

Managing interactions between sea lice from finfish farms and wild salmonids

SEPA response to consultation feedback



Contents

Executive summary	4
Overview.....	4
Implementation timetable.....	5
Risk screening and modelling.....	5
Permitting requirements.....	7
Regulation of existing farms: <i>Preventing deterioration</i>	8
Regulation of existing farms: <i>Reducing pressure on wild salmon</i>	9
Compliance assessment and enforcement.....	10
Adaptive management approach for sea trout.....	12
Further assessment and environmental monitoring for salmon	14
1. Introduction	16
1.1 Background	16
2. Response to the consultation.....	17
3. Risk Assessment Framework.....	18
3.2 Wild Salmon Protection Zones.....	18
3.3 Screening models	24
3.4 Risk assessment matrix	31
3.5 Further assessments and refined models	35
4. Risk assessment framework for sea trout.....	40
5. Pre-application process.....	45
5.1 Background	45
5.2 Introduction	46
6. Applications for new or expanding farms	48
6.1 Introduction.....	48
6.2 Background	50

Managing interactions between sea lice from finfish farms and wild salmonids

7	Regulation of existing farms	62
7.1	Background	62
7.2	Introduction	62
7.3	Preventing deterioration	62
7.4	Reducing pressure on wild salmon populations	68
7.5	SEPA response	72
8.	Compliance assessment	73
8.1	Background	73
8.2	Introduction	74
8.3	Consultation questions and responses	74
8.4	SEPA response	77
9	Environmental monitoring	82
9.1	Background	82
9.2	Introduction	83
9.3	Consultation questions and responses	83
9.3.1	Examples of responses	85
9.4	SEPA response	87
10	Making data available	92
10.1	Background	92
10.2	Introduction	93
10.3	Consultation questions and responses	93
10.4	SEPA response	95
	Annex I – Consultation statistics	96
	Managing interactions between sea lice from finfish farms and wild salmonids	96
	Who responded to the consultation?	96
	How we classified responses	97

Analysis of responses to consultation questions/themes..... 98

Alphabetical list of respondents 106

Annex II: List of prioritised WSPZs and farms in the highest relative-risk category 108

Table A: List of prioritised Wild Salmon Protection Zones 109

Table B: List of farms initial screening indicates may be in the highest relative risk category
110

Executive summary

Overview

In October 2021 in their [response](#) to the [recommendations](#) of the Salmon Interactions Working Group, Scottish Ministers identified that SEPA would:

- become the lead body with responsibility for managing the interaction between sea lice from fish farms and wild salmon and sea trout; and
- consult on proposals for an adaptive spatially-based framework, which will be applied through the Water Environment (Controlled Activities) (Scotland) Regulations 2011.

In December 2021, we launched our [first consultation](#) on proposals for a regulatory framework. That consultation focused on the main elements of the framework. The feedback we received led to us to make several changes, including to the implementation timetable. It also informed the development of our detailed proposals, which we set out in a [second consultation](#), issued in May 2023.

In total we received 41 responses to the second consultation. These included:

- 25 responses from fisheries and environmental interest groups;
- 10 responses from those involved in the sector; and
- 6 responses from public bodies.

The differences in views we received on the detailed proposals were pronounced. Representatives of wild fisheries and environmental interests broadly supported the proposals, though raising concerns about some of the details and the length of time envisaged before action is taken to reduce sea lice concentrations produced by existing farms. In contrast, fish farmers were much less supportive, some challenging the need for a regulatory framework and nearly all suggesting that a new generation of validated refined models for assessing sea lice and wild salmon interactions must be developed before the framework is implemented.

We have carefully considered all the feedback and, in response, made several changes to implementation detail and timelines.

Implementation timetable

We will take on lead regulatory responsibility for managing sea lice and wild salmon interactions from 1st February 2024 and for managing sea lice and sea trout interactions from March 2025.

	February 2024	March 2024 to February 2025	March 2025
Framework for protecting salmon applied to all applications for new farms and farm expansions			
All existing farms required to report lice counts and fish numbers			
Pilot monitoring programmes in prioritised Wild Salmon Protection Zones commence			
Sea lice limit conditions reflecting current performance ("standstill" conditions) apply to existing, higher relative risk farms			
Adaptive approach to protecting sea trout implemented, including in Northern Isles			

This summary outlines our decisions on the key elements of the framework following consideration of the feedback we received. Details of feedback on the different aspects of the framework, and our responses, are provided in the body of the document.

There are no identified salmon rivers in the Northern Isles. The risk assessment framework for managing interactions between sea lice from fish farms and wild salmon will apply on the West Coast and Western Isles. The approach to managing sea lice interactions with sea trout will apply to the West Coast, Western Isles and Northern Isles

Risk screening and modelling

We will assess farm development proposals with the help of screening models to identify those proposals that we are confident are unlikely to pose a significant risk to wild salmon populations and, hence, do not require further assessment.

This will avoid developers having to carry out detailed assessments of interactions between sea lice and wild salmon for all permit applications and ensure our regulatory efforts to protect the environment are targeted according to risk.

In the second consultation, we showed the results of a simple, initial screening assessment of existing farms on the West Coast and around the Western Isles. Our screening models were still in development so the assessment used modelled sea lice concentrations and simple length statistics for each Wild salmon Protection Zone (WSPZ). We have now completed development of our screening models. They now include our virtual salmon post-smolt model. This allows the models to simulate the exposure to infective-stage sea lice that wild salmon post-smolts may experience as they move through WSPZs.

Using these completed screening models, we have made an initial assessment of the seven relevant applications, or pre-applications, for new or expanded farms that were in process on 30th November 2023. Our initial assessment concluded that none of these development proposals are likely to require further assessment. We have also assessed 164 existing farms on the West Coast and around the Western Isles using the models. This assessment placed 103 (63 %) of them in the lowest risk category.

Having considered the available evidence, we are satisfied that the current versions of the screening models are appropriately precautionary and suitable for screening fish farm development proposals and focusing regulatory effort.

Where further assessment is required, suitable models are freely or commercially available that can provide the basis for such assessments. These refined models must be validated by comparing their predictions on the distribution of sea lice infestation pressure in WSPZs against the results of sentinel cage studies. To minimise any increase in the time needed to prepare an application, we will offer developers early pre-application screening assessments of their development proposals to identify if refined modelling is required. Developers will then be able to plan and undertake data collection to validate the models in parallel with the wider monitoring and modelling work needed to support their applications.

Permitting requirements

When granting authorisation for farm developments, we will:

- **Require the farms to report the average number of adult female sea lice per fish, and the total number of fish on their farms each week between mid-March and 30th October.**
- **Except for farms in the lowest relative-risk category, include risk-proportionate permit conditions limiting the average and maximum number of adult female lice on the farms. The limit conditions will apply between mid-March and 31st May each year, the sea lice management period for protecting wild salmon.**

We have extended the reporting period for weekly counts of sea lice and fish numbers compared with that proposed in the consultation. We have done this so that we have the information needed to help inform the adaptive management of risks to sea trout, which, in contrast to wild salmon post-smolts, remain in coastal waters throughout much of the year.

Farms must also report sea lice counts to the Fish Health Inspectorate. We will work with the Inspectorate to develop a simple and streamlined reporting system for sea lice counts for our purposes and its purposes.

Accurate and precise information on sea lice numbers on farmed fish is fundamental to the effective management of risks to wild salmonids, especially for farms posing the highest relative risks. We intend to ensure that the number of counts not conducted, particularly in the critical period for protecting wild salmon between mid-March and 31st May, is minimised:

- Farmers will be required to comply with quality assurance performance standards for counts. The performance standards will be incorporated our [Measures Assessment Certification Scheme \(MACS\)](#) and developed with the Fish Health Inspectorate in consultation with Norwegian regulators, fish farm operators and others with relevant expertise.

- Criteria for, and rules on, exemptions from conducting sea lice counts will be detailed in the performance standards. For example, counts will not be required within the first 6 weeks of a farm being stocked with smolts. At farms subject to sea lice limit conditions, other exemptions from conducting counts will be permitted only in exceptional circumstances during the 11-week sea lice management period each Spring.
- We will undertake a statistical analysis of the accuracy and precision of counts of sea lice at the highest-risk farms (i.e., farms where small variations in sea lice numbers have the greatest potential to be environmentally significant) and introduce permit requirements for enhanced counts at these farms if necessary for reliably measuring compliance with permit limits.

Sea lice limit conditions will be proportionate to risk. No such conditions will be added to the permits of farms in the lowest risk category. When applicable, sea lice limit conditions will include a limit applied as a four weekly rolling mean and a limit applied as a weekly maximum. The latter will be set at a level such that, if it is exceeded, the rolling mean will also be exceeded. In the first instance, both limits will be defined in terms of the multiple of the average number of adult female sea lice per fish and the number of farmed fish.

Regulation of existing farms: *Preventing deterioration*

During 2024, we will introduce requirements for all existing farms to report the weekly average number of adult female sea lice per fish, and the total number of fish, on their farms between mid-March and 30th October each year.

In late 2024, we will add standstill sea lice limit conditions to the permits of existing farms on the West Coast and around the Western Isles, other than farms in the lowest relative risk category. These conditions will be effective between mid-March to 31st May from 2025 onwards.

Information about sea lice numbers and fish numbers on all farms, including lower risk farms, is important. This is because risk assessments need to account for the cumulative effects of all contributions (from small to large) to infective-stage sea lice concentrations to avoid

underestimates or overestimates of risk; and because, to manage interactions effectively and proportionately, we need to be able to identify and respond to trends in the prevalence of sea lice on farms across sea areas.

The purpose of the sea lice limit conditions will be to ensure that the number of sea lice on existing farms does not increase during Spring sea lice management periods and put wild salmon populations at a greater risk of adverse impact. The limit conditions will require operators to maintain their current performance in controlling sea lice levels and will be derived from an analysis of their farms' performances in managing sea lice in previous years.

For the Spring 2024 sea lice management period for protecting wild salmon, we will engage with the operators of the small number of existing farms in the highest risk category to encourage extra focus on maintaining good lice management performance on these farms, including through adhering to suitable voluntary sea lice limits.

Regulation of existing farms: *Reducing pressure on wild salmon*

We will require appropriate action by operators of relevant higher relative risk farms as soon as we have sufficiently robust evidence that a reduction in sea lice concentrations is necessary to improve the condition of a wild salmon population.

We will lead a collaborative approach to determining if, and where, such action is required through Scotland's River Basin Management Planning process.

The river basin management planning process involves the following steps:

- Assessing wild fish populations and identifying those that are not in a good condition.
- Identifying the pressures that could be contributing to impacts on the condition of salmon populations, including sea lice from fish farms.
- Driving further investigations into the relative importance of the different pressures where confidence needs to be improved.
- Identifying the most effective combination of measures to deliver improvements in the condition of the salmon populations.

- If the combination of measures includes reducing sea lice infestation pressure, taking targeted action to reduce sea lice numbers, focusing on those farms making the highest relative contribution to sea lice infestation pressure in the relevant WSPZs.

We require suitably robust evidence that reductions in sea lice concentrations are required before we act. We expect it to take around 5 years to carry out the modelling and monitoring work necessary to generate this evidence. If we obtain suitable evidence sooner, we will act on it without delay.

For farmers wishing to relocate farms to help reduce sea lice concentrations, we will provide wide-scale screening model assessments to identify locations where the environment can readily accommodate increased fish production.

Compliance assessment and enforcement

We will ensure compliance with permit conditions by running checks on reported data; carrying out farm inspections; taking appropriate action in line with our enforcement policy where we identify non-compliances; and publicising whether farms' performances are good, acceptable or unacceptable when we implement our new performance assessment scheme.

Ensuring operators meet their environmental obligations by complying with permit conditions is central to securing environmental protection.

During 2024, our focus will be on developing a performance standard for sea lice counts in consultation with Fish Health Inspectorate, fish farmers and Norwegian regulators. This work will include ensuring the number of weeks in which sea lice counts are not conducted during the 11-week sea lice management period for protecting wild salmon is minimised to ensure we can:

- Maintain up-to-date assessments of the number of sea lice larvae being produced by farms and, hence, the risk to wild salmon; and
- Accurately assess compliance with sea lice limit conditions as these are added to permits.

By the 2025 sea lice management period for protecting wild salmon, a higher proportion of farms will be subject to sea lice limit conditions. Our priority from 2025 onwards will be ensuring compliance with those limits, with our main regulatory effort focused on the highest relative-risk farms.

Every year, we will re-run our latest risk assessment models for each WSPZ and use the results to update where we target programmes of farm inspections and understand the potential scale of environmental effects of any non-compliances. We will consider those potential effects in relation to our regulatory response to non-compliances.

If a farmer is unable to manage sea lice sufficiently to prevent repeat non-compliances, we will take appropriate and proportionate enforcement action to secure compliance. This action may include varying the farm's permit (e.g., to reduce the number of fish that can be held) or suspending it.

We do not expect there to be significant tensions in practice between farmers' responsibilities for farmed fish health and compliance with permit conditions relating to sea lice.

- Farmers proposing new farms or expansions of existing farms will have a good understanding of the sea lice limit conditions that will apply to potential developments during the pre-application process. This will allow them to consider how they will both manage farmed fish health and comply with sea lice limit conditions when preparing applications.
- For existing farms, we will not impose blanket new, restrictive sea lice limits. The sea lice limit conditions we will apply from mid-March 2025 to existing farms will be for the purpose of controlling increases in sea lice numbers. As these conditions will reflect existing sea lice management performance, their achievement is expected to be compatible with the farms' existing farmed fish health management practices.
- If a farm fails to comply with sea lice limit conditions, we will require the farmer to bring the farm back into compliance. However, it will be up to the farmer to decide on the best ways to do so considering farmed fish health.

If tensions do occur between farmers' responsibilities for farmed fish health and their obligations under the framework, we will seek to bring together, and work with, bodies and organisations with farmed fish health responsibilities and expertise to help us understand those tensions and whether information we can provide about the water environment may be of use to operators in solving the tensions (e.g., to help identify environmentally optimal locations for any operator wishing to re-locate a farm at which significant fish health challenges are impeding their ability to adequately manage sea lice).

Adaptive management approach for sea trout

We will not take forward the approach to protecting sea trout proposed in the consultation.

Instead, starting in March 2025, we will implement an adaptive approach to managing interactions between sea lice from fish farms and sea trout. This will be underpinned by a new, nationally overseen monitoring programme.

Sea trout are a priority marine feature, and we need to do as much as we can to ensure they are protected. Currently, we do not have sufficient scientific understanding to create a bespoke risk management framework for sea trout equivalent to the one we have developed for wild salmon. However, considering responses to the consultation, we have decided to proceed with an alternative approach. This will build on the environmental management plan-based approach to protecting sea trout currently used by local authorities. These plans will no longer be required as a condition of planning permission from March 2025.

As is the case for environmental management plans, fish farm operators will be responsible for the funding the monitoring required for the adaptive approach. The monitoring will be:

- Targeted using information from sea lice dispersion modelling.
- Planned for sea areas rather than planned on a farm-by-farm basis.
- Undertaken by fishery boards and trusts or environmental consultancies.
- Be part of a nationally overseen programme designed in consultation with Scottish Government scientists; local fishery boards and trusts; and fish farm operators.

To inform where monitoring is targeted, we will model sea lice concentrations within a 5 km radius of the mouths of rivers with catchment areas of greater than 10 km² and smaller rivers identified as important spawning burns for sea trout¹. We will rank the resulting sea lice concentrations from low to high and use this information to identify a sub-set of representative locations in different sea areas for monitoring. The principal focus will be sea areas with the greatest number of the highest ranked sea lice concentrations and in which there is relatively limited access to freshwater (i.e., limited scope for the sea trout to rid themselves of sea lice).

The monitoring programme will be designed to assess whether there is evidence of sea-lice related impacts on sea trout (e.g., through catching and inspecting sea trout using sweep netting) and improve understanding of sea trout habitat usage.

Where monitoring finds clear evidence that sea lice from farms are adversely affecting sea trout in an area, we will:

- Require the farm operators to deliver a reduction in the number of sea lice larvae being produced by their farms.
- Monitor the effect of the reduction and use the results to iterate action under the adaptive approach accordingly.
- Manage new farm development proposals to maintain the reduced concentrations of infective-stage sea lice in the area.

During 2024, we will lead work to design the new monitoring programme. This will include:

- Considering the results of monitoring carried out under existing local planning system environmental management plans.
- Identifying how monitoring under those plans can be adapted, re-focused or simply incorporated as appropriate into the national monitoring programme.
- Providing advice to local authorities on how best to align new environmental monitoring plans with the new national monitoring programme as the design of the later is developing.

¹ <https://www.orkney.gov.uk/Service-Directory/D/aquaculture.htm>

- Beginning work with Shetland Islands Council to identify locally important sea trout burns and a simplified method for identifying how that monitoring should be targeted until a suitable resolution sea lice dispersion model is available for Shetland.

Further assessment and environmental monitoring for salmon

We will lead a collaborative approach to refined model development for the prioritised WSPZs. Our intention is for the refined models to be freely available for anyone to use.

We will lead work to design and then deliver targeted monitoring programmes to investigate the relationship between the condition of wild salmon populations and the relative exposures of post-smolts from those populations to infective-stage sea lice.

Determining if action to reduce sea lice levels on existing fish farms is needed to improve the condition of wild salmon populations will require:

- The development of validated refined models for the 8 WSPZs that screening indicates may be close to, or exceeding, the sea lice exposure threshold.
- Collection of environmental monitoring data on wild salmon populations for the purpose of analysing the relationship between the condition of the populations and the different pressures to which they may be subject, including sea lice from fish farms.

In 2024, we plan to initiate pilot monitoring programmes in one or two of these WSPZs to collect information to validate the refined models, including information on the distribution of infective-stage sea lice concentrations from sentinel cage studies. We will set up a stakeholder group to support the development of the pilot monitoring programmes. We will ask scientists in Norway experienced in such studies to help design and oversee the programmes and the sector to undertake, or otherwise deliver, the monitoring work involved.

We will then work with the sector to expand the monitoring programmes to cover other prioritised WSPZs, always reviewing those priorities against our most up-to-date screening assessments.

Because we now have modelling information on the relative exposures to infective-stage sea lice of salmon post-smolts from different rivers, we are now able to start examine whether there is a relationship between sea lice exposure and the condition of different salmon populations.

To do this, we will analyse existing fish population monitoring information and collect targeted new data on salmon population health using appropriately designed monitoring programmes. We will develop the latter in consultation with Scottish Government scientists, Fisheries Management Scotland and local fishery managers. During 2024, we will implement targeted pilot programmes informed by our analysis of existing monitoring information.

1. Introduction

1.1 Background

In 2018, the Scottish Parliament's Environment, Climate Change and Land Reform (ECCLR) Committee and Rural Economy and Connectivity (REC) Committee reported on their inquiries into salmon farming in Scotland. The [REC inquiry](#) concluded that the status quo was not an option and that changes to the regulation of the sector were required. As a result of these conclusions, Scottish Ministers established the [Salmon Interactions Working Group](#) (SIWG) in 2018. The SIWG published its [recommendations](#) in May 2020. In October 2021, Scottish Ministers published their [response to the SIWG](#) recommendations, identifying SEPA as the lead body with responsibility for managing the interaction between sea lice from fish farms and wild salmonids.

SIWG Recommendations.

A single lead body (with appropriate competence and capacity) should be assigned responsibility for regulating wild and farmed fish interactions and given appropriate powers for monitoring and enforcement.

Scottish Ministers' Response to SIWG

Scottish Ministers' [response to the SIWG's](#) recommendations (published in October 2021) confirmed their policy intent for SEPA to become the lead body responsible for managing the risk to wild salmonids from sea lice from fish farms using The Water Environment (Controlled Activities) (Scotland) Regulations 2011. The Scottish Minister's response included a requirement for SEPA to consult on the outline of the regime. The commitment to develop a new risk assessment framework was reiterated in [The Programme for Government 2022/23](#).

Scottish Wild Salmon Strategy

The Government's [Scottish Wild Salmon Strategy](#) sets the high-level vision and objectives to guide collective action to protect wild salmon. It identifies a series of pressures that have the potential to affect salmon populations. The [Wild Salmon Strategy Implementation Plan 2023 –](#)

[2028](#) identifies the actions that will be taken to achieve the vision set out in the strategy. The implementation plan identifies an action for SEPA of “*Continued development and phased implementation of the risk assessment framework for managing the interaction between sea lice from marine fish farm developments and wild salmon and sea trout in Scotland*”.

In December 2021, we launched our [first consultation](#) on proposals for a regulatory framework for managing this interaction. The consultation focused on the broad structure of the regulatory framework. It closed in March 2022, and we published our [analysis of the feedback](#) we received in September 2022.

That analysis led to us to make several important changes, including to the implementation timetable. Following this consultation, we worked in discussion with stakeholders to develop the details of how the framework would operate in practice. We launched a [second consultation](#) setting out our detailed proposals in May 2023 and engaged widely with stakeholders about these proposals during the consultation period, which closed on 15th September 2023.

The feedback provided on the second consultation proved equally valuable, and we have made a series of changes to the framework.

The purpose of this document is to describe our analysis of the feedback we received on the second consultation and our response to the comments and suggestions made.

2. Response to the consultation

This section provides an overview of the consultation responses. More details are provided in Annex II and the summary spreadsheet.

In total there were 41 completed responses to the consultation. Of these, 25 used our online consultation hub, 14 responded via email and 3 responded by both email and hub responses. Respondents have been categorised into three groups to help with summarising the results. Some of those responding by email did not follow the format of consultation questions. This meant that comparing the responses was not always possible. However, we were able to group

all responses into themes. The groups of respondents and the response statistics by theme are set out in Annex I.

The responses to the consultation were highly polarised. In general, responses from representatives of the sector questioned the justification for the framework until further scientific evidence is produced demonstrating the impact on wild salmonids from sea lice from fish farms in Scotland. They also argued that other pressures on wild salmonid populations should be addressed rather than singling out fish farming. They believed that the timetable was too ambitious, and more time needed to be spent developing and validating models before implementation.

Wild fishery and environmental interest groups generally welcomed the framework, but they called for faster implementation, wanting quicker action to reduce sea lice numbers on existing farms.

Public bodies and regulators welcomed the framework. They called for clear guidance and collaboration. A few in this category would like to see the inclusion of sea trout immediately and most would like to see the inclusion of existing farms sooner.

All respondents highlighted the value of Scotland's Aquaculture Website and supported its redevelopment.

3. Risk Assessment Framework

3.2 Wild Salmon Protection Zones

3.2.1 Background

The greatest risk of large numbers of salmon being infested with harmful levels of sea lice is during their passage, as small post-smolts, through sea lochs and other confined areas of sea such as sounds at the start of their migration to oceanic feeding grounds. We have identified a network of Wild Salmon Protection Zones (WSPZs) along the West Coast and around the

Western Isles. These WSPZs are a core part of the regulatory framework, defining the sea areas where the potential risk to wild salmon populations is greatest and action to control exposure to sea lice from fish farms will be targeted.

3.2.2 Introduction

In the second consultation, we proposed changes to the original network of WSPZs in response to feedback on the proposals in our first consultation:

- Creating WSPZ extending for 5 km from all river mouths that support salmon populations.
- Creating WSPZs for all river in the aquaculture zone that are designated as freshwater pearl mussel Special Areas of Conservation.
- Extending the Sound of Mull WSPZ to where it opens into the Sea of Hebrides.

3.2.3 Consultation questions and responses

In the consultation, we asked the following question.

- Do you agree with our revisions to the WSPZs? If not, please explain why you disagree and what would be your alternative?

Most wild fishery organisations were positive about the changes we had made but suggested further additions. They thought that the 5 km WSPZs around the mouths of salmon rivers should be made more extensive: either increasing the distance to 20 km or creating more extensive WSPZs joining up the perceived patchwork of 5 km WSPZs. Most of representatives from the sector did not respond positively, regarding the changes as arbitrary and not based on scientific evidence.

Examples of the feedback received from different stakeholders include:

Finfish aquaculture sector comments

Bakkafrost Scotland:

“BFS does not agree with the WSPZ revisions and maintains its criticisms of the use of expert judgement in the determination of WSPZ boundaries”. “SEPA have added a further layer of precaution to its risk estimation by imposing a minimum 5 km WSPZ buffer from all river

mouths". "Until such a point that wild salmonid migratory pathways are known with confidence, an appropriate alternative would be to limit WSPZs only to confined/constrained areas of sea, that are likely to support migration". "The consultation document proposes that all areas of sea within 5 km of a Special Area of Conservation (SAC) designated for Freshwater Pearl Mussel (FWPM) will be included as a WSPZ. BFS does not support this proposal".

MOWI Scotland:

"WSPZs appear to have been arbitrarily extended in a 'blanket one size fits all' approach rather than taking the time to look into further detailed bathymetric, hydrographic, and associated influencing factors to each sea Loch or sound... The arbitrary extension to include rivers where only trout are present would further appear to be a 'catch all' approach rather than based on any scientific appraisal. The suggested alternative is to thoroughly research each location and rank the potential risk based on specific criteria".

Environmental/fisheries interest groups

Coastal Communities Network:

"The WSPZs proposed so far do not include all the high-risk areas through which wild salmonids are likely to migrate. SEPA's and CCN's modelling shows clear risks of lice accumulations in areas outside the designated WSPZs". "The WSPZs should be extended where modelling indicates that significant lice accumulations occur outside the proposed WSPZ boundaries".

Scottish Anglers National Association:

"Yes" agrees with proposed revisions and "appreciates the promise that the designation of zones will evolve in light of emerging information about changing salmon stocks".

Argyll DSFB:

"We are broadly supportive of the changes made to the WSPZs since the first consultation". "Whilst we support the identification of an appropriate radius to define the edges of a WSPZ where a salmon river drains into open sea, we do not understand the basis of setting this at 5 km." "We would advocate either one large WSPZ to cover the entire Firth of Clyde, or for the radius of each current WSPZ to be extended to 20 km, thereby ensuring continuity between the current zones". "We therefore consider that the WSPZ identified for the Linnhe and Sound of

Mull system should be extended to cover the outer Firth of Lorn, which these tracking studies have shown to be an important migratory corridor for salmon from these rivers.” “We would expect that the overall number and individual boundaries of WSPZs will be kept under review and amended to include rivers that previously held salmon or hold small unexploited populations.”

Public bodies and academic institutes

Shetland Islands Council:

“As far as we are aware, Shetland does have a small wild salmon population.” “There should be some consideration and recognition given to protecting, maintaining and importantly enhancing this wild salmon population in the locations where they occur in Shetland”.

3.2.4 SEPA response

We received contrasting views on how WSPZs should be delineated, especially in terms of their seaward limits and application to river mouths that are not within sea lochs or sounds.

The purpose of delineating WSPZs is to focus effort to protect wild salmon post-smolt populations on likely bottlenecks in their migration. Models do indicate that concentrations of infective-stage sea lice from farms can be present beyond the seaward boundaries of WSPZs. These modelled concentrations have a patchy distribution and areas of modelled high concentration typically extend over a proportionately smaller area of sea than they do in the more confined WSPZs.

Nevertheless, we agree that some salmon post-smolts may be exposed to additional infestation pressure after leaving WSPZs. The risk to salmon populations will be greatest if the post-smolts are from WSPZs in which the exposure threshold is exceeded, or is close to being exceeded, and there are modelled high concentrations of infective-stage sea lice across a large proportion of the likely migration paths for fish after leaving the WSPZs.

We will review the delineation of WSPZs as part of the adaptive management approach as understanding of how salmon post-smolts disperse beyond WSPZs improves and sea lice dispersion models are validated. However, we agree that modelled concentrations of sea lice in

the Firth of Lorn would be likely to add to the exposure to sea lice of populations of wild salmon post-smolts leaving the Loch Linnhe system WSPZ. **We will extend the Loch Linnhe system WSPZ to include the Firth of Lorn.**

The 5 km radius for WSPZs delineated around river mouths creates a standardised area for managing risk from any very high infective-stage sea lice concentrations when salmon-post smolts first enter the sea. We received divergent suggestions regarding these WSPZs, with some advocating making them larger or merging them and others arguing that they are arbitrary and unnecessary. **We will include the 5 km radius WSPZs around salmon river mouths within the adaptive framework when it is implemented.**

We have changed our interim approach to protecting sea trout populations following feedback from consultees (see Section 4.4). The new interim approach is not based on WSPZs. We had proposed delineating sea trout WSPZs for the small number of freshwater pearl mussel river Special Areas of Conservation that do not support populations of salmon. **We will not take forward WSPZs for sea trout in relation to freshwater pearl mussel SACs when we implement the framework.**

The WSPZ network includes sounds. Nearly all either have salmon rivers entering them; have salmon river mouths close to them or are likely dispersion routes out of the Minch. However, this is not the case for the Sound of Iona or the Sound of Gigha WSPZs. **We will not include the Sound of Iona or the Sound of Gigha as WSPZs when we implement the framework.**

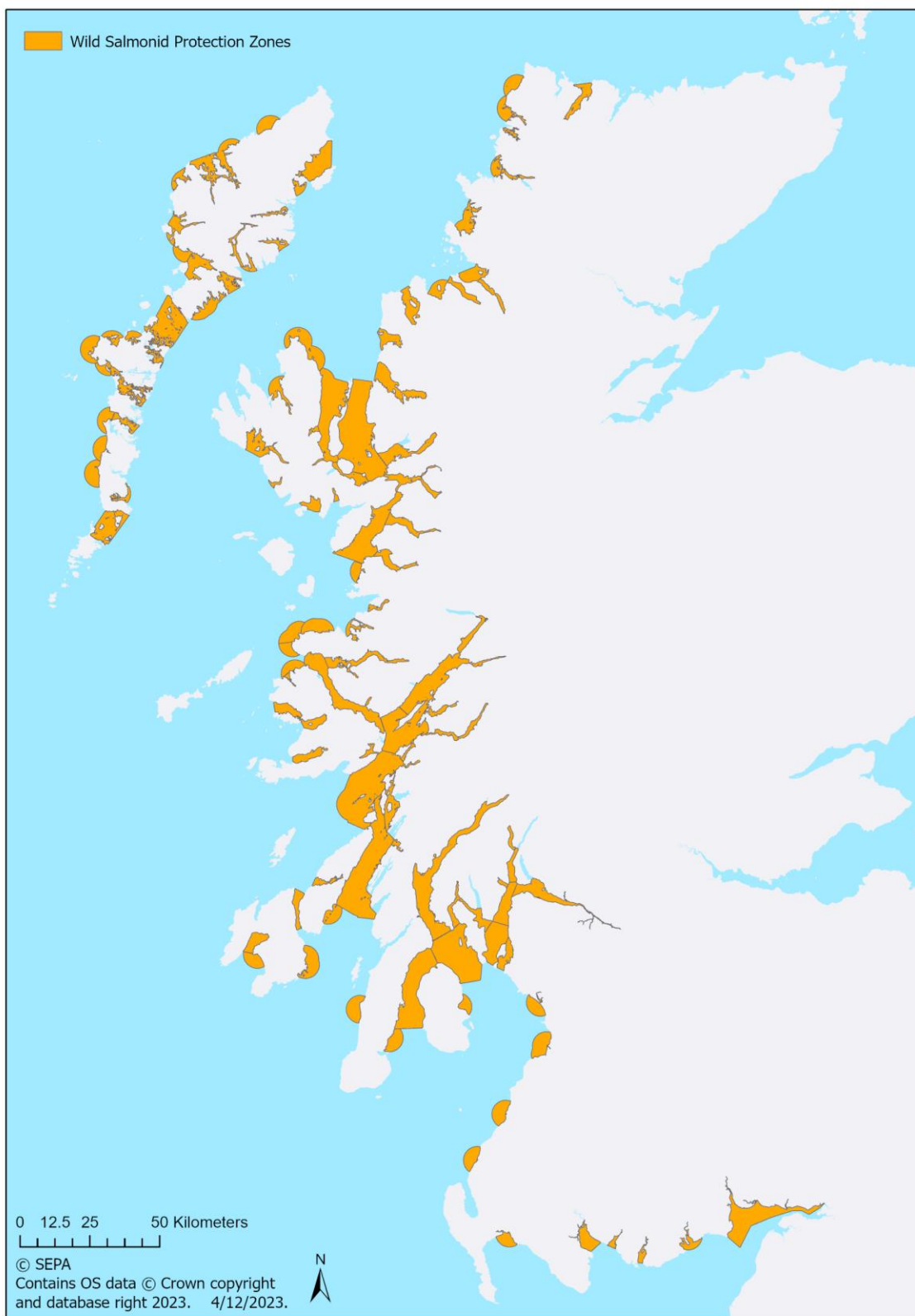


Figure 1: Map of updated WSPZs. An interactive version is available [online](#).

3.3 Screening models

3.3.1 Background

Screening is an important means of ensuring that our use of resources, and the requirements we place on developers, are:

- proportionate to environmental risk; and
- deliver the greatest benefit for the environment.

We already use spatially-based screening models for initial risk assessments of proposed discharges from fish farms of anti-sea lice medicines, organic matter from fish faeces and nutrients. The models provide a triage of higher and lower risks and identify where more detailed assessment using refined models is required to decide if a development can proceed.

3.3.2 Introduction

All screening models we use are designed to be precautionary. This ensures we can use them to screen out activities that we are confident do not need further assessment to enable us to manage risks to the water environment. Our screening models for sea lice show that risks to wild salmon are likely to be greater in some WSPZs than others and that not all farms contribute equally to environmental risk.

In the second consultation, we presented the results of an initial, simple screening assessment. This used two of the building blocks of our screening model, a 3-D hydrodynamic model and a sea lice dispersion model, to predict sea lice concentrations along with simple length statistics for each WSPZ. However, it did not use the third building block of the screening model, our virtual salmon post-smolt model.

The results of the simple, initial assessment were shown as maps of infective-stage sea lice concentrations in each WSPZ based on assumptions about the number of fish on each farm and assuming an average of 0.4 adult female sea lice per farmed fish. We also provided an email address to allow consultees to gain access to the input/output files and scripts of the components of the screening model used.

3.3.3 Consultation questions and responses.

In the consultation, we asked the following questions.

- Do you have any suggestions to improve our screening models (Question 3)?
- Do you have any suggestions on how we could better present the outputs of the models (Question 4)?
- Do you agree with the proposed timetable? If not, please explain why you disagree and what would be your alternative (Question 7)?

Many in the sector objected to the use of our screening models, perceiving them to be too precautionary and not suitable for use in regulatory decision-making. Some believed that their application would lead to a moratorium on fish farm developments because most development proposals would be identified as requiring further assessment and the refined models then necessary would take years to develop.

Wild fishery and environment interest groups were broadly supportive of the proposed screening approach. However, some were concerned that the screening models in combination with insufficiently large Wild Salmon Protection Zones (WSPZs) would result in underestimates of the risk to wild salmon from sea lice.

3.3.4 More detailed consultation feedback

MOWI:

“The current approach developed by SEPA provides an initial risk screening process, which is highly precautionary...”

Bakkafrost:

“BFS maintains its objections to the implementation of the framework in its current form based on outstanding concerns relating to the framework’s underpinning science, metrics used to estimate risk of impacts and salmonid mortality, and the excessive levels of precaution that are embedded within the model itself.”

Fisheries Management Scotland:

“We do not have the capacity to fully assess the screening models in detail, but we understand the basis behind them and support their use until such time as refined modelling is available for all WSPZs on a consistent, agreed basis”. “We seek clarification from SEPA that the proposed threshold of 0.75 infective-stage sea lice per m² days is suitably protective of wild fish”.

Scottish Environment LINK:

“The presented model is a good starting point, but simulations naturally have their limitations being simplified abstractions of large and complex natural systems. This simulation does require finessing using adaptive management and significant input from other stakeholders, but for screening initial risk is an acceptable starting point, if protocols for incorporating any changes are robust”.

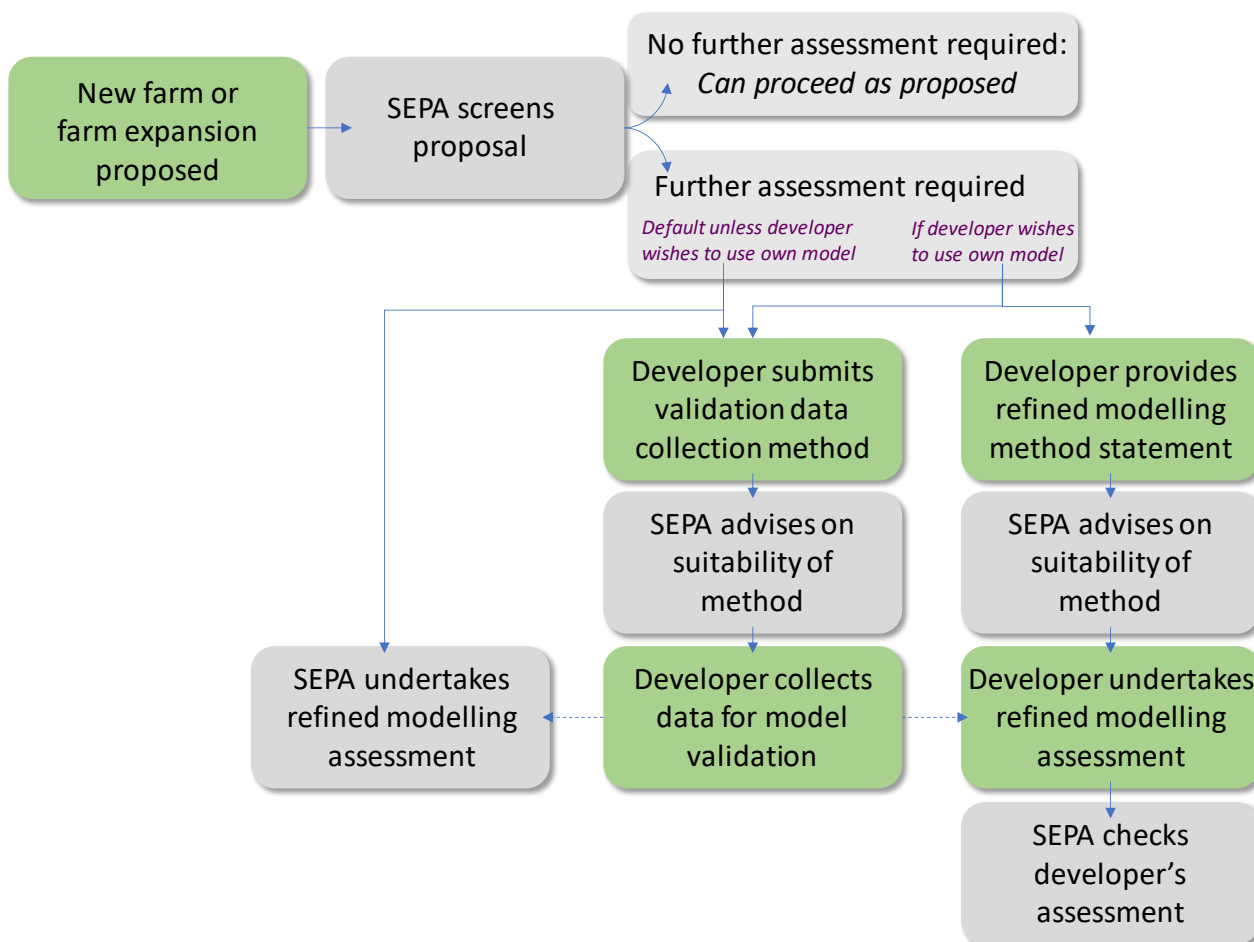
Coastal Communities Network:

“SEPA does not include the risk that salmonid posts-smolts will swim through multiple, non-contiguous WSPZs, increasing their cumulative exposure to sea lice.” “The risk to any fish making long distance coastal migrations through multiple WSPZs should also be assessed.”

“SEPA’s virtual smolt tracking method seems a reasonable basis for assessing exposure to sea lice, but only if the tracks are not limited by excluding areas outside WSPZs, where lice can gather in high densities, and only when peak lice exposure values are included in the cumulative exposure total”.

3.3.5 SEPA response.

We will assess farm development proposals with the help of screening models to identify those proposals that we are confident are unlikely to pose a significant risk to wild salmon populations and, hence, do not require further assessment.



Since the consultation was published, we have incorporated our virtual salmon post-smolt model into the screening models for all WSPZs. This simulates the potential exposure to infective-stage sea lice that wild salmon post-smolts may experience.

For assessing risk, the 95th percentile of modelled exposures of the relevant population of virtual salmon post-smolts will be rounded to one decimal place and compared with the infective stage sea lice exposure threshold of 0.7 infective-stage sea lice per m² days. The output of the updated assessment is discussed in section 3.4.4.

The model outputs identify:

- the relative risk from sea lice to wild salmon in different WSPZs.
- the relative contribution of different farms to infective-stage sea lice concentrations in each WSPZ.

We are satisfied that the models provide a suitable basis for triaging where further assessment needs to be focused. As we currently do when applying any screening models, we will consider other contextual information alongside the models' outputs (e.g., sea lice counts on farms in an area being much higher or much lower than the default assumptions in the models). If, in the light of this information, we conclude that the models may be underestimating the environmental risk posed by a proposed development, we will require further assessment of that development.

It is important that screening models err on the side of being precautionary. This enables us to use them to confidently screen out developments that do not require further assessment to enable us to manage risks to the water environment. However, we agree with the feedback from the sector that it is reasonable to ask whether the degree of precaution in the screening models is greater than necessary.

The table below summarises our review of factors that influence potential overestimates, or underestimates, of sea lice risk. Some of the factors may tend to push the screening models in the direction of being under precautionary risk whilst others will have the opposite effect. However, we are comfortable that, overall, the models incorporate an appropriate level of precaution.

Factors that may reduce precaution	Factors that may add precaution	Factors that may reduce or add precaution
<p>1. Screening model does not include the vertical migrations of lice.</p> <p><i>This is probably the main factor that causes the model to produce higher average infective-stage sea lice concentrations than the SPILLS project Loch Linnhe model output. Screening output considers the top 2 m of the modelled water, in common with published Norwegian studies. Vertical migration moves particles into and out of this 2 m layer.</i></p>	<p>1. Screening model uses relatively simple and direct virtual salmon-post smolt migration paths through WSPZs.</p> <p><i>Salmon post-smolts may take longer, more circuitous paths through WSPZs.</i></p> <p>2. Hydrodynamic models may tend to over-mix in the vertical plane.</p> <p><i>Even state of the art hydrodynamic models do not fully capture observed levels of density stratification, which most often acts to suppress vertical mixing. This</i></p>	<p>1. Screening model used an assumption that all farms have an average number of adult female sea lice per farmed fish of 0.4 for initial assessments.</p> <p><i>Average numbers of lice on farmed fish may be higher or lower than assumed. Peaks, and consistently higher counts than 0.4 occur on some farms, and these may be important leading to an underestimate of exposure risk.</i></p>

<p>2. Screening model calculates the number of fish from the maximum allowed biomass. <i>In practice, the number of fish on a farm will reduce over the production cycle due to mortalities and selective harvesting.</i></p> <p>3. Screening model includes all farms classed as active. <i>Some of the farms included may not be in operation.</i></p> <p>4. Salinity avoidance of lice not included in the model <i>Including this process may cause modelled lice to move to deeper water in some sea areas, reducing the near surface concentrations.</i></p>	<p><i>may lead to an underestimate of infective-stage sea lice concentrations at the surface and, indeed, overall mixing and transport.</i></p> <p>3. Screening model's assumptions about sea temperature may not reflect extremes that are expected to become increasingly common. <i>Higher sea temperatures than included in model assumptions could result in the models underestimating sea lice concentrations.</i></p> <p>4. Cross-infection between farms is not included in the modelling. <i>Not including this complex, but likely important, process may lead to an underestimate of the influence of farms which are linked.</i></p>	<p>2. Screening model includes only a small number of the potential "direct" virtual salmon post-smolt migration paths. <i>In some cases, the virtual salmon post-smolt model may not include representative proportions of paths through high and low infective-stage sea lice concentrations within WSPZs).</i></p> <p>3. Screening model hydrodynamics use average wind conditions. <i>In practice, some weather patterns may increase the dispersion of lice from a farm whilst others may decrease it. There is some evidence from work in Norway that using average wind conditions could lead to models to underestimate sea lice concentrations.</i></p>
--	---	--

We will use our screening model to help focus regulatory effort on those farms (either existing or proposed) that represent a higher relative risk in comparison with other farms.

Once a suitable refined model is developed for a WSPZ, we will use it as the basis for screening assessments rather than our current screening model.

The screening models' estimates of infective-stage sea lice concentrations are very similar to estimates produced by Coastal Communities Network's independently developed model².

² Coastal Communities Network's response to the consultation presents some of the estimates of sea lice concentrations produced by its model.

Comparison of our screening model with the [SPILLS Project](#) Loch Linnhe model output indicated good agreement in the spatial distribution of infective-stage sea lice. The screening model predicted concentrations of infective-stage sea lice that were in the same range as the concentrations predicted by the SPILLS model. In modelling terms, there was close agreement given the differences in model designs. This included:

- The use of climatological average tides, river flows and wind patterns in the screening model whereas the SPILLS Project modelling was based on a hindcast of specific patterns of these forces for the modelled periods between 2010 and 2013. This may have acted to reduce predicted concentrations of lice in the SPILLS Project model output compared to that of the screening model.
- The SPILLS Project model was run for Autumn whereas the screening model was run for Spring. The modelled sea lice in the SPILLS model would become infective in a shorter time than in the screening model due to warmer autumn sea temperatures.
- The two models accounted for different numbers of contributing farms and different assumptions about sea lice numbers on those farms.
- The inclusion of vertical diurnal sea lice movements in the SPILLS Loch Linnhe project model but not in the screening model.

Next steps

We have asked fish farm operators to provide us with 6 years' data on adult female sea lice counts and farmed fish numbers covering 2018, 2019, 2020, 2021, 2022 and 2023. We plan to run our screening models using this information for each year to assess trends and generate an empirically based estimate of sea lice numbers on each farm for use in modelling. We will use these estimates in place of the default assumptions³ for the number of sea lice on farms we are using in the current version of the models.

³ i.e., an average of 0.4 adult female sea lice per fish and the number of fish equalling 1.75 times the maximum permitted biomass in kilograms (as an estimate of the potential weight of fish a farm might produce) divided by 5 kg (as an estimated average harvest weight of each fish).

3.4 Risk assessment matrix

3.4.1 Background

The output of the screening models is an assessment of the:

- level of exposure to infective-stage sea lice to which wild salmon post-smolts may be exposed during their passage through a WSPZ.
- the size of the contribution of each farm to that exposure.

To target regulatory effort, we need to apply a set of risk-based criteria to these model outputs. Having clear criteria is important to ensure our regulatory decisions are transparent, consistent, proportionate and accountable.

3.4.2 Introduction

We proposed the use of a risk assessment matrix to govern how we use the outcomes of screening model assessments in regulating fish farms.

The matrix is created by using the two outcomes of the screening model assessments to categorise:

- How close exposure levels in a WSPZ are to the exposure threshold (i.e. the remaining capacity before the threshold is exceeded); and
- The contribution of each farm to exposure in the WSPZ.

This section outlines the feedback received on the matrix and our response.

3.4.3 Consultation questions and responses

We asked the following question in the consultation.

- Do you agree with our proposed risk assessment methodology? If not, please explain why you disagree and what would be your alternative (Question 6)?

- Do you agree with the proposed timetable? If not, please explain why you disagree and what would be your alternative (Question 7)?

Aquaculture sector comments

MOWI Scotland:

“No” does not agree with the proposed methodology. *“It is acknowledged the risk assessment matrix describes relative risk and does not imply impact however the results of the risk assessment approach have been misrepresented and we are disappointed that further time has not been spent on refining risk.”*

Bakkafrost:

“No” does not agree with the proposed methodology. *“BFS remain concerned with several aspects of the risk assessment methodology”. These concerns include “Use of unvalidated metrics to define what constitutes risk to wild salmonids”; “Attempts to define the ‘capacity’ of a WSPZ do not consider baseline conditions, that may naturally exist above the threshold stated to cause harm.” “The assessment of risk is established entirely without considering the sensitivity of the receptor.”*

Organic Sea Harvest:

“No” does not agree with the proposed methodology. *“The methodology appears to rely heavily on the screening modelling...” that “...appears to incorporate a number of overly pessimistic assumptions including a worst case scenario assuming all sites are at peak biomass during the defined sensitive period”.*

Scottish Sea Farms:

“No” does not agree with the proposed methodology. *“While the basic premise of the modelling described for high-level screening purposes appears sound, and the presentation of WSPZ capacity versus site contribution to sea lice concentration within a table is potentially helpful, we do not agree with the imposition of conditions on sites simply on the basis of relative risk, especially given that no impact of those sites has presently been demonstrated”.*

Environmental/fisheries interest groups

Argyll District Salmon Fishery Board and Argyll Fisheries Trust:

“We are inclined to agree with the proposed risk assessment methodology, dependent upon further clarification as to how the quantitative outputs of the screening model relate to the categories set out in the risk matrix. We support the principal behind using a matrix to assess risk, but the basis upon which the WSPZs and farms are assigned to the relevant risk categories is not set out in sufficient detail for stakeholders to have a full understanding”.

Public/academic bodies

NatureScot:

“We are in agreement with the proposed risk assessment process and acknowledge that a phased approach is required to ensure that SEPA can prioritise key Wild Salmonid Protection Zones (WSPZs) for further action. However, we would also highlight the importance of prioritising application of the proposed screening process to identify potential risk to Special Areas of Conservation (SAC).”

3.4.4 SEPA Response

We will use the risk assessment matrix to focus regulatory effort when we implement the framework.

The matrix we presented in the consultation combined the length of each WSPZ and the modelled average infective-stage sea lice concentration in each WSPZ to provide an initial assessment of relative sea lice infestation pressure. We have now refined this assessment by using the output of our virtual salmon post-smolt model, which we have applied to all WSPZs.

Figure 2 shows the updated assessment in comparison with that presented in the consultation. There are a small number of changes in the relative risks identified across WSPZs.

Modelled effect on exposure to infective-stage sea lice (% of exposure threshold)	Modelled remaining available capacity in WSPZ (% of exposure threshold at 95 th percentile of virtual salmon exposures)		
	53 WSPZs Large (< 50)	4 WSPZs Intermediate (≥ 50 to < 100)	8 WSPZs Little or none (≥ 100)
Negligible (< 10)	51	12	27
Small (10 to < 20)	5	6	19
Moderate (20 to < 30)	0	3	18
Substantial (> 30)	1	1	19

Key: Relative risk posed by farm

1 2 3 4

Lowest to highest

Figure 2: Updated risk assessment matrix categorising the relative potential risk posed by individual farms. Note: The numbers in each cell are authorised fish farms listed as active on the Scotland’s Aquaculture website as of the end of January 2023 along the West Coast and around the Western Isles, including farms we have authorised, but which are not yet operational.

Relative risk (1 lowest, 4 highest)	Number of farms (164)		Proportion of farms (%)	
	Consultation	Updated	Consultation	Updated
1	84	103	51	63
2	39	23	24	13.5
3	20	19	12	11.5
4	21	19	13	12

As in the consultation version, the updated assessment uses an assumption of 0.4 adult female sea lice per farmed fish and an estimate of the number of fish on each farm derived from the authorised maximum biomass of fish that can be held.

To further improve our assessments, we have asked farm operators to provide information on the number of farmed fish held on their farms each week and their counts of adult female sea lice for of the years 2018 to 2023. Once we have collected this information, we will re-run our screening assessment and update the risk assessment matrix accordingly.

Thereafter, we will update our assessments of the status of WSPZs every 4 years or when refined modelling has been undertaken if earlier. The updates will be used to understand how the risk characterisation of WSPZs is changing over time and inform how we adjust the targeting of our regulatory effort on existing farms.

3.5 Further assessments and refined models

3.5.1 Background

The role of our screening model is to provide a triage of higher and lower risks, allowing us to separate out farms (existing or proposed) that we are confident do not need further assessment for us to be able to manage risks to wild salmon populations. This is why it is important that some precaution is built into screening models so that they do not underestimate risk and wrongly screen out farms that need further assessment to evaluate, and manage, the risk they pose to wild salmon populations.

3.5.2 Introduction

Where a screening assessment indicates that a sea lice exposure threshold could be exceeded, or be close to being exceeded, more refined modelling will be required. Refined models include more sophisticated representations of the system being modelled and a greater degree of calibration and validation than screening models.

The results of refined modelling will be used to:

- Decide if a proposed farm development can be authorised.
- If the farm development can be authorised, determine the appropriate permit conditions.
- Help identify where action to reduce sea lice concentrations is required to safeguard wild salmon populations.

3.5.3 Consultation responses

We received unanimous support from those responding from the sector for the development of refined models and agreement to work with us to develop them. However, they believed that it would take about 5 years to develop suitable refined models and that the sea lice framework should not be implemented until this work is complete.

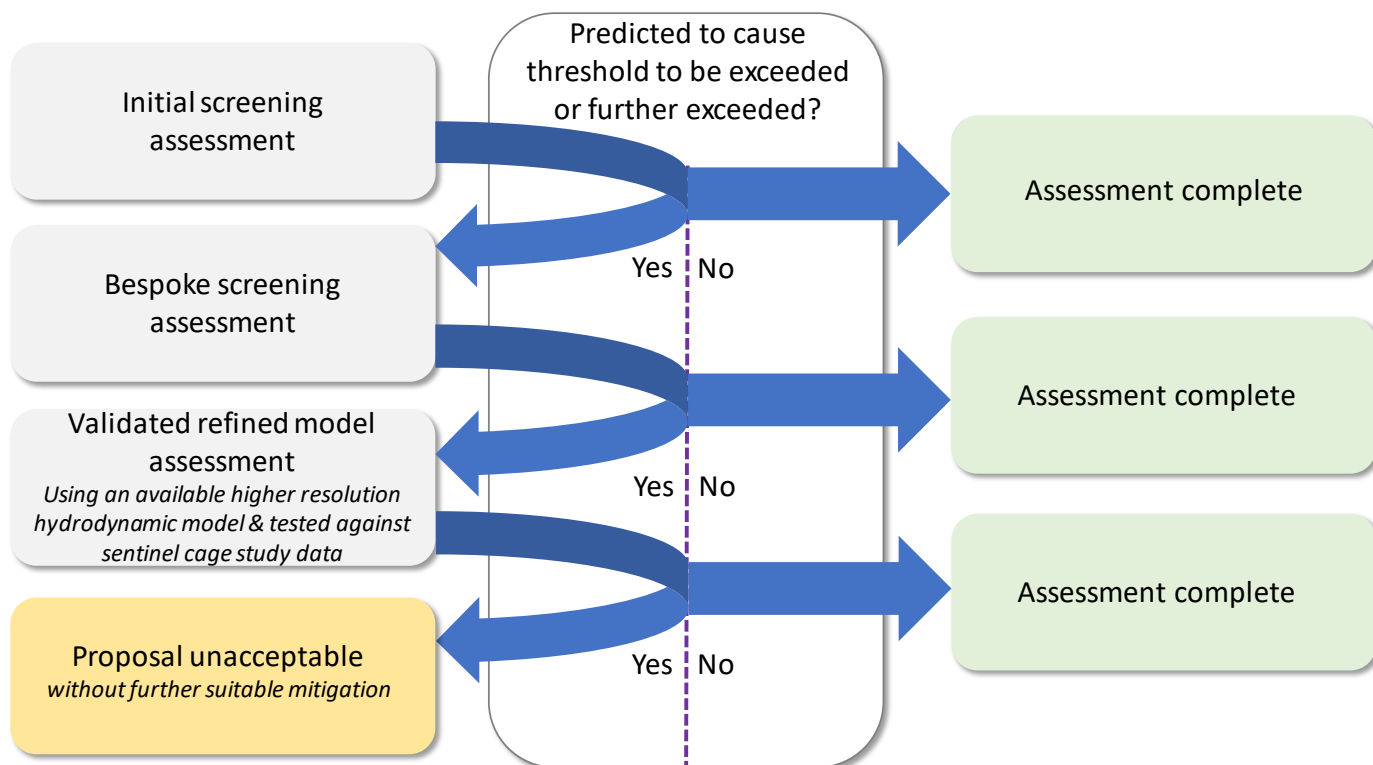
Fishery and environmental interests also told us that they want to be involved in the development of refined models, although they do not expect implementation of the regulatory framework to be delayed while those models are developed.

The smaller fish farm businesses and the environmental/fisheries bodies considered that the development of models should be led by SEPA so that there was a single agreed model that all could use.

3.5.4 SEPA responses

We do not agree that it is necessary or acceptable to delay using the framework to determine applications for proposed farm developments for 5 years whilst the next generation of refined models is developed. We consider that the current generation of available refined models provides a sufficient basis for making regulatory decisions.

The process of progressing through the initial and further assessments is illustrated below.



Bespoke screening

Where initial screening identifies a need for further assessment, the first step will be to refine the screening assessment.

To do this, we will run the screening model:

- Using data on sea lice counts and farmed fish numbers from multiple years for all farms contributing to infective-stage sea lice in the relevant WSPZ⁴.
- Where necessary, with additional “virtual fish tracks” for the virtual salmon post-smolt model to improve representativeness and take account of the results of wild salmon tracking studies if available.
- With bespoke wild salmon post-smolt average passage times that reflect the results of local wild salmon tracking studies if available.

⁴ We have already run the screening model for the Loch Fyne system WSPZ and the Loch Linnhe system WSPZ using reported sea lice data for multiple years rather than the default assumption of an average of 0.4 adult female sea lice per farmed fish used in our basic screening model (see Appendix 3 to the consultation).

Developers will be able to use the results of screening to inform their decisions on whether they wish to apply to develop at the locations screened and, if so, any mitigation they wish to incorporate into their development proposals.

If a developer proposes to incorporate mitigation, the expected effect of that mitigation will be accounted for in assessments. For example, development proposals would be screened as not requiring further assessment where the proposals are for farms that would be permitted based on:

- being used for short production cycles with the farm fallow or only recently stocked with smolts during the Spring wild salmon smolt migration period; or
- incorporating a physical barrier to sea lice during the Spring wild salmon migration period.

We also expect screening model results to help developers assess if a location may be at risk of cross-infection with sea lice from other farms or if the development may increase the risk of cross-infection for existing farms in the area. In many instances, it is likely that locations in WSPZs that contribute most to sea lice infestation pressure on wild salmon post-smolts are also likely to pose the greatest demands on farmed fish health management. We expect developers to try to avoid such locations and, hence, we expect most applications that we receive will be for development in locations screened as not requiring further assessment.

Refined model

A refined model will be required if bespoke screening concludes that further assessment is necessary.

The refined model will be expected to:

- Be based on a higher resolution calibrated hydrodynamic model.
- Use a sea lice dispersion model with standardised sea lice behaviour, including diurnal vertical migration of lice, salinity avoidance and variable maturation in response to temperature.
- Include a fully representative set of virtual wild salmon post-smolt “tracks” from the key salmon rivers.

- Be validated using the results of suitable sentinel cage studies, supported by information on sea lice numbers on existing farms⁵ if appropriate.
- Take account of the recommendations arising from the latest scientific modelling projects, such as the SPILLS Project, and other relevant scientific papers and reports.

Where screening concludes further assessment is required:

- **We will undertake the refined modelling unless the developer wishes to use their own model.**
- **Developers will be required to provide the data to calibrate and validate any refined models.**

When we undertake refined modelling, we will use the WestCOMS⁶ model in combination with MIKE⁷ particle tracking models to model sea lice dispersion.

We will aim to work with the Scottish Association for Marine Science (SAMS) to enable improvements to the resolution and performance of WestCOMS in the WSPZs identified as higher risk.

If a developer wishes to undertake their own modelling, we will expect them to base their modelling on WestCOMS or another freely available hydrodynamic model and to check their proposed modelling method with us.

If a refined modelling assessment is required to support an application, the predictive skill of the model must be validated as a minimum by comparing its predictions on the distribution of sea lice infestation pressure in the relevant WSPZ against the results of sentinel cage studies.

To minimise any increase in the time needed to prepare an application, we will offer developers early pre-application screening assessments of their development proposals to identify if refined

⁵ This technique has been employed in a recent Seafood Innovation Project Fund <https://www.seafoodinnovation.fund/projects/sea-lice-management-decision-support-system-rd126/>

⁶ <https://www.sams.ac.uk/facilities/thredds/>

⁷ <https://www.mikepoweredbydhi.com/products/mike-21/sediments/particle-tracking>
https://manuals.mikepoweredbydhi.help/latest/MIKE_3.htm

modelling is required. Developers will then be able to plan and undertake any required sentinel cage studies in parallel with wider monitoring and modelling work they already need to do to support applications. We estimate that it will take around 12 months to plan, organise and complete a sentinel cage study.

Next generation models

We intend to work with colleagues from other countries involved in managing sea lice from fish farms, including Norway, Faroes and Canada, and Scottish Government's Marine Directorate to support the development of an international test bench for sea lice dispersion models.

We intend to promote the creation of a next generation of sea lice dispersion models for Scotland. To do this, we will seek to develop a partnership with Norwegian experts in sea lice modelling, Scottish Government scientists, fish farming companies, and other stakeholders with relevant expertise. Because of the strong views of different stakeholders, our ambition is for this next generation of models to be free for all to use. Initial meetings with the different stakeholders have already taken place.

4. Risk assessment framework for sea trout

4.1 Background

Scottish Ministers asked us to consult on a framework for managing the interaction between sea lice from fish farms and wild salmonids, i.e., salmon and sea trout. Scientific understanding of the interaction between sea trout and sea lice is improving but is less advanced than it is for salmon, including in terms of understanding of the local patterns of movement of sea trout within coastal waters, where they remain for much, or all, of the sea phase of their lifecycle.

4.2 Introduction

In our first consultation, we proposed that the first iteration of the framework would be focused on protecting wild salmon populations rather than sea trout. Once sufficient knowledge became available, we would develop, and consult on, an appropriate and proportionate risk-based

framework for protecting sea trout populations. The responses to this proposal from the sector and environment/fisheries interest groups were clear: We should include sea trout in the framework from the outset. Representatives of the sector wanted sea trout to be included to avoid the situation where we became the lead regulator for managing the interaction between sea lice from fish farms and wild Atlantic salmon, but local authorities remained the lead regulator with respect to interactions between sea lice from fish farms and sea trout. They considered that this would represent dual regulation. Environment/fisheries interests stated that it was unacceptable to ignore the recommendations of SIWG that the framework should protect all salmonids.

In the second consultation, we proposed that we should include sea trout within the scope of the framework. The intention was to protect young, post-smolt sea trout during the first weeks of their time in coastal waters. To do this, we proposed that the period over which permit sea lice limits apply would be extended from the end of May until 28th June for farm development proposals predicted to make a substantial contribution to infective-stage sea lice concentrations within a WSPZ. The limits during this additional period would be calculated as 0.5 (average number of adult female sea lice per fish) x the maximum number of fish to be held on the farm applied as a 28-day rolling average.

This section outlines the feedback received on our proposals with respect to sea trout and our response.

4.3 Consultation questions and responses

We asked the following questions relating to sea trout in our second consultation.:

- Do you have any additional information on, or suggestions how we could identify, important sea trout rivers in the West Coast, Western Isles and Northern Isles (Question 2)?
- Do you agree with our proposed approach to developing a risk assessment framework for sea trout? If not, please explain why you disagree and what would be your alternative (Question 5).
- Do you agree with how we propose to provide a level of protection until the end of June for sea trout on the West Coast and around the Western Isles while we develop a new risk

framework for sea trout? If you disagree, please explain how you would apply the matrix and why this would deliver a better outcome (Question 14).

- Do you agree with how we propose to set permit conditions to protect sea trout populations? If not, please explain why you disagree and what would be your alternative. (Question 15)

The response to these questions was overwhelmingly negative. The sector representatives challenged the need for a framework to protect sea trout. Wild fishery interests dismissed the arbitrary cut-off at the end of June and considered that the proposed standard of 0.5 lice per fish to be too lax.

Aquaculture sector comments

MOWI Scotland:

“We do not agree with the need for a specific framework for sea trout and therefore the proposed extension of WSPZs on the West coast, Western Isles nor the planned introduction in the Northern Isles”.

Bakkafrost Scotland:

“BFS do not agree that it is appropriate to extend the protection period between 1st and 28th of June, as there is currently no evidence to support the rationale that a specific framework for sea trout is necessary.”

Environmental/wild fisheries interest groups

Fisheries Management Scotland:

“We have significant concerns about the interim approach proposed to offer ‘a level of protection’ for sea trout ahead of a full regulatory framework being developed.”

“We do not believe that the use of a limit of 0.5 adult female lice per fish x maximum number of fish on the farm is appropriate. The basis for the framework is that impacts on wild salmonids are a function of both the concentration of sea lice in the environment and the exposure time to those lice. Given that sea trout are resident in coastal waters for a prolonged period (and

therefore their exposure to sea lice in the environment can be assumed to be longer than for salmon) we can see no justification for the allowable lice per fish limit to be higher for sea trout, than is proposed for salmon”.

4.4 SEPA response

We will take on lead regulatory responsibility for managing the interaction between sea lice from fish farms and sea trout from March 2025.

Sea trout are a priority marine feature, and we need to do as much as we can to ensure they are protected. Currently, we do not have sufficient scientific understanding to create a bespoke framework for sea trout equivalent to that we have developed for wild salmon. However, considering responses to the consultation, we have decided to proceed with an alternative interim approach. This will build on, and replace, the environmental management plan-based approach currently used by local authorities.

We will implement an adaptive management approach for managing interactions between sea lice from fish farms and sea trout.

The adaptive approach will be underpinned by a nationally coordinated monitoring programme. This will be designed to enable us to determine if, and where, sea lice from fish farms are resulting in adverse impacts on sea trout. Where we conclude that the operation of a farm is resulting in adverse impacts, we will require the operator to take swift and appropriate adaptive action to protect the sea trout population.

We will develop a nationally overseen monitoring programme in consultation with Scottish Government scientists, fishery boards and trusts, and fish farm operators. As is the case for monitoring work under current local planning system environmental management plans, the programme will be funded by fish farm operators and the monitoring will be undertaken by fishery boards and trusts or by environmental consultancies.

Programmes of monitoring will be planned for sea areas rather than on a farm-by-farm basis. Scientific studies show that most sea trout spend much of their time close to the shoreline and often close to a river estuary⁸. To inform where monitoring is targeted, we will:

- model sea lice concentrations within a 5 km radius of the mouths of rivers with catchment areas of greater than 10 km² and smaller rivers identified as important spawning burns for sea trout⁹.
- rank the resulting sea lice concentrations from low to high and use this information to identify a sub-set of representative locations in different sea areas for monitoring.

The principal focus for monitoring will be sea areas with the greatest number of the highest ranked sea lice concentrations and in which there is relatively limited access to freshwater (i.e., limited scope for the sea trout to rid themselves of sea lice).

The monitoring programme will operate between April and October and be designed to assess whether there is evidence of sea-lice related impacts on sea trout (e.g., through catching and inspecting sea trout using sweep netting). It will also include targeted sea trout tracking studies to improve understanding of sea trout habitat usage around the coasts.

Monitoring results will be analysed considering the concentration of infective-stage sea lice in the areas in which sea trout are sampled and the relative contributions of the farms concerned to those concentrations.

Where monitoring finds clear evidence that sea lice from farms are adversely affecting sea trout in an area, we will:

- Require the farm operators to deliver a reduction in the number of sea lice larvae being produced by their farms.
- Monitor the effect of the reduction and use the results to iterate action under the adaptive approach accordingly.

⁸ See [WSFT Report Draft4 NoNum](#) and references in: Finstad B., Sandvik A. D., Ugedal O., Vollset K. W., et al (2021) Development of a risk assessment method for sea trout in coastal areas exploited for aquaculture. *Aquaculture Environment Interactions* 13:133-144. <https://doi.org/10.3354/aei00391>

⁹ <https://www.orkney.gov.uk/Service-Directory/D/aquaculture.htm>

- Manage new farm development proposals to maintain the reduced concentrations of infective-stage sea lice in the area.

During 2024, we will lead work to design the new monitoring programme. This will include:

- considering the results of monitoring carried out under existing environmental management plans and identifying how monitoring under those plans can be adapted, re-focused or simply incorporated as appropriate into the national monitoring programme.
- arranging for the funding for the programme by fish farm companies, other than those who's farms do not contribute more than negligibly to infective-stage sea lice concentrations close to any relevant river mouth.
- working with Shetland Islands Council to identify locally important sea trout burns in Shetland and a simplified method for identifying how monitoring should be targeted in advance of a suitable sea lice dispersion model being developed for Shetland.

The results of the monitoring programme together with the work of researchers in Scotland, Norway and elsewhere will progressively improve our understanding of the interaction between sea lice and sea trout populations in Scotland. Once this understanding is sufficient, we intend to develop, and then consult on, proposals for a bespoke, predictive framework for assessing risk to sea trout analogous to that we have developed for wild salmon.

5 Pre-application process

5.1 Background

In 2019, we introduced a new service for fish farm developers and other interested parties. We started to produce screening reports providing an initial assessment of farm development proposals. We publish these [screening reports](#) on our website.

The reports form the basis of our pre-application process. They provide:

- Developers with our initial assessment of the suitability of a potential development location and an understanding of the information necessary to support an application.

- Interested third parties with an understanding of a proposal's potential interactions with the environment that they can use to help identify any relevant local issues (e.g., important local environmental features that might be affected by the development or other uses being made of the area of sea concerned).

The combination of the initial screening report and feedback from interested third parties on potential local issues ensures that developers can better plan the work needed to prepare their applications. This includes preparing the targeted modelling and monitoring information necessary to assess potential issues identified.

SIWG Recommendations

Local engagement mechanisms between finfish farmers and wild fishery managers should be established as a minimum, to engage in pre-application consultation, agree joint local management priorities and projects, act as a forum for information and data exchange, identify research priorities and request management action as appropriate.”

Scottish Ministers' response to SIWG

We agree that local engagement mechanisms between finfish farmers and wild fishery managers should be established as a minimum, to facilitate pre-application consultation, agree joint local management priorities and projects, act as a forum for information and data exchange, and identify research priorities and request management action as appropriate.

5.2 Introduction

In the consultation, we proposed including information in our screening reports on the potential for interaction between sea lice from a potential farm development and wild salmonids.

The screening model output for sea lice will also provide information on the extent to which a potential location for a farm development is likely to:

- be exposed to concentrations of infective-stage sea lice from other farms in the area; or
- result in increased exposure of existing farms to infective-stage sea lice.

We will also continue work to enable us in due course to use the hydrodynamic models we have developed for sea lice screening as a basis for enhancing our existing screening of discharges of nutrients (nitrogen compounds) from farms in areas of higher potential risk.

We will work with local planning authorities to:

- Facilitate the use of our screening reports in informing their Environmental Impact Assessment (EIA) scoping exercises for farm developments¹⁰.
- Provide the opportunity for developers to benefit from a joint pre-application process with us and the relevant local planning authority, which will identify coordinated and targeted information requirements with respect to their proposals' potential effects on the water environment.

The consultation presented a workflow which showed how we would bring sea lice considerations into the pre-application process.

This section outlines the feedback received on our proposals for incorporating sea lice and wild salmonid interactions into our pre-application screening reports, and our response.

5.2.1 Consultation questions and responses

We asked the following questions in the consultation:

- Do you agree with the proposed workflow for pre-applications? If not, please explain why you disagree and what would be your alternative (Question 8)?
- Do you agree with the proposed timetable? If not, please explain why you disagree and what would be your alternative (Question 9).

Overall, most respondents supported the proposal to incorporate sea lice screening into the pre-application process. However, both the sector and environmental/wild fishery interest groups

¹⁰ Screening models are not currently available for Shetland. We are in the process of exploring the most effective way to promote the rapid development of a suitable resolution 3-D hydrodynamic model.

raised some concerns: Representatives from the sector questioned whether the precaution within the screening model would create unnecessary concerns. Some also felt that:

- there should be statutory timelines associated with the pre-application process; and
- the details of the pre-application process should reflect the outcomes of the work on the [consenting process](#) for fish farms directed by the [Scottish Aquaculture Council](#) on consenting.

Wild fishery interest groups were strongly of the view that District Salmon Fishery Boards should be consulted during the pre-application process.

5.2.2 SEPA response

We will integrate consideration of interactions between sea lice from fish farms and wild salmon into our pre-application process for fish farm developments, including incorporating our sea lice screening model outputs into our screening reports.

In doing so, we will:

- ensure District Salmon Fishery Boards have an opportunity to comment on screening reports;
- re-assess our existing published response times for the different stages of the pre-application process in discussion with the sector as experience of the process develops; and
- reflect the outcomes of the work of the [Consenting Task Group](#) in our pre-application process once that Group makes its recommendations.

6 Applications for new or expanding farms

6.1 Introduction

Scottish Ministers decided in their response to the SIWG that interactions between sea lice from fish farms and wild salmonids should be managed through an adaptive spatially-based risk

assessment framework, to be applied through The Water Environment (Controlled Activities) (Scotland) Regulations 2011.

Developers must apply for a permit from SEPA which allows them to keep fish in open-net pens if they wish to develop a new farm or keep more fish at an existing farm. We will apply the sea lice framework when determining the application and, if granting authorisation, include such conditions within the farm's permit that we think necessary to protect wild salmonids.

SIWG Recommendations (May 2020)

Robust conditions, based on an adaptive management approach, to safeguard wild salmonids should be contained within a licence rather than through planning consent;

As a priority, the consenting of new developments should be managed within an adaptive spatial planning model which is risk based, of suitable resolution, underpinned by best available scientific evidence, and takes into account the cumulative effect of management practices of existing developments and impacts on wild salmonid fish.

Scottish Ministers' Response to SIWG (October 2021)

We agree that robust conditions, based on an adaptive management approach, to safeguard wild salmonids should be contained within a licence rather than through planning consent and that the relevant licence conditions should apply to existing, as well as new, fish farms.

We agree that, as a priority, the consenting of new developments should be managed through the application of an adaptive spatially based risk assessment tool, underpinned by the best scientific evidence available and which takes into account the cumulative effect of management practices of existing developments and potential impacts on wild salmon.

It is intended that development proposals involving increases in the numbers of fish farmed, including applications for new farms or expansion of existing farms, will be assessed using the new spatially-based risk assessment framework as part of the CAR licence determination process and where there is the potential for interaction, subject to conditions appropriately limiting their contribution to lice loads in coastal waters.

SIWG Recommendations

The licence should contain conditions relating to:

- *Requirement for undertaking, recording and reporting of a weekly sea louse count.*
- *Trigger levels for sea lice intervention action specific to the farm management area (to be reviewed subject to adaptive management).*
- *Requirement to monitor lice levels in the environment and assess impacts on wild salmonids.*
- *Requirement to report on the results of such monitoring.*
- *Requirement to contribute to research to understand the migratory distributions of wild salmonids within the West Coast and Northern Isles context.*
- *The actions that are required to be taken where monitoring demonstrates adverse impacts on wild salmonids and the timeframe in which demonstrable actions should be successfully delivered.*
- *Requirement for the farm to be party to a farm management agreement for the farm management area.*
- *Requirement to undertake an end of farm cycle review which informs the next production cycle process.*

6.2 Background

In the consultation, we proposed that we would use the screening assessments to determine the information that should be provided by a developer when making an application. The screening output would also determine the approach we take when considering the conditions that could apply to the application. The rules for how we would do the latter are expressed in the risk matrix.

In lower-risk situations, we proposed that we would not require any further assessment but would require the operator of the farm to report farmed fish numbers and counts of adult female sea lice numbers per fish.

In the highest risk situations, we would require further modelling work to better define the risk to enable us to determine whether to grant the application, and, if so, the conditions on sea lice limits to include in the permit. We explained that such conditions would be based on a multiple of the number of fish on the farm and the average number of adult female sea lice per fish. We also suggested a default value for the average number of adult female sea lice per fish (0.2) that we could use in calculating the multiple for higher risk developments.

This section outlines the feedback received on our proposals for how permit conditions would be set and our response.

6.2.1 Consultation questions and responses

We asked the following questions in the consultation:

- Do you agree with the way we have used the risk assessment matrix to identify where we will apply permit conditions for reporting and lice limits? If you disagree, please explain how you would apply the matrix and why this would deliver a better outcome (Question 10)?
- Do you agree with our proposal for setting permit limits on the number of lice on a farm? If not, please explain why you disagree and what would be your alternative (Question 1)?
- Do you agree with our proposal for applying a rolling average limit, and a maximum daily limit on the number of adult female sea lice? If not, please explain why you disagree and what would be your alternative (Question 23)?
- Do you agree that it is proportionate to require enhanced sea lice counts at high-risk sites and that this should be delivered in due course via automated systems using artificial intelligence? Please give reasons for your answer (Question 13).
- Do you have any comments or suggestions on how we plan to phase in the framework (Question 16).
- Do you agree with the proposed timetable? If not, please explain why you disagree and what would be your alternative (Question 17).

In general, representatives of the sector supported the principle of controls being proportionate to risk but believed that the risk assessment matrix was overly precautionary for use in this context. There was also support for basing conditions on the multiple of number of farmed fish and average sea lice counts per fish. However, there were strong views that the latter should be counts of gravid females rather than all adult females. Sector representatives also told us that the framework was not ready for implementation by our proposed timetable.

Environment and wild fisheries interest expressed broad support for the application of the framework to new and developing farms by the end of 2023. However, whilst they agreed that permit conditions should be proportionate to risk, they considered that sea lice limits should be included in all or most fish farm permits. They were generally opposed to setting sea lice limit conditions in the form of a rolling average and believed that our proposed separate maximum limit should be lower.

Aquaculture sector comments

Bakkafrost Scotland

“In relation to how the matrix is used to apply permit conditions, BFS agrees with the principle of applying different permit conditions, proportionate to the perceived risk of the farm, rather than, for example, applying the most stringent conditions ubiquitously across all farms.”

“Although BFS disagree with the thresholds upon which the lice limits will be derived, multiplying lice numbers by fish stock numbers seems a logical means of establishing the permit limits”.

“BFS does not agree with the proposed timetable for permitting on the basis that it does not believe that the framework as currently proposed is ready for implementation.”

Loch Duart

“The proposed SLRF is currently based on the use of adult female lice data, the combination of both gravid and non-gravid female lice. It is Loch Duart’s view that it is the gravid lice that represent the relevant lice stage in terms of potential risks to wild salmonids and that the modelling framework should be based on the assessment of gravid lice and not adult females”.

MOWI Scotland

“A rolling limit and a maximum daily limit could be used if gravid females were the key metric used to calculate the daily and rolling average figures”.

Salmon Scotland

“We firmly believe that it is not appropriate to set licence conditions that farmers cannot comply with. The reality of fish farming in Scotland means that there will, almost certainly, be situations during every production cycle where a count will not be possible”.

“..it is also clear.....that SEPA have not assessed the viability or accuracy of currently available automated lice counting technology and thus deemed it to be appropriate, nor have they assessed the financial implications of deploying such technology. Salmon producers continue to assess this technology but as yet do not deem it sufficiently accurate for widescale use.....In conclusion, we do not support the proposal to require salmon farmers to use automated lice counting technology.”

Scottish Sea Farms

“We do not agree with any of the proposals relating to sea lice management, controls, or conditions.” “...we recommend that a technical steering group is established which includes the Fish Health Inspectorate (FHI), the Animal and Plant Health Agency (APHA), the Chief Veterinary Office (CVO) of Scotland’s team, fish veterinarians, RSPCA etc., to establish the appropriate mechanism required to manage those sites which are evidenced as posing a high risk to wild salmon whilst considering the health and welfare of the farmed fish and impacts on the environment which may arise from the additional measures which may be required.”

Environmental/wild fisheries interest groups**Argyll District Salmon Fishery Board & Argyll Fisheries Trust**

“We are strongly of the view that conditions relating to numeric lice limits should apply to all new and existing farms. We accept that a risk assessment matrix is an appropriate approach to manage risk, with the overarching objective of ensuring that the total sea lice load in a WSPZ does not exceed the critical exposure threshold for wild salmon.”

River Tweed Commission

“We are strongly opposed to SEPA using a rolling average for lice management performance”.

Fidra

“We agree that it is proportionate to require enhanced sea lice counts at high-risk sites. We welcome the development of artificial intelligence and automated sea lice counting systems and urge that a timetable for development and deployment of such a system is made available at the earliest opportunity. We do caution implementation on the new technology until it has been fully validated and is able to achieve suitable standards of monitoring.”

West Sutherland Fisheries Trust

“We broadly support the application of the framework to new and developing farms by the end of 2023. We also support the intention to apply the framework to all determinations undertaken after the implementation date, no matter when the application was submitted”.

Fisheries Management Scotland

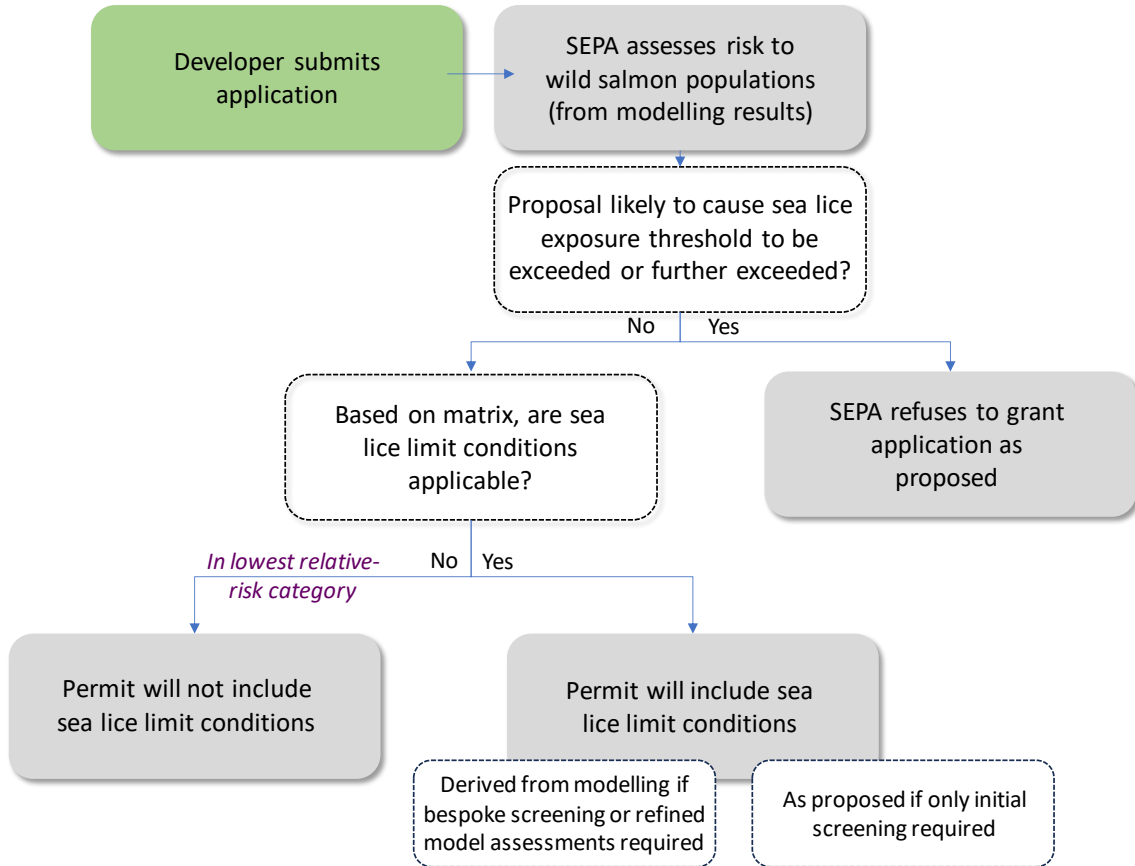
“...we also take issue with the idea of using 4 times the rolling average as the threshold for the purpose of avoiding large peaks. If a lice level of 4 times the rolling average is reached, that would mean that the four-week rolling average has also been breached in a single week. If SEPA is to persist with the approach of using a rolling average, the peak level should be set much lower – we would suggest twice the rolling average”.

“On reporting, we support the requirements set out, with the caveat that both sea lice levels and the number of farmed fish should be reported and published in as close to real time as possible so that the process is fully transparent. This is in line with the recommendations of the Salmon Interactions Working Group”.

6.2.2 SEPA response

From 1st February 2024, we will apply the risk framework for managing interactions between sea lice from fish farms and wild salmon when determining applications for new farms or increases in the number of fish at existing farms.

This will include applications for new farms or increases in the number of fish at existing farms received prior to this date but which have not been determined by this date.



Applications for farm developments which we determine as being likely¹¹ to result in the sea lice exposure threshold being exceeded, or further exceeded, will not be granted authorisation.

Where our screening assessments indicate that a proposal may result in the threshold being exceeded, or further exceeded, the developer may:

¹¹ A proposal that is modelled to result in salmon post-smolt exposures exceeding the sea lice exposure threshold at < 96th percentile of all modelled exposures will be assessed as risking the sea lice exposure threshold being exceeded. In a WSPZ in which the exposure threshold is already modelled as being exceeded at the 95th percentile of exposures, a proposal that is modelled to lower the percentile at which salmon post-smolt exposures exceed the threshold by 1 percentile or more will be assessed as risking the exposure threshold being further exceeded.

- Undertake suitable refined modelling to assess whether the sea lice exposure threshold would be exceeded, or further exceeded; or
- Revise the development proposal (e.g., select a different location; reduce the number of fish planned to be kept; change production cycle timings to reduce sea lice numbers during the Spring sea lice management period; deploy a barrier to sea lice around the farm pens during the sea lice management period; etc).

We will use the risk assessment matrix to underpin our decisions on the appropriate risk proportionate controls to apply when granting applications for new farms or increases in fish numbers at existing farms.

As described in section 3.4.4, the risk assessment matrix will be driven by the outputs of the most up-to-date version of our screening models and the output of refined models as they become available. As our understanding of risks improve, the position of some WSPZs and farms within the risk matrix may change.

The screening model, like all screening models, is precautionary. Because of this, we remain confident that sea lice limit conditions for farm developments screened as lower risk are not necessary for the framework to be effective at protecting wild salmon.

Contribution to infective-stage sea lice exposure	Remaining available capacity in WSPZ		
	Large	Intermediate	Little or none
Negligible			
Small			
Moderate			
Substantial			

Key: Permit conditions controlling on farm sea lice levels (19th March to 31st May)

- No sea lice limit conditions.
- Sea lice limits as proposed by the developer and used in the screening assessment.
- Sea lice limits derived from a from an appropriate modelling assessment demonstrating that the farm will not compromise achievement of the sea lice exposure threshold.
- Sea lice limits derived from an appropriate modelling assessment demonstrating that the farm will not compromise achievement of the sea lice exposure threshold.

Key: Monitoring and reporting (19th March to 30th October)

- Weekly fish numbers and average number of adult female sea lice per fish.
- Weekly fish numbers and average number of adult female sea lice per fish. Enhanced sea lice counts if necessary

Reporting

Once new farms or increases in fish numbers at existing farms are authorised, we will require the operators to provide weekly reports of fish numbers and average numbers of sea lice per fish between 16th March and 30th October each year.

We will require the same information from existing farms (see Section 7.3.4). We need the information:

- For assessing compliance with sea lice limit conditions at farms where they apply.
- To ensure our risk assessments account for the cumulative effects of all contributions (from small to large) to infective-stage sea lice concentrations. This is important to avoid underestimates or overestimates of risk.
- To enable us to identify, and adapt the framework in response to, trends in the prevalence of sea lice on farms across sea areas.

- To provide accurate input data for further, targeted assessments of risk using refined models.
- To provide the data to support the development of a modelling framework for protecting sea trout.

We will re-run screening assessments on an annual basis. This will allow us to review the risk categorisation of individual farms, taking account of changes over time, including improved understanding of local patterns of sea lice dispersion and wild salmonid post-smolt movements.

The outcomes of updated assessments of risk will be used to:

- Identify and target any further action necessary to prevent the risk deterioration in the condition of salmon populations, such as adding, or revising, sea lice control conditions in farm permits.
- Advise farmers on the outcomes of their management of sea lice and our latest assessments of environmental capacity for farm developments.
- Help identify if, and where, action to reduce sea lice infestation pressure on wild salmon may be required.

We will work with the Fish Health Inspectorate to develop a simple process for reporting sea lice count information to meet both our requirements and those of the Fish Health Inspectorate under the Fish Farming Businesses (Reporting) (Scotland) Order 2020.

During the sea lice management period for protecting wild salmon (mid-March to 30th May), we will require weekly fish numbers and sea lice counts to be reported within 2 days of the end of the reporting week rather than 8 days after the reporting week as currently allowed for sea lice count reporting to the Fish Health Inspectorate.

To inform the adaptive approach to the protection of sea trout from sea lice (see section 4.4), the weekly reporting of fish numbers and sea lice counts will be required from mid-March until 30th October rather than from mid-March to 31st May.

Reliable, weekly data on sea lice numbers are essential to ensure interactions between sea lice from fish farms and wild salmon are being appropriately managed. Reports to the Fish Health Inspectorate published on [Scotland's Aquaculture Website](#) for 2021, 2022 and 2023 show that, during the 11-week sea lice management period for protecting wild salmon post-smolts a large proportion of farms, excluding those that were fallow, missed providing counts in at least 1 week with many not providing counts for 2 or more weeks. According to data published on [BarentsWatch](#), Norwegian farms had a much lower rate of missed counts during the same period.

If a count is not conducted, the Fish Farming Businesses (Reporting) (Scotland) Order 2020 requires farmers to report the reason. The top two reasons given for non-reporting during the Springs of 2021, 2022 and 2023 were:

- Withdrawal period prior to harvesting.
- Veterinary advice.

The high proportion of missed counts is an issue that must be addressed for effective management of the interactions between sea lice from fish farms and wild salmon. We intend to ensure that the number of counts not conducted during the 11-week sea lice management period for protecting wild salmon is minimised:

- Farmers will be required to comply with quality assurance performance standards for counts. The performance standards will be incorporated our [Measures Assessment Certification Scheme \(MACS\)](#) and developed in consultation with the Fish Health Inspectorate, Norwegian regulators, fish farm operators and others with relevant expertise.
- Criteria for, and rules on, exemptions from conducting sea lice counts will be detailed in the performance standards. For example, counts will not be required within the first 6 weeks of a farm being stocked with smolts or if, for reasons of prolonged bad weather, they cannot be conducted safely. At farms subject to sea lice limit conditions, other exemptions from conducting counts will be permitted only in exceptional circumstances during the 11-week period between mid-March and the end of May.
- We will undertake a statistical analysis of the accuracy and precision of counts of sea lice at the highest-risk farms (i.e., farms where small variations in sea lice numbers have the

greatest potential to be environmentally significant) and introduce permit requirements for enhanced counts (e.g., counting lice on a larger number of fish) at these farms if necessary for reliably measuring compliance with permit limits. We will do this in consultation with the Fish Health Inspectorate.

Section 8.4 on compliance describes how we will manage failure to conduct counts when an exemption does not apply.

We will not require the use of automated sea lice counting systems at this time.

Once the automated counting technology is suitably advanced, we believe automated sea lice counting systems can play a valuable role in the management of sea lice on farms, especially where maintaining sea lice numbers at low levels is required for the protection of wild salmon. We will explore with regulators in Norway the potential to develop a common performance standard for automated sea lice counting systems. This will provide the basis for evaluating the suitability and readiness of the technology.

Permit limits on sea lice numbers

We will set sea lice permit limits in the form of the total number of adult female sea lice on the farm calculated from the multiple of the average number of adult female sea lice per fish and the number of fish.

The limits will apply as a four-weekly rolling mean and a maximum number at any time set at four times the average.

As refined models are developed, we will review whether maximum limits can be based instead on analysis of model outputs.

The number of adult female sea lice is used as the basis for the existing controls in Scotland administered by the Fish Health Inspectorate and for the controls applying in Norway. Published data on sea lice on Scottish farms is also of counts of adult female sea lice. We will proceed on the basis that the average number of adult female sea lice on farmed fish is a suitable and

appropriate approach to use in managing interactions between sea lice from fish farms and wild salmon and sea trout.

In the context of an adaptive approach, we will be open to discussion about framing sea lice limit conditions in relation to gravid sea lice rather than all adult female sea lice per fish. To inform such discussion, we will need detailed information on counts of gravid and non-gravid female sea lice. No suitable data has been provided yet by fish farm operators.

We will adopt a simplified approach to setting risk-proportionate sea lice limit conditions compared with our proposals in the consultation.

Applicants will be required to include information in their applications on the limits to which they propose to control the number of sea lice on their farms. Where, based on initial screening, we require bespoke screening or refined modelling to support an application (see Section 3.5.4), the limits proposed in the application must be derived from the relevant model runs under which the development would not risk the sea lice exposure threshold being exceeded or further exceeded. Developments that need such modelling are likely to be in one of the two highest relative risk categories in the risk matrix and have the tightest limits.

If bespoke screening or refined modelling was not required, the limits proposed by the developer in the application should normally be the same as, or lower than, the limits the developer identified for the purpose of initial screening assessment. This is because, should the farm not perform to the limits indicated during initial screening, it could pose a risk to wild salmon. However, an applicant can choose to support any application with bespoke screening or refined modelling even where we have not required them to do so and use the modelling outputs as the basis for proposed sea lice limits.

If a proposal is categorised as being in the lowest relative-risk category, no sea lice limits will be included in the permit. In all other cases, the limits proposed or derived from modelling will be translated into permit conditions, subject to checks of the refined modelling assessment if applicable.

7 Regulation of existing farms

7.1 Background

In their response to the SIWG, Scottish Ministers agreed that relevant licence conditions for protecting wild salmonids should be included in licences for existing, as well as new, fish farms.

SIWG Recommendations

For sites where best scientific evidence indicates that an existing site presents an adverse impact on wild salmonids:

- *In the first instance, tighter regulatory standards should apply (see section 2 below);*
- *The consenting regime should be amended to enable efficient relocation of existing biomass to a suitable alternative location, within a spatial planning and area management framework.*

Scottish Ministers' response to SIWG

We agree that robust conditions, based on an adaptive management approach, to safeguard wild salmonids should be contained within a licence rather than through planning consent and that the relevant licence conditions should apply to existing, as well as new, fish farms.

7.2 Introduction

In the consultation, we proposed that regulation of sea lice from existing farms should be delivered in two phases:

1. action to prevent deterioration; and
2. where required, action to drive improvements.

7.3 Preventing deterioration

7.3.1 Background

When we implement any new regulatory framework, our priority is to ensure that it prevents any deterioration of the environment. In the previous section, we explained how we will apply the framework to proposals for new farms and increases in fish numbers at existing farms to

manage risks to wild salmon populations. This section deals with how we will regulate existing farms under the framework so that sea lice numbers on those farms do not reach levels likely to put further pressure on salmon populations.

7.3.2 Introduction

In our consultation, we proposed setting permit conditions which would require all existing farms to report fish numbers and lice counts between mid-March and 31st May. This information is important. It will allow us to run our models to assess year-to-year variation in the number of sea lice on farms and to continually update our risk assessments accordingly, which, in turn, inform where we need to direct our regulatory effort.

We also proposed using the risk assessment matrix to identify existing farms that fall into the three highest relative risk categories and to vary their permits to include sea lice limits. These limits would be designed to ensure the farms maintain their existing sea lice control performance to guard against increased sea lice infestation pressure on wild salmon populations and, hence, potential deterioration in the condition of those populations.

A given increase in sea lice numbers on the highest relative risk farms will have a proportionately larger effect on sea lice infestation pressure in a WSPZ than it would on farms in lower risk categories. Consequently, we said that we would prioritise adding sea lice limit conditions to the permits for farms in the highest relative risk category and that the limits would be based on the normal current performance of the farm.

This section outlines the feedback received on our proposals for managing the risk of deterioration with respect to existing farms and our response.

7.3.3 Consultation questions and responses

We asked the following question in the consultation:

- Do you agree with our approach to monitoring and reporting conditions and the way we have used the risk assessment matrix to identify where we will add lice limits to permits? If

you disagree, please explain how you would apply the matrix and why this would deliver a better outcome (Question 18).

Representatives of the sector generally did not support our proposed requirements for applying reporting conditions and sea lice limit conditions in permits for existing farms. However, there was support for the principle of permit conditions being risk proportionate.

Representatives of wild fisheries and environmental interests strongly supported the inclusion of reporting conditions in the permits of existing farms. They also supported the inclusion of sea lice limit conditions. However, most argued that standstill conditions were inadequate and conditions to reduce sea lice infestation pressure were necessary.

Aquaculture sector comments

Mowi Scotland

“We disagree with the intention to roll out these requirements to existing fish farms.”

“... this should only be considered after robust scientific pilot studies have first been undertaken and concluded. We would also highlight the legal requirements from FHI regulatory control that are already in place for sea lice data reporting”.

“...we understand from engagement with SEPA that they have concerns and wish to ensure precautionary protection of wild salmonids during the coming (2024) season. While appropriate pilot studies are set up, Mowi is willing to work collaboratively with SEPA to identify and apply appropriate lice levels for the Mowi farms within the grouping of twenty-one farms that SEPA have identified (on the basis of relative risk) as being of most concern”.

Bakkafrost Scotland

“BFS does not believe that any condition applied under the SLRF will achieve the aim to prevention of deterioration as SEPA do not have the regulatory authority to act on alternative, more significant pressures impacting wild salmonid populations e.g. recreational fisheries, predation.”

“In relation to how the matrix is used to determine where to add lice conditions to permits, BFS agrees with the principle that any permit conditions should be proportionate to the perceived risk of a given site, rather than the ubiquitous application of permit conditions across all aquaculture sites”.

Scottish Sea Farms

“It is unacceptable for any controls to be added to any farms unless that farm is evidenced to have significant environmental harm. It is inappropriate to require any farm that will not have a sea lice performance standard imposed to require any data relating to a non-existing performance standard”.

“There is existing legislation requiring reporting, these reports are then publicly published on a weekly basis providing access to this information, there is no further need to duplicate or require this information. Putting in conditions where there is no need to is an inappropriate use of regulatory power and contrary to better regulation principles”.

Environmental/fisheries interests

West Sutherland Fisheries Trust

“...we do not consider that an initial approach designed to maintain the status quo through ‘no deterioration’ conditions for existing farms is acceptable”.

“The purpose of the framework should be to ensure that the numbers of infective stage sea lice are managed at a level below critical thresholds for the protection of wild fish. Therefore, we consider that the same approach [to setting numeric sea lice limits] should apply to both new and existing farms”.

“..we believe that all farms should be subject to numeric lice limits. On that basis we do not agree with how the risk assessment matrix identifies the farms which will be subject to numeric lice limits”.

“With regards to monitoring and reporting, we support the requirements set out, with the caveat that both sea lice levels and the number of farmed fish should be reported and published in as close to real time as possible.”

Fidra

“Fidra agrees with the approach for monitoring and reporting conditions and the addition of sea lice limits to permits. We support the mandatory requirement of monitoring and reporting of sea lice numbers across all farms within the WSPZ framework and urge the further development of quality assurance standards to increase confidence in reporting”.

“We also recommend the use of third party organisations to ensure independent, verified monitoring and reporting of sea lice numbers, as seen in relation to environmental monitoring in the Faroe Islands”.

Scottish Environment LINK

“LINK agrees with the way the risk assessment matrix will identify the need for adding lice limits to permits”.

“We are in support of mandatory monitoring and reporting of sea lice numbers across all farms and look forward to the development of the quality assurance standards for sea lice counts to increase confidence in these figures”.

Coastal Communities Network

“It is unreasonable that SEPA’s interim measures should not necessarily affect a harmful farm’s normal performance. In practice this means that maximum lice levels on the most damaging existing farms will be frozen until SEPA can thoroughly model their impacts, allowing the worst performing farms to carry on releasing high numbers of lice for several more years, even in the areas where wild salmonids are most vulnerable. This is a perverse reward for the operators of the worst farms for sea lice.”

7.3.4 SEPA response

We will require reporting of sea lice counts and fish numbers between 16th March and 30th October each year for all existing farms.

As explained in the permitting section, we will require the information on a weekly basis from mid-March until the end of October each year to underpin our regulation of the risk from sea lice to sea trout as well as to wild salmon.

In late 2024, we will add standstill sea lice limit conditions to the permits of existing farms on the West Coast and around the Western Isles, other than farms in the lowest relative risk category. These conditions will be effective between mid-March to 31st May from 2025 onwards.

We do not accept that we can move straight to setting conditions to drive reductions in sea lice numbers on existing farms without appropriate evidence that doing so is necessary, including considering other pressures on the wild salmon populations concerned. However, we do think it is important that, from early in its implementation, the framework controls existing farms to ensure that they do not increase sea lice infestation pressure on wild salmon populations.

We will derive the sea lice limits we set for existing farms from a statistical analysis of their lice control performance over the recent past.

As described in Section 3.3.5, since the consultation, we have updated our screening model to include our virtual salmon post-smolt model for all WSPZs. There are 61 farms out of 164 that are not in the lowest risk category. We will add sea lice limit conditions to prevent deterioration to the permits of these 61 farms in advance of the Spring 2025 sea lice management period.

For the Spring 2024 sea lice management period for protecting wild salmon, we will engage with the operators of the small number of existing farms in the highest risk category to encourage extra focus on maintaining good lice management performance on these farms, including through adhering to suitable voluntary sea lice limits.

7.4 Reducing pressure on wild salmon populations

7.4.1 Background

Where pressure on the water environment from regulated activities is leading to adverse impacts, we use our regulatory powers to help improve the condition of the water environment. If the pressure is not due to non-compliance with permit conditions, we may impose permit conditions on the regulated activities to reduce the pressure those activities place on the environment.

Imposing such conditions on an activity that already has our authorisation to operate requires clear evidence that those conditions are required to protect the water environment or other users of the water environment.

Typically, regulatory action to reduce impacts on the water environment is managed through Scotland's river basin management planning process. The process involves undertaking monitoring to identify environmental impacts; identifying the pressures responsible for the impacts; and deciding on the most cost-effective combination of measures to address the impacts and improve the environment.

7.4.2 Introduction

In the consultation, we proposed:

- Using our screening model to identify WSPZs where sea lice from fish farms may be a potential pressure on wild salmon populations.
- Targeting monitoring and further modelling accordingly to determine if sea lice from fish farms is a pressure on the wild salmon populations in the WSPZs concerned.
- Gathering and examining evidence from monitoring about all pressures on the salmon populations to assess their relative influence and decide on the most cost-effective combination of measures to improve the status of the salmon populations.
- If the combination of measures includes reducing sea lice concentrations, taking targeted action to reduce sea lice numbers on farms making the largest contributions to the

exposure of wild salmon to infective-stage sea lice in the WSPZs (i.e., the higher relative risk farms in the risk matrix).

We explained that it is likely to take several production cycles to complete this process and determine if and where action is required to reduce pressures on wild salmon populations from sea lice.

This section outlines the feedback received on our proposals for reducing pressure on wild salmon populations from sea lice and our response.

7.4.3 Consultation questions and responses

We asked the following questions in the consultation:

- Do you have any existing evidence that could be used to assist assessments of the WSPZs where the sea lice exposure threshold is potentially being exceeded (Question 19).
- Would you be interested in collaborating with us in carrying out the assessments required to determine if action is required to reduce infective-stage sea lice concentrations in those WSPZs in which screening suggests the sea lice exposure threshold may be exceeded (Question 20)?
- Do you agree with the proposed timetable? If not, please explain why you disagree and what would be your alternative. If so, how would you be willing to contribute (Question 21)?

Representatives from the sector considered that there was already sufficient protection in place for wild salmonid populations with respect to sea lice from fish farms. However, they told us they were willing to work with us in carrying out pilot assessments in prioritised WSPZs to provide evidence to substantiate this view.

Representatives of environmental and wild fisheries interest groups were also positive about collaborating with us to improve understanding of sea lice and wild salmon interactions. However, many believed that the indicative timetable for completing the work was unacceptably long and swifter action to reduce pressure from sea lice from fish farms on wild salmon was

needed. Some also felt that the costs of monitoring should be fully recovered from fish farming businesses.

Aquaculture sector comments

MOWI Scotland

“We strongly believe in our existing commitments and controls around lice management, including during spring, provide sufficient protection for wild salmonids. Excellent lice control can be evidenced from data that has been published since 2018.”

“Mowi would be willing to collaborate in pilot studies to help better inform and validate the models and help with setting up sentinel pen trials. We would also be willing to assist with sampling works along with other stakeholders”.

Bakkafrost Scotland

“As BFS has outlined extensively, it does not believe that the proposed sea lice exposure thresholds are scientifically robust, and therefore any evidence suggesting that the threshold is currently being exceeded cannot be relied upon as a measure to determine where risk exists, and where regulatory intervention may be needed”.

“BFS remains committed to working with SEPA on a programme of work to build an appropriately robust and validated modelling framework to assess interaction risk and assist in delivering this through an appropriately designed trial of the framework, ahead of implementation as a permitting and regulatory tool. This process would naturally include undertaking assessments of lice concentrations in WSPZs, and identifying mitigating actions should they be deemed necessary”.

Scottish Sea farms

“Scottish Sea Farms would be very open to collaborating with SEPA and partners, under the auspices of best scientific principles implemented through an expert-led, transparent and robust pilot study, on the basis those contributing partners share the same goal: to deliver an assessment tool that supports the sustainable growth of open pen salmon farming”.

“.....we recommend that a technical steering group is established which includes the FHI, APHA, the CVO Scotland’s team, fish veterinarians, RSPCA etc., to establish the appropriate mechanism required to manage those sites which are evidenced as posing a high risk to wild salmon whilst considering the health and welfare of the farmed fish and impacts on the environment which may arise from the additional measures which may be required”.

Environmental/ wild fishery interest comments

Fisheries Management Scotland

“Fisheries Management Scotland members are working to manage these issues on a day-to-day basis, and have collected local data on sea lice interactions for a number of years which will be valuable to feed into this process. On the understanding that such assessments will be taken forward quickly, and in line with the precautionary principle, we are happy to work with SEPA and other partners to develop the evidence base to assist swift and robust assessments of WSPZs as necessary.”

“...the proposed timeline for completion of this process (2027) is unacceptable” “The full framework must be delivered at pace, and SEPA must ensure that appropriate resources are available to develop the framework as soon as possible.”

Scottish Environment LINK

“LINK agrees with the timetable but would like to ensure that the timetable does not shift, and all efforts are taken to implement these actions in a timely manner. Where an exposure threshold has been confirmed as exceeded remedial actions should be implemented swiftly.”

Public/academic body comments

The Scottish Association for Marine Science (SAMS)

“SAMS has expertise in aquaculture modelling, technology and monitoring method development and optimisationin conducting boat-based field trials in local aquaculture regions..”. “We are open and keen to collaborate across all areas of our expertise.”

7.5 SEPA response

This section provides the clearest example of the tensions between:

- ambition to urgently improve the condition of wild salmon populations; and
- the sector's concerns that they could face unjustifiable and disproportionate constraints on their activities.

We will require action by the operators of relevant farms as soon as we have appropriately robust evidence that a reduction sea lice concentration is necessary to improve the condition of a wild salmon population.

Requiring action by a regulated business without first having sufficient evidence to be confident that the action is needed risks imposing unnecessary costs on that business and risks potentially unnecessary use of energy, materials and other environmental resources to comply with the action.

Any variation of a permit will be evidence-based, proportionate and reasonable. Evidence-based means that there must be suitable evidence that the activity is causing, or is likely to cause, a significant adverse impact on the water environment. Deciding if there is suitable evidence involves carefully considering the strength of all the available modelling and monitoring evidence.

We will take forward work as quickly as possible with fish farm operators and other relevant interests to pilot further assessments in WSPZs identified through screening as requiring further assessment.

The work will comprise two main elements:

- Progressively improving our understanding of sea lice infestation pressure in those WSPZs in which screening modelling indicates the exposure threshold may be exceeded. This will involve developing and validating refined models.

- Monitoring wild salmon populations in relevant river catchments to assess the relationship between the condition of the populations and our assessments of different pressures to which they may be subject, including sea lice infestation pressure.

Where this work indicates a potential link between the condition of a wild salmon population and exposure to sea lice, we will identify sea lice from fish farms as a potential pressure in the river basin management planning process, and our current confidence in our assessment of the pressure.

The normal river basin management planning approach will be used to evaluate the relative influence of different pressures on the salmon population and determine the most cost-effective combination of measure to take to improve its condition.

Whether the combinations of measures taken include action to reduce exposure to sea lice from fish farms alongside existing actions, such as on-going work to remove barriers to fish migration, will depend on the available evidence on the relative importance of sea lice infestation pressure.

8. Compliance assessment

8.1 Background

The SIWG and Scottish Ministers' response to its recommendations emphasised the importance of transparent monitoring of compliance and robust enforcement action to deal with non-compliance.

SIWG Recommendations

A single lead body (with appropriate competence and capacity) should be assigned responsibility for regulating wild and farmed fish interactions and given appropriate powers for monitoring and enforcement.

An enforcement policy should be published, informed by existing controls, to include specific penalties and sanctions for breaching conditions but incorporating some flexibility to respond to specific local conditions;"

Enforcement sanctions relating to sea lice and escapes, including the use of fixed and variable monetary penalties, should have a mechanism to allow monies to be invested into wild salmonid conservation work. Alternatively, this could be informed by the approach taken in Norway through OURO.”

Scottish Ministers’ response to SIWG

We welcome these jointly agreed recommendations which ask for a step change in how the risk of sea lice transfer from farmed to wild fish is managed. We agree that the regulatory regime for the protection of wild salmonids should be robust, transparent, enforceable and enforced.

We note SIWG calls for one lead body to take responsibility for interactions and that conditions and enforcement should be achieved through a licensing regime. We will consider this in forming our policy options, including how the Technical Standard for Scottish Finfish Aquaculture would fit within or alongside any enforcement regime.

8.2 Introduction

In the consultation, we stressed the responsibility of operators to monitor their environmental performance. They must act when there is a problem and notify us where necessary. It is our job to audit and report on the compliance of operators with the conditions of their permits and to take enforcement action where this is required. We proposed a hierarchy of audit work, starting with a farm’s performance and moving on to audits at a company or sector level. We considered that farm-level compliance work should be focused on those farms we assess as posing the greatest relative risk.

This section outlines the feedback received on our proposals on compliance assessment and our response.

8.3 Consultation questions and responses

We asked the following questions in the consultation:

- Do you agree with the way we are proposing to use the risk assessment matrix to identify where we should focus our regulatory effort? If you disagree, please give your reasons and describe what you would propose instead (Question 22).
- Do you agree with the proposed timetable? If not, please explain why you disagree and what would be your alternative (Question 23).

Representatives of the sector expressed broad agreement with the principle that our work to audit compliance should be risk based, but they did not agree with the way the risk assessment matrix had been constructed. They were particularly concerned that we would not take farmed fish health into account when undertaking compliance assessment and enforcement work.

Wild fishery and environmental interests largely supported our risk-based approach to focusing our compliance assessment effort on high-risk farms but stressed the importance of validating this risk assessment. They were concerned about the ability of SEPA to take enforcement action where non-compliance was recorded. They also raised concerns about the provision of reported data.

Example consultation responses

Aquaculture sector comments

Bakkafrost Scotland

“BFS agrees with the principle that regulatory effort should be targeted toward sites identified as higher risk, however, using risk assessment criteria that is agreed between both the aquaculture sector and SEPA”.

Scottish Sea Farms

“We agree with the principles of better regulation which state that regulation should be proportionate and targeted only where needed. We do not agree with the proposed risk assessment matrix inclusion of regulatory effort being required for farm licences that do not contain a sea lice performance standard. Farms that do not contain a performance standard for sea lice limits should also not contain data and reporting performance standards for sea lice limits.”

“Regarding SEPA issuing non-compliances for every instance where a sea lice count has not been provided demonstrates again SEPA’s lack of understanding of salmon farming. There are several accepted reasons why a sea lice count cannot be conducted, such as storms, compromised fish, harvesting activities etc.”

MOWI Scotland

“The approach outlined to ensuring compliance is a significant concern as it does not reference anywhere the welfare needs of farm raised salmon nor recognise the potential conflict in law that will arise”. “We have no confidence, based on SEPA’s current regulatory approach, that SEPA will introduce a fair, balanced, and proportionate compliance assessment framework that will consider the fish health and welfare needs of farm raised salmon. The absence of such a compliance framework, or even recognition of the issue within the consultation, is a clear failure to follow the Scottish Regulators Strategic Code of Practice”.

Cooke Aquaculture Scotland

“Clear guidance is required to determine the time requirement for submission of weekly lice and fish numbers to SEPA. Due to difficulties in counting exact fish number mid-way through a production cycle there is a requirement for some flexibility. In addition, persistent adverse weather conditions or other factor such as ongoing treatments may prevent lice/fish counts. These factors need to be accounted for as they may result in disproportionate and unavoidable non-compliance”.

Environmental/wild fishery interest comments

Ayrshire Rivers Trust

“We broadly support the principle that the initial focus of regulatory effort should be on ‘high’ and ‘considerable’ risk farms, but this is predicated on confidence in the screening model (and the data used to populate this) giving an accurate picture of what is happening on the ground. On that basis, we would like to see a focus on monitoring for impacts on wild fish, and the use of sentinel cages, in all WSPZs to ensure that impacts are not occurring in WSPZs considered by SEPA to be lower risk. We would again emphasise that the inputs to the screening models are based only on 2.5 years of publicly available data”.

Fisheries Management Scotland

“This framework is intended to protect wild fish, and therefore any failures in compliance should be treated consistently with this objective in mind. Where other factors (such as farmed fish health issues, which compromise sea lice control) occur, the overriding factor should be the protection of the environment. Should such issues occur repeatedly, we would question the sustainability of that farm location, and other regulatory controls, up to and including review or revocation of licenses, may be necessary.”

River Ayr District Salmon Fishery Board

“Data reporting and auditing of data reporting for ALL farms should start in 2024, as a fundamental pillar of the framework and to increase transparency in the process and support the framework in meeting the test of being robust, transparent, enforceable and enforced from the outset.”

Coastal Communities Network.

“Sanctions for non-compliance with the new sea lice terms of CAR licences must include fines, the reduction of biomass and ultimately the suspension and revocation of licences if required, as with any other CAR licence breaches.”

“SEPA’s response to the SIWG makes no mention of relocating farms to protect wild fish. This should be an option, if that is the best way to prevent deterioration of the environment.”

8.4 SEPA response

Ensuring operators comply with their permit conditions is central to securing environmental protection.

We will target farm inspections using the risk assessment matrix and any information (e.g., from our analysis of reported data or gathered from other regulators) indicating potential issues with environmental performance.

8.4.1 Auditing reported data

We will audit the reported weekly average number of adult female sea lice per fish and the weekly total number of fish held.

The ability of any regulatory framework to manage interactions between sea lice from fish farms and wild salmon is dependent on the provision of good quality data on sea lice numbers on farms. An up-to-date understanding of the numbers of sea lice on their farms is also fundamental to the ability of operators to ensure they are complying with their permits' sea lice limit conditions during the sea lice management period for protecting wild salmon.

One of our concerns about the provision of sea lice count data is maintaining the weekly frequency of counts. We intend to categorise all failures to conduct counts other than where an exemption applies (See Section 6.2.2) as non-compliances. Because maintaining counts through 11-week the sea lice management period for protecting wild salmon is fundamental, we expect operators to take steps to ensure that the number of counts that are not conducted is minimised.

8.4.2 Performance Assessment Scheme

We are in the process of developing a new Performance Assessment Scheme for regulated activities, with a consultation planned in 2024. We will not be publishing performance assessments for regulated sites, including fish farms, until that consultation has been completed.

We want the new scheme to be transparent and objective: operators either comply with a permit condition or they do not. However, an important part of the new scheme will be how we interpret the overall compliance record of a site to rank its performance (good, acceptable or poor performance). This assessment is of most importance for regulated businesses in terms of building or maintaining their environmental reputations with their shareholders and customers. Over the next year, we will consult with fish farm operators and other interested parties as we develop the rules for how the regulatory requirements of the new sea lice framework will be incorporated into the performance assessment scheme.

8.4.3 Phasing of compliance work

Implementing the framework early in 2024 means that only a small number of applications will have been determined in advance of, or during, the Spring 2024 sea lice management period and few, if any, of those developments granted authorisation are likely to become operational during this period.

During 2024, our focus will be on developing a performance standard for sea lice counts in consultation with Fish Health Inspectorate, fish farmers and regulators from other jurisdictions.

By the Spring 2025 sea lice management period for protecting wild salmon, we will have added sea lice limit conditions to the permits of farms on the West Coast and around the Western Isles other than those assessed as being in the lowest risk category. Our priority from 2025 onwards will be ensuring compliance with those limits, with our main regulatory effort focused on the highest relative-risk farms.

Every year, we will re-run our risk assessment models for each WSPZ and use the results to update where we target programmes farm inspections.

In due course, where we determine that reductions in sea lice infestation pressure in WSPZs are required (See section 7.5), we will vary the sea lice limits in the permits of the relevant farms. Ensuring these farms comply with the varied limits will then be a compliance assessment priority for us as we work to improve the condition of salmon populations.

8.4.4 Enforcement

Where necessary and appropriate, and in accordance with our enforcement policy, we will act to bring farms back into compliance where operators fail to comply with regulatory requirements.

SEPA's [enforcement policy](#) is available on our website. In making enforcement decisions, we consider the following factors (see document for full details).

- Intent

- Foreseeability
- Impact
- Financial implications
- Deterrent effect
- Previous history

Enforcement action during 2025 will be influenced by the fact that it will be the first year when sea lice limit conditions are in effect. Our focus will be on assessing:

- the scale of compliance or non-compliance with sea lice limits over the salmon migration window; and
- the projected consequences of any non-compliances with those limits based on re-running screening models.

For these assessments, we will look at the modelled change in exposure of virtual salmon post-smolts that traverse through those areas of WSPZs in which the non-compliant farms are modelled to be contributing to infective-stage sea lice concentrations.

Our confidence that the scale of modelled effects of non-compliances correspond to equivalent scale real world effects will initially be relatively low but will progressively improve as our model and model validation improves. For this reason, during 2025, our enforcement focus will be on ensuring that any operators who did not comply with their sea lice limit conditions are focused on preventing repeat failures the following Spring.

In subsequent years, where permit limits for sea lice have been exceeded, we will report non-compliances and work with operators to make sure that appropriate steps are taken to ensure non-compliances are addressed. Where we consider it appropriate, this will include immediate steps to bring the farm back into compliance within the same Spring sea lice management period in which the non-compliance happened. The onus will be on the farmers to develop and deliver appropriate responses to prevent non-compliances.

Where necessary, we will vary permit conditions or use appropriate enforcement powers to help secure compliance. We have a wide range of enforcement actions we can take, including, for

example, variable monetary penalties or referral to the Procurator Fiscal, and we will use the most appropriate in the circumstances, in line with our enforcement policy.

8.4.5 Compliance and farmed fish health

Representatives of the sector expressed concerns about the potential for conflict between complying with sea lice limits set under the framework to protect wild salmonids and their responsibilities regarding farmed fish health.

In our consultation, we recognised that such tension may arise, for example, where farm operators are faced with reconciling the requirements to control lice for the protection of the environment with managing farmed fish health issues that preclude some active interventions to control sea lice.

However, we do not expect significant tensions to arise frequently between farmers' responsibilities for farmed fish health and compliance with permit conditions relating to sea lice:

- Farmers proposing new farms or expansions of existing farms will have a good understanding of the sea lice limit conditions that will apply to potential developments during the pre-application process. This will allow them to consider how they will both manage farmed fish health and comply with sea lice limit conditions when preparing applications.
- For existing farms, we will not impose blanket new, restrictive sea lice limits. The sea lice limit conditions we will apply from mid-March 2025 to existing farms will be for the purpose of controlling increases in sea lice numbers. As these conditions will reflect existing sea lice management performance, their achievement is expected to be compatible with the farms' existing farmed fish health management practices.
- If a farm fails to comply with sea lice limit conditions, we will require the farmer to bring the farm back into compliance. However, it will be up to the farmer to decide on the best ways to do so considering farmed fish health.

If non-compliance with sea lice limit conditions occurs repeatedly because a farm is unable to act to control sea lice because of farmed fish health issues, we will require the operator to re-assess whether the farm is sustainable in its current form, taking account of its location, stocking density, and operating model. If the operator wishes to explore re-locating production to another location as a means of reducing fish health challenges, we will run our sea lice and farm discharge screening models to help identify potential environmentally optimal locations.

If tensions do occur between farmers' responsibilities for farmed fish health and their obligations under the framework, we will seek to bring together, and work with, bodies and organisations with farmed fish health responsibilities and expertise to help us understand those tensions and whether information we can provide about the water environment may be of use to operators in solving those tensions.

9 Environmental monitoring

9.1 Background

The SIWG and Scottish Ministers' response to its recommendations highlighted that an adaptive regulatory framework for managing interactions between sea lice from fish farms and wild salmonids needs to include monitoring to help improve understanding of those interactions and identify negative impacts.

Salmon Interaction Working Group Report

The reformed regulatory system should protect wild migratory salmonids, proactively seek to understand and address any negative impacts detected through monitoring.

Scottish Ministers' response to the SIWG.

the Scottish Government and Scottish Green Party shared policy programme commits us to considering how the fish farming sector can contribute more to support communities, recreational fisheries, promote innovation and support services such as inspections and monitoring, including for the purposes of improving the scientific evidence base.

it is our intention that local authorities would no longer be advised to include Environment Monitoring Plans as a planning condition and instead, SEPA will become responsible for regulating these environmental interactions.

9.2 Introduction

An important part of all environmental regulatory frameworks is the ability to understand where environmental impacts are currently occurring and then track whether:

- new developments cause deterioration; and
- any measures that are taken to reduce pressures deliver improvements.

In the consultation, we identified three main objectives for the first environmental monitoring strategy under the framework to support an adaptive approach.

- Support and complement the development and validation of refined models for the small number of WSPZs in which screening indicates the sea lice exposure threshold may be exceeded.
- Gather data to assess the effectiveness of the combination of actions taken to protect wild salmon populations, including action to manage risks from sea lice.
- Support the development and introduction of a framework for assessing risks to sea trout, including in the Northern Isles.

This section outlines the feedback received on our proposals for environmental monitoring and our response.

9.3 Consultation questions and responses

We asked the following questions:

- Do you agree with how we propose to prioritise where we target effort under the first environmental monitoring strategy for the framework? If not, please explain your reasons and what you think we should do instead (Question 24)

- Do you think the focus of the monitoring strategy should be on the types of monitoring listed above? If not, please explain your reasons and what you propose instead or in addition (Question 25).
- Do you think that the proposed collaborative approach is the best mechanism for developing and delivering a monitoring plan? If not, please give your reasons and describe what you would propose instead (Question 26).
- Are there other bodies and organisations you think would be interested assisting with a collaborative approach to environmental monitoring? If so, please can you say who they are and how you think they could contribute (Question 27).
- Do you agree with the proposed timetable? If not, please explain why you disagree and what would be your alternative (Question 28).

All stakeholders agreed that we need to develop an environmental monitoring programme to help validate refined models and to assess the effectiveness of the regulatory framework. Almost all respondents who made comments about environmental monitoring supported the use of a collaborative approach. However, we also heard broad feedback that the monitoring programme needs to be owned and led by SEPA. One finfish producer also added the caveat that a collaborative approach needs to be managed to ensure it remains firmly focused on delivering the objectives required of it to support the sea lice risk framework.

Most stakeholders recognised the need to target monitoring effort according to environmental risk. However, representatives of wild fisheries interests believed there should also be some environmental monitoring in all WSPZs from the outset. In general, representatives of the sector were in favour of piloting approaches to monitoring. However, one finfish producer felt that the screening model was insufficiently robust to be used for the purpose of identifying priorities for monitoring.

Representatives of the sector were strongly of the view that all pressures on wild salmon populations need to be monitored rather than only pressure from sea lice, with one suggesting that the Scottish Government's Wild Salmon Strategy was the vehicle for ensuring an integrated approach.

9.3.1 Examples of responses

Aquaculture sector comments

MOWI

“Mowi would support a collaborative approach to the design, set up and operation of any pilot studies that are undertaken to validate and verify the screening models and any subsequent refined modelling that is to be undertaken. We would also welcome collaboration in any monitoring plans and collection of data from all parties involved in such pilot studies.”

“Environmental monitoring should be coordinated through a Scientific Advisory Board that will facilitate a coordinated and collaborative approach to monitoring the health of wild salmon stocks.” across Scotland.

Bakkafrost Scotland

“BFS does not believe that the first environmental monitoring strategy for the framework should be targeted in WSPZs that the screening model suggests the sea lice exposure threshold is exceeded. BFS opposition to this approach is based on the following. BFS does not believe that the screening model is robust enough to adequately identify risk, and therefore any risk identified prior to validation of the model remains unfounded”.

“As a matter of urgency, an environmental monitoring programme must be detailed, consulted on, and established ahead of SLRF implementation.”

“BFS is supportive, in principle, of a collaborative approach between industry, regulators, and verified expertise existing in third party organisations, however the involvement of third parties must not complicate or distract from the key objectives of environmental monitoring.”

Environmental/wild fisheries interest group comments

Argyll District Salmon Fishery Board & Argyll Fisheries Trust

“We are supportive of the collaborative approach outlined in the document, but we do not understand SEPA’s reluctance to use charging powers to recover costs associated with

undertaking, or commissioning, the necessary environmental monitoring. The collaborative approach should inform the scope of the work required and then SEPA's charging powers should be used to recover the cost of delivering this work".

Ayrshire Rivers Trust

"We understand the proposed initial focus on the eight WSPZs on the West Coast and around the Western Isles in which SEPA's initial screening assessments indicate the sea lice exposure threshold may already be met or exceeded. However, if stakeholders are to have confidence in the framework, it is imperative that the same approach is quickly rolled out to WSPZs which fall into the next category of risk, and for environmental monitoring to be undertaken in all WSPZs from the outset."

Coastal Communities Network

"A significant part of how success is judged will be the comparison of calibrated and validated sea lice dispersion modelling to field measurements of sea lice in sentinel cages and on wild fish. Who will monitor sea lice and wild fish for these comparisons? This must be done independently of the industry."

Scottish Environment LINK

"Yes, LINK agrees with the prioritisation of the WSPZs thought to be at the highest risk for refined models and are glad that assessment of the effectiveness of actions taken to protect the wild salmonid population is seen as another priority."

"Yes, LINK supports a collaborative approach for developing a monitoring plan as this follows the basic principle of using the best available scientific evidence."

Callander McDowell

"SEPA say that their fish ecologists will work with other to help implement any monitoring plans in rivers of concern. They have already identified eight Wild Salmon Protection Zones requiring further assessment. Yet, there is already seventy years of data available from Marine Scotland plus other sources of information to help assess the impacts of salmon farming on the wild fish populations in these eight prioritised protection zones."

9.4 SEPA response

9.3.1 Collaborative monitoring programme

A broad spectrum of those who commented expressed interest or willingness to assist in developing and implementing a collaborative monitoring plan in a variety of ways. We agree that a collaborative approach to planning and delivering monitoring programmes requires a clear owner and lead.

We will own and lead the planning and delivery of coordinated and collaborative monitoring programmes under the sea lice regulatory framework.

We will also work with Scottish scientists and leading international scientists with relevant experience to ensure the monitoring programmes are designed in the best way possible to produce high quality scientific evidence.

We will ensure all our work to monitor pressure on wild salmon is informed by, and coordinated with, the implementation of Scotland's Wild Salmon Strategy¹².

9.3.2 Monitoring for calibrating and validating refined models

To support the development of refined models, we will target monitoring initially in those WSPZs in which our screening model indicates the sea lice exposure threshold may be close to being exceeded or exceeded.

Annex II lists the 8 WSPZs for which this is the case based on the latest version of our screening models.

In 2024, we plan to start with pilot monitoring programmes in one or two of the prioritised WSPZs. The initial pilots will be selected from the Loch Carron & East Skye system WSPZ, the

¹² <https://www.gov.scot/publications/wild-salmon-strategy-implementation-plan-2023-2028/>

Loch Fyne & Kilbrannan Sound system WSPZ and the Loch Linnhe & Firth of Lorn system WSPZ.

We will then expand the monitoring programmes to cover other prioritised WSPZs, with priorities continually checked against our most up-to-date screening assessments.

The monitoring programmes will be designed to collect information with which to calibrate and validate refined models. This will include information on:

- infective-stage sea lice distribution obtained from sentinel cage studies supplemented where appropriate by information on sea lice levels on existing fish farms; and
- prevailing conditions, such as water temperature and salinity, and winds during the sentinel cage deployments.

We will also consider¹³ observations on sea lice numbers on wild sea trout, including information generated through the new, nationally overseen monitoring programme that we will create under the adaptive approach to managing risks to sea trout (see Section 4.4).

Equivalent monitoring to calibrate and validate refined models in other WSPZs will be required to be undertaken by developers when refined models are needed to support applications for farm developments.

Our intention is to work with Scottish Government scientists and Norwegian scientists who have designed such monitoring programmes in Norway to help us design and oversee the pilot monitoring programmes with the aim of establishing a best practice international approach for this type of monitoring.

Many respondents, including representatives of the sector, expressed their willingness to collaborate in the development and implementation of pilot monitoring programmes. Our intention is to establish a stakeholder group to assist us in overseeing the monitoring

¹³ Vollset, K. W., Halttunen E., Finstad B., Karlsen O., Bjørn P. A. and Dohoo I. (2017) Salmon lice infestations on sea trout predicts infestations on migrating salmon post-smolts. ICES Journal of Marine Science, Volume 74, Issue 9, November/December 2017, Pages 2354–2363, <https://doi.org/10.1093/icesjms/fsx090>

programmes and for the relevant fish farming companies to fund (directly or, if necessary, via charging) and undertake the monitoring.

In parallel, we will:

- Continue to work with the Atlantic Salmon Trust and Scottish Government scientists to enable us to use the results of salmon post-smolt tracking studies to refine our virtual salmon post-smolt model.
- Work with scientists in Scotland and in other salmon producing countries to assess the viability and cost-effectiveness of other potential methods for obtaining information with which to validate refined models, including any new methods for directly monitoring sea lice in plankton or the potential to use of observations of sea lice numbers on wild salmon post-smolts captured by special trawling in WSPZs¹⁴ in Scotland.

9.3.3 Wild salmon population health monitoring

Monitoring of wild salmon populations provides information to help:

- assess the influence of different pressures on the condition of the populations; and
- the effect of measures taken to improve the condition of the populations.

Monitoring for these purposes is part of river basin management planning. However, to date the river basin management planning process has not had a mechanism for identifying exposure of salmon post-smolts to sea lice from fish farms as a potential pressure on the condition of specific salmon populations. This is because there was no suitable framework for enabling an assessment of the relationship between the condition of individual wild salmon populations and the relative exposure of post-smolts from those populations to sea lice. Our sea lice assessment framework now provides this.

We have started by comparing our existing fish population monitoring results for rivers across the West Coast against modelled relative exposures of virtual salmon post-smolts from those rivers to infective-stage sea lice.

¹⁴ [Salmon lice-induced mortality of Atlantic salmon during post-smolt migration in Norway | ICES Journal of Marine Science | Oxford Academic \(oup.com\)](#)

We intend to work with Scottish Government scientists to build on our initial analysis using other available data on the condition of salmon populations, such as data collected under the [National Electrofishing Programme for Scotland](#) (NEPS). For those rivers where sufficient monitoring data is available on the condition of salmon populations, we will start to identify rivers where sea lice from fish farms is a potential pressure on their salmon populations.

We will then develop targeted monitoring programmes to:

- Assess whether sea lice from fish farms is a potential pressure on salmon populations in rivers for which there are insufficient existing monitoring data to make such an assessment.
- Increase our understanding and confidence about relative importance of all pressures, including sea lice, on the salmon populations.

We will work with Scientific Advisory Board¹⁵ set up under the Wild Salmon Strategy to design and implement suitable wild salmon monitoring programmes.

The programmes will include salmon populations subject to a range of modelled sea lice exposures and, hence, will extend beyond the prioritised WSPZs. The results will improve the baseline against which changes in salmon population health can be assessed over time.

Some finfish producers said that monitoring should include monitoring of sea lice numbers on wild fish outside of aquaculture areas to enable comparison of “*background impact and perceived farm impact*”. As explained above, we agree that the monitoring programmes should include comparative monitoring of salmon populations subject to a range of different exposures to sea lice from relatively high exposures to relatively low exposures. It is also worth noting that results from wider studies of sea lice on wild fish (principally sea trout) in areas distant from finfish aquaculture zones are already available¹⁶.

¹⁵ <https://www.gov.scot/publications/wild-salmon-strategy-implementation-plan-2023-2028/pages/9/>

¹⁶ Gargan P., Karlsbakk E., Coyne J., Davies C. and Roche W. (2016) Sea lice (*Lepeophtheirus salmonis* and *Caligus elongatus*) infestation levels on sea trout (*Salmo trutta* L.) around the Irish Sea, an area without salmon aquaculture. *CES Journal of Marine Science* (2016), 73(9), 2395–2407. <https://doi.org/10.1093/icesjms/fsw044>

9.3.4 Local authority environmental management plans

A few consultees, including local authorities and finfish producers, highlighted the need for clarity about the transition from, and future role of, environmental management plans (EMPs).

EMPs are currently required to be produced by operators of some existing farms as a condition of their planning permission. The plans require monitoring, which is often carried out by local fishery boards and trusts. One finfish producer also noted that the development of EMPs “*has generated effective and collaborative working arrangements between the sector and the wild fish stakeholders*” and another consultee believed it would be important to retain the benefits of EMPs, including their role in building trust.

Until the regulatory framework is implemented, we expect local authorities to require EMPs as a condition of new planning permissions where they consider it necessary to do so. Once the framework is implemented for salmon on 1st February 2024 and for sea trout from March 2025, our understanding is that EMPs will no longer be required as a condition of local authority planning consents.

The environmental monitoring element of EMPs will be delivered through the new regulatory framework’s WSPZ monitoring programmes and the new nationally overseen sea trout monitoring programme (see Section 4.4). As with EMP monitoring, these programmes will be collaborative programmes funded by operators and designed to support adaptive management. However, they will be led by us, and their targeting and design will be driven by the needs of the regulatory framework.

During 2024, we will commence work with local authorities to review EMPs for existing farms.

The review will consider:

- The information already generated by the EMP.
- The monitoring approaches used.
- Further monitoring information required to support implementation of the new regulatory framework.

Once a review has been completed and its outcome agreed with the local authority, we will work with the local authority and the operator concerned to incorporate any continued, or revised, monitoring required into the framework's monitoring programmes.

10 Making data available

10.1 Background

In their response to the SIWG, Scottish Ministers stressed their commitment to making data available to the public and other users of the marine environment. They highlighted the importance of [Scotland's Aquaculture Website](#) in this context and their expectation that SEPA will publish information it collects through the regulatory framework.

SIWG Recommendations

The SIWG recommends that Scottish Ministers invest in the appropriate infrastructure to collect and report catch and associated data, which maintains, as far as possible, the continuity of data since 1952, whilst allowing catch data to be reported in as close to real time as possible.

Scottish Ministers' response to SIWG

We are absolutely committed to open and transparent regulation and making data available to the public and other users of the marine environment.

We will continue to contribute funds to the Scotland's Aquaculture Website improvement programme, led by SEPA.

SEPA is committed to the continued publication of information collected through the CAR licence regime, including any additional information relating to sea lice collected as the CAR regime adapts.

We commit to focussing on data requirements within the proposed Wild Salmon Strategy which will seek to bring together information that will lead to a better understanding of the geographical variation in pressures and opportunities for action as identified by the SIWG in collaboration with stakeholders, including the District Salmon Fisheries Boards and Trusts.

10.2 Introduction

In the consultation, we proposed to make the information we gather about the management of interactions between sea lice from fish farms and wild salmonids as easily accessible as possible. We proposed doing this by making the information available through two key platforms, which would allow us to present information in the appropriate context:

- Scotland's Aquaculture Website; and
- Scottish Wild Salmon Strategy annual reports.

This section outlines the feedback received on our proposals for making data available and our response.

10.3 Consultation questions and responses

We asked the following question:

- Do you agree with the proposed timetable for improving accessibility of information collected in implementing the framework? If not, please explain why you disagree and what would be your alternative (Question 29).

There was broad agreement that:

- Data collected under the framework should be made easily accessible.
- Scotland's Aquaculture Website could be used for this purpose.
- Scotland's Aquaculture Website should be modernised.

There was also broad support for the proposed timetable for modernising Scotland's Aquaculture Website with the caveat from one respondent that work on the Website should be independent of work on the sea lice regulatory framework to avoid diverting resource from the latter.

There was also a call to make data on the full range of pressures on wild salmon similarly easily accessible.

1.1.1 Aquaculture sector comments

MOWI Scotland

“Mowi welcome the initiatives to try and coordinate and collate the respective information and data that is proposed. However, we have concerns on delivery timetables required to modernise platforms and the future accessibility of data on the full range identified pressures on wild salmonids”.

Bakkafrost Scotland

“BFS supports SEPA’s investment into ensuring that data in the public domain is transparent and accessible for interested parties and individuals. BFS does not believe that the timetable for undertaking these improvements should detract resource from other priority components of SLRF development, and indeed, that the proposed improvement works should be at all subject to or dependent on the progression of SLRF”.

Scottish Sea Farms

“The farmed salmon sector provides more data relating to its farming than any other food production sector (including many other non-food production sectors) in the UK and we support transparent, consistent and proportionate provision of data. Additionally, we have expressed our concerns relating to the presentation of data via the current aquaculture website platform. Scottish Sea Farms would be very open to collaborating with SEPA and partners to support delivery of an improved platform.”

1.1.2 Environmental/fishery interest groups

River Stinchar District Salmon Fishery Board

“We support SEPA’s proposal to update and modernise Scotland’s Aquaculture Website but, in common with our previous comments, we do not think that the proposed timetable for doing so is acceptable. This work should commence immediately, and we believe that the ambition should be for this to be completed within 12 months”.

Fidra

“We agree with the proposed time table, and expect timely implementation as outlined”.

Scottish Environment LINK

“LINK agrees with the proposed timetable but would like to ensure that the timetable does not shift, and that all efforts are taken to implement these actions in a timely manner”.

10.4 SEPA response

We will make all the data collected under the framework that can be made publicly available, publicly available as soon after it is collected as possible.

At the outset, we will make use of the existing digital platforms to publish the information. We recognise that one of these, Scotland’s Aquaculture Website, serves an important role in bringing together information on aquaculture from a range of bodies but needs modernisation to make the information easier to find and understand.

We see the modernisation of Scotland’s Aquaculture Website as a priority more generally.

We will work with the partner organisations responsible for the Scotland’s Aquaculture Website and others with the aim of completing the development of a new version of the Website by the end of 2027.



For the future of our environment

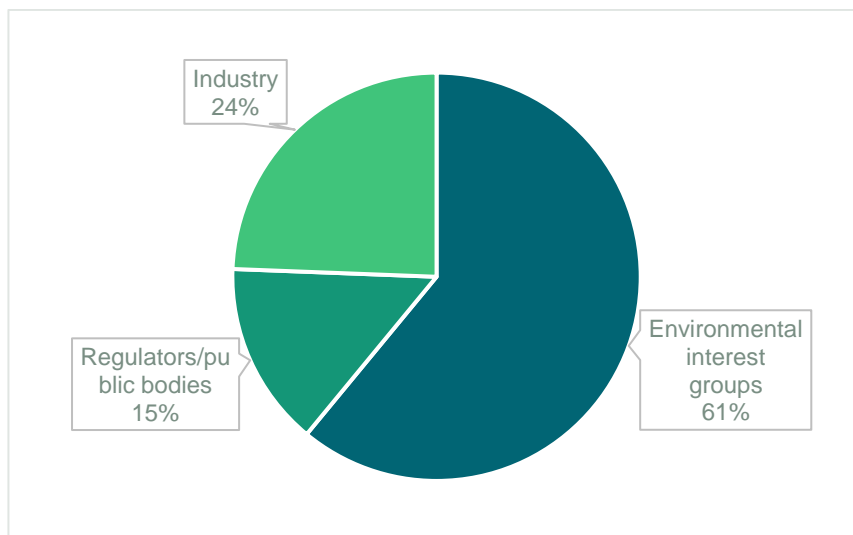
Annex I – Consultation statistics

Managing interactions between sea lice from finfish farms and wild salmonids

Who responded to the consultation?

In total there were 41 respondents who submitted comments on the consultation. Of these, 24 used our online consultation hub, 14 responded via email and 3 responded by both email and hub responses. Respondents have been categorised into three groups to help with summarising the results. Some of those responding by email did not follow the format of consultation questions. This meant that comparing the responses was not always possible. However, we were able to group all responses into themes.

Compared to the first consultation, there were fewer responses by approximately 40%. Most of the responses were from environmental interest groups (25 responses), within this group are fisheries groups, charities, environmental NGOs, community groups and individuals. Industry made up nearly a quarter of all responses (10 responses), this category includes marine fish farm operators/developers, aquaculture supply chain and trade bodies. Public bodies accounted for the remainder of the responses (6 responses), these included responses from local authorities, Crown Estate Scotland, public bodies and regulators. One of the responses submitted via the hub contained no answers, therefore, we have not included it in our results.



How we classified responses

Responses were classified based on whether the response indicated agreement with the question via a 'yes', 'no' or 'not answered' response. Questions were followed by the option to provide further detail explaining the response. From this we assessed the level of support, or otherwise, for each question. Table 1 shows how the responses were classified.

Table 1: How the responses were classified

Response category	Definition
Yes	Yes response, with either no comment or support expressed.
Yes conditionally	Yes response, but comments give conditions to which they agree. Or Yes/no not given, but comments indicate agreement.
No	No, with either no comment or support not expressed.
No conditionally	No, but comments give conditions to which they disagree. Or Yes/no not given, but comments indicate conditional disagreement.
No answer	No response.

Analysis of responses to consultation questions/themes

This section looks at the general responses received under each chapter, giving a breakdown of responses per type of respondent.

Support for the development of the framework

Table 2 shows the split between the type of respondent and their support for the development of the framework. Regulators/public bodies were unanimously in favour of the framework, yet industry and environmental interest groups had mixed opinions.

Table 2: Numbers of responses, by type, and their support for the development of the framework

Response category	Industry	Environmental interest groups	Regulators/public bodies
In favour	1	15	6
Conditionally in favour of framework		5	
Not in favour	5	2	
Conditionally not in favour of framework	4	3	

Risk assessment framework

Questions asked were:

- Q1 - Do you agree with our revisions to the WSPZ? If not, please explain why you disagree and what would be your alternative.
- Q2 - Do you have any additional information on, or suggestions how we could identify, important sea trout rivers in the West Coast, Western Isles and Northern Isles?
- Q3 - Do you have any suggestions to improve our screening models?
- Q4 - Do you have any suggestions on how we could better present the outputs of the models?
- Q5 - Do you agree with the proposed timetable? If not, please explain why you disagree and what would be your alternative?

- Q6 - Do you agree with our proposed risk assessment methodology? If not, please explain why you disagree and what would be your alternative?
- Q7 - Do you agree with our proposed approach to developing a risk assessment framework for sea trout? If not, please explain why you disagree and what would be your alternative?

Summary

Of the regulators/public bodies that responded to this question, all were in favour. Responses were divided within environmental interest groups and industry was generally not in favour.

Table 3: Support for the proposed risk assessment framework (Q1, 5, 6 and 7)

Response category	Industry	Environmental interest groups	Regulators/public bodies
Yes	10%	35%	50%
Yes conditionally	3%	2%	8%
No	50%	37%	
No conditionally	10%		
No answer	28%	26%	42%

Pre-application process

Questions asked were:

- Q8 - Do you agree with the proposed workflow for pre-applications? If not, please explain why you disagree and what would be your alternative?
- Q9 - Do you agree with the proposed timetable for the development of pre-application environmental assessment? If not, please explain why you disagree and what would be your alternative?

Summary

Regulators/public bodies were supportive in the approach to the pre-application process, yet industry and environmental interest groups were split in their opinions.

Table 4: Support for the pre-application process

Response category	Industry	Environmental interest groups	Regulators/public bodies
Yes	15%	34%	50%
Yes conditionally	15%	2%	
No	35%	32%	
No conditionally			
No answer	35%	32%	50%

Application for new or expanding farms

Questions asked were:

- Q10 - Do you agree with the way we have used the risk assessment matrix to identify where we will apply permit conditions for reporting and lice limits? If you disagree, please explain how you would apply the matrix and why this would deliver a better outcome?
- Q11 - Do you agree with our proposal for setting permit limits on the number of lice on a farm? If not, please explain why you disagree and what would be your alternative?
- Q12 - Do you agree with our proposal for applying a rolling average limit, and a maximum daily limit on the number of adult female sea lice? If not, please explain why you disagree and what would be your alternative?
- Q13 - Do you agree that it is proportionate to require enhanced sea lice counts at high-risk sites and that this should be delivered in due course via automated systems using artificial intelligence? Please give reasons for your answer.
- Q14 - Do you agree with how we propose to provide a level of protection until the end of June for sea trout on the West Coast and around the Western Isles while we develop a new risk framework for sea trout? If you disagree, please explain how you would apply the matrix and why this would deliver a better outcome?
- Q15 - Do you agree with how we propose to set permit conditions to protect sea trout populations? If not, please explain why you disagree and what would be your alternative?
- Q16 - Do you have any comments or suggestions on how we plan to phase in the framework? If so, please provide details.

- Q17 - Do you agree with the proposed timetable for permitting? If not, please explain why you disagree and what would be your alternative?

Summary

Responses were very mixed for the approach to applications for new or expanding farms.

Regulators and public bodies were supportive, but industry and environmental interest groups had a spread of responses with the majority being unsupportive.

Table 5: Support for SEPA's approach to applications of new or expanding farms (all except Q16 considered)

Response category	Industry	Environmental interest groups	Regulators/public bodies
Yes	11%	32%	50%
Yes conditionally	1%	1%	2%
No	44%	34%	
No conditionally	4%		
No answer	39%	33%	48%

Regulation of existing farms

Questions asked were:

- Q18 - Do you agree with our approach to monitoring and reporting conditions and the way we have used the risk assessment matrix to identify where we will add lice limits to permits? If you disagree, please explain how you would apply the matrix and why this would deliver a better outcome?
- Q19 - Do you have any existing evidence that could be used to assist assessments of the WSPZs where the sea lice exposure threshold is potentially being exceeded? Please add any files that could be used as evidence to assist assessments of these areas.
- Q20 - Would you be interested in collaborating with us in carrying out the assessments required to determine if action is required to reduce infective-stage sea lice concentrations in those WSPZs in which screening suggests the sea lice exposure threshold may be exceeded? If so, how would you be willing to contribute? If yes, please provide an email address so we can contact you.
- Q21 - Do you agree with the proposed timetable for introducing measures at existing farms? If not, please explain why you disagree and what would be your alternative?

Summary

Responses received were polarised, with industry and environmental groups being unsupportive of the approach and regulators/public bodies being unanimous in their support.

Table 6: Support for SEPA's approach to the regulation of existing farms (Q18 and 21)

Response category	Industry	Environmental interest groups	Regulators/public bodies
Yes	10%	14%	50%
Yes conditionally			
No	60%	56%	
No conditionally			
No answer	30%	30%	50%

Compliance assessment

Questions asked were:

- Q22 - Do you agree with the way we are proposing to use the risk assessment matrix to identify where we should focus our regulatory effort? If you disagree, please give your reasons and describe what you would propose instead?
- Q23 - Do you agree with the proposed timetable for our compliance work? If not, please explain why you disagree and what would be your alternative?

Summary

The response from industry was generally unsupportive of the approach to compliance assessment, with environmental interest groups and regulators/public bodies being mostly supportive.

Table 7: Support for SEPA's approach to compliance assessment

Response category	Industry	Environmental interest groups	Regulators/public bodies
Yes	15%	38%	50%
Yes conditionally		2%	8%
No	40%	28%	
No conditionally	5%		
No answer	40%	32%	42%

Environmental monitoring

Questions asked were:

- Q24 - Do you agree with how we propose to prioritise where we target effort under the first environmental monitoring strategy for the framework? If not, please explain your reasons and what you think we should do instead?
- Q25 - Do you think the focus of the monitoring strategy should be on the 5 types of monitoring listed? If not, please explain your reasons and what you propose instead or in addition?
- Q26 - Do you think that the proposed collaborative approach is the best mechanism for developing and delivering a monitoring plan? If not, please give your reasons and describe what you would propose instead?
- Q27 - Are there other bodies and organisations you think would be interested assisting with a collaborative approach to environmental monitoring? If so, please can you say who they are and how you think they could contribute?
- Q28 - Do you agree with the proposed timetable for the development of the Framework monitoring plans? If not, please explain why you disagree and what would be your alternative?

Summary

Table 8 shows the levels of support for the approach to monitoring. Mixed views were held across all groups, with public bodies/regulators being the most supportive of the proposals. Environmental interest groups and industry were generally unsupportive of the proposals.

In terms of collaboration of those who responded to the question, 96% were in favour of the proposed collaborative approach.

Only 33% of those who responded on the proposed timetable for monitoring plans were supportive of the plans. This group was from a mix of respondent types.

Table 8: Support for SEPA's approach to environmental monitoring

Response category	Industry	Environmental interest groups	Regulators/public bodies
Yes	15%	20%	42%
Yes conditionally	5%	4%	17%
No	35%	50%	8%
No conditionally	5%		
No answer	40%	32%	33%

Making data available

Questions asked were:

- Q29 - Do you agree with the proposed timetable for improving accessibility of information collected in implementing the framework? If not, please explain why you disagree and what would be your alternative?

Summary

Industry and public bodies/regulators were broadly supportive of the proposals under making data available. Mixed views were received from environmental interests groups.

Table 9: Support for making data available

Response category	Industry	Environmental interest groups	Regulators/public bodies
Yes	30%	20%	50%
Yes conditionally	30%		
No		44%	
No conditionally			
No answer	40%	36%	50%

Alphabetical list of respondents

Argyll and Bute Council
 Argyll District Salmon Fishery Board & Argyll Fisheries Trust
 Atlantic Salmon Trust
 Ayrshire Rivers Trust
 Bakkafrost Scotland
 British Trout Association
 Callender McDowell
 Coastal Communities Network
 Cooke Aquaculture Scotland
 Crown Estate Scotland
 Fidra
 Fish Legal
 Fisheries Management Scotland
 Kames
 Loch Duart
 MOWI Scotland
 NatureScot
 Organic Sea Harvest
 Orkney Islands Council
 Orkney Trout Fishing Association
 Outer Hebrides Fisheries Trust
 Private individuals
 River Ayr District Salmon Fishery Board
 River Doon District Salmon Fishery Board
 River Stinchar District Salmon Fishery Board
 River Tweed Commission

Salar Pursuits Limited
Salmon Scotland
Scottish Anglers National Association
Scottish Environment LINK
Scottish Sea Farms
Shetland Islands Council
Skye and Lochalsh Rivers Trust
The Scottish Association for Marine Science (SAMS)
West Sutherland Fisheries Trust
Western isles District Salmon Fisheries Board
Wild Fish

Annex II: List of prioritised WSPZs and farms in the highest relative-risk category

This Annex provides information on the names and locations of WSPZs prioritised for further assessment and farms in the highest relative-risk category of the matrix.

The information is based on an initial screening assessment of 164 farms identified as active on Scotland's Aquaculture Website or that have recently been authorised on the West Coast and Western Isles. The assessment:

- Used the full screening model, including the virtual salmon post-smolt model.
- Assumed each farm was in operation and holding its estimated maximum number of farmed fish. The latter was estimated from the maximum permitted biomass.
- Assumed each farm had an average of 0.4 adult female sea lice per fish.

The initial assessment describes the relative risk based on the scenario of all farms operating as described above. The actual sea lice numbers on the farms (which may be higher or lower than the default assumption used for initial screening) will be considered as part of further assessment. This will include accounting for any mitigation built into the operation of the farms, such as timing growth periods at sea to ensure the farm has no, or only low numbers of, sea lice during the sea lice control period for protecting wild salmon. Consequently, the lists of prioritised WSPZs and farms in the highest relative-risk category may change based on further assessment.

Relative risk in the context of the current assessment refers only to the predicted degree to which a farm would be likely to contribute to exposure to wild salmon post-smolts if operated according to the default assumptions. It does not mean that a farm characterised as being in the highest relative risk category is causing an adverse effect on wild salmon populations or that adverse impacts on wild salmon are occurring in WSPZs prioritised for further assessment.

Table A: List of prioritised Wild Salmon Protection Zones

WSPZ Name	Main sea areas within WSPZ
Fyne ¹⁷ (see also footnote 19)	Sound of Bute, Kilbrannan Sound, Loch Fyne
Jura	Sound of Shuna, Loch Crinan, Sound of Jura North
Linnhe ¹⁸	Loch Feochan, Sound of Kerrera and Oban Bay, Loch Aline, Loch Leven, Firth of Lorn (North), Loch Etive, Loch Creran, Sound of Mull, Loch Sunart, Loch Spelve, Loch Linnhe, Firth of Lorn South
East Skye	Sound of Raasay, Inner Sound, Sound of Sleat, Broadford Bay, Loch Alsh, Loch Portree, Loch Sligachan, Loch Hourn, Loch Nevis, Loch Duich, Loch Long (Alsh), Loch Carron
Loch a Siar	Loch a Siar, Gob an Tobha to Rubha Huisinis
Loch Claidh	Loch Claidh, Loch Seaforth
Loch Braccadale	Loch Braccadale, Loch Harport
Loch Torridon	Loch Torridon

¹⁷ Appendix 3 of our second consultation showed the results of a more bespoke screening modelling assessment for the Loch Fyne WSPZ. This used the virtual salmon post-smolt model and reported data on average numbers of adult female sea lice per farmed fish for each farm rather than the default assumption that all farms were stocked and had 0.4 adult female sea lice per fish used for initial screening. That assessment concluded that coordinated production cycle timings and effective sea lice management on the farms in the WSPZ (most of the farms were operating at less than 0.4 adult female sea lice per fish for all, or most of, the relevant period in 2021 and 2022) mean that, in even years, the risk from sea lice to wild salmon post-smolts is likely to be very low. In odd years, further assessment is needed. Screening suggested that exposures to infective-stage sea lice in 2021 might have been close to the sea lice exposure threshold.

¹⁸ Appendix 3 of our second consultation shows the results of a more bespoke screening modelling assessment for the Loch Linnhe WSPZ. As with that for the Loch Fyne WSPZ, this used reported data on the average number of adult female sea lice per fish for each farm for 2021 and 2022 rather than the default assumptions.

Table B: List of farms initial screening indicates may be in the highest relative risk category

Licenced farm name	Licenced site ID	Licence number	Maximum biomass (tonnes)
Ardcastle (see footnote 17)	FFMC43	CAR/L/1010775	1752
Ardgaddan (see footnote 17)	FFMC47	CAR/L/1010817	2381
Bagh Dail nan Ceann North and South	FFMC54	CAR/L/1004226	3000
Camas an Leim (Torridon)	CAL1	CAR/L/1010002	2500
Loch Duich	DUI1	CAR/L/1010433	2500
Gorsten (see footnote 18)	GORS1	CAR/L/1009968	2500
Meall Mhor (see footnote 17)	FFMC14	CAR/L/1015860	1345
North Kilbrannan ¹⁹	NKBN1	CAR/L/1168182	2475
Noster	NOS1	CAR/L/1009974	2200
Poll na Gille	FFMC34	CAR/L/1000800	2500
Portnalong	PORL1	CAR/L/1002889	2000
Rubh an Trilleachain	RTRI1	CAR/L/1109280	2500
Scalpay	SCLP1	CAR/L/1156482	2500
Seaforth	SEA5	CAR/L/1009963	2110
Soay Sound	SOAY1	CAR/L/1004053	2300
Strondoir Bay (see footnote 17)	FFMC70	CAR/L/1003721	1767
Tarbert South (see footnote 17)	FFMC49	CAR/L/1010476	1568
Trilleachan Mor	TRM1	CAR/L/1013016	2130
West Strome	WSTR1	CAR/L/1100544	2000

Notes to Table B and Figure B:

The farms listed in Table B and shown in Figure C were identified based on the initial screening assessment, which uses the default assumptions about number of fish on the farms and on the average number of female sea lice per fish. Being in the high relative risk category means that:

- the level of exposure of wild salmon post-smolts to infective-stage sea lice is expected to be more sensitive to increases in the number of sea lice on a farm on the list than to the same increase in sea lice on a farm in one of the other relative risk categories.
- Under the default assumptions and notwithstanding any mitigation, a farm on the list will use more of the capacity of the WSPZ to accommodate sea lice than a farm in any other relative risk category.

¹⁹ The North Kilbrannan farm in the Loch Fyne WPZ was granted planning consent at the end of November 2023 shortly before publication of this response. The farm will be fallow each alternate year of production during the wild salmon post-smolt migration period. In these alternate years, the farm will be in the lowest relative-risk category. This mitigation is of significance in the context of the risk status of the WSPZ and will be evaluated early in the further assessment process. See also footnote 17.

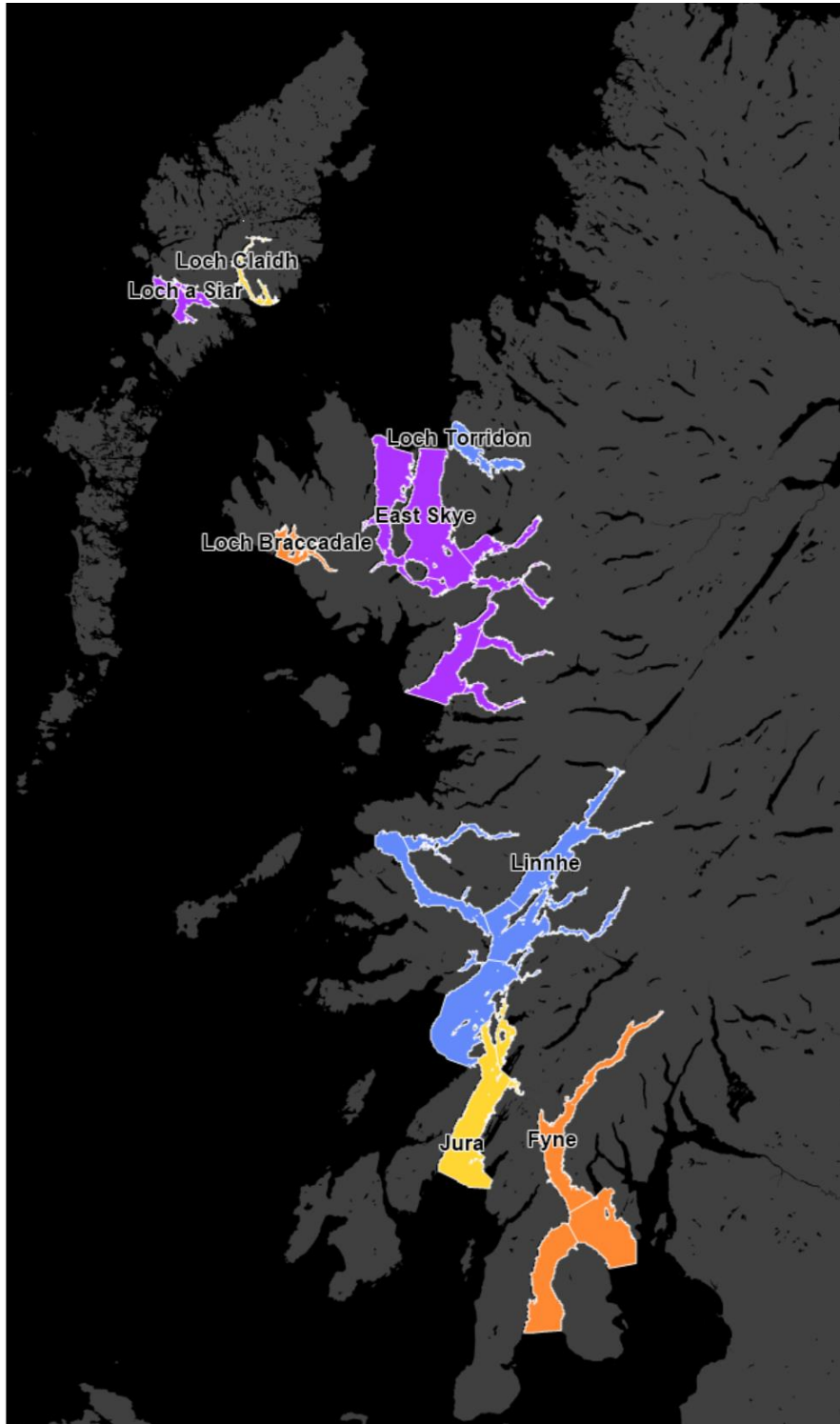


Figure A: Map showing location of prioritised WSPZs

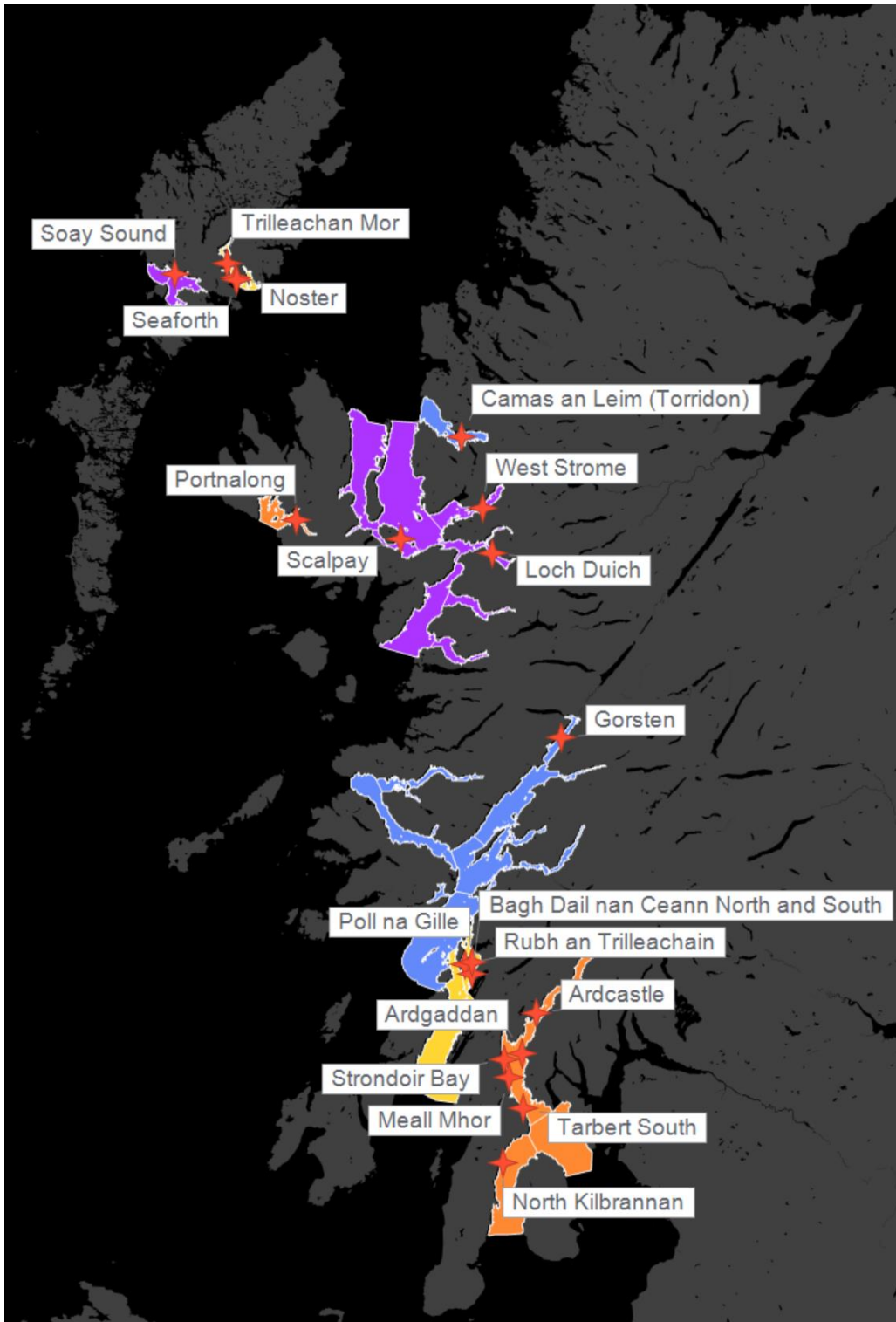


Figure B: Map showing location of farms characterised as posing the highest relative-risk.

For information on accessing this document in an alternative format or language, please contact SEPA by emailing equalities@sepa.org.uk

If you are a user of British Sign Language (BSL), the Contact Scotland BSL service gives you access to an online interpreter, enabling you to communicate with us using sign language.

contactscotland-bsl.org