appropriate):	Action 1: 2019-2021; Action 2: 2019-2021
	Expected outcome:	Action 1: Development of a more coherent and co-ordinated national approach to IAS management that will facilitate better communication and collaboration between relevant authorities. Action 2: Survey techniques will be developed and evaluated to assess the extent of infestation of Curly-leaved waterweed in Lough Corrib and monitor the efficacy of control measures undertaken there.
	Approach for monitoring effectiveness & enforcement:	Action 1: The Department of Culture, Heritage, and the Gaeltacht in consultation with other relevant Departments (notably the Department of Communications, Climate Action and Environment) will oversee the implementation of this action. Action 2: As the lead participant, IFI will manage the implementation of this programme and report annually on the progress made.
	Funding secured for both action and monitoring programme?	Expected

4. Management of Aquaculture, Introductions and Transfers, and Transgenics:

Council has requested that for Parties / jurisdictions with salmon farms, there should be a greater focus on actions to minimise impacts of salmon farming on wild salmonid stocks. Each Party / jurisdiction with salmon farming should therefore include at least one action relating to sea lice management and at least one action relating to containment, providing quantitative data in Annual Progress Reports to demonstrate progress towards the international goals agreed by NASCO and the International Salmon Farmers Association (ISFA):

- *100% of farms to have effective sea lice management such that there is no increase in sea lice loads or lice-induced mortality of wild salmonids attributable to the farms;*
- *100% farmed fish to be retained in all production facilities.*

In this section please provide information on all types of aquaculture, introductions and transfers, and transgenics (including freshwater hatcheries, smolt-rearing etc.

4.1 **(a) Is the current policy concerning the protection of wild salmonids consistent with the international goals on sea lice and containment agreed by NASCO and ISFA? (b) If the current policy is not consistent with these international goals, when will current policy be adapted to ensure consistency with the international goals and what management measures are planned to ensure achievement of these goals and in what timescale?** *(Max. 200 words for each)*
(Reference: BMP Guidance)

(a) While there are a number of controls in place to ensure the effective and efficient management of sea lice, the current policy is not consistent with the International goal that 100% of farms to have effective sea lice management such that there is no increase in sea lice loads or lice-induced mortality of wild salmonids attributable to the farms. Please see Appendix 1 for detail on sea lice management in Ireland.
The current policy on containment that 100% farmed fish to be retained in all production facilities is consistent with International goals. More detail is provided in Appendix 1.

(b) With regard to sea lice control, the current policy is a broad scale policy with national rather than site specific lice trigger treatment targets that may not ensure consistency with the international goals of ensuring 100% of farms have effective sea lice management such that there is no increase in sea lice loads or lice-induced mortality of wild salmonids attributable to the farms. There are no plans to introduce lice trigger levels appropriate for effective sea lice control at all sites. The policy on sea lice control is set out in the Department of Agriculture Pest Control Strategy (2008). There are also no current plans to introduce additional SMART actions.

4.2 **(a) What quantifiable progress can be demonstrated towards the achievement of the international goals for 100% of farms to have effective sea lice management such that there is no increase in sea lice loads, or lice-induced mortality of wild salmonids attributable to sea lice? (b) How is this progress monitored, including monitoring of wild fish? (c) If progress cannot be demonstrated, what additional measures are proposed and in what timescale?** *(Max. 200 words each)*
(Reference: BMP Guidance)
The measures by which these goals may be achieved, and against which the Review Group will be measuring the effectiveness of the Implementation Plan, are set out in the

BMP Guidance SLG(09)5 (Best management practice; reporting and tracking; factors facilitating implementation) as agreed by NASCO and ISFA.

(a) No quantifiable progress can be demonstrated towards the achievement of the international goals for 100% of farms to have effective sea lice management such that there is no increase in sea lice loads, or lice-induced mortality of wild salmonids attributable to sea lice. Sampling of sea trout has shown high lice levels in some areas and may be a reflection of similar lice infestation pressure of out migrating salmon smolts. A 26-year record from the Erriff river was used to evaluate the contribution of sea lice from one salmon aquaculture bay to declining returns of wild one sea-winter (1SW) salmon. Statistical models suggested that returns were >50% lower in years following high lice levels on nearby salmon farms during the smolt out-migration.

One SMART action to demonstrate progress would be the quantifiable index of lice levels on Irish salmon farms, the annual trend in ovigerous sea lice levels relative to lice treatment trigger levels during May at the time of wild salmonid smolt runs, Fig 3 below. Mean ovigerous lice levels were consistently above treatment trigger levels until 2011. Mean values have been just below the 0.5 ovigerous lice threshold since 2011, with the exception of 2014. For 2017, during the critical spring period, ovigerous lice levels were above trigger treatment levels in 19% of inspections of one sea winter fish. Therefore, despite the national mean trend in ovigerous lice levels being just within the lice treatment trigger in recent years, ovigerous lice levels at some individual farms were above this trigger. It is also not known if the lice trigger levels set in spring (0.5 ovigerous) are sufficiently low at all sites to ensure no lice induced mortality of wild fish from farm lice occurs. This is compounded by the same 0.5 ovigerous lice trigger being in place at all farms, despite the licensed tonnage and number of fish present at individual farm sites.

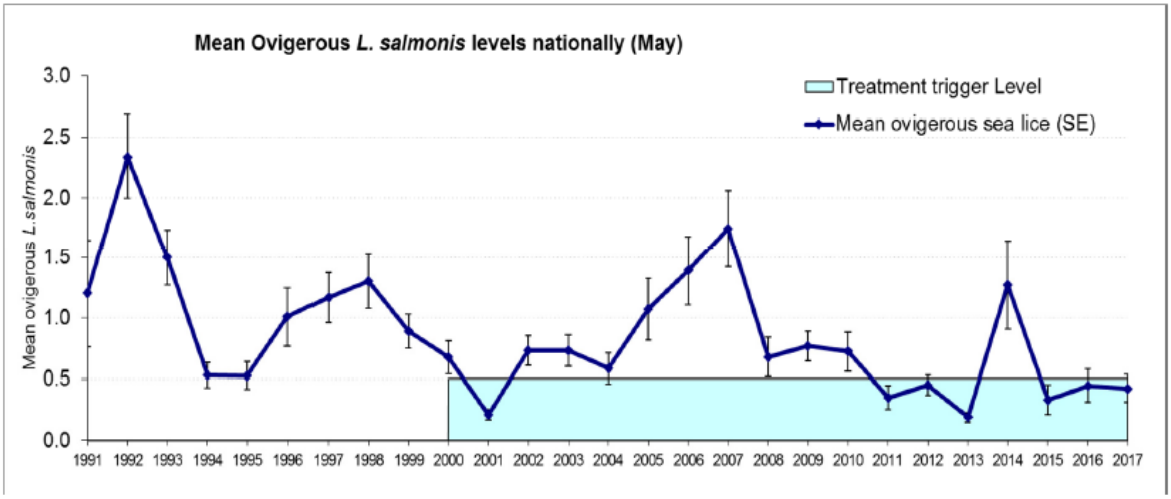

Figure 3. Annual trend in May of ovigerous *L.salmonis* lice on 1-sea winter salmon in Ireland over the 1991-2017 period (Source – Marine Institute).

(b) Progress is not monitored in any systematic way. A SMART action to monitor progress on achieving sea lice goals is sampling for lice infested sea trout in the estuary of rivers entering aquaculture bays annually. Heavily lice infested sea trout are regularly recorded in certain rivers. The timing of fallowing of sites, generally every second year, has been shown to reduce lice infestation rates on sea trout.
Salmon smolts that may become lice infested do not return to freshwater so no assessment is possible. Fishlift trawling to sample lice levels on salmon smolts at sea has

not been undertaken in Ireland since the early 2000's. A SMART action is the assessment of lice impacts from aquaculture by releasing groups of chemically treated and untreated hatchery salmon smolts in a small number of aquaculture bays. Comparison of return rates of protected and unprotected groups provides information of lice induced mortality from aquaculture.

(c) No additional measures are proposed other than those set out above.

4.3 **(a) What quantifiable progress can be demonstrated towards the achievement of the international goals for achieving 100% containment in all (i) freshwater and (ii) marine aquaculture production facilities? (b) How is this progress monitored, including monitoring of wild fish (genetic introgression) and proportion of escaped farmed salmon in the spawning populations? (c) If progress cannot be demonstrated, what additional measures (e.g. use of sterile salmon in fish farming) are proposed and in what timescale?** *(Max. 200 words each)*
(Reference: BMP Guidance)
The measures by which these goals may be achieved, and against which the Review Group will be measuring the effectiveness of the Implementation Plan, are set out in the BMP Guidance SLG(09)5 (Best management practice; reporting and tracking; factors facilitating implementation) as agreed by NASCO and ISFA.

(a)(i) Progress is being demonstrated as there have been no reports of an escape of juvenile salmon from freshwater sites although electro-fishing data shows that trickle escapes do occur.

(a)(ii) No progress is being demonstrated in achieving 100% containment for marine aquaculture production sites. Over the 1996-2017 period approximately 800,000 farmed salmon have been reported escaping from marine sites, Fig 4. While one large escape occurred in 2014, reported escapes of farmed fish has been low since then. However, some escapes go unreported as evidenced by the presence of approx. 500 escaped farmed salmon entering five rivers in the mid-West in 2017 despite no report of an escape having occurred.

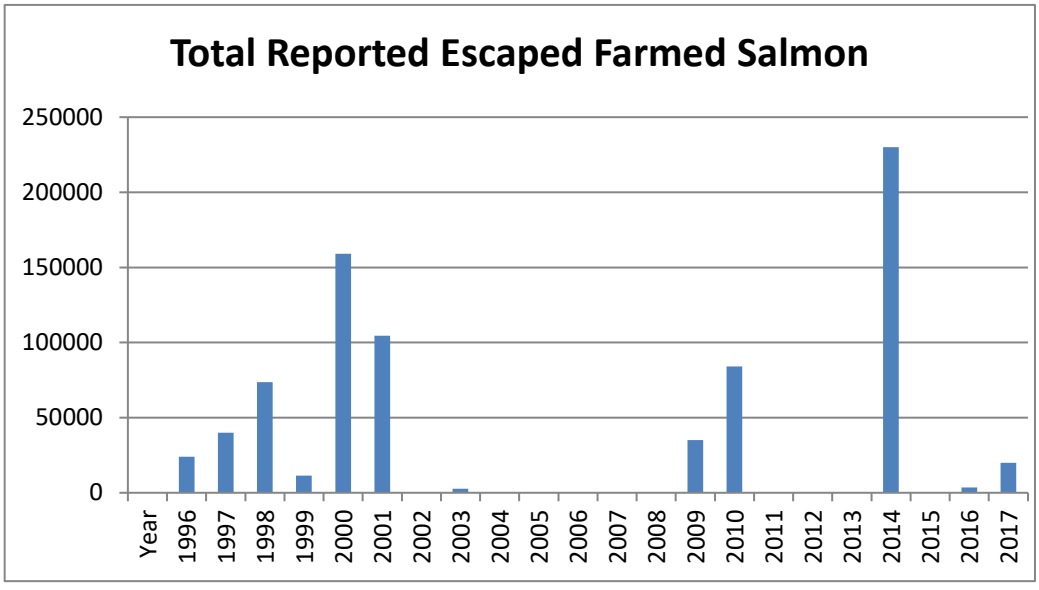

Figure 4. Estimate of reported escaped farm salmon from marine sites 1996-2017.

(b) Escaped farmed fish are examined in commercial catches. From 1980 to 2006 catches were examined on a routine basis from fish dealers' premises, commercial and recreational landings. Up to 2006, the catch examined comprised principally of drift-net catches from the major salmon fishing areas. With the closure of the mixed-stock fisheries at sea in 2007, the scanning now takes place within the estuaries and rivers (catches, traps and broodstock collections). The number of escapees recorded is an underestimate as the catch examined is limited to summertime commercial fisheries. Therefore, the analysis gives no indication of the number of escapees which may enter rivers. Generally, the rate of escapees in Irish catches is usually less than 0.5% Systematic monitoring for escapees is also carried out in the Burrishoole and Erriff Rivers. Escapees have been less than 0.5% of the total wild run of salmon in the most recent 5 years. However, more information on the incidence of escapees in river spawning stocks is obtained from the National Coded Wire Tagging and Tag Recovery Programme. In 2016, only two escapees were reported in catches being scanned for tagged fish and none were reported for broodstocks examined in 6 rivers. In 2017, 26 escapees were reported in a sample of 7,380 fish in catches being scanned for tagged fish and none were reported for broodstocks examined in 6 rivers. In summer 2017, 66 farmed escaped salmon were caught by anglers in five rivers in the mid-West. There was no report of an escape in any salmon farm and therefore the number of fish that escaped in this event is unknown.

(c) **It is clear that no progress can be demonstrated towards the International goal.** No additional measures, other than those set out above, are planned. There are no plans to mark a proportion of fish in salmon farms or move to the use of sterile fish in aquaculture.

4.4 What adaptive management and / or scientific research is underway that could facilitate better achievement of NASCO's international goals for sea lice and containment such that the environmental impact on wild salmonids can be minimised? *(Max 200 words)*
(Reference: BMP Guidance and Article 11 of the Williamsburg Resolution)

Sea Lice

A research project is underway examining the use of cleaner fish as a means of controlling sea lice on salmon farms. The industry has begun to desalinate sea water as a means of treating farmed salmon for Amoebic gill disease and control sea lice. A new project in the West is proposing developing the use of 'super smolts' whereby salmon can be grown to a larger size in freshwater thus reducing the length of the grow out time at sea and this may have considerable benefits to reducing sea lice impact on wild fish if timing is coordinated with wild salmonid smolt runs.

The LiceTrack project proposes to develop a sea lice integrative model developing and refining hydrodynamic modelling, incorporating environmental variables, sea lice production on salmon farms and other data requirements to support the sustainable development of aquaculture and conservation of wild salmon stocks. Existing modelling tools have been developed in Norway and Scotland. These models simulate dispersal of larval sea lice based on farm production, hydrodynamics, water temperature and salinity, and have been used to identify the role of specific salmon farming sites as recipients or sources of sea lice. In order to make directly comparable estimations of lice dispersal, and hence larval concentrations and infection pressure, the models need to be standardised. The work carried out in each country can also benefit from the exchange of ideas to ensure optimal solutions are arrived at. For this reason, a network has been formed within the project that will meet with the objective of developing a standard model that can be plugged into any hydrodynamic model of local currents to generate sea lice dispersal patterns. This project will contribute to developing best management practice for sea lice control

and define a range of production strategies aiming at reducing the presence of sea lice and their negative impacts, both on farmed and wild Atlantic salmon.

Containment
The pilot proposal to develop the use of 'super smolts' could reduce the time spent by farmed fish at sea. There are no plans to move to closed containment systems or land based salmon farming at present in Ireland.

4.5 What is the approach for determining the location of aquaculture facilities in (a) freshwater and (b) marine environments to minimise the risks to wild salmonid stocks? *(Max. 200 words for each)*

(a) Approaches for freshwater and marine sites are similar see below.

(b) The licensing and regulation of aquaculture, both finfish and shellfish, in Ireland is the statutory responsibility of the Department of Agriculture, Food & the Marine (DAFM). The core Act covering Aquaculture licensing including choice of appropriate sites is the Fisheries (Amendment) Act, 1997.

In considering an application for an aquaculture licence and determining the location, including an application to renew an aquaculture licence, the licensing authority must consider:

• the potential impacts on safety and navigation,
• the ecological impacts on wild fisheries, natural habitats, flora and fauna,
• the suitability of the waters,
• the other beneficial uses of the place or waters,
• the likely effects on the economy of the area, and
• the statutory status under European legal frameworks of the area under application.

This process involves consultation with a range of scientific and technical advisers as well as various statutory consultees. Applications are also subject to public consultation whereby any interested person or body may make submissions or observations on any licence application. The process also involves publication of Ministerial decisions on applications and allowing a one month period for appeal of any decision. Any such appeal must then be considered by the independent Aquaculture Licences Appeals Board.

Assessment at Licence Application Stage
In relation to aquaculture licence applications the following are required to submit an Environmental Impact Statement (EIS) as part of the application process:

• all seawater salmonid breeding installations
• seawater fish breeding installations with an output which would exceed 100 tonnes per annum;
• all fish breeding installations consisting of cage rearing in lakes;
• all fish breeding installations upstream of drinking water intakes;
• other fresh-water fish breeding installations which would exceed 1 million smolts and with less than 1 cubic metre per second per 1 million smolts low flow diluting water.

Other aquaculture applications may also be required to submit an EIS if it is considered that it may have a significant impact on the environment. All potential environmental impacts including wild-farmed interactions must be outlined and addressed in the EIS. Detailed scoping documents are provided for guidance in the preparation of an EIS. The EIS is a public document

and together with any commentary received during the application process forms part of the body of information utilized in making a determination on the licence application.

4.6 What progress has been made to implement NASCO's guidance on introductions, transfers and stocking? *(Max. 200 words)*
(Reference: Articles 5 and 6 and Annex 4 of the Williamsburg Resolution)

Ireland has contributed to the formulation of and adheres to NASCO's policy in Restocking (Appendix 1, Williamsburg Agreement).

ARTICLE 5.

Codes of Containment including operating protocols are specified in an Aquaculture Licence and there are specific protocols outlined for containment and legislation in event of large scale escape events. All equipment must comply with international standards as specified in the licence and Department engineers must inspect and confirm compliance with regard to structures and moorings.

Salmon ranching takes place in seven rivers in Ireland. Three rivers (Shannon, Erne, Lee) undertake ranching using local stocks. Ranching is practised in two rivers (Erriff, Burrishoole) for research purposes and ranched stock are removed at traps in the lower section of both rivers. Ranching is undertaken in the Corrib using local stock to maintain a ranching strain. Ranching to the rod is undertaken in Delphi using local stocks.

Apart from salmon ranching, unfed salmon fry and parr derived from local stocks are stocked into three rivers harnessed for hydro-power for stock rehabilitation. No introductions or transfer of salmon for enhancement purposes takes place.

All hatcheries and aquaculture facilities engaged in the culture or farming of salmonids must be covered by an Aquaculture licence as a requirement of the Fisheries (Amendment) Act, 1997. All facilities where fish are held, reared or on-grown must hold a Fish Health Authorisation granted under S.I. 261 of 2008.

ARTICLE 6.
Non-indigenous salmon smolts are released in one river for research purposes (potential impact of sea lice) and all returning adults are removed in a total upstream trap at the head of tide.

Introductions of reproductively viable non-indigenous anadromous salmonids or their gametes is not be permitted in Ireland.

Annex 4: Apart from the stocking of hydro rivers and the ranching programmes outlined above, there is little or no salmon stocking taking place in Ireland.

4.7 Is there (a) a requirement to evaluate thoroughly risks and benefits before undertaking any stocking programme and (b) a presumption against stocking for purely socio-political / economic reasons? *(Max. 200 words each)*
(Reference: Guidelines for incorporating social and economic factors in decisions under the Precautionary Approach and Annex 4 of the Williamsburg Resolution)

(a) Yes, NASCO's Guidelines on stocking are used as a basis for decision making

(b) Yes, Ireland's policy with regard to salmon enhancement is based on attainment of

conservation limits on individual rivers. River below conservation limit are not subject to any harvesting of salmon to facilitate recovery and habitat rehabilitation programmes are promoted to enhance stocks instead of stocking.

4.8 What is the policy / strategy on use of transgenic salmon? *(Max. 200 words)*
(Reference: Article 7 and Annex 5 of the Williamsburg Resolution)

Transgenic salmonids are not used and have never been used for aquaculture or restocking in Ireland and there are no plans or policy to do so as this would contravene current scientific advice and policy.

4.9 *For Members of the North-East Atlantic Commission only:* What measures are in place, or are planned, to implement the eleven recommendations contained in the 'Road Map' to enhance information exchange and co-operation on monitoring, research and measures to prevent the spread of *Gyrodactylus salaris* and eradicate it if introduced, including the development and testing of contingency plans? *(Max. 200 words)*
(Reference 'Road Map' to enhance information exchange and co-operation on monitoring, research and measures to prevent the spread of G. salaris and eradicate it if introduced, NEA(18)08)

Ireland presented a Briefing paper on *Gyrodactylus salaris* at the Working Group on *G. salaris* in the North-East Atlantic Commission Area in 2017.

Since 2005, wild salmon fry & parr from selected river systems in Ireland are examined annually for the presence of *G. salaris.* To date, over 40 rivers have been sampled. A detailed contingency plan for dealing with any outbreak of *G. salaris* in Ireland has been prepared. In addition to the contingency plan, IFI and MI have co-produced and widely circulated awareness literature to highlight the issue of *Gyrodactylus* among stakeholders and advise on biosecurity measures that can be taken to minimise the risk of introduction of the parasite to Ireland (e.g. *A Guide to Protecting Freshwater Fish Stocks in Ireland from the Parasite Gyrodactylus salaris* https://goo.gl/NRgVY0). In addition, both state agencies host information in this regard on their respective websites.

4.10 Identify the main threats to wild salmon and challenges for management in relation to aquaculture, introductions and transfers, and transgenics.

Threat / Challenge A1	Sea lice infestations from salmon aquaculture impacting on survival of wild salmon stocks. This could have a significant effect for stocks not meeting CLs or reduce available surpluses.
Threat / challenge A2	Escapes of farmed fish and threats to genetic integrity of wild stocks leading to loss of natural production, disruption of spawning activities of wild fish and genetic introgression.
Threat / challenge A3	Increases in incidence of diseases in salmon aquaculture and transfer to wild fish. Amoebic Gill Disease (AGD) caused by infection with the protozoan parasite *Neoparamoeba.perurans* has caused mortality in farmed salmon in recent years. Cardiomyopathy Syndrome (CMS), a severe viral cardiac disease, has also been recorded in Irish salmon farms in recent years. The threat of these diseases to wild salmon is unknown at present.
Threat / challenge A4	

Copy and paste lines to add further threats/challenges which should be labelled A5, A6, etc.

4.11	**What SMART actions are planned during the period covered by this Implementation Plan (2019 – 2024) to address each of the threats and challenges identified in section 4.10 to implement NASCO's Resolutions, Agreements and Guidelines and demonstrate progress towards achievement of its goals and objectives for aquaculture, introductions and transfers, and transgenics?**	
Action A1:	Description of action:	**Sea lice Infestation** **While no progress on achieving NASCO sea lice goal can be demonstrated, the sea lice Protocols below do attempt to reduce lice levels on farms, particularly in spring. No SMART actions other than those set out below are planned.** (a) During the spring period, Sea lice protocols are in place which set out ovigerous lice thresholds (0.3-0.5 ovigerous lice per fish March –May and 2.0 ovigerous lice per fish outside this period). When the threshold is breached a notice to treat is issued to the salmon farm to bring lice levels under control. (b) Under the Department of Agriculture, Fisheries and Food "Strategy for Improved Pest Control in Irish salmon farms, 2008", a feature of the strategy is to enhance the control of sea lice infestations on Irish salmon farms by the creation of a "real time" management regime. This regime is intended to vigorously deal with failures to control sea lice infestations on a case-by-case basis. The lice management regime is designed to bring progressively tougher actions to bear on the infestation to ensure the highest possible level of compliance. If after a number of attempts satisfactory lice control has not been achieved the cell may move to recommend accelerated harvesting, followed by extended fallowing post-harvesting. In exceptional circumstances the cell may also recommend mandatory restocking arrangements and/or an indefinite prohibition on restocking.
	Planned timescale (include milestones where appropriate):	Sea lice monitoring occurs monthly and notice to treat instructions are given when required.
	Expected outcome:	Reduced sea lice levels on farmed salmon
	Approach for monitoring effectiveness & enforcement:	Results of the monthly or bi-monthly sea lice inspection of all salmon farm sites. Results of sea lice monitoring on wild sea trout (as a proxy for salmon) and recorded lice infestation levels in individual aquaculture bays
	Funding secured	Yes

	for both action and monitoring programme?	
Action A2:	Description of action:	Codes of containment and operating protocols are set out in each aquaculture licence and there are specific protocols outlined for containment and legislation in event of large scale escape events. All equipment must comply with international standards as specified in licencing information. Department engineers must agree compliance with regard to structures . No new SMART actions are planned. The industry complies with the codes of practice regarding husbandry and good engineering practices. In the event of an escape, the farm operator will make an emergency application to the Department of Agriculture for a special licence under Section 14 of the Fisheries Act 1959 to deploy nets to recapture the escaped fish. Inland Fisheries Ireland may take such action as it considers necessary to recapture stock which has escaped from a facility operated under a licence. Under 77(2), the Minister (DCENR), may authorise a licensee or other person or body to take such action as is specified in the authorisation to recapture stock which has escaped from a facility.
	Planned timescale (include milestones where appropriate):	Compliance with engineering standards for cages is ongoing. Emergency planning to recapture escapes is in place.
	Expected outcome:	Prevention of escapes generally. In the event of escapes, prompt recapture of a significant proportion of the stock.
	Approach for monitoring effectiveness & enforcement:	Proportion of escaped fish recaptured. Monitoring of rivers for the presence of farmed fish.
	Funding secured for both action and monitoring programme?	Yes
Action A3:	Description of action:	Council Directive 2006/88/EC (on animal health requirements for aquaculture animals and products and on the prevention and control of certain diseases) is the statutory framework within which aquatic diseases are regulated in Europe. This Directive has been transposed into Irish law by S.I. No 261 of 2008. Under this legislation, Ireland has the highest possible rating (Category 1 i.e. disease freedom) in relation to the important salmonid diseases ISA, VHS, IHN, BKD and *G. salaris*. In addition to the statutory framework, a Code of Practice has been

		agreed between industry and government in relation to general fish health management. A Fish Health Handbook has been devised which provides guidance in relation to the control and management of non-listed diseases on salmonid farms. The proactive disease control and stock management principles outlined in the Handbook have been applied by industry since 2012. The handbook is reviewed annually by an industry/ government working group. No new SMART actions are planned. In recent years, since the principles of the Handbook have been implemented, the incidence of diseases such as Pancreas Disease and IPN have declined. Gill related disorders have however, been on the increase, impacted to some degree by water temperatures and significant phyto and zooplankton blooms. Amoebic Gill Disease (AGD) caused by infection with the protozoan parasite *Neoparamoeba.perurans* has been associated with mortality in farmed salmon in recent years, due in large part to the lack of availability of freshwater treatments. Significant resources are however being invested in developing infrastructure to ensure that treatments can be carried out, which will significantly decrease infection pressure. A new pilot project using de-salinated sea water to treat AGD is also underway. A significant investment in research aimed at determining why this disease has recently emerged as an issue, is also being made. An ongoing project aims to generate knowledge for the development of preventative and curative practices for AGD and tools which will be adapted to relevant life stages and husbandry practices for the culture of Atlantic salmon. Amoeba has been occasionally recorded on wild salmon but do not appear to have caused any negative impact. The condition is best treated with freshwater baths so any adult salmon returning to freshwater will be appropriately treated, should they have been infected. Temperatures above 10oC are thought to trigger the disease, but Scottish outbreaks have occurred at temperatures from 7.5oC. This raises the possibility of wild salmon smolts being infected in the vicinity of salmon farms in spring, although there is no evidence to show that this has occurred to date.
	Planned timescale (include milestones where appropriate):	Ongoing
	Expected outcome:	Reduced incidence of disease outbreaks in aquaculture facilities

	Approach for monitoring effectiveness & enforcement:	This involves intensive monitoring and application of legislation regarding control of disease and adherence to the agreed Code of Practice.
	Funding secured for both action and monitoring programme?	Yes
		Choose an item.

Copy and paste lines to add further actions which should be labelled A5, A6, etc

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Appendix 1: Implementation plans for progressing NASCOs international goals for effective sea lice management such that there is no increase in sea lice loads or lice-induced mortality of wild stocks attributable to sea lice.		
International Goals	**100% of farms to have effective sea lice management such that there is no increase in sea lice loads or lice-induced mortality of wild salmonids attributable to the farms.**	**Irish progress towards International Goals** 1. One of the most important management strategies of the Irish Pest Management Strategy (2008) is carrying out a synchronized Autumn/Winter treatment to reduce sea lice burdens to as close to zero as practicable on all farmed fish which are to be overwintered. 2. This strategy has continued over the period since the initiation of Single Bay Management, and the spring treatment trigger level has been reduced from a starting point of 2 ovigerous L. salmonis per fish to the current levels of 0.5 ovigerous L. salmonis per fish. Outside the spring period a level of 2 ovigerous L. salmonis per fish acts as a trigger for treatment. Where the number of mobile sea lice is high, treatments are triggered in the absence of egg bearing females. 3. The objective is that all sea lice inspections results are below the spring (March –May period) lice treatment trigger of 0.5 ovigerous lice and outside this period below the 2.0 ovigerous lice treatment trigger. A number of salmon farms have a spring lice threshold of 0.3 ovigerous lice stipulated in their licence conditions.
Best Management Practices (BMPs)	Area management, risk-based, integrated pest management (IPM) programmes that meet jurisdictional targets for lice loads at the most vulnerable life-history stage of wild salmonids.	A number of controls are in place to ensure the effective and efficient management of sea lice. There is a national sea lice monitoring programme which involves the inspection and sampling of each year class of fish at all fish farm sites 14 times per annum - twice per month during March, April and May and monthly for the remainder of the year except December-January. One inspection is carried out during this period. This programme is applied at all marine finfish farms Data on lice levels at salmon farms are made available to all stakeholders each month and all data are published in full each year by the Marine Institute.
		In 2008 this monitoring protocol was updated and strengthened by DAFF by the launching of a new Pest Management Strategy. http://www.agriculture.gov.ie/media/migration/fisheries/aquacultureforeshoremanagement/SeaLiceControlStrategy%20230210.pdf

		This strategy introduced a new management cell approach to dealing with incidences where target levels of lice control were not being met. On two occasions in 2012, and once in 2016 and once in 2018, breaches of protocol regarding lice levels and inability to control lice entering the spring period lead to accelerated harvesting of farmed salmon prior to wild smolt runs by Ministerial order.
	Single year-class stocking	Currently practiced
	Fallowing	Currently practiced
	Risk-based site selection	As part of Licencing
	Trigger levels appropriate to effective sea lice control	Trigger levels are applied before farms are advised to treat. Failure to treat could lead to actions taken by licencing authority but this action has not been enforced consistently.
	Strategic timing, methods and levels of treatment to achieve the international goal and avoid lice resistance to treatment	Not specified under the terms of the licence but treatments are advised by regulatory authorities and administered by farms.
	A comprehensive and regulated fish health programme that includes routine sampling, monitoring and disease control	**See above – comprehensive monitoring in place**
	Lice control management programmes appropriate to the number of fish in the management area	Lice control is not related to the size of farms or the number of farmed fish present. The same lice trigger levels are applied irrespective of the size of farms. Management of sea lice is based on results of the monitoring programme
	Adaptive management in response to monitoring results to meet the goal	Regular monitoring allows adaptive responses to lice levels on farm including orders to remove all fish from sites where lice are not adequately controlled. This action has been applied on four occasions since 2012 but has not been applied consistently where farms have shown an inability to control lice coming into the spring period.
Reporting & Tracking	Monitoring programme appropriate for the number of farmed	The Monitoring programme is not related to the number of farmed salmon in a management area. The sampling programme is effective at characterizing the lice load on farmed fish. A sampling programme also

	salmon in the management area and sampling protocols effective in characterising the lice loads in the farms and wild salmonid populations.	takes place on wild sea trout in the estuary of rivers entering aquaculture bays. There is currently no assessment of lice infestation of out migrating wild salmon smolts at sea. The sampling programme on sea trout is used as an indication of the potential lice infestation pressure on wild salmon smolts in the same area.
	Lice loads on wild salmonids compared to areas with no salmon farms	Sampling was carried out on lice levels on sea trout in salmon farming areas and away from salmon farms over the 1992 to 2001 period (Gargan et al, 2003) and remote from salmon farms over the 2010-2012 period (Gargan et al. 2016). Sampling has continued on lice infestation levels on sea trout in aquaculture bays.
	Lice-induced mortality of wild salmonids (e.g. as monitored using sentinel fish, fish-lift trawling, using batches of treated smolts)	Untreated and treated hatchery reared salmon have been released in Ireland to investigate lice induced mortality of wild salmonids for the past 15 years. (Gargan et al. 2012).
	Monitoring to check the efficacy of lice treatments	No regular or systematic monitoring programme is in place.
Factors Facilitating Implementation	Development of a monitoring programme appropriate for the number of farmed salmon in the management area and sampling protocols effective in characterising the lice loads in the farms	Monitoring programme not related to the number of farmed salmon in a management area. Sampling programmes are effective at characterizing the lice loads on farms.
	Access to a broad suite of therapeutants, immunostimulants and management tools	Currently very few theurapeutants are licenced for aquaculture. This remains a problem in Ireland restricting potential methods to deal with specific pathogens and parasites. Costs of treatments are also problematic. Sea lice sensitivity to treatments reduce efficacy,
	Collation and assessment of site selection and relocation criteria	These issues would be dealt with on a case by case basis and under the terms of the original licence.

	Regulatory regimes which facilitate availability of alternative sites, as necessary, to support achievement of the goal	These issues would be dealt with on a case by case basis. Currently alternative sites would need to go through the full licencing process.
	Training at all levels in support of the goal and to increase awareness of the environmental consequences of sea lice	IFI train staff to monitor lice levels on sea trout in aquaculture areas.
	Monitoring of lice levels: in areas with and without farms; before, during and after a farm production cycle; and in plankton samples	No specific programme of monitoring for areas outside the immediate aquaculture areas. Research is required to examine lice levels at various stages of farm production both inside and outside of sea cages. An EU funded programme began in 2018, LiceTrack, coordinated by NASCO, in two bays in the West to collect sea lice from water samples through lice pumping and using environmental DNA to determine lice abundance close to and at distance from farms and it is intended to expand this programme to other areas.

Implementation plans for progressing the achievement of the international goals for ensuring 100% containment in marine aquaculture facilities.		
International Goals	**100% farmed fish to be retained in all production facilities**	**Irish progress towards International Goals**
Best Management Practices (BMPs)	Codes of Containment including operating protocols	These issues are specified in the Licence and there are specific protocols outlined for containment and legislation in event of large scale escape events.
	Technical standards for equipment	All equipment must comply with international standards as specified in licencing information
	Verification of compliance	Department engineers must agree compliance with regard to structures
	Risk-based site selection	Must be indicated within the EIS for a licence
	Mandatory reporting of escape events and investigation of causes of loss	This is a requirement under the licence

	Adaptive management in response to monitoring results to meet the goal	See text below- Legislation is in place to allow authorities to intercept escapees following events.
Reporting & Tracking	Number of incidents of escape events and standardised descriptions of the factors giving rise to escape events	This is a mandatory requirement under the licence
	Number and life-stage of escaped salmon (overall number; % of farmed production)	This is a mandatory requirement under the licence
	Number of escaped salmon in both rivers and fisheries (overall number; % of farmed production) and relationship to reported incidents	With regard to BMP Ireland does not have a systematic monitoring programme for escapees into freshwater although several index rivers are monitored to provide information (Burrishoole, Erriff, Corrib).
Factors Facilitating Implementation	Monitoring of rivers for escaped salmon	As above
	Site appropriate technology	Specified under licencing agreements and EIS
	Advanced permitting to facilitate recapture and exchange of information on effectiveness of recapture efforts	Under Irish legislation, the farm operator can make an emergency application to the Department of Agriculture for a special licence under Section 14 of the Fisheries Act 1959 to deploy nets to recapture the escaped fish. Under the Fisheries Amendment Act 1997, Section 77(1), Inland Fisheries Ireland, both within the meaning of the Act of 1980, may take such action as it considers necessary to recapture stock which has escaped from a facility operated under a licence. Under 77(2), the Minister (DCENR), may authorise a licensee or other person or body to take such action as is specified in the authorisation to recapture stock which has escaped from a facility operated under a licence. (3) An authorisation referred to in *subsection (2)* may be granted subject to such conditions, if any, as the Minister or the designated officer, as the case may be, considers necessary or expedient.

	Technology development (e.g. cage design, counting methods for farmed salmon, methods to track origin of escaped salmon and their progeny)	New technologies for cage design and counting are introduced by industry as they become available. Methods to track the origin of escaped salmon are not in place as farmed stock are not marked. It is possible genetically to distinguish escaped salmon in rivers but it is not possible to track these fish back to the farm of origin as yet as most farms use the same genetic Norwegian based stock.
	Training at all levels in support of the goal and to increase awareness of the environmental consequences of escaped salmon	No systematic training in place
	Assessments of the relative risks to the wild stocks from escaped salmon from freshwater compared to marine facilities and from large but infrequent escape events compared to small but frequent escape events.	No assessment of the risk of escapes from freshwater undertaken, however, there is no evidence of large scale escape events in freshwater so currently not considered a major threat. One genetic project is ongoing in the Northwest to assess the consequences of long term small escapes of farmed fish in a freshwater system.