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Legislative Review of Salmon Farming in the Falkland Islands

REPORT FOR DIRECTORATE OF NATURAL RESOURCES, FALKLANDS ISLAND GOVERNMENT

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Abbreviations and Acronyms

ABM	**Area-Based Management**
ADDs	Acoustic Deterrent Device(s)
ASC	Aquaculture Stewardship Council
ASI	Accreditation Services International
AZE	Allowable Zone of Effect
BAP	Best Aquaculture Practices
BEMPs	Broadscale Environmental Monitoring Programs
CAB	Conformity Assessment Body
CEN	European Committee for Standardisation
EIA	Environmental Impact Assessment
EU	European Union
FCR	Feed Conversion Ratio
FFVA	The Faroese Food and Veterinary Authority
FHI	Fish Health Inspectorate
FIG	Falkland Islands Government
GAA BAP	Global Aquaculture Alliance Best Aquaculture Practice
GDP	Gross Domestic Product
GLFA	General Law of Fisheries and Aquaculture
ha	Hectare(s)
INCAR	Interdisciplinary Center for Aquaculture Research
m	Metre(s)
MAB	Maximum Allowable Biomass
MEP	MacAlister Elliott and Partners
MMA	Marine Managed Area
MT	Million tonnes
NFSA	Norwegian Food Safety Authority
NGO	Non-governmental organisation
NMNRs	National Marine Nature Reserves
OECD	The Organisation for Economic Cooperation and Development
RAS	Recirculating Aquaculture Systems
SMZs	Sustainable Multi-Use Zones
SSPO	Scottish Salmon Producer's Organisation
UK	United Kingdom
WHO	World Health Organization

Executive Summary

This report has been compiled by Macalister Elliott and Partners Ltd (MEP) on behalf of the Falkland Islands Government (FIG). The Falkland Islands are considering the potential for commercial-scale salmon farming operations in the future and have commissioned a series of studies to determine the environmental impacts, best practices and legislative requirements for a salmon farming industry.

This report is part of a broader suite of studies commissioned by FIG to explore the potential for salmon aquaculture in the Falklands. It focuses specifically on legislative and regulatory considerations, drawing on international best practices and applying a precautionary lens. While comparisons are made with other jurisdictions, the recommendations are intended to be adaptable to the Falklands' unique context. This report does not assess commercial feasibility, but instead outlines legislative structures and regulatory options that align with precautionary principles and international environmental governance standards.

Currently, a relatively simple regulatory system exists in the Falklands for aquaculture development, and this is a reflection of a lack of activity in the sector. However, there have been approaches to FIG from commercial organisations who see salmon farming as having potential in the islands. The current system is controlled through a general planning system and two key pieces of regulation, the Fish Farming Ordinance, and the Fishery Products Ordinance. The general process for significant salmon farming developments is currently untested but would involve an application for planning, the completion of an EIA and then the provision of a Fish Farming licence with conditions raised, as seen as applicable by FIG.

To provide regulatory comparisons for the Falklands, the current systems employed in Scotland, the Faroe Islands, Norway, and Chile were considered in detail.

Scotland is a major player in European aquaculture, particularly in Atlantic salmon farming, which significantly contributes to the national economy and coastal employment. In response to environmental concerns and regulatory gaps highlighted by parliamentary inquiries, the Scottish Government launched a reform of the sector, culminating in the 2023 "Vision for Sustainable Aquaculture" and an ongoing update of the National Marine Plan (NMP2). The regulatory framework for salmon farming in Scotland is comprehensive and multi-layered, involving seabed leasing through Crown Estate Scotland, environmental and social impact assessments (ESIA), planning permission from local authorities, Controlled Activities Regulation (CAR) licences from SEPA, Marine Licences from Marine Scotland, and Aquaculture Production Business (APB) authorisation for fish health compliance. These measures aim to ensure environmentally sustainable growth, mitigate ecological impacts, and incorporate community and stakeholder input, while stricter enforcement and clearer regulatory timelines have been urged to address rising fish mortality and environmental degradation.

The Faroe Islands, a small North Atlantic archipelago, has rapidly developed a successful salmon farming industry, producing over 115,000 tonnes in 2022. Once devastated by disease outbreaks in the early 2000s, the sector is now seen as a global benchmark for sustainability and biosecurity. The regulatory framework, overseen by the Faroese Ministry of Trade and its agencies, is underpinned by strict rules within designated Management Zones (MZs), including single-company control, all-in/all-out production, mandatory fallowing, and health inspections. Innovative practices such as the use of non-chemical lice treatments, reduced cage grow-out times through larger land-raised smolts, and

deep-sea farming trials have placed the Faroes at the forefront of sustainable aquaculture. While expansion is limited by the fixed number of MZs, future growth is likely to come from technological innovation and offshore site development, offering valuable insights for other remote island nations considering aquaculture.

Norway, the world's largest producer of farmed salmon, contributes over half of global supply and operates under a highly structured legal framework centred on the Aquaculture Act (2005). While Norway's scale, infrastructure, and institutional capacity differ significantly from the Falklands, its inclusion in this report is intended to highlight the evolution of a mature regulatory system and the use of adaptive management tools. These offer useful insights into how environmental performance can be integrated into licensing and oversight frameworks, even if direct transferability is limited.

Salmon farming mainly occurs in open net pens along Norway's vast coastline, with land-based hatcheries using Recirculating Aquaculture Systems. Licences—often awarded via competitive auction—are indefinite but tightly regulated through the Traffic Light System, which adjusts production based on environmental performance, particularly sea lice levels. Norway promotes innovation and sustainability through green and development licences, and mandates rigorous environmental monitoring, including seabed and water quality assessments. Despite facing challenges like sea lice resistance and waste management, Norway has led a shift toward non-chemical treatments and strengthened waste and plastic controls. Economic policies include taxes on production and profits, with funds supporting local communities and research. The 2022 strategy, *A Sea of Opportunities*, aims to simplify regulations, introduce fixed-term licences, and improve transparency. Norway's regulatory approach, aligned with EU directives, reflects a dynamic balance between economic growth, environmental protection, and social trust.

Chile, the world's second-largest producer of farmed salmon, has seen rapid aquaculture expansion over the past 30 years, bringing substantial economic benefits but also serious environmental and social challenges. Although Chile's political and governance context is not directly comparable to the Falklands, its experience offers important cautionary lessons. The environmental and social challenges that emerged during Chile's rapid expansion—particularly around antibiotic use, escapees, and stakeholder conflict—underscore the importance of proactive regulation and phased development.

Governed by the General Fisheries and Aquaculture Law and overseen by agencies like SUBPESCA and SERNAPESCA, Chile's regulatory framework has evolved in response to crises, notably the 2007 ISA outbreak, which prompted a moratorium on new concessions. Key concerns include heavy antibiotic use, chemical pollution, fish escapes, and conflicts with indigenous communities. Recent reforms aim to enhance environmental monitoring, waste management, and transparency, with a new aquaculture law on the works and expected to be promulgated sometime in 2025. The government is also addressing social issues, such as indigenous rights and community consultation, while supporting moves towards sustainability through stricter enforcement and innovation. However, balancing economic growth with ecological protection remains a pressing challenge for Chile's salmon farming sector.

These case studies were selected not as direct templates, but as illustrative examples of how different jurisdictions have responded to the environmental, social, and regulatory challenges of salmon aquaculture. While the Falklands differ significantly in scale, geography, and institutional capacity, the lessons drawn from these systems can inform a tailored, context-appropriate regulatory framework. Accordingly, the recommendations presented in this report are not fixed or

inflexible conditions, but a precautionary framework intended to guide future policy development. Their implementation should be informed by local feasibility, stakeholder input, and phased progression. This report does not assess commercial viability, which is outside its scope, but recognises that practicality and proportionality will be essential considerations in any future decision-making.

MEP has reviewed the current legislation in place in the Falkland Islands and has proposed a series of recommendations, drawing on best practices from international regulatory frameworks. These recommendations aim to support the development of a high-standard regulatory system that could be implemented should salmon farming be approved in the future.

A maximum biomass limit: Should salmon farming be permitted, it is recommended that a maximum harvestable biomass limit be established through regulation. This limit should be provisional and subject to ongoing review, particularly as site-specific environmental data becomes available. While modelling exercises by MEP have provided indicative figures, these should not be treated as fixed thresholds. Instead, biomass limits should be informed by detailed site-level assessments of environmental carrying capacity, with adjustments made as necessary to reflect cumulative impacts, production cycles, and evolving understanding of local conditions. This approach reflects the application of the precautionary principle and aligns with international best practice in early-stage aquaculture development. We nonetheless advise applying the precautionary principle by starting with a low biomass threshold, subject to regular review. An absolute upper limit should still be established to offer assurance to stakeholders on the intended scale of development.

Sterile fish only: Given the introduction of Atlantic salmon poses ecological risks as a non-native species, it is recommended that only sterile fish are used. Currently, triploidy inducement is the most widely used method to achieve sterility, though it is not without challenges, including variable performance and deformity rates. However, recent research suggests that outcomes can be improved through optimised hatchery conditions and tailored nutrition. All-female stock may also offer a viable alternative, and both approaches should be considered within a broader risk mitigation strategy. While escapes are rare, the use of sterile fish provides an added safeguard and aligns with international examples of best practice in sensitive or isolated ecosystems..

Certification as a requirement: All farms should be required to align with the principles and best practices outlined in the ASC certification requirements. These are considered the highest standard globally and would ensure that farms are operating at the highest possible levels. While full certification may not be immediately achievable, using ASC as a benchmark would help ensure that farms operate to the highest possible environmental and social standards.

The potential to insist on organic production only was considered in detail but was not seen as possible since the standards do not allow for the use of non-native species unless they have been produced in the country for over ten (10) years (which is clearly not the case in the Falklands).

Marine Zoning, all in-all out and significant fallowing: The best parts of the Faroe Islands legislation have been used to attempt to reduce the concerns specifically around sea lice. These have proven successful in the Faroes and would be well employed in the Falklands.

Minimum Smolt size: We are recommending that a minimum size limit of 400 grams (g) is set in the regulations for a smolt stocking size to cages in the Falklands. A clear trend is being seen globally in

the production of larger and larger smolts in land-based systems. However, no country has introduced regulatory size limits around this, something we think that could start in the Falklands.

Some key next steps are required and are summarised by the four key recommendations set out below.

Recommendation 1: FIG Agreement on Approach: A general agreement is first required from FIG on the approach and way forward. MEP has set out its suggested approach and recommends this is discussed with FIG and a broad level of agreement set as a starting point[1].

Recommendation 2: Faroe Island Visit: MEP sees significant synergies between the Falklands Islands and the industry which has developed in the Faroe Islands. The two states are very similar in many ways, and the Faroes has attempted to maintain 'high standards' within its sector. Despite the obvious complication of organising a visit to the Faroe Islands, we do believe that this would be highly beneficial for key members of the FIG. It would allow the processes employed in the Faroes to be seen first-hand and for discussions to be held directly with key legislators in the country. MEP would be able to help organise such a visit should it be agreed as a good next step.

Recommendation 3: Stakeholder Discussion and Review: The decision to allow or not allow future salmon farming in the Falklands is clearly one that needs to involve discussions with stakeholders. Firstly, the island residents will need to be consulted and concerns and questions addressed. Once the proposed approach set out in the document is agreed in FIG, MEP would suggest that we attend such stakeholder meetings in the Falklands.

Also of importance is that the potential industry stakeholders are also consulted on the potential changes (specifically, Unity Marine). The introduction of new rules for potential salmon farming in the Falklands would be pointless if no commercial organisation would be prepared to undertake farming because the rules are too onerous or cannot be achieved.

While this report does not assess commercial interest or viability, it recognises that regulatory frameworks must be both robust and implementable. Stakeholder feedback, including from potential operators, will be essential to ensure that proposed standards are both precautionary and practicable.

Following a period of stakeholder consultation with all parties, it is likely that key amendments would need to be made to the suggested legislation and processes which are set out here.

Recommendation 4: Development of Policy and Legislation: Should agreement be made on the policy and legislation and a decision made to move forward with salmon farming, then the next stage would be the development of the specific ordinance and frameworks required under the Falklands legal system.

Finally, it must be stressed that this report is not designed to advocate either for or against the commencement of large-scale salmon farming in the Falkland Islands. As with virtually any anthropogenic activity, salmon farming will produce negative outcomes (as well as positive outcomes) which some stakeholders find acceptable, and others do not. The final decision on

[1] This does not mean that agreement is required on whether to allow salmon farming but that the possible approach should it be allowed is generally accepted.

whether these outcomes are acceptable or not will need to be taken by the FIG (following consultation). However, this report has attempted to set out a potential regulatory system which would present a 'best practice' approach to cage-based salmon farming within a relatively small archipelago and acknowledging what could be a small (globally) but significant industry for the Islands.

1. Introduction

This report is an update on the report that has been compiled by Macalister Elliott and Partners Ltd (MEP) on behalf of the Falkland Islands Government (FIG). MEP is a UK-based fisheries and aquaculture consultancy which has been operating since 1977.

The Falkland Islands are considering the potential for commercial-scale salmon farming operations in the future. The waters of the Falklands are considered well suited to salmon farming and approaches have been made to the authorities by interested parties previously.

The potential for commencing commercial salmon farming would create additional revenue for the government and create jobs for islanders. However, salmon farming globally has also seen some significant environmental concerns raised.

This report represents the second in a series of studies commissioned by FIG to inform decision-making around salmon aquaculture. The first report—*Environmental Impacts and Best Practice Mitigations*—provided an initial assessment of the potential environmental impacts of salmon farming and included a detailed overview of what the negative impacts of salmon farming are and how these have been experienced by other countries in the development of the sector. It then presented some recommendations on potential development options within the Falkland Islands.

This second report specifically focuses on the legislative and regulatory dimensions of salmon farming. Its aim is to provide recommendations on how the Falklands' current legal framework could be improved/developed to ensure the highest standards of production could be obtained (should it be decided to move forward with commercial aquaculture production in the Islands). To inform this legislative review, four case studies have been considered for production in Scotland, the Faroe Islands, Norway and Chile. All of these countries have shown significant growth in salmon farming in the past two decades but operate quite different legislative requirements. The final part of the report makes recommendations on how current Falklands legislation could be developed to allow for best practices to be adopted in the future.

Finally, it is important to state from the outset that no aquaculture production of farmed salmon is entirely without impact on the environment. As with any anthropogenic process, it is inevitable that some negative impacts will occur within the environment. However, the aim of this review is to provide approaches which can minimise and mitigate these negative outcomes to the greatest degree possible but within the context of allowing a commercial salmon farming industry to develop (albeit at a controlled level).

2. Current Legislative System in the Falklands

2.1. National Vision and Policy

The Falklands has developed the Falklands Islands Development Plan (2015), which aims to provide a 'structure' for the future spatial development of the Islands. Under this plan, aquaculture development is covered by SP8: Rivers, Coastal Areas and Territorial Sea. Here it states;

'Both marine and freshwater aquaculture proposals, together with any associated proposal on land, will;

1. *Be considered against the impact on marine ecology, biodiversity and heritage resources, water quality and catchment and visual amenity and landscape/coastal quality; and*
2. *Only be supported where they demonstrate no significant adverse impact on the environment and how any structures are to be removed and the land reinstated if/when no longer in use.'*

Under Point 5.25 a further discussion on aquaculture is included and mentions that aquaculture is a possible growth area to help diversify the economy of the Falkland Islands. However, the remaining discussion relates mainly to the environmental concerns of aquaculture and states that;

'The primary objective therefore is to ensure that the development of marine farming can be undertaken sustainably with no undue impact on native species.'

The term "no significant adverse impact" is commonly used in environmental planning frameworks, but its practical application depends on clear criteria. These are typically defined through Environmental Impact Assessment (EIA) processes, which consider factors such as the magnitude, duration, reversibility, and cumulative nature of impacts. At present, the Development Plan does not provide a specific definition or threshold for what constitutes a "significant" impact.

No formal Government policy exists for the development of aquaculture in the Falkland Islands. In fairness, this is recognised by the FIG and is one of the reasons this work has been commissioned. If salmon farming were to be developed, it would be considered wise for this 'framework for aquaculture development' to be further expanded to recognise what the FIG classes as sustainable and not creating undue impact. After all, it is the basis of this development plan, which will create the basis for decisions to be made under the planning process.

2.2. Relevant Legislative framework for salmon farming

Step 1: Seabed ownership and lease

In most countries that have cage-based aquaculture, it is a requirement for the applicant to first rent the planned seabed site from a national agency which is responsible for its control and development. The seabed in the Falkland Islands is, as in the UK, owned by the Crown (see The Falkland Islands (Territorial Sea) Order 1989[2]). The Order provides for territorial waters to extend to 12 nautical miles (nm) from the baseline. In the UK, the Crown Estate is managed by a statutory corporation of the same name. There is no such body in the Falkland Islands.

[2] The Falkland Islands (Territorial Sea) Order 1989

Under the Falkland Islands Constitution[3], the authority for disposal of Crown land, including the seabed, rests with the Governor, ordinarily acting on the advice of the Falkland Islands' Executive Council. The Falkland Islands Government does not have any detailed/established policy in relation to authorising use of the seabed on behalf of the Crown (i.e., distinct from any statutory measures in place to control the exploitation of natural resources *in connection with* the sea/seabed (e.g., the Fish Farming Ordinance). This is therefore, an area which would need policy development.

In terms of who would be responsible for developing that policy, the Falkland Islands Government does not have a lands officer or department; instead, responsibilities for the development of policies in connection with disposal of land, including the seabed, and the administration of that process, lie across several Directorates; (a) Law and Regulation; (b) Public Works; (c) Policy, Economic and Corporate Services; and (d) Natural Resources.

Step 2: Planning Permission (& EIA)

The planning process is the main tool used globally for the issuance of aquaculture licenses and this is currently also the case in the Falkland Islands.

The process of Planning Permission on the Falkland Islands is governed by the Planning Ordinance 1991. This document sets out the process for applying for planning, how it is considered and the outcomes, appeals and enforcement actions which exist. The actual planning process is overseen by the Falkland Islands Government Planning and Building Services (PBS).

Salmon farming activities are specifically covered under the Planning Ordinance under Section 26 (Meaning of 'Development'). Here, it is clearly stated that the *'placing or assembly of any tank, cage, frame… for the purpose of fish farming'* should be considered as development which requires planning permission to be granted. In consideration of this, it is clear that all salmon farming activities would need planning permission to be granted under the Planning Ordinance 1991.

The planning system in the Falklands is currently operated through a web page on which all forms, requirements and applications are placed. A single application form currently exists for all planning types and was updated in 2021. No specific form exists for an aquaculture application, but this is by no means surprising since only one application has been made to date (that by the Falkland Islands Fish Company). Reviewing this previous application confirms that the standard form was completed for this purpose (although it is also true to state that this application form really is not fit for purpose for major fish farm applications to be made in the future).

With a planning application form, a fee is also required to be submitted. The fees depend on the application.

Decisions on planning applications are made based on the current Falkland Islands Development Plan, which was adopted in 2015 and has already been discussed above (it has limited direction for planning in relation to sustainability and no undue impact at present).

The other requirements for seeking planning permission are relatively standard, with requirements on publicising plans in advance and ensuring all representations are considered. No specific

[3] See Section 73 of the Falkland Islands Legislation

requirements are made in relation to aquaculture, except for the acknowledgement in Section 39, which states that;

"Subject to the following subsections, an application for planning permission for exploration for or winning and working of minerals or an application for planning permission for fish farming must be determined by the Governor."

In essence, this places aquaculture development on a similar level to mineral extraction in the islands and requires approval at the highest level of the FIG.

The Planning Ordinance though, does specify that planning permission may require the completion of an Environmental Impact Assessment (EIA). The requirements on what is required under this EIA are very broad and simply allow the authorities to vary the requirements as they see fit. Although it is not specifically stated, it is clear that applying for planning for a salmon farming operation would require an EIA to be completed in line with the planning process. As will be seen in the case study below for what is required in an EIA for an operation setting up in Scotland, it is common practice to provide quite prescriptive requirements on what the EIA should cover within the legal regulations. This is something that will need to be developed within the Falklands regulations.

Step 3: Fish Farming Ordinance

In 2006, a new piece of legislation was passed in relation to aquaculture, called the Fish Farming Ordinance (Ordinance No. 20 of 2006). This regulation aims to set out the rules and regulations in connection with aquaculture production in the Falkland Islands. It includes requirements on who and what can apply for a fish farming licence, what pre-requisites are required (i.e., planning), and some other generic requirements.

In general, the ordinance provides some important general legislative rules which are required to manage any aquaculture sector. For example, the ability to provide, invoke and suspend licences, to enforce and inspect requirements and what happens when licences are cancelled (to name a few). The requirements though do not provide any technical legislation on what is and isn't allowed for fish farming activities in the Falkland Islands.

Some key points of the Fish Farming Ordinance are as follows

1. That a licence can only be issued to a qualifying company (a company which has 25% or more of its share capital invested in a company or person(s) which have legal status in the Falklands).
2. That Planning permission is a prerequisite that is required before any licence will be issued.
3. That submitting an application should include;
   a. A map of the waters for which the licence is sought
   b. Details of the operation being completed
   c. Any equipment to be used
   d. A business plan
   e. Information on the source of financing and beneficial owners
4. The licence will run for an indeterminate period (no specific period is provided)
5. That any licence must result in the commencement of activity within five (5) years
6. That conditions may be imposed on the licence as seen fit by FIG

7. That the licence holder may have to pay royalty licences as may be prescribed (no specific rates for royalties are provided).

As previously mentioned, the requirements set out under the Fish Farming Ordinance cover many of the basic requirements for enforcing aquaculture legislation in the Falklands. They though are not clearly integrated into the full approval system and miss significant technical requirements which would form the backbone of sustainable production in the Falklands. This is discussed in more detail in Section 5 of this report.

Stage 4: Fishery Products Ordinance

The Falklands brought legislation into force in 2006 relating to fishery products (the Fishery Products Ordinance (Ordinance No 21.). These regulations are mainly relating to the production of shellfish but do also provide general rules relating to permission to discharge and the control of disease, which are poignant and require further consideration here.

Permission to Discharge

Part 2 of the Fishery Products Ordinance 2006 provides for pollution controls to potentially be put in place in relation to waters designated as controlled waters. However, no waters have currently received such designation under the Fish Farming Ordinance, nor have any notices been issued or regulations made to put any pollution controls in place (i.e., there are currently no prohibitions under this legislation). A licence permitting the discharge of wastes may be applied for and must be supported by relevant evidence (we presume an EIA). Since salmon farming will naturally release effluent into the water, we can only presume that this legislation would be appropriate and would require any salmon farm to receive a consent to discharge.

The process set out here is the same basic one that is governed by the CAR process in Scotland (effectively providing permission to pollute). However, the legislation is not really set up to deal with salmon farming and so would require additions to make it fit for purpose.

Control of Disease

The regulations require any person who observes abnormal mortality in fish or shellfish to notify the authorities as quickly as possible. Should the authority have reasonable grounds for suspecting disease, the regulations then give them the ability to prohibit the sale and, if required, instruct the destruction of the contaminated/infected fish/shellfish.

The above are important requirements within any regulatory environment for ensuring that only healthy fish enter the market and are removed as required to avoid the spread of further infection. However, this is very much the most basic level of disease control that can exist and we make much stronger regulatory recommendations specifically for salmon farming in Section 5 of this report.

Live Fish Introduction

Section 28 places a prohibition on the introduction of live fish or eggs into the Falklands unless accompanied by documents confirming they are from an area free from disease. This will be an important factor if salmon eggs are to be imported initially.

In general terms, the Fishery Products Ordinance provides quite basic regulatory requirements covering both fisheries and aquaculture and a wide plethora of requirements from water classification to hygiene and quarantine requirements. However, its relationship with the Fish Farming Ordinance is less clear and will need further consideration as the legislation is developed.

Other relevant legislation

Maritime Ordinance 2017[4]

Part 14 of the Maritime Ordinance contains controls on dumping and deposits at sea. These controls were primarily driven by the implementation of the Dumping at Sea Convention, which are, in very general terms, similar to controls contained in the Food and Environment Act 1985 (which were repealed by the Marine and Coastal Access Act 2009).

Fish farming activities are potentially subject to such controls under the Maritime Ordinance. However, attention should also be paid to the Deposits in the Sea (Exemptions) Order 1995[5] This Order was made under the Marine Environment Protection Ordinance 1995, which is a predecessor to Part 14 of the Maritime Ordinance. Its provisions are preserved for as long as they are consistent with the Maritime Ordinance.

In particular, Paragraphs 10 and 11 of the Exemption Order, which have particular relevance to fish farming, state exemptions for the:

"*10. Deposit of any substance or article (otherwise than for the purpose of disposal) in the course of, for the purpose of, or in connection with, the propagation or cultivation of fish or shellfish.*

11. Deposit (by way of return to the sea) of any substance or article dredged from the sea-bed in connection with the propagation or cultivation of shellfish."

These exemptions are crucial for fish farming operations as they allow for certain activities related to the cultivation of fish and shellfish to proceed without the need for a specific license, provided they meet the conditions outlined in the Exemption Order.

Nature Reserves

The Falkland Islands has a number of nature reserves in coastal areas. Although most of the nature reserves were designated many years ago, and are subject to relatively minimal controls, those nature reserves continue in force under the Conservation of Wildlife and Nature Ordinance 1999[6]. The presence of nature reserves will affect the planning for salmon farming.

Proposed Marine Managed Areas

Similar to the above, although not yet legislation, a project to introduce Marine Managed Areas (MMA's) in the Falkland Islands is well progressed[7], with a consultation on the proposed MMA's of the Falkland Islands run between March and May 2022. The policy for MMA's is currently being drafted and is under review, anticipated to be approved by the end of 2025. This current draft (as made available to MEP) currently suggests that aquaculture activities would be prohibited within all

[4] See relevant legislation for the Maritime Ordinance (2017)
[5] See Deposits in the Sea (Exemptions) Order 1995
[6] Refer to the Conservation of Wildlife and Nature Ordinance (1999)
[7] The latest consultation reports are available at the Falklands Island Government website, see Marine Managed Areas – Consultation Report

proposed MMA's and this would therefore need to be carefully considered in the event of sector development.

3. Case Studies

3.1 Scottish Salmon Farming

3.1.1. National Vision and Policy

National Vision for Aquaculture

Scotland is one of the leading regions for aquaculture in Europe, mainly known for farming Atlantic salmon. The industry provides a significant boost to the economy, bringing in major export revenue and providing thousands of jobs in coastal areas. Most farms are on the west and northwest coasts due to planning restrictions[8].

After two major parliamentary inquiries in 2018, the first by the Environment, Climate Change and Land Reform (ECCLR) Committee[9] and the second by the Rural Economy and Connectivity (REC) Committee[10], the Scottish Government launched a thorough review of aquaculture regulations. This resulted in the creation of the Scottish Aquaculture Committee and the release of the "Vision for Sustainable Aquaculture" in July 2023[11]. The vision sets out a roadmap for the industry up to 2045, focusing on sustainable growth, protecting the environment, and balancing industry needs with those of local communities and environmental groups.

National Policy

Scotland's National Marine Plan (NMP), established in 2015[12], provides a strategic framework for the sustainable development of marine resources, including aquaculture. Recognising the evolving challenges and opportunities in marine management, the Scottish Government initiated the development of a new National Marine Plan (NMP2)[13] to address issues such as climate change, biodiversity loss, and increased competition for marine space.

In October 2022, the Scottish Government published the "Stakeholder Engagement Strategy and Statement of Public Participation"[14] to guide the development of NMP2. This strategy emphasises the importance of involving diverse stakeholders, including coastal communities, industry representatives, and environmental organisations, to ensure the plan reflects a balanced approach to marine resource management.

The development process for NMP2 is structured to be inclusive and transparent, with multiple phases of consultation and feedback. The Scottish Government aims to publish and begin implementing NMP2 by 2026, aligning with commitments outlined in the Programme for Government 2022-23.

[8] Aquaculture | Scotland's Marine Assessment 2020
[9] Environment, Climate Change and Land Reform (ECCLR) Committee report on the environmental impacts of salmon farming
[10] Salmon farming in Scotland
[11] Vision for sustainable aquaculture - gov.scot
[12] Scotland's National Marine Plan - gov.scot
[13] National Marine Plan 2: stakeholder engagement strategy and statement of public participation - gov.scot
[14] Environment, Climate Change and Land Reform Committee - Development and Implementation of Regional Marine Plans in Scotland – Response (August 2023)

Aquaculture remains a significant sector within Scotland's marine economy, contributing substantially to employment and exports. The NMP2 aims to build upon the foundations of the 2015 plan by setting updated objectives and policies that promote sustainable growth in aquaculture while addressing environmental and societal considerations. This includes enhancing regulatory frameworks, improving fish health management, and mitigating environmental impacts associated with aquaculture operations.

Recent parliamentary inquiries[15] have highlighted challenges within the aquaculture sector, particularly concerning fish mortality rates and environmental impacts. In January 2025, a report criticised the Scottish Government for its slow progress in regulating the salmon farming industry, citing record salmon deaths in 2023 and urging stronger leadership and clearer timelines to address sustainability issues.

National Legislation

To support the strategic framework and plans of the Scottish Government, a vast array of national legislation exists in the country.

Marine (Scotland) Act 2010[16]: This Act establishes the legal framework for managing Scotland's marine environment, including provisions for marine planning, licensing, and conservation. It ensures that marine resources are used sustainably and that activities such as aquaculture comply with environmental standards.

Aquaculture and Fisheries (Scotland) Act 2013[17]: This Act provides the legal basis for regulating fish farming and shellfish farming, addressing fish health, sea fisheries, and freshwater fisheries. It includes provisions for monitoring and enforcement to ensure compliance with industry standards.

Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR)[18]: These regulations control activities that can affect Scotland's water environment, including discharges from aquaculture facilities. They ensure that such activities are conducted in a manner that protects water quality and complies with environmental standards.

Aquatic Animal Health (Scotland) Regulations 2009[19]: These regulations focus on the health and welfare of aquatic animals, establishing protocols for disease prevention, control, and eradication. They designate competent authorities responsible for health licensing and farm inspections, ensuring that aquaculture operations adhere to health standards to prevent the spread of diseases.

Fish Farming Businesses (Reporting) (Scotland) Order 2020[20]: This order mandates that fish farming businesses regularly report specific information to authorities, enhancing transparency and monitoring within the aquaculture industry. It ensures compliance with environmental and health standards.

[15] Salmon farming in Scotland | Scottish Parliament Website
[16] Marine (Scotland) Act 2010
[17] Aquaculture and Fisheries (Scotland) Act 2013
[18] The Water Environment (Controlled Activities) (Scotland) Regulations 2011
[19] The Aquatic Animal Health (Scotland) Regulations 2009
[20] The Fish Farming Businesses (Reporting) (Scotland) Order 2020

Alien and Locally Absent Species in Aquaculture (Scotland) Regulations 2015[21]: These regulations control the introduction and movement of non-native and locally absent species in aquaculture. They are designed to prevent ecological imbalances and protect native biodiversity by regulating which species can be used in aquaculture operations.

3.1.2. The Legislative framework for fish farming in Scotland

The legislative framework[22] for fish farming in Scotland has undergone significant updates in recent years to enhance environmental protection and streamline regulatory processes. Below is an updated overview of the current framework.

Step 1: Seabed Ownership and Leasing

In Scotland, the seabed (up to 12 nm) is effectively 'owned' by the Crown Estate[23] (as determined by the Crown Estate Act 1961[24]) and they have a statutory duty to 'obtain a return for any area of seabed or foreshore within its ownership'.

As a result, usually the first step for an operator is to agree to a lease of the seabed which it is considering placing its farm on. To allow an operator the time to develop a potential area (and jump through all the other regulatory hoops required) it is normal for a Lease Option Agreement (LOA) to be granted. This lasts for three years with the condition that relevant planning is submitted within two. If all required licences are obtained within the three years, they the Crown Estate will convert the LOA to a full seabed lease. In this regard the Crown Estate has the unique situation of determining licensing requirements at both the beginning and end of the process.

The process of obtaining an LOA is completed directly with the Crown Estate and requires the completion of an application form which needs to be accompanied with a plan of the area to be leased and a brief outline of the business/production plan for the site in question. The Crown Estate will consider the application to decide if the required resources (technical and financial) are available and that the applicant is following best practices for production.

Rents and Charges

In 2022, Crown Estate Scotland finalised a comprehensive review of aquaculture lease terms, leading to significant changes in the rent structure. For finfish (e.g., salmon) farming, rents are now based on harvested production and market price, reflecting the consistently strong prices for salmon. This new scheme effectively raised the rent by 95%, with changes taking effect in January 2023. Additionally, the previous 10% Outer Islands discount, which was in place to offset higher operational costs in areas like the Outer Hebrides, Orkney, and Shetland, has been removed[25].

Rents for finfish farm leases are charged in arrears for six-monthly rent assessment periods. They include provisions for charges where there is no harvested production (minimum rent) or where fish are being raised for subsequent on-growing to harvest elsewhere (nursery site rent). Both of these provisions relate to the site's consented capacity.

[21] The Alien and Locally Absent Species in Aquaculture (Scotland) Regulations 2015
[22] Overview of regulatory framework | Scottish Environment Protection Agency (SEPA)
[23] Aquaculture overview | Crown Estate Scotland
[24] Crown Estate Act 1961
[25] Rents and charges | Crown Estate Scotland

Step 2: Environmental Social Impact Assessment (ESIA)

Once an LOA has been received, the applicant is now free to commence the regulatory application process. Usually, the first step is to complete an Environmental Social Impact Assessment (ESIA) which aims to provide a systematic assessment of the likely environmental effects arising from a proposed development.

In Scotland, the requirements for completing an ESIA are covered by the Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017[26]. The key points from this are as follows;

EIA Threshold Level: Any farm which will produce more than 10 tonnes of dead fish weight per year or is designed to hold a biomass of 100 tonnes or greater or will extend to 0.1 hectares (ha) or more of the surface area of the marine waters are required to complete an ESIA. Projects below these thresholds may still require an EIA if they are likely to have significant environmental effects.

Form of the ESIA: The form of the ESIA is not specified directly (i.e., no template is provided) but the 2017 regulations do require certain items to be included;

1. A description of the development, including in particular:
   a. a description of the location of the development;
   b. a description of the physical characteristics of the whole development;
   c. a description of the main characteristics of the operational phase of the development (in particular any production process), for instance, energy demand and energy used, nature and quantity of the materials and natural resources (including water, land, soil and biodiversity) used;
   d. an estimate, by type and quantity, of expected residues and emissions (such as water, air, soil and subsoil pollution, noise, vibration, light, heat, radiation and quantities) and types of waste produced during the construction and operation phases.
2. A description of the reasonable alternatives (for example in terms of development design, technology, location, size and scale) considered by the developer, which are relevant to the proposed project and its specific characteristics, and an indication of the main reasons for selecting the chosen option, including a comparison of the environmental effects.
3. A description of the relevant aspects of the current state of the environment (the "baseline scenario") and an outline of the likely evolution thereof without implementation of the development as far as natural changes from the baseline scenario can be assessed with reasonable effort on the basis of the availability of relevant information and scientific knowledge.
4. A description of other factors likely to be significantly affected by the development: population, human health, biodiversity (for example fauna and flora), land (for example land take), soil (for example organic matter, erosion, compaction, sealing), water (for example hydromorphological changes, quantity and quality), air, climate (for example greenhouse gas emissions, impacts relevant to adaptation), material assets, cultural heritage, including architectural and archaeological aspects, and landscape.

[26] The Town and Country Planning (Environmental Impact Assessment) (Scotland) Regulations 2017

5. A description of the likely significant effects of the development on the environment resulting from, inter alia:
   a. the construction and existence of the development, including, where relevant, demolition works;
   b. the use of natural resources, in particular land, soil, water and biodiversity, considering as far as possible the sustainable availability of these resources;
   c. the emission of pollutants, noise, vibration, light, heat and radiation, the creation of nuisances, and the disposal and recovery of waste;
   d. the risks to human health, cultural heritage or the environment (for example due to accidents or disasters);
   e. the cumulation of effects with other existing and/or approved projects, taking into account any existing environmental problems relating to areas of particular environmental importance likely to be affected or the use of natural resources;
   f. the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;
6. The description of the likely significant effects should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development. A description of the forecasting methods or evidence, used to identify and assess the significant effects on the environment, including details of difficulties (for example technical deficiencies or lack of knowledge) encountered compiling the required information and the main uncertainties involved.
7. A description of the measures envisaged to avoid, prevent, reduce or, if possible, offset any identified significant adverse effects on the environment and, where appropriate, of any proposed monitoring arrangements (for example the preparation of a post-project analysis).
8. A description of the expected significant adverse effects of the development on the environment deriving from the vulnerability of the development to risks of major accidents and/or disasters which are relevant to the project concerned.
9. A non-technical summary of the information provided under paragraphs 1 to 8.

To complete this, the applicant will be required to appoint a specialised company to perform the ESIA and will be required to collect relevant baseline data at the site. Once the ESIA has been completed, it is sent to the relevant authorities as part of the planning process (as set out in the next step below).

To note that the Scottish Government has been urged to enhance regulatory measures in the salmon farming industry due to concerns over environmental impacts and fish mortality rates. A parliamentary inquiry highlighted the need for stronger enforcement and potential restrictions on farms with high mortality rates, emphasising the importance of robust environmental assessments in the planning process.

Step 3: Planning Permission

As with the Falklands, planning has been required in Scotland for all fish and shellfish farms since April 2007 under the Town and Country Planning Act (the Planning Regulation). The process is overseen by the Local Planning Authorities (LPA) of which six are relevant in Scotland (Argyll and Bute Council, Highland Council, Orkney Council, Shetland Council and Comhairle Council).

Each LPA has a slightly different application process but for the benefit of this report, we have used the Argyll and Bute Council system.

Historically, local authority planning controls extended up to 3 nm from the coast, while fish and shellfish farms required planning permission out to 12 nm. In September 2024, the Scottish Government proposed extending local authority marine planning zones to cover the entire 12 nm. This change aims to provide clarity and consistency in the planning process, especially for developments beyond the 3 nm limit. A 12-week public consultation on this proposal concluded in December 2024[27].

In 2020, amendments to the Town and Country Planning (General Permitted Development) (Scotland) Order 1992 were introduced, affecting fish farming developments[28]. These changes expanded certain permitted development rights (PDRs), allowing specific types of development to proceed without full planning applications, provided they meet defined criteria. For instance, the maximum size of replacement or additional pens permitted under PDR was increased from 100 metres (m) to a larger size, facilitating operational flexibility for fish farm operators.

Pre-Application Process

A relatively new development in planning is the 'pre-application' process. This is basically a 'pre-assessment' which allows the developer to discuss the details of the project with the council team and get a feel for how the project would be received and what steps are required to ensure the smooth process of full planning. The process is charged for by the council at £1,000 each.

Full Application Process

Whether or not a pre-application is completed, the full planning process commences with the submitting of an application form[29]. This must be accompanied by the following documents;

a. Location plan and admiralty chart showing application site
b. Plans of the cages/cultivation equipment to be used
c. Evidence of leaseholding for relevant seabed area
d. Environmental Impact Assessment (ESIA)
e. Landscape and Visual Impact Assessment
f. Design Statement
g. Water Quality Report (usually forms part of the ESIA)

The Scottish Government has updated the planning application fees for aquaculture developments, effective from December 12, 2024[30]. Planning applications for aquaculture are charged at £230 for each 0.1 ha of the surface area of marine waters used for the placement or assembly of equipment and £86 for each 0.1 ha of seabed used in relation to such development, subject to a maximum fee of £28,809.

[27] Aquaculture Marine Planning Zones | marine.gov.scot
[28] The Town and Country Planning (General Permitted Development) (England) (Amendment) (No. 2) Order 2020
[29] See the ePlanning Scotland Portal, Scotland's online planning system
[30] The Town and Country Planning (Fees for Applications) (Scotland) Amendment Regulations 2024

The planning process is handled by the 'Major Applications Team' at Argyll and Bute Council. Upon receipt of the application documents, the council has a guideline of providing a decision on the application process within four (4) months (two (2) months if no Environmental Statement is required). However, it is common for the decision-making process to take much longer than this. An example of a planning application is provided in the following link[31].

During this period the council will seek stakeholder opinions from both the public and relevant statutory authorities. The Statutory authorities who are invited to comment directly include the Scottish Environmental Protection Agency (SEPA) and Marine Scotland Science (MSS).

This process is triggered by the release of a Planning Application Statement which is published on the council's website and in local press sources. The statement sets out the planning application details, including the fact that it has been accompanied by an EIA, and invites interested stakeholders to comment in writing within 4 months of the date of the notice. However, due to the public 'interest' in schemes of this type, it is common for the council to receive high numbers of often detailed responses and requests for further information. Many stakeholders also request significant periods of extension to the process to allow them to submit further supporting information for the process. As an example of this, in the Kilbrannon farm example linked above, a total of 285 public comments and 12 consultee comments were received (of which 237 are objections). Following requests from public stakeholders and the applicant, the decision-making process was extended to allow further comments to be received until the end of July 2021 (despite originally being meant for finalisation in December 2020). This highlights that the process involves significant back and forth between objectors and the applicant, with the latter attempting to appease the former with additional information prior to the council finally making a final planning decision[32] (in this case, the site was approved in late 2023[33]).

The actual decision-making process for planning taken by the council is further guided by supplementary planning guidance on aquaculture development (SG AQUA 1) which is developed by each of the different councils in the context of the National Marine Plan and Scottish Planning Policy. This guidance sets out nine separate Development Criteria (DC) areas against which the planning application will be considered. These are considered in more detail below;

Recent updates to planning frameworks in Scotland have introduced several changes relevant to aquaculture development. As of February 2024, the Local Development Plan 2 (LDP2[34]) has been adopted, replacing the 2015 Local Development Plan and its associated Supplementary Guidance. This updated plan now serves as the statutory planning document, guiding decisions regarding built and aquaculture development within Argyll and Bute. Furthermore, the Scottish Government has committed to revising the National Marine Plan (NMP) to address climate and biodiversity challenges. These changes reflect the continued evolution of planning policy to ensure sustainable development within marine environments.

DC1 Landscape/seascape and visual amenity: DC1 has an overriding principle of trying to ensure that the proposed facility will be 'satisfactorily integrated' within the existing landscape. This is often

[31] Proposal for the formation of a fish farm (Atlantic Salmon) incorporating twelve 120 m circumference circular cages and siting of feed barge, see Argyll and Bute Local Planning Application 20/01345/MFF

[32] The applicant will be keen to mitigate as much of the negative comments from the public as possible prior to a planning decision being taken to improve the chances of a positive decision being made.

[33] Fish farming expert: Mowi Scotland gets green light for Kilbrannan fish farm

[34] Argyll and Bute Local Development Plan 2

completed through a Landscape and Visual Impact Assessment (LVIA). Some important areas for consideration under DC1 are as follows;

- *National Scenic Areas (NSAs):* In Argyll and Bute, seven NSAs have been designated due to highly varied and valuable landscapes. Although it is not impossible for planning to be granted in these areas it is likely to have significantly more constraints than areas outside the NSAs.
- *Areas of Panoramic Quality (APQs):* These are a lesser designation but still have 'enhanced' landscape considerations.
- *Cumulative Impacts:* Multiple developments in an area are likely to have a cumulative impact which should be considered under DC1.

Some specific recommended development guidelines are also provided here to help mitigate the effects under DC1;

- Long, regular coastline areas may offer better opportunities for larger sized development by creating a sense of big space
- Dark vegetation and/or steep landform which casts shadows across the water for the large part of the day can help to mitigate the visual effects (by making the farms harder to see).
- Landscape which is less removed and accessible is considered more desirable for development
- Areas already characterised by activity (for example regular maritime traffic) are also considered favourable.

DC2 Isolated coast and wild land: Following on from the final two points above, areas of Isolated Coast and Wild Land have been mapped by the council and are considered less suitable for development.

DC3 Historic or archaeological sites & their settings: Aquaculture development should not compete with iconic or important coastal features either visually or in terms of direct impact (for example, wreck sites).

Key Ancient Monuments, listed buildings, conservation areas and points of marine interest are all designated and mapped in the region and should be avoided for marine aquaculture siting.

DC4 Priority habitats/species and designated sites for nature conservation: Scottish planning policy requires the planning authorities to take account of effects on the seabed and that protected or important marine habitats should be specifically considered. With regards to habitats, in Argyll & Bute, eight (8) RAMSAR sites, ten (10) Special Protection Areas (SPAs) for birds, five (5) Marine Protected Areas (MPAs), fourteen (14) Sites of Special Scientific Interest (SSIs), and two (2) National Nature Reserves are in existence. In simple terms, any planning applications which are likely to negatively affect the qualifying features which give the areas their designation are unlikely to receive permission.

In line with the Fourth National Planning Framework (NPF4), published in November 2021, Scotland's approach to planning and development emphasizes sustainable growth, environmental protection, and community engagement. NPF4 aligns with the objectives of SG AQUA 1 by ensuring that aquaculture developments are planned responsibly with environmental and community considerations at the forefront.

DC5 Ecological status of water bodies and biological carrying capacity: The biological carrying capacity of the water body is obviously a key concern but is really covered in significant detail in the ESIA process and the provision of a CAR license. Should there be considered to be unsuitable loading levels for the surrounding waterbody, then it is doubtful that a CAR licence or planning would be granted.

One recent development under DC5 has been the creation of location guidelines for sea lochs specifically. Here, Marine Scotland used nutrient modelling to determine areas which could support additional biomass (Category 2 and 3) and those that couldn't (Category 1). For Category 1, any increase I production biomass is ruled out straight away (so providing further limitations on areas which cannot be considered for aquaculture development).

A major update under DC5 is the inclusion of the Vision for Sustainable Aquaculture (2023)[35], which outlines long-term goals for the finfish, shellfish, and seaweed farming sectors. The Vision focuses on environmental sustainability and economic growth, emphasizing responsible practices to ensure minimal impact on the ecosystem and compliance with evolving regulations.

DC6 Commercial and recreational activities: Again, Scottish marine planning requires that other marine interests are considered when a new farm is being planned. These include commercial fishing, tourism, recreational activities and Ministry of Defence activities (if appropriate).

The aim is not to exclude aquaculture in areas that these other activities take place (as this would probably cover everywhere) but to identify what the potential impacts could be and propose mitigation measures accordingly. This should include careful consideration of public safety considerations and avoiding the impeding of access to the foreshore.

DC7 Economic impact: The positive and negative economic impacts are considered under DC7. Aquaculture is likely to create jobs but could for example, result in losses from commercial fishing grounds.

If the new facility is likely to support Economically Fragile Areas, then additional weight is given to this in the planning process.

DC8 Management Areas: Management Areas are a relatively new concept within the aquaculture sector. They require groups of farms that are located within the same hydrographic areas (often linked to tidal flow) to manage risks in a coordinated manner (in an effort to mitigate any cumulative impacts). These are commonly used for the control of sea lice in particular.

On this basis, any new farm within an overlapping tidal excursions area will be required to operate in accordance with the existing sites.

DC9 Operational Impact (waste, noise, light and odour): Finally, the planning system takes account of these additional areas. Noise and light are considered on a case-by-case basis (with more remote sites likely to be more of an issue as they have much lower existing noise and light pollution). Farms may have to show how they will mitigate against this (lights directed down, silent generators used etc.).

[35] Vision for sustainable aquaculture - gov.scot

All farms will need to develop a waste management plan to show how they will handle the inevitable waste that will occur from the farm.

A planning decision is made by weighing up all of the above considerations, including all stakeholder feedback and applicant responses to make the final decision. In all cases planning will either be granted with conditions or rejected (it is possible for permission to be granted without conditions, but this never happens).

As an example of what conditions are often attached to a granted planning application, the Eilean Grianain (Carradale) Salmon Farm is used[36]. This was granted with eight (8) conditions which can be summarised as follows;

Condition 1: The farm can only be permitted in accordance with the specific plans provided

Condition 2: Within nine (9) months of first being stocked with fish, the operator needs to submit a strategy on monitoring and managing the interaction between the farm and the wild fish environment. The strategy should cover containment breaches (escapes) and sea lice control and should specifically;

a. Define a monitoring regime for sea lice infestation monitoring sites up to 30 kilometres (km) from the site
b. Define sea lice infestation levels at which additional mitigation measures must be imposed
c. Define what these mitigation measures shall be
d. Identify a minimum threshold for escape events, above which further monitoring will be completed to further knowledge of genetic impacts of escapes.
e. Provide for a periodic review of the strategy.

This strategy must be approved by the planning authority before implementation.

Condition 3: Requires the removal of any unused associated equipment (not used for three years) to lessen any visual amenity.

Condition 4: Commitment to remove any damaged and/or stranded equipment by the operator.

Condition 5: All lighting to be directed downwards by shielding and extinguished when not required.

Condition 6: All equipment above the water surface should be non-reflective and finished in a dark, muted colour (unless required otherwise for navigational purposes).

Condition 7: Provision of details on any Acoustic Deterrence Devices (ADDs) to be used at the site and approval in advance by the Planning Authorities.

Condition 8: Details of any non-productive species (i.e., cleaner fish) to be submitted and approved by the Planning Authorities in advance of use.

[36] Marine fish farm at Carradale North: EIR release - gov.scot

Step 4: Controlled Activities Regulation (CAR) Licensing

Since April 2006, it has become a legal requirement for aquaculture operations to receive a CARs license. This licensing process is completed by the Scottish Environmental Protection Agency (SEPA) and is used to control impacts on the water environment. For fish farming, this mainly relates to the release of nutrients and chemicals into the water column. In effect, the CAR license provides the operator with a 'licence to pollute' on the basis that it has been considered as unlikely to create a significant impact on the environment. It is common for CAR licences to be issued with conditions which set site specific condition limits for which the operator (or operators) is responsible for maintaining.

In 2019, the framework related to the CAR licensing process underwent a significant overhaul with significant new additions put in place (in response to mounting criticism). These new requirements are considered in more detail below under the CAR licensing process.

Stage 1 - Pre-Application Proposal: The applicant is required to submit a pre-application form to SEPA. This form provides key details, including the location of the farm, intended biomass, feeding rates and sea lice treatment plans. SEPA then register this on the 'SEPA Registry', allocates a lead office and launches the following stages.

Stage 2 - Screening Modelling and Risk Assessment: SEPA produce a screening modelling exercise and risk identification reports within six (6) weeks of receipt of the pre-application proposal. This report is provided to the applicant who has twenty-one (21) days to comment. Following this, the report is published on the SEPA website until the point that the application is fully determined. An example of a Screening and Risk Identification Report can be found here[37].

Stage 3 - Engagement Meetings: A period of engagement with SEPA, the applicant and local communities now follows. In practice, though this normally occurs at the same time as the engagement, which is undertaken for the Planning Permission process set out below. Following this engagement process, any required changes to the Screening and Risk Identification Report are made by SEPA within four (4) weeks.

Stage 4 - Modelling Method Statement: The applicant is now required to propose a modelling method statement which aims to address the risks identified in the above process. SEPA have provided guidance on how best to do this in the following document[38]. SEPA will provide responses to the Method Statement within two (2) weeks of receipt, and the aim is to finalise the method statement as soon as practically possible.

Stage 5 - Modelling Data Collection Report: For a period of ninety (90) days, the applicant is then required to collect a variety of physical and environmental data from the site (including current and water depths). These are then sent in pre-agreed templates to SEPA, who then will confirm if the data collected is acceptable to continue within two (2) weeks.

Stage 6 – New DEPOMOD Modelling Report: The applicant is now required to complete specific base modelling and scenario analysis which will result in the completion of a NewDEPOMOD modelling report (DEPOMOD is a specific modelling program often used in the aquaculture sector).

[37] SEPA: Example screening modelling and risk identification report
[38] SEPA: Marine modelling guidance for aquaculture applications

Stage 7: Conclusion of Modelling: At this point, SEPA brings together all the modelling data and outputs and creates a Modelling Summary Report. If all is considered in order, then the applicant can move to the Baseline Survey stage.

Stage 8 – Baseline Survey & Planning: So far, the process has been reliant on some relatively limited data collection and modelling to determine key risks. Now a Baseline Survey is required to be completed by the applicant. The first step in this is to determine a survey plan. SEPA will provide advice on what, when and how this will need to be collected[39].

Stage 9 – Baseline Survey Completion & Reporting: The applicant now completes the agreed baseline survey and sends the results in a pre-defined template for review by SEPA. SEPA review the baseline survey and informs the applicant of any amendments or issues.

Stage 10 – Baseline Summary Report: SEPA will produce a Baseline Summary Report and make it publicly available.

Stage 11 – Environmental Monitoring Plan (EMP): The final step in pre-application is for the applicant to devise an EMP setting out how they intend to continue to monitor the site following the introduction of fish and to ensure validation of the modelling outputs.

Stage 12 – Validation of Permit Application: With the pre-application process now complete, the more formal (but shorter) validation process can commence. Here the first step is to submit the full application form to SEPA for approval[40]. As part of this application process, all relevant documents already supplied during the pre-application process must be resubmitted and referenced. A Fish Production Plan (FPP), Medicine Minimisation Plan (MMP) and Seabed and Water Quality Monitoring Plan (SWMP, as agreed in the pre-app) must also be supplied at this stage.

Stage 13 - Consultation on Permit Application: The full application then needs to pass a further period of consultation. This includes placing an advert in the national and local press and contacting relevant statutory authorities. All groups/individuals who were contacted during the pre-application are also recontacted at this point. All stakeholder responses must be provided within twenty-eight (28) days.

Stage 14 - Final Permit Determination: SEPA will then move to determining a final decision on the CAR application. If this is successful then a Draft Permit is created and sent to the applicant, statutory consultees and relevant third parties. The applicant can appeal a decision if it feels the outcome or conditions are unreasonable. Similarly other parties can request that the application be 'called-in' for determination by Scottish Government Ministers.

A CAR Permit is then issued to the applicant. To help standardise this process, SEPA have developed a draft permit template which provides standard conditions of use which are often included for the farm's operation (although others may also be added if required). These standard conditions are set out in the table below with a description of the justification behind each.

[39] SEPA: Bseline survey and monitoring plan design
[40] See SEPA's application for a new permit, FORM C-2

Fish Species: Only one species may be farmed at the site at one time (with exceptions for cleaner fish) *Justification: Although not common to mix species on site it is commonly a requirement that this is not allowed. The only exception to this is in the use of cleaner fish.*
***Maximum Weight of Fish*: A maximum weight of fish to be held at the site at one time will be set.** *Justification: This is a standard licence requirement for any fish farm pretty much anywhere. A maximum biomass is agreed for the farm based on the outcome of all the other investigative work and as determined as suitable by SEPA. This biomass is the amount that cannot be exceeded on the farm (i.e., a maximum biomass not an average one).*
Fallow Period: A minimum period of 42 consecutive days fallow period must be used between every production cycle during which no fish shall be kept on the site. SEPA must be notified within 14 days of a site being stocked and fallowed. *Justification: The use of a fallow period has become a more and more common regulatory requirement in salmon farming. The aim of it is to break the life cycle of the sea lice and help in reducing infection rates. The 42-day period is considered a minimum time to allow this to happen and is used as a standard fallow period. However, SEPA can increase or decrease this as they see fit.*
Pen Configuration: An agreed configuration of pens is agreed in the licence and specific locational points are stated (National Grid References). A maximum distance is specific from which the pens can deviate from these NGRs (taking account of tide, currents etc.). *Justification: This condition is added to ensure the farmer cannot add or move the cages from the agreed locations. With the NGRs set in the licence it is easy for a SEPA official to check the location using a handheld GPS unit.*
Medicine Minimisation: All reasonable steps must be taken to minimise the discharge of medicine residues *Justification: This condition helps to ensure the protection of the water environment through sustainable water use.*
Medicines & Chemical Use: Only medicines and chemicals specifically authorised in this permit may be discharged into the water environment. *Justification: This condition ensures that only permitted and authorised chemicals are allowed to be discharged by the farm (and specifically lists what these are as part of the permit).*
PSL and PSWP: All medicines named in the Permitted Substance List (PSL) or Permitted Substance Working Plan (PSWP) must be used in accordance with the limits specified. *Justification: Ensures that farms only administer approves substances at approved levels and using approved techniques.*
Bath Sea lice medicines: Provides detailed requirement on the use of bath sea lice medicines including the quantity and types permitted, number of pens to be treated at once etc. *Justification: Strict conditions on use of these chemicals is to avoid any impacts on the natural environment to the best extent possible.*
In-feed sea lice medicines: Similar to the above but for in feed treatment. Includes a limit of 50 ug/ kg of treatment per day (or 60 mg per kg if approved by a vet). The current EPQ requirements also

effectively mean that new farms are only able to treat the fish once every five years. *Justification: Strict conditions on use of these chemicals is to avoid any impacts on the natural environment to the best extent possible.*
Notification of Medicines Use: Requires SEPA to be informed at least two (2) working days prior to a treatment being carried out (for bath medicines) or five (5) working days for in-feed medicines. *Justification: Required to ensure strict environmental levels are not likely to be exceed by the farms use.*
Biological Seabed Standards: Requires the seabed at any point immediately under the outer edge of any pen to contain a minimum of two (2) species of re-worker polychaete worms with a combined abundance of more than 1,000 individuals per square metre. *Justification: Required to ensure strict environmental levels are not likely to be exceed by the farm's use.*
Chemical Seabed Standards: Requires Emamectin benzoate concentrations to not exceed 12 ng/kg (dry weight) in the seabed at the boundary of the mixing zone *Justification: Chemical used in in-feed treatments and aims to ensure that excreted quantities do not build up to toxic levels in the seabed around the farm.*
Seabed and Water Monitoring Plan: Monitoring to be carried out against the approved SWMP (submitted at the CAR application stage). Monitoring activities should be notified to SEPA fourteen (14) days in advance *Justification: Ensures that the farm is meeting its SWMP requirements properly.*
Notification of environmental event: SEPA to be informed of any event which could cause an adverse impact to the water environment or human health or is a breach of the CAR permit within 24 hours of identification. *Justification: Pretty clear justification.*
Management of environmental event: All reasonably practicable measures should be taken to stop an event and to minimise and/or mitigate its effects. *Justification: Clearly important that the farm attempts to deal with an event to the best degree possible.*
Reporting of environmental event: Within fourteen (14) days of any event a report must be submitted to SEPA setting out the reasons for the event, actions taken to minimise its impacts and actions taken to prevent it recurring. *Justification: Important to learn lessons from incidents as and when they occur.*
Data Recording & Reporting: All key records must be maintained for six (6) years and key information (as specified by SEPA) should be submitted every quarter. *Justification: Record keeping is a vital part of monitoring and so it is important that the farm maintains the records and submits important data regularly to the authorities.*

Step 5: Marine Licence Approval

Any process which involves the placing of obstacles or objects into the sea or onto the seabed is required to be issued with a marine licence by Marine Scotland and is governed by the Marine Scotland Act. Clearly salmon farming in cages falls into this category.

A marine licence application cannot be determined without valid planning permission already being provided[41]. For this reason, it is completed as a separate step after planning.

The marine Licence is applied through an application form[42] which must be completed and accompanied by clear charts showing the location of all planned structures (including specific lat/long coordinates). This must also be accompanied by an application fee which is calculated based on the capital expenditure for the project (ranging from £150 to £10,000). Marine Scotland aim to make all marine licence decisions within fourteen (14) weeks from receipt of the fee and application form. Once made, an application must also be advertised in a selection of papers or media outlets for a period of forty-two (42) days minimum. Marine Scotland will then also carry out a twenty-eight (28) day consultation with both statutory and non-statutory consultees (SEPA, MCA, RYA for example). If granted, the licence remains valid for up to six (6) years at which point it must be re-applied for.

In practice, the marine licensing step is somewhat of an unnecessary step in that it repeats many of the other processes already undertaken through the EIA and planning permission process.

Step 6: Aquaculture Production Business (APB) Authorisation

Usually, the final step in licensing for a new fish farm in Scotland is the issuance of an Aquaculture Production Business (APB) authorisation. An APB is issued in Scotland by the Marine Scotland Science Fish Health Inspectorate (MSS-MHI). The licence is in relation to animal health requirements only and is issued when the operator will not lead to 'an unacceptable risk of spreading disease'.

The requirements which inform this decision-making process are set out in the Aquatic Animal Health Regulations (2009) in Scotland. One of the main requirements under this is for regular fish health inspections of farms by the authorities. During these inspections, areas such as health management, biosecurity and the general health of the fish are checked. The authorities have the regulatory power to suspend farming activities at any time if they feel it is required.

The process commences with the completion of an application[43] and Aquatic Animal Holding Form[44]. The form requires the farm to detail its biosecurity measures and site practices (including fish movement control, mortality recording and disposal etc.). The aim of this assessment is to confirm that the farm is capable of meeting the following key requirements;

a. Recording the movement of animals into or out of the farm
b. Recording of mortalities
c. Recording outcomes from health surveillance assessments
d. Follow good biosecurity practices
e. Comply with surveillance requirements from the Fish Health Inspectorate

The licence application process usually takes around three (3) months to complete but is one of the easier parts of the licensing process. Farms will usually apply for this at the same time as the marine licence (or at least when planning is drawing to an end).

[41] A marine licence can be applied for prior to planning being granted but cannot be awarded.
[42] Finfish and shellfish farm application form
[43] Application for authorisation of an Aquaculture Production Business
[44] Guidance for Completing the Aquatic Animal Holding Site Details

3.2. Faroese Salmon Farming

Our second case study considers the situation in the small North Atlantic archipelago of the Faroe Islands. Located 200 miles to the northwest of Scotland and about halfway between Norway and Iceland, the development of a salmon farming industry is a relatively new thing in the country. Although some salmon farming was reported in the country in the 1970's it was not until the 1990's that production really began to increase significantly. On the face of it, the reasons are clear with the country blessed with clean temperate oceanic waters, strong currents and significant fjord inlets which are ideal for salmon farming operations.

In 2022[45], it was estimated that the Faroe Islands produced 115,650 tonnes of Atlantic Salmon, representing about 4% of global farmed salmon production. This marks a significant increase from the 90,000 tonnes reported in 2020, highlighting the continued growth and success of the industry.

Today, the Faroe Islands are considered by many to represent the 'gold standard' of salmon production and have worked very hard to maintain an image of a high quality, well-managed industry. This was not always the case though, and between 2004 and 2006 the industry was decimated by Infectious Salmon Anaemia (ISA). Since then, the government has rewritten the legislation and management which supports the industry with the aim to be 'best in class', and this has proven relatively successful to date.

With this in mind and considering the relative similarities between the Faroes Islands and the Falkland Islands (they are both distant archipelagos with small populations and a reliance on the natural environment for much of their income), this is seen as a key case study for consideration.

In the review below, the key salmon farming requirements as set out by the Faroe Islands are presented. It should be noted that the full system for planning is not reviewed here as it is relatively similar to that already set out for Scottish farming above. However, it is some of the specific requirements which are most relevant for this review.

The current key regulation for aquaculture is the Faroese Veterinarian Act which was first created in 2003 and has been amended several times since. The Faroese Ministry of Trade (fMoT) is the government authority responsible for the policy and maintains the legislative framework. It is also responsible for the issuing of farming licences.

The fMoT is supported in this role by the Faroese Environment Agency (FEA) and the Faroese Food and Veterinary Authority (FFVA). The FEA are responsible for the granting of an environmental approval to each farm. This is the equivalent process completed by SEPA in Scotland in the issuing of a CAR.

One of the notable updates since 2020 is the focus on non-chemical sea lice treatments, driven by increasing resistance to chemical treatments and environmental concerns. The Faroe Islands have pioneered the use of mechanical and biological control methods, significantly reducing reliance on chemicals and earning recognition for sustainable practices.

In recent years, the government has also initiated research into deep-sea aquaculture as an alternative to coastal operations. This involves licensing sites outside of traditional management

[45] Aquaculture Overview for Faroes ecoregion

zones (MZs), allowing for production in deeper, more exposed waters to mitigate disease transmission and environmental impact.

The issuing of licences to salmon farming operations in the Faroe Islands is strictly controlled and has been developed through the creation of specific Management Zones around the country. In Figure 1 below, these MZs are shown, and in most cases, these are identical to a single fjord or bay separated by areas with well-mixed waters due to strong tidal currents. Within each of these MZs the authorities have set a significant number of rules and requirements which aim to reduce disease risks and mixing.

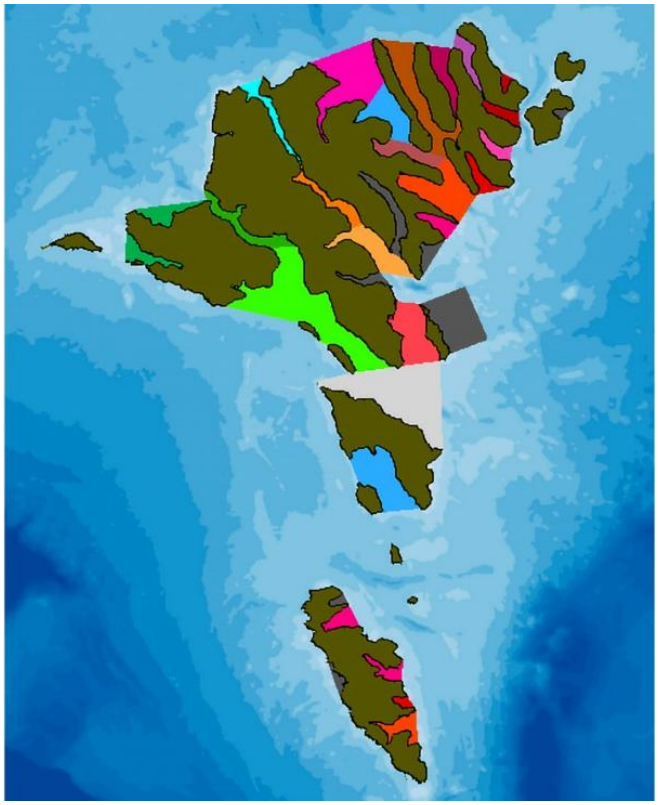

Figure 1: Salmon Management Zones in the Faroe Islands

Rule 1: All in/ all out rule: Each MZ is allowed only a single generation at one time, meaning that all fish are stocked at the same point and also harvested together. This is often referred to as the "all in/all out" policy and helps ensure that no mixing of generations can occur in the Faroe Islands (the same year class is only ever being produced).

Rule 2: Single company per MZ: To help with this, it is also required for each MZ to be controlled by a single company as well (this also helps with regulatory control as any breaches in an MZ are the responsibility of only one company and no one else can be blamed). In Figure 1 above, the blue zones are operated by MOWI, the green zones by Luna and the red/orange/pink by Bakkafrost.

Rule 3: Fallowing: Once the fish have been removed from an MZ, a period of forced fallowing is required (i.e., a period when no fish are added to the MZ). This must be for a minimum period of two (2) months but can be extended if disease was detected by the authorities. During this fallow period, all nets must be removed from the water before being cleaned and disinfected on land (only when

the nets are removed does the fallow period commence). Furthermore, the cage structures must also be disinfected at sea with the whole process and chemicals used approved first by the FFVA.

Rule 4: Updated Operational Plan: It is a requirement that a new Operational Plan is submitted for each new restocking activity (following the required period of fallowing) and approved by the authorities before any new fish can be added to the water. Furthermore, the specific requirements of what must be included in these operational plans are dictated by the authorities.

Rule 5: Biomass Approval: No specific rules exist on the total quantity of fish that can be produced in a set MZ, although rules do exist on maximum biomass levels within cages specifically, of between 15 and 25 kg per m^3 (rising with the average fish size from 2 kg to 3 kg or over). Instead, the authorities operate a more practical approach which considers how past production has gone. Should a previous production have experienced disease or mortality issues, then the authorities will reduce anticipated biomass. However, if performance has been good, biomass can be maintained or even in some cases, increased.

Rule 5: Distance from farms: All farms must be at least 2.5 km apart in the same MZ.

In addition to the above rules which are specific to the MZ operations, the authorities have also introduced other significant legislative requirements on farms in the country. The key ones are set out below.

Health Inspections: A registered veterinarian must be associated with each farm and must complete regular inspections of each site at set intervals. For on-growing farms producing more than 1,000,000 fish, twelve (12) inspections a year are required. This is reduced to six (6) inspections for farms of less than 1,000,000 fish. What is required during each inspection is also specifically set out by the authorities within the legislation and includes requirements for dissection of mortality.

Fish Kill Disposal: Farms are required to have the capacity to dispose of at least 1% of the maximum biomass on a daily basis. This should include the ability to collect, grind, convert to silage, temporarily store and then have collection completed. This requirement can be provided by a sub-contractor agreement, but this must be signed and in place in advance. The aim of these requirements is to avoid dead fish being left for significant periods and creating a disease/health risk to the remaining stock (or other farms).

All the above requirements which have been discussed are set out in the Faroese Veterinarian Act for Aquaculture and more specifically, the Executive Order on the establishment of and disease-prevention in aquaculture facilities.

With regards to actual licensing, the Faroe Islands has a similar system although not as detailed, as has been set out in Scotland. However, the country has determined that no additional licences are possible within its MZs and so the opportunity for new players to join does not exist. This has led to the industry considering how it could possibly increase production in the country. The main approaches which are now being considered are reducing cage based on-growing time and also the use of deep-sea sites. Both of these are discussed in more detail below.

Reducing Cage Grow Out Time: The Faroe Islands has been somewhat of a pioneer in attempting to reduce cage grow-out periods. It is widely recognised that the longer salmon spend in cages the greater the risks associated with significant sea lice infestations. To counter this, the industry has

been working on the use of a land-based system which grow 'smolts' to much larger sizes than was previously the case. Traditionally, salmon are transferred to cage systems at around 200 g. However, several companies in the Faroes Islands have increased this to 500 g using intensive RAS based land systems. In turn, this can reduce the time required to reach market size from 18 to 12 months. The company, HiddenFjord report a stocking size of 650 g currently. Above this though, the land systems required are seen as prohibitive currently, but this has not deterred HiddenFjord with trialling new systems to reduce this further. This includes the trialling of floating closed containment systems which are designed to hold the fish until the reach 2 kg and can then be transferred to traditional open cages for 4-6 months only.

What is clear is that the Faroe Islands is leading the way in maximising land production and so providing the largest smolt sizes possible for stocking to cages. This is seen as sensible all round as it reduces the risks considerably. In response, the authorities have also ensured that the legislation is in place to deal with these land-based facilities effectively. Currently, no specific legislative requirement on smolt stocking sizes is in place in the Faroes Islands but this may well form a consideration in the future.

Deep Sea Production: In recent years, the Faroe Islands legislation was updated to allow sites outside of the MZs (and in deeper more exposed locations) to be licensed for production in the future. This is certainly not a new situation with many countries and producers considering the possibility of deep-sea aquaculture for salmon.

The use of such sites has clear advantages and disadvantages. On the plus side, the water depths and currents make disease and sea lice infestations much less likely. Also, the effects on benthic habitats and nutrient loading in the water column are greatly reduced. However, the systems used are under significant stress from increased wave action and are more likely to break in significant storms (essentially an engineering problem). Indeed, storms have already caused fish losses to occur in the Faroe Islands in recent years for traditional inland sites[46] and so the risks of using these more exposed sites are clear to see. Still though, this is tactic that the company Bakkafrost clearly sees as the future for expansion in the Faroe Islands[47].

3.3. Norwegian Salmon Farming

Norway is the largest producer of farmed salmon, accounting for approximately 54% of global production as of 2022. The country's extensive coastline, approximately 100,000 km long, makes it well-suited for aquaculture. Most farmed salmon in Norway is produced in open net pens located in coastal inshore environments, with the hatchery phase primarily conducted in Recirculating Aquaculture Systems (RAS) on land. In recent years, some production has also occurred in semi-closed pens and offshore operations as new technologies are developed.

Norway's aquaculture industry is governed by a comprehensive legal framework that balances economic growth with environmental protection. At the heart of this framework is the Aquaculture Act (2005)[48], which regulates the management, control, and development of aquaculture in both inland and marine waters. This Act establishes a licensing system that is essential for ensuring that aquaculture activities are conducted sustainably. The licenses are primarily issued and managed by the Directorate of Fisheries, while the Norwegian Ministry of Trade, Industry and Fisheries holds the

[46] Fish Farmer Magazine "Bakkafrost fish may have escaped in storm"
[47] Fish Farmer Magazine "Bakkafrost plans to move to offshore farming"
[48] The Norwegian Aquaculture Act - regjeringen.no

authority to award them. The Act mandates that environmental impact assessments are conducted before granting licenses, thereby minimising the risk of ecological harm.

Licences in Norway are typically acquired through a competitive auction system, allowing successful bidders to hold them indefinitely, with the right to transfer ownership on the open market. The Licensing Regulations (2004) complement the Aquaculture Act by setting forth specific conditions under which licences are managed. A fundamental aspect of this regulatory framework is the Traffic Light System, which is designed to manage the Maximum Allowed Biomass (MAB) for each licence. This system employs a colour-coded approach to indicate whether production limits can be increased, maintained or must be reduced. A green light allows for a 6% increase in biomass, a yellow light maintains the current limit, and a red light mandates a 6% reduction within two years. Compliance with this system, particularly sea lice management, is crucial for sustaining production levels.

Since 2013, Norway has also implemented green licences to encourage environmentally responsible practices. These licences are granted based on stringent environmental criteria, including effective sea lice management and robust containment measures to prevent fish escapes. Additionally, development licences were introduced between 2015 and 2017 to promote technological innovation and encourage sustainable practices within the sector. Such licences are offered to farmers who invest in new technologies to reduce environmental impacts.

Norway has established rigorous environmental oversight mechanisms to support ongoing monitoring and compliance. The Norwegian Institute of Marine Research (IMR) plays a pivotal role in this regard, conducting annual risk assessments that analyse the environmental conditions in each production area. This includes assessing sea lice levels, water quality, and the overall health of marine ecosystems. The results of these assessments are made publicly available, fostering transparency and public trust in the industry.

One of the central challenges for the Norwegian aquaculture industry is the management of sea lice, a pervasive problem affecting both farmed and wild salmon populations. Norway's regulatory framework sets some of the world's strictest standards for sea lice control, mandating that farms maintain adult female sea lice levels below 0.1 per fish from April to September. Failure to meet these standards can result in production reductions or even the revocation of licences. Chemical treatments have historically been used to combat sea lice, but increasing resistance has led to a significant decline in chemical usage. Instead, non-chemical alternatives such as mechanical delousing and cleaner fish have become more prevalent.

Waste management also forms a critical aspect of Norway's regulatory framework. If not adequately managed, organic waste, including uneaten feed and fish faeces, can severely impact the benthic environment. As a result, monitoring of the seabed and surrounding waters is mandatory. Norway's Environmental Quality Standards (EQS) are designed to limit nutrient pollution and prevent water quality degradation. In addition to organic waste management, the issue of plastic waste from aquaculture operations is also addressed, focusing on recycling and reusing materials like nets and other equipment.

The regulatory framework is continuously evolving to address emerging challenges. In 2022, the Government launched a new strategy titled "A Sea of Opportunities[49]", which aims to simplify the current complex and often overlapping regulations. This strategy reflects a long-term vision for the sector, emphasising sustainable growth while enhancing the protection of marine ecosystems. One of the anticipated changes is the introduction of fixed-term licences, replacing the current system of indefinite ownership. There has also been a move towards greater data transparency, including real-time reporting of environmental metrics via online dashboards.

Economic considerations are also central to Norway's legislative framework. Aquaculture operators are subject to various fees and taxes, including a production fee of 0.405 NOK/kg of harvested salmon and a resource rent tax of 35% on annual profits. These financial contributions support local municipalities and are intended to ensure that communities benefit from aquaculture's economic success. Additionally, a research fee of 0.3% is directed to the Norwegian Seafood Research Fund, while an export fee of 0.3% is allocated to the Norwegian Seafood Council.

Social acceptance and public trust are crucial for maintaining the industry's social licence. Norway has made significant efforts to enhance transparency and engage with local communities. The establishment of publicly accessible online dashboards has improved data availability, allowing communities to stay informed about the environmental performance of local salmon farms. Research suggests that while the public generally supports aquaculture for its economic benefits, there remains scepticism about further expansion without stricter environmental safeguards.

Internationally, as part of the European Economic Area (EEA), Norway complies with EU regulations such as the Water Framework Directive (2000/60/EC), which promotes the sustainable management of aquatic resources. Moreover, animal welfare and disease management are guided by EU standards to ensure the health and safety of both farmed and wild salmon populations.

Considerations for Obtaining an Aquaculture License in Norway (see footnotes[50,51,52])

1. Legal Framework:

- **Aquaculture Act (2005)**: This Act regulates the management, control, and development of aquaculture in both inland and marine waters. It establishes the licensing system essential for sustainable aquaculture activities.
- **Licensing Regulations (2004)**: These regulations set forth specific conditions under which licenses are managed.

2. Involved Agencies

- **Directorate of Fisheries**: Primarily responsible for issuing and managing licenses.
- **Norwegian Ministry of Trade, Industry and Fisheries**: Holds the authority to award licenses.
- **Norwegian Institute of Marine Research (IMR)**: Conducts annual risk assessments and environmental monitoring.

3. Licensing Process

[49] An introduction to the Government's new aquaculture strategy - Simonsen Vogt Wiig
[50] The Aquaculture Act - Regjeringen.no
[51] Act No. 79 of 2005 relating to aquaculture (Aquaculture Act) - UNEP
[52] Norway has the strictest aquaculture regulations in the world - Science Norway

- **Environmental Impact Assessment (EIA)**: Conduct an EIA to evaluate potential ecological impacts. This is mandatory before a license can be granted.
- **Compliance with the Traffic Light System**: Understand the Maximum Allowed Biomass (MAB) management system, which uses a color-coded approach to indicate production limits.

4. Environmental and Technical Requirements

- **Sea Lice Management**: Maintain adult female sea lice levels below 0.1 per fish from April to September.
- **Waste Management**: Implement measures to manage organic waste and comply with Environmental Quality Standards (EQS) to prevent nutrient pollution.

5. Licensing Auction

- **Competitive Auction System**: Licenses are typically acquired through a competitive auction. Successful bidders can hold licenses indefinitely and transfer ownership on the open market.

6. Apply for the License

- **Application Submission**: Submit the application form to the Directorate of Fisheries. The form covers aquaculture, food safety, environmental, water resources, and coastal administrations.
- **Technical Requirements**: Ensure that the production process and equipment meet relevant technical standards.

7. Compliance and Monitoring

- **Annual Risk Assessments**: Participate in annual risk assessments conducted by the IMR to monitor environmental conditions.
- **Transparency and Reporting**: Engage with local communities and maintain transparency through publicly accessible online dashboards.

8. Economic and Social Considerations

- **Fees and Taxes**: Be prepared to pay various fees and taxes, including a production fee, resource rent tax, research fee, and export fee.
- **Community Engagement**: Enhance social acceptance and public trust by engaging with local communities and ensuring transparency.

Overview of the Traffic Light System

The Traffic Light System is a risk-based management framework used to regulate salmon farming operations across different regions in Norway.

Purpose and Function

- The system categorizes regions into three colours—**green**, **yellow**, and **red**—based on the environmental risk of sea lice infestation and its impact on wild salmon populations.
- It aims to balance the growth of the aquaculture industry with the preservation of marine biodiversity by adapting farming practices to the ecological capacity of each region.

Colour Classifications

- **Green Light**: Indicates low environmental risk. Farms in green areas are allowed to increase their Maximum Allowed Biomass (MAB) by 6%.
- **Yellow Light**: Signals moderate environmental risk. Farms in yellow areas must maintain their current production levels without any increase.
- **Red Light**: Denotes high environmental risk. Farms in red areas are required to reduce their MAB by 6% within two years to mitigate environmental impact.

Evaluation Criteria

- The system primarily evaluates the impact of sea lice on wild salmon populations. This includes monitoring sea lice levels and assessing mortality exposure.

- The Norwegian Institute of Marine Research (IMR) conducts comprehensive assessments to determine the environmental conditions in each production area.

Implementation and Updates

- The Ministry of Trade, Industry and Fisheries oversees the implementation of the Traffic Light System. They periodically update the colour designations based on the latest environmental data.
- For example, in 2024, six production areas were given a green light, five a yellow light, and two a red light.

Importance of the Traffic Light System

- **Environmental Protection**: By regulating production based on environmental risk, the system helps protect wild salmon populations and marine ecosystems.
- **Sustainable Growth**: It ensures that the aquaculture industry can grow sustainably without compromising environmental health.
- **Transparency and Trust**: The system's color-coded approach and public reporting foster transparency and build public trust in the industry.

In summary, Norway's legislative framework for aquaculture is robust and comprehensive, aiming to balance industry growth with environmental sustainability. The Traffic Light System, green licences, and ongoing innovation incentives reflect a forward-thinking approach to managing the industry's environmental footprint. However, ongoing challenges related to sea lice management, waste control, and public trust necessitate continual adaptation and enhancement of regulatory measures.

3.4. Chilean Salmon Farming

Chile has emerged as the world's second-largest producer of farmed salmon, with salmon exports reaching approximately USD 4.8 billion in 2021. The rapid growth of the salmon farming industry in Chile over the last 30 years has led to significant economic benefits. However, it has also posed numerous environmental and social challenges, drawing the attention of local communities, indigenous groups, NGOs, and the global market.

Salmon farming in Chile is predominantly conducted in open net pens, with approximately 300 operational sites in 2022, distributed across Los Lagos, Aysen, and Magallanes. These regions have seen considerable expansion, partly driven by global demand and the favourable conditions for

aquaculture in colder southern waters. Despite this growth, environmental challenges such as chemical pollution, antibiotic resistance, and harmful algal blooms remain significant.

To manage the environmental impacts and ensure the sustainability of aquaculture, Chile has developed a comprehensive legislative and regulatory framework. The primary legislative instrument governing the sector is the General Fisheries and Aquaculture Law, which outlines the rules and procedures for licensing, environmental impact assessments, and operational requirements. The law is administered by various governmental departments, including the Undersecretariat for Fisheries and Aquaculture (SUBPESCA)[53] and the National Fisheries and Aquaculture Service (SERNAPESCA)[54]. These bodies enforce compliance, conduct inspections, and oversee disease management programmes. Additionally, the Superintendency of the Environment (SMA) is tasked with implementing environmental regulations and ensuring that aquaculture projects undergo thorough Environmental Impact Assessments (EIA).

A significant milestone in Chile's aquaculture legislation occurred following a severe outbreak of Infectious Salmon Anaemia (ISA) in 2007, which affected nearly all production areas and prompted a moratorium on new aquaculture concessions. Initially implemented in 2010, this moratorium has been extended several times and remains in force in some regions. The outbreak underscored the urgent need for more stringent sanitary measures and better environmental management practices. Since then, regulatory updates have been made incrementally, often in response to specific crises or emerging issues.

The current government has prioritised reforming the aquaculture sector, recognising the need to balance economic growth with environmental sustainability. Key proposals include enhancing SERNAPESCA's operational capacity to conduct more thorough inspections and increasing the use of advanced technologies for monitoring compliance. There is also a clear focus on strengthening the regulatory framework by developing a New General Law on Aquaculture, which has been debated throughout 2024-2025[55].

One of the critical challenges in Chilean aquaculture regulation is the control of chemical treatments and antibiotic use. Chemical treatments are commonly employed to combat sea lice infestations, particularly prevalent in Chile. Using pesticides such as Azamethiphos and Hexalumuron has raised environmental concerns, as these chemicals can affect non-target species and contribute to marine ecosystem degradation. Additionally, the widespread use of antibiotics to treat bacterial infections, particularly *Piscirickettsia salmonis*, has led to significant concerns about antibiotic resistance. Despite recent regulatory tightening, Chile remains one of the world's largest consumers of antibiotics in salmon farming. To address these issues, new amendments to the General Fisheries and Aquaculture Law have mandated increased transparency regarding the volume and type of antibiotics used, with data now being published at both farm and company levels.

Waste management has also become a focal point of legislative reform. Waste from salmon farming operations, including organic matter, feed residues, and chemical pollutants, can accumulate on the seabed and surrounding waters, potentially causing eutrophication and harmful algal blooms. Following a series of environmental incidents, including a significant algal bloom in 2016 that led to widespread fish mortality, new regulations have mandated continuous monitoring of water quality

[53] The Undersecretariat for Fisheries and Aquaculture - SUBPESCA. Subsecretaría de Pesca y Acuicultura
[54] National Fisheries and Aquaculture Service (SERNAPESCA)
[55] Refer to the SUBPESCA website for latest updates: Proceso Participativo Ley General de Acuicultura

parameters such as dissolved oxygen and salinity. Compliance with these standards is enforced by the Superintendencia de Medioambiente (SMA), and failure to meet environmental benchmarks can result in the revocation of operating licenses.

A particularly contentious issue in Chilean aquaculture is the use of Acoustic Deterrent Devices (ADDs) to protect salmon cages from marine mammals, particularly sea lions. While ADDs are legal and actively promoted as a non-lethal deterrent, concerns remain about their impact on marine mammal populations and other non-target species. Additionally, the issue of escaped farmed salmon, many of which are non-native Atlantic salmon, continues to pose ecological risks. Recent amendments to the legislation have increased penalties for escapes, including fines and operational suspensions, and have allowed third parties to recapture escaped fish, recognising the broader ecological implications of uncontrolled salmon migration.

Social and indigenous rights are also critical aspects of Chile's aquaculture framework. There have been ongoing disputes between salmon farming companies and indigenous communities, particularly in the southern regions where aquaculture operations often overlap with traditional fishing grounds and protected areas. The Kawésqar communities, for example, have voiced strong opposition to aquaculture within the Kawésqar National Reserve, arguing that the industry infringes on their cultural and territorial rights. The government has recognised the need to enhance consultation processes and include Indigenous perspectives in decision-making, but tensions remain high as expansion continues in some areas.

Considerations for Obtaining an Aquaculture License in Chile (see footnotes[56,57,58])

1. Legal Framework

- **General Fisheries and Aquaculture Law**: This law outlines the rules and procedures for licensing, environmental impact assessments, and operational requirements.
- **Regulatory Updates**: Be aware of ongoing reforms, including the proposed New General Law on Aquaculture, expected to be debated throughout 2025.

2. Involved Agencies

- **Undersecretariat for Fisheries and Aquaculture (SUBPESCA)**: Responsible for policy-making and regulatory oversight.
- **National Fisheries and Aquaculture Service (SERNAPESCA)**: Enforces compliance, conducts inspections, and oversees disease management programs.
- **Superintendency of the Environment (SMA)**: Implements environmental regulations and ensures thorough Environmental Impact Assessments (EIA).

3. Licensing Process

- **Environmental Impact Assessment (EIA)**: Conduct an EIA to evaluate potential ecological impacts. This is mandatory before a license can be granted.

[56] General Fisheries and Aquaculture Law - SUBPESCA
[57] Environmental Regulations - SMA
[58] Aquaculture Licensing Process - Global Seafood

- **Compliance with Environmental Standards**: Understand and comply with environmental standards, including waste management and water quality monitoring.

4. Apply for the License

- **Application Submission**: Submit the application form to SUBPESCA. The form covers aquaculture, food safety, environmental, water resources, and coastal administrations.
- **Technical Requirements**: Ensure that the production process and equipment meet relevant technical standards.

5. Licensing Auction

- **Competitive Auction System**: Licenses are typically acquired through a competitive auction. Successful bidders can hold licenses for a renewable 25-year term.

6. Environmental and Technical Requirements

- **Chemical and Antibiotic Use**: Implement measures to control chemical treatments and antibiotic use. Increased transparency regarding the volume and type of antibiotics used is required.
- **Waste Management**: Implement measures to manage organic waste and comply with environmental quality standards to prevent nutrient pollution.

7. Compliance and Monitoring

- **Annual Inspections**: Participate in annual inspections conducted by SERNAPESCA to monitor compliance with environmental and operational standards.
- **Transparency and Reporting**: Engage with local communities and maintain transparency through publicly accessible reports and data.

8. Economic and Social Considerations

- **Fees and Taxes**: Be prepared to pay various fees and taxes, including production fees and environmental compliance fees.
- **Community Engagement**: Enhance social acceptance and public trust by engaging with local communities and ensuring transparency.

In response to these multi-faceted challenges, the Chilean government is working to develop a more integrated and sustainable approach to aquaculture governance. The proposed New General Law on Aquaculture aims to address many existing gaps, including stricter environmental monitoring, enhanced social responsibility measures, and more explicit guidelines on the coexistence of aquaculture and traditional community practices. As global demand for salmon continues to grow, Chile faces the dual challenge of maintaining its economic position while safeguarding environmental and social sustainability.

4. Specific Considerations and Recommendations

4.1. Use of Triploids

One of the key areas of concern for the introduction of salmon farming in the Falklands will be the fact that Atlantic Salmon *(Salmo salar)* is not a native species. As was noted in our Environmental Impacts and Best Practices Report, this represents some potential risks for native species and ecosystems should escapees begin to breed or compete in the waters surrounding the islands.

Two potential mitigation systems exist on this basis, namely the use of closed containment systems (land-based facilities) or the farming of sterile fish.

The use of land-based facilities presents a clear mitigation by avoiding the fish mixing with the environment in the first place. However, the potential for land-based farming of Atlantic salmon in the Falklands seems counterintuitive (one of the advantages of land-based farming is that it can be located near to major markets to reduce transport costs, and this is clearly not the case in the Falklands). It is the ideal environment for cage farming which would make the waters around the Falklands attractive to the prospect of cage farming specifically. For this reason, we do not see the potential for developing on-grown land-based salmon farming in the Falklands as worthwhile for significant consideration (although smolt production on land should definitely be encouraged).

The second approach is the use of so-called 'sterile fish' which are unable to breed in the wild and so naturally mitigate the risks of interaction with native species and ecosystems. In salmon the most common and accepted method of achieving sterile fish is through the process called 'triploidy'. Triploid fish are those which have three sets of chromosomes (two from the female and one from the male) and so render the salmon sterile. The process of triploidisation is commonly achieved by exposing newly fertilised eggs to hydrostatic pressure (Benfey and Sutterlin, 1984). This process has been relatively well developed over the last few decades and has even become a requirement in certain jurisdictions (Tasmania, parts of Norway etc.).

Triploidy though is not without its issues and is still undergoing research and development. The key issues presented by the process are as follows;

Success Rate: The process of creating triploid eggs is around 99.5% effective when performed correctly. However, it is not necessarily 100% effective and so it is still possible for diploid salmon to exist within triploid batches, which if they escape, present the same risks for standard farming. Clearly though the risks are much reduced within triploid production[59].

Skeletal Issues: Evidence does exist that triploid salmon are more prone to skeletal deformities than standard diploid ones (Amoroso *et al*. 2016; Benfey 2001; Sadler, Pankhurst, and King 2001; Sutterlin, Holder, and Benfey 1987). The reasons for this have been researched quite extensively and appear to be linked to different nutritional requirements, particularly phosphorous (Fjelldal *et al*. 2016; Sambraus *et al*. 2020; Smedley *et al*. 2016, 2018). This has led to feed producers actually creating specific feeds for triploid fish[60].

[59] It should also be pointed out that the evidence for mixing of wild and farmed salmon population is relatively weak. Some evidence does exist but this is limited.
[60] See BioMar's product catalogue - https://www.biomar.com/en/uk/products--species/salmon/triploider/

Mortality Rates: Evidence exists that mortality rates in triploid fish are higher than those experienced in standard production systems. Madaro *et al.,* (2021) found increased mortality in triploid production when compared to that of diploidy on the same farms with most interestingly linked to periods around delousing (an indicator that the fish may be less able to withstand stress). In total, this research showed an increase in mortality of triploid over diploid production of 4%, which could be quite significant in a commercial setting**. However, it is worth noting that other studies (e.g. Clarkson et al., 2021) have reported improved outcomes under controlled conditions, indicating that performance may be context-dependent.**

Emaciation and Meat Quality: The incidence of emaciation has been seen to be a more common occurrence in triploid production than diploid. Again, this is also linked to a lower meat quality performance with experiments showing a lower prevalence of 'superior' meat quality in triploid production over that of diploid (Madaro, *et al.*, 2021) of 5%.

'Genetic Enhancement': Triploid production is not a form of genetic modification but often the public fail to make this distinction and can become concerned about the process of 'triploid production'. Few people are aware of its common use in agriculture already (bananas are virtually all produced through triploid use) and so a program of education is often required for the public. This is likely to be a potential area of concern in the Falklands (as is the effects of escapes of a non-indigenous species).

A combination of the above issues has seen the use of some triploid farming being phased out in Norway recently while a better understanding of the welfare issues is determined. However, currently it really remains the only commercial method for creating sterile species and so research is likely to continue to improve these welfare concerns over time. We believe that the benefits of triploid product would outweigh the potential impacts of escapes in the Falklands[61].

4.2. Product Certification

The use of third-party standards to certify the best practices of salmon farms has been discussed at some length in the other report prepared by MEP (Environmental Impacts and Best Practices Mitigations).

The idea of requiring all farms to produce salmon to the standards of a certified product farming in the Falklands is clearly an attractive idea and would help to guarantee that best standards are being met. However, two significant concerns were raised in the previous report relating to non-indigenous species and sterile fish use and how these may affect the ability of certification being achieved. MEP has sought some clarifications on these issues and presents the key findings below for the two main options considered, Aquaculture Stewardship Council (ASC) and Organic Certification.

Aquaculture Stewardship Council (ASC): Under the current ASC Salmon Standard (v1.4), the use of non-native species is not allowed under the ASC standard except for certain some exceptions:

1. *The species has a history of wide commercial production in the area*: This is not the case in the Falklands for Atlantic salmon.

[61] The proposal for farming put forward by Unity Marine includes the use of triploids.

2. *The species is being produced in closed containment systems:* Non-native species can only be farmed if they are in systems that demonstrate separation from the wild through effective physical barriers. While the standard does not explicitly define what an "effective physical barrier" is, the audit manual clarifies that such systems must prevent the escape of reared fish or biological material that might survive and reproduce. This could be argued to include physical infrastructure (e.g., tanks or isolated water bodies); however, it is generally interpreted that this refers to land-based or fully enclosed systems, or potentially isolated freshwater bodies not connected to the sea. Traditional net pen systems in open marine environments are unlikely to meet this threshold unless they incorporate additional containment and treatment measures. As such, this exception is not likely to be applicable in the Falklands for Atlantic salmon.
3. *100% Sterile salmon are being used:* This follows on from the discussion above around triploid use. The ASC do not define which methods are classed as producing '100% sterile salmon'. Following clarifications with the ASC, they state that the onus is on the producers to show they are 100% sterile to the certification body at the time of assessment. However, they also noted during discussions that the ASC Salmon Steering Group were currently uncertain if any technology was capable of producing 100% sterile salmon. This is an unfortunate position for the ASC to adopt in that they seem to suggest that it is not possible but that the final decision is based on the assessment body reviewing the evidence provided.

Under the new ASC Farm Standard (v1.0, May 2025), which will replace the species-specific standards from May 2027, the approach to non-native species has changed. The standard does not include a blanket prohibition on non-native species, but instead requires farms to assess and mitigate ecological risks using the Environmental Impact Classification for Alien Taxa (EICAT) framework developed by the IUCN. The standard states:

"ASC certified farms are required to implement robust escape management practices and mitigation measures in line with the EICAT classification to minimise the risks posed by alien species and their impacts." (Criterion 2.4 – Rationale)

The standard also includes the following relevant indicator:

"2.4.1: The Unit of Certification (UoC) shall not stock transgenic animals."

While the ASC Farm Standard does not explicitly reference the use of sterile fish (e.g., triploids), such measures may be considered as part of a mitigation strategy to reduce the EICAT risk classification. Similarly, land-based or closed containment systems may be viewed more favourably under the contextualisation process, as they reduce the likelihood of escape and establishment.

In summary, the ASC Salmon Standard currently provides clearer exemptions for non-native species under specific conditions (e.g., sterility or containment), whereas the ASC Farm Standard adopts a more flexible but less prescriptive approach based on ecological risk. This shift may offer future opportunities for certification in the Falklands, but only if the ecological risks are shown to be minimal and appropriate mitigation measures are in place.

<u>*Organic Certification*</u>: Two issues exist for the production of organic certified fish in the Falklands;

1. *Non-Indigenous Species:* The EU Organic standard states that 'locally grown species shall be used'. 'Locally grown' are then defined as species which are neither alien nor locally absent.

Rather confusingly though, certain species that are non-indigenous are allowed to be certified, such as pacific oysters in Europe (as an example). Following clarification, it appears that the EU have accepted species which have been present or produced for a significant period of time in the local environment (although they don't specify what they see as 'significant'). The current interpretation currently used is that the species needs to have been produced for at least 10 years in the country with no significant issues. Since no salmon is currently produced in the Falklands it is not considered possible that it could be certified as organic in the next ten (10) years at least.

2. *Triploidy Use:* The use of sterile fish has been recommended as a licence requirement elsewhere in this report as a way of mitigating escapes from a non-indigenous species. However, this is specifically not allowed under the EU Organic standard.

Based on the above, it is not considered possible for EU organic certification to be obtained for salmon produced in the Falklands.

Following the outcomes above, it is our recommendation that any future production is required to align with the principles and best practices outlined in the standards of ASC certification as part of its licensing agreement in the Falkland Islands. This would help maintain the highest production standards and provide confidence that any company is operating to the highest standards possible. We suggest that the regulatory wording be framed to require farms to meet all applicable requirements of the ASC Farm Standard, to the extent that these are compatible with Falklands legislation. This means that a farm would not need to be necessarily certified against the ASC standard but would need to show (probably through a third-party audit) that it does me*et all* the requirements of the standard other than those which do not allow it under Falklands legislation.

5. Suggested Reforms to Legislative System

In this report, we have set out the current legislation for salmon farming in the Falklands and then provided example case studies from Scotland, the Faroes Islands, Norway and Chile for comparison. We have also raised some specific issues or areas which we see as specifically important to salmon production in the Falklands (sterile fish and product certification). In this section, we now attempt to pull all of this together to make recommendations on how to reform the Falkland's legislation, so it is line with the best practices possible. Most of this review is based on the Fish Farming Ordinance since this forms the basis for legislation in the Falklands. While we have not specifically rewritten this, we have clearly set out areas for inclusion in the ordinance below. When legislative requirements outside of the ordinance are required, these are specifically discussed below.

5.1. Step 1: Seabed Ownership and Leasing Process

As noted in Subsection 2.2, the Falkland Islands Government does not have any detailed/established policy in relation to authorising the use of the seabed on behalf of the Crown, which is a potential area for policy development. The policy would be developed across several Directorates; (a) Law and Regulation; (b) Public Works; (c) Policy, Economic and Corporate Services; and (d) Natural Resources.

5.2. Step 2: Developing the Current Planning Systems

The current planning system in the Falklands is relatively simple but offers a good base from which salmon farming planning can be considered. Some significant changes should be made, though, to help better inform the decision-making process for salmon farming applications specifically:

1. *Application Form:* All planning applications in the Falklands use a single application form, which is clearly not suitable for the consideration of a major salmon farming operation. We would recommend that a specific form be created for salmon farming applications. This could be based on the ones currently developed by the different councils of Scotland (for example, Argyll and Bute) and would ensure better initial information is collected at the commencement of the process.
2. *Planning Policy Development:* Currently, the Falklands has no specific planning policy development which can be used to support the process of approving/ rejecting the planning applications which may be made for salmon farming. While a lot of the discussion and recommendations in this report detail the processes which we believe should be included to ensure that best practice is undertaken, it does not deal with what level or locations of farming is right for the Falklands. This is not necessarily a scientific discussion point but often more of a social one[62]. Defining this through a set of planning policies is going to be crucial (including the potential use of spatial planning). Some suggestions around this are as follows;
   a. *Designated Aquaculture Areas:* One system is to define species areas which are 'approved' for salmon farming activities. This could be based on the assessment of the areas and a decision that they represent the best locations for both environmental and social reasons (i.e., they are not sensitive habitats, are not areas of outstanding beauty etc.). The advantage here is that the areas are pre-determined and so the planning process is more about determining if the development is of a scale and quality to be suitable for approval.
   b. *Case by case approach:* Here applications are determined on a case-by-case basis with no pre-determined locations either approved or rejected in planning policy. In locations with few applications (which may be likely in the Falklands), this can be a workable approach. However, if multiple applications are being received it can soon become unworkable.
   c. *Combined Approach:* One option is to have a case-by-case approach which is combined with other 'general limitations'. Most commonly, these limitations will be spatial (i.e., areas which are considered unsuitable for aquaculture development for a variety of reasons) and quantitative (a limit on biomass either within areas or on a wider scale are set).

The approach, which is to be taken in the Falkland Islands, should it be agreed to permit salmon farming, clearly needs further discussion. To commence this process, we have made an initial recommendation on what we think would constitute a suitable planning policy for salmon farming development in the Islands as follows.

1. Salmon farming planning applications shall be considered on a case-by-case process through the planning process and Fish Farming Ordinance requirements.
2. Areas of designated protective status (as identified through a geo-spatial survey) will not be permitted to allow salmon farming development under any circumstances[63].
3. Within the Falkland Islands, the maximum annual production cap (i.e., volume of harvestable biomass per year[64]) for cage farming operations should not be exceeded. No additional licensing applications will be considered beyond this yearly harvestable biomass.

[62] The point being raised here is that a system can be implemented which reduces the environmental impacts to as low as possible but that does not make the granting of salmon farming planning applications socially acceptable to the community at large. The planning framework policy needs to attempt to achieve this by setting out clear rules on what is and what is not allowed.
[63] What constitutes an area not permitted for development of fish farming clearly needs further debate and agreement. However, we believe that it would be sensible for certain areas of the Falkland Islands to be designated as not suitable for development.

In summary, we are recommending a planning policy which considers new application on a case-by-case basis but with development in certain areas prohibited and a cap on the total biomass allowed for cage farming in the islands determined in advance. Once agreed, it will be important for this to be included in the Falklands Development Plan (or within a separate development plan for aquaculture).

Environmental Social Impact Assessment (ESIA) Requirements

The current Falklands legislation does specify that an EIA is required for certain projects. Although it is not specifically stated that this is a requirement for salmon farming activities it does seem that this is likely to be the case. We would recommend though that specific legislation is added requiring any application for a fish farm which will produce more than 5 tonnes of dead fish weight per year to complete an ESIA (as opposed to an EIA) avoid confusion.

The Falklands legislation does not seem to currently provide specific requirements on what is needed to be completed in the EIA. To avoid doubt or confusion, we believe that some specific requirements for an ESIA should be included in the legislative system (either through separate legislation or through inclusion in the current Ordinance). In Annex 1, we have provided a recommended minimum content requirement for an ESIA being submitted on behalf of a salmon farming application. In reality, the completion of ESIAs will often follow a set process, and so none of the requirements are likely to be controversial. However, we do recommend that the modelling of pollutant dispersal from the farming operation is undertaken using suitable software (for example, DEPOMOD). Within the Scottish regulation, this is a requirement of the CAR licensing system, however we do not think an additional process should be added here as it will overcomplicate the system in the Falklands (see the discussion below under Step 3).

The process for completing, submitting and approving the ESA is also not defined but clearly needs to include a period of stakeholder comment and discussion before a final approval is made. This can be included in the planning process to avoid the need for separate and duplicating processes to be ongoing at the same time.

5.3. Step 3: Developing a CAR licensing system?

The CAR system which has been outlined for the Scottish regulations is the process by which a farm is given permission to discharge into the environment. To determine this, the farm is required to model its discharges, and these are determined against the baseline to determine the risk and to set maximum limits of discharge which may be considered acceptable within a licence (or may not as the case may be).

This process should form part of the ESIA and has become very complicated and burdensome in the Scottish system with multiple periods of stakeholder feedback, analysis and reporting.

For the Falklands, considering the simplicity of the regulatory system is likely to be an advantage (noting the current review in Scotland to reduce the regulatory authorities involved), we would not recommend the creation of a new and separate CAR licensing system. Instead, we would suggest that the process requires the inclusion of relevant information relating to modelling within the ESIA process and this is considered at this stage. The licensing for the facility is therefore still achieved

[64] This figure should be significantly low enough to avoid the reaching of any carrying capacity issues in specific water bodies (otherwise a full carrying capacity assessment would need to be completed).

through the obtaining of a salmon farming licence through the Fish Farming Ordinance and a separate CAR licence is not therefore required (See Section 5.6 for an overview of how this system is seen as working in the Falklands).

5.4. Step 4: Amending & Developing the Fish Farming Ordinance

The current Fish Farming Ordinance provides a good basis on which to develop the aquaculture legislation, which may be necessary to ensure best practices are used by the industry. It is also important to note that the Falkland Islands have legislative drafters that will produce any amending Bill, regulations etc., in response to reasonable propositions where changes may be needed. Thus, any propositions here are at a very high level and more detailed policy development is needed.

During this review, we have taken some of the best practices which are currently occurring globally (with particular emphasis on the Faroe Islands) and that we think would benefit from inclusion in the Fish Farming Ordinance requirements. Below, we set out the significant additions which we would recommend adding to the ordinance.

Marine Zones: We suggest that the FIG implement a system of Marine Zones around the Falklands, which are based on areas of mixing water bodies, similar to that employed in the Faroe Islands. These MZs will then allow for the control of single fish classes within them.

Suggested policy recommendation(s):

Requirements 1: Marine Zones shall be determined by the FIG for all waters around the Falkland Islands

Requirement 2: The licensing of finfish aquaculture shall only be allowed within the approved Marine Zones

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Protected Status Zones: It is recommended that the FIG decides on areas around its coast which should not be allowed for aquaculture development (specifically finfish aquaculture). These areas should be ones considered of scientific or social importance. We believe that some mapping work has already been completed in this context and could be used to guide these decisions.

Suggested policy recommendation(s):

Requirement 1: The licensing of finfish aquaculture shall be prohibited in 'protected status zones'

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Biomass Limitations: MEP is recommending that a maximum yearly harvestable limit of cage-based finfish is set in regulation. This limit should be provisional in nature and subject to ongoing review, particularly as the industry develops and more site-specific environmental data becomes available. While previous modelling exercises (e.g. DEPOMOD) have provided indicative estimates of environmental carrying capacity for certain sites, these figures should not be treated as fixed thresholds. Instead, biomass limits should be informed by detailed, site-specific assessments of depositional footprint and carrying capacity, with expert analysis guiding any adjustments. It is also recognised that harvestable production may exceed standing biomass at any one time, due to production cycles and growth dynamics. This is standard practice and should be factored into

environmental assessments and regulatory planning. We nonetheless advise applying the precautionary principle by starting with a low biomass threshold, subject to regular review. An absolute upper limit should still be established to offer assurance to stakeholders on the intended scale of development.

Suggested policy recommendation(s):

Requirement 1: The maximum annual cage-based harvestable finfish biomass shall be determined through the carrying capacity of the Falkland Islands' waters.

§§§§

Licensing Process: As a general comment, the current Fish Farming Ordinance is not particularly clear on how it fits within the general application process for salmon farming. It does mention the requirement for planning permission to be determined but this is not specifically clear.

Our recommendation is that a potential farmer should be required to apply for a 'Fish Farming Licence' at the same time as planning permission is commenced. This process should involve the completion of an application (including all areas covered in section 4 (and as specified below). The licence though cannot be granted until the planning permission has been granted for the facility[65].

Suggested policy recommendation(s):

No specific text is specified here but the ordinance needs to be made clearer on how it fits into the overall process. This could be aided by a separate flow diagram for the whole approval process (once developed) in the Falkland Islands.

§§§§

Application Requirements: The current Fish Farming Ordinance includes requirements for what needs to be provided as part of the licence application process (Section 4). We would recommend the inclusion of the following additional requirements.

Suggested policy recommendation(s):

Requirement 1: An initial Emergency Response Plan (including a biosecurity plan)

Requirement 2: Evidence of the proposed Internal Control System for the facility, including, but not limited to, health inspection processes, water quality monitoring and operational planning systems.

Requirement 3: An initial Operational Plan for the facility.

§§§§

Requirement for Fallowing: Fallowing refers to the period of time at which salmon farm is unused, which allows the environment to recover from sediment build-up beneath cages and also to control diseases. We are recommending an enforced period of fallowing be introduced for any future cage

[65] This appears to be the case under the current ordinance but the process is not specifically made clear.

operations in the Falklands. We are setting this at two (2) months but with a notice that this can be extended by the authorities (as required).

Suggested policy recommendation(s):

Requirement 1: All cage-based farming activities must observe a two (2) month fallowing period in between production cycles. This period will commence from the day the nets are removed from the water.

Requirement 2: The Authorities reserve the right to extend this fallowing period should it be deemed necessary and on presentation of the reasoning to the licensee.

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Equipment Disinfection During Fallowing Period: As is practiced in the Faroe Islands, we believe an enforced period of equipment disinfection should be stipulated in the legislation as part of the fallowing period. This should include the removal of all nets on to land and the cleaning of all equipment in the sea as required. The plan for this should be approved in advance and should follow specific requirements on chemical use and wastewater treatment (which are dealt with further down in these recommendations.

Suggested policy recommendation(s):

Requirement 1: All cage nets must be removed during a period of fallowing and disinfected on land.

Requirement 2: Any floating equipment which cannot be removed from the sea during a period of fallowing must be washed and disinfected at sea.

Requirement 3: Prior to a fallowing period commencing, a plan for the cleaning and disinfection of the equipment (as specified above) must be presented and approved by the authorities.

Operational Plan & Logbook: It is standard practice for a farm to be required to maintain an operational plan for its stocking operations. We are recommending that this forms part of the approval process following every fallowing period (i.e., a new operational plan is submitted each time). The requirements of what should be included in an operational plan are also specified here in Annex 2 of this document.

On top of an operational plan, the farm should also maintain a day-to-day operational logbook. This is a record of all the daily activities which are being completed on the farm and should be available (completed) to review by the authorities at any time. Again, the suggested requirements of the Operational Logbook are provided in Annex 3.

Suggested policy recommendation(s):

Requirement 1: The licence holder must maintain a continuous operation plan for its aquaculture facility.

Requirement 2: For operations requiring periods of fallowing (cage-farming operations), an updated operational plan must be submitted to the authorities a minimum of six (6) months prior to any new proposed stocking activity for prior approval.

Requirement 3: For operations with continuous production during the year, an operational plan should be submitted by the end of January each year to the authorities.

Requirement 4: The licence holder shall also maintain an operational logbook with, as a minimum, the information maintained in Annex 3. The logbook must be always maintained up to date.

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Hatchery Supply: The production of smolt should be completed in land-based facilities in the Falklands to allow for vertical control of the process. All should be approved by the FIG for supply. However, an exception to this rule would be the import of eggs, which will be necessary (at least in the short term) since no egg production facilities currently exist in the Falklands.

Suggested policy recommendation(s):

Requirement 1: On-growing farms may only be supplied with smolt from hatcheries operating in the Falklands and approved for such operations by the FIG.

Requirement 2: Eggs may be imported from external suppliers but must be approved in advance by the FIG and inspected and quarantined on arrival.

Requirement 3: All hatcheries operating in the Falklands must use modern Recirculating Technology (RAS).

§§§§

Smolt transfer size limit: One of the most significant areas of change which is currently occurring in the salmon industry is the extending of land based growing periods for salmon. The reasons for this are discussed in the report but focus on reducing the time required in the cage system. In the Faroe Islands, this practice has been particularly well developed with some companies now growing fish to 500 g on land prior to stocking on sea.

We recommend that an aggressive target is set here to encourage as much land-based production as possible and to limit the cage time to a minimum, hence an average target weight of 500 g for cage stocking is provided.

Suggested policy recommendation(s):

Requirement 1: Fish (except for broodstock and/or cleaner fish) may only be transferred to a cage farm at an average size of 500 g and no smaller.

Requirement 2: The authorities may reduce the size requirement in Requirement 1 at their discretion.

§§§§

Emergency Response Plan (ERP): All farms should operate an ERP which sets out the processes that should occur in certain emergencies, specifically fish escapes, mortality events, disease outbreaks, etc.

Suggested policy recommendation(s):

Requirement 1: All licence holders must maintain an Emergency Response Plan (ERP) which identifies all key hazards and the measures to be taken in the event of accidents or specific events.

Requirement 2: The ERP should be approved in advance by the authorities (prior to the granting of a licence).

Requirement 3: If the ERP is to be changed, it should be resubmitted to the authorities for prior approval.

§§§§

Single Year Class in MZs: This rule has been developed in the Faroes and has been well-received and shown to be effective for reducing sea lice transmission. We would recommend its inclusion in the Fish Farming Ordinance to ensure that only fish from the same year class could be produced in a single Marine Zone at any one time**.**

Suggested policy recommendation(s):

Requirement 1: All farms operating cage-based operations within the same Marine Zones may only farm fish of the same year class at the same time.

Requirement 2: No new year class may be stocked into a farm in the same Marine Zone until all the farms have been emptied of existing fish (and any required fallow period completed).

Requirement 3: Different year classes may be allowed at land-based facilities provided it is split into different production units for this purpose. This must receive the approval of the authorities in advance of operations.

Requirement 4: Cleaner fish (e.g., wrasse and lumpfish that are used to control sea lice infestations) are exempt from the requirements in Requirement 1, meaning that different year classes of these fish may be stocked in one production cycle.

§§§§

Use of sterile fish: It is our recommendation that only sterile fish be farmed in the Falkland Islands due to the risk of introducing non-indigenous species. For this process, we anticipate that the use of triploid fish will be the standard approach employed and although these do come with some welfare concerns, we feel the positives of using sterile fish outweigh this. However, other methods of producing sterile fish may become available and so the wording is left to allow these to be considered on a case-by-case basis.

For all farms producing non-native species, a requirement to monitor the potential impacts of the species is included.

Suggested policy recommendation(s):

Requirement 1: Only fish approved as sterile by the authorities may be used for cage based on-growing operations in the Falklands.

Requirement 2: The use of triploidy is encouraged for developing sterile fingerlings. However, other methods may be considered by the authorities on a case-by-case basis.

Requirement 3: All farms producing non-native species in the Falklands must implement and maintain an approved monitoring plan to determine any potential interaction effects of the species with native species and the ecosystem at large.

Requirement 4: For cleaner fish, only native indigenous species may be used in salmon farming operations.

§§§§

Adhering to global best practice: To ensure the highest possible standards are maintained at any farming facility in the Falklands, we are recommending that licence holders adhere to the principles of the Aquaculture Stewardship Council (ASC) certification requirements. It is considered that a time period will need to be provided from the commencement of activities and have suggested that this is set at three (3) years from the first stocking of fish into cages. The proposed approach ensures high environmental and operational standards while allowing flexibility for local conditions.

Suggested policy recommendation(s):

Requirement 1: All cage-based farming operations should aim to align with the principles of the ASC standards within three (3) years of the first stocking of fish. Where full ASC certification is not feasible—due to misalignment with FIG licensing requirements or technical constraints—operators may demonstrate adherence to ASC-aligned practices through annual third-party audits and transparent reporting.

Requirement 2: If a farm is found to be no longer aligned with the principles of the ASC standards—or fails to demonstrate continued adherence through third-party audits and reporting—this may result trigger a review of the company's fish farming licence. The final decision shall be at the discretion of the authorities and will be considered on a case-by-case basis, taking into account the nature and severity of the non-compliance.

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Updated Operational Plan: It is recommended that a new Operational Plan is submitted for each new restocking activity (following the required period of fallowing) and approved by the authorities before any new fish can be added to the water.

Furthermore, the authorities should be provided with the opportunity to require a reduction in biomass if previous production runs have encountered issues.

Suggested policy recommendation(s):

Requirement 1: Prior to any restocking of fish into a cage farm system (following a period of fallowing), a new Operational Plan must be submitted to the authorities and approval received for each activity.

Requirement 2: The authorities reserve the right to request a reduction in biomass for a new stocking activity into cages based on previous negative performance (for example, disease issues, regulatory breaches etc.).

§§§§

Distances between farms: It is good practice to maintain a minimum distance between farms. All farms must be at least 2.5 km apart in the same MZ. However, if DEPOMOD modelling indicates that farms can be closer without overlapping impacts, adjustments to this distance may be considered.

Suggested policy recommendation(s):

Requirement 1: All farms must be at least 2.5 km apart in the same MZ (unless models suggest shorter distances can be effectively managed).

Requirement 2: The measurement shall be taken from the closest surface-based structure of the two farms in question.

§§§§

Cage net depth: Per guidance from the FAO[66], cage net depth should be no deeper than one-third of the site's depth and *at least* 15 m should be left between the net base and seabed (at low tide), to permit a wider and better dispersion of cage waste particulates. Net depths greater than this are likely to result in a higher severity of impact on sediments below the cages (and can be modelled using DEPOMOD).

Suggested policy recommendation(s):

Requirement 1: All cage-based farms shall always maintain a cage net depth of no deeper than one-third of the site's depth.

Requirement 2: All cage-based farms shall maintain *at least* 15 m of space between the net base and the seabed (at low tide).

§§§§

Maximum Biomass: A maximum biomass should be maintained on the farm (kg/m^3) to help reduce disease incidents. It should be noted that this is the maximum permissible level and not the average (i.e., it should never go higher than this).

Suggested policy recommendation(s):

Requirement 1: All cage-based farms shall always maintain a maximum fish biomass of no more than 25 kg per m^3.

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[66] Aquaculture Operations in Floating HDPE Cages: a field handbook - https://openknowledge.fao.org/items/f0467127-a9e3-4670-8a59-3076f91ce868

Fish Lice Inspections & Treatment: Fish lice represents one of the biggest issues in salmon farming and so strict controls are necessary to identify infections quickly and treat them in an effective but environmentally sensitive manner. To aid the FIG in monitoring sea lice infestations it is suggested that a requirement to report infestation numbers at regular intervals is made a condition of licensing for cage operations.

Suggested policy recommendation(s):

Requirement 1: Sea lice numbers are to be counted and reported to the FIG for all cage farming activities. This shall be completed once every two weeks in the summer months and once every month during the winter months.

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Health Inspections: Health inspections are a vital part of maintaining vigilance against disease and ensuring early detection. They should be completed by a qualified veterinarian and we suggest presenting prescribed levels as set out below.

Suggested policy recommendation(s):

Requirement 1: All aquaculture facilities incorporating fish must have an approved veterinarian who is responsible for the completion of animal health inspections.

Requirement 2: This veterinarian must be registered with the authorities and any changes notified in advance.

Requirement 3: Health inspections must be completed at the facility (nursery, broodstock or on-growing facility) once every month as a minimum.

Requirement 4: A facility may request a reduction in these inspections to six (6) per year following the first year of operation and based on the farms risk assessment and previous performance. Granting of this reduction will be at the discretion of the authorities.

Requirement 5: Fish health inspections should include, but not be limited to;

a. The dissection of a sample of slaughtered fish
b. The dissection of a sample of any fish which have died from unknown causes
c. A visual inspection of the operational units
d. A review of the operational logbook

Requirement 6: After every fish health inspection, an inspection report should be produced and maintained by the licence-holder.

§§§§

Fish Mortality Disposal: It is important that a farm is capable of dealing with fish mortality in an efficient and effective manner. This helps avoid potential disease issues and helps increase biosecurity. As such, we recommend the setting of specific capacity requirements around this.

Suggested policy recommendation(s):

Requirement 1: All farms must have the capacity (either directly or through a sub-contractor agreement) to dispose of at least 1% of the maximum farm biomass on a daily basis.

Requirement 2: This capacity should include the ability to collect, grind, convert to silage, temporarily store the fish and to finally dispose of it.

§§§§

Chemical and Medical Use: These requirements are simply added to ensure farms are not using chemicals or medicines which are not approved.

Suggested policy recommendation(s):

Requirement 1: Any chemicals to be used at aquaculture facilities must be approved by the authorities

Requirement 2: Any medicines to be used at aquaculture facilities must be approved in advance by the authorities.

§§§§

Humane Slaughter: The use of humane slaughter techniques is growing in popularity around the world and in our opinion should be included as a legislative requirement for farms operating in the Falklands.

This can either require the use of instant slaughter methods or the use of sedation first in other cases.

Suggested policy recommendation(s):

Requirement 1: All fish must be sedated prior to slaughter or disposal, so that the fish lose consciousness before they are killed.

Requirement 2: The requirement for sedation shall not apply if fish are slaughtered using a method that ensures the fish die instantly on commencement of the process.

5.5. Step 5: Provision of a Fishery Products Licence

Having reviewed the Fisheries Product Ordinance, we are unclear if a system for licensing an aquaculture facility exists under its requirements.

In most countries, an aquaculture company will need a secondary licence which is issued by the Fish health inspectorate. This licence is specifically related to the health of the fish and ensures veterinary practices are being followed. This often extends to ensuring that the final product meets consumer regulations once entering the market (for example its free of antibiotic residue etc.).

It appears that the majority of this is covered by the Fisheries Product Ordinance but some of the requirements have been included in Section 5.4 above under changes to the Fish Farming Ordinance.

Two options now exist for the Falklands. Firstly, these requirements could instead be included in the Fishery Products Ordinance and a second separate licence provided under this. The advantage here

is that the authorities would have the ability to stop a farm from selling/ moving its products by suspending this licence specifically (but without effecting its general aquaculture licence).

Alternatively, all fish health requirements could be included under the Fish Farming Ordinance and only a single licence provided. This maintains a relatively simple system which can also be advantageous.

For the benefit of our recommended regulatory system, as summarised in Section 5.6 below, we have presumed that these will correspond to two separate licences (a salmon farming licence and a fisheries product licence).

Some further provisions relevant to salmon farming can also be found in the following regulations:

- Fishery Products (Hygiene) Regulations 2012[67]
- Fishery Products (Vessels, Establishments and Installations) Regulations 2014[68]
- Fishery Products (Examination for Contaminants, Residues and Maximum Residue Levels) Regulations 2015[69]

5.6. Overview of the proposed approval system

In Annex 4 of this report, we have provided a visual representation of the licensing system and how we see it working within the Falklands. Below we summarise this process and highlight the documents/requirements that will be needed for the process to move forward at each stage.

1. Firstly, an applicant must apply for a Lease Option Agreement (LOA) from the Governor. This process provides the applicant with the basis to move forward with the consenting process.
2. Once an LOA is in place, the applicant may commence the collection of baseline data from the site which will be used to inform the ESIA. The ESIA can now be prepared in line with the requirements set out in Annex 1.
3. Once the ESIA is completed, the applicant should now apply for planning permission. This process requires the completion of a specific Fish Farming Application Form (to be developed) and should be accompanied by the completed ESIA.
4. Upon receipt of notification of the planning application, the applicant can now apply for a fish farm licence (under the Fish Farming Ordinance). To do this, the applicant must again submit a Fish Farming Licence Application Form (to be developed) and provide a host of relevant information including the ESIA, a Business Plan, an Operational Plan (OP) and an Emergency Response Plan (ERP). The information provided must show that the applicant will be operating in-line with the requirements specified in the Fish Farming Ordinance (to be updated).
5. At the same time, the applicant may also apply for a fishery products licence (under the fishery products ordinance) which will provide the farm with permission to sell its product on the market.
6. The Planning Application will now proceed through the set process with a period of stakeholder comment and discussion included. During this, in person meetings will be assembled to allow any stakeholder the chance to present questions to the applicant. FIG will then collate all questions and responses from the applicant before raising any specific comments they have on the planning application.
7. Following all comments and feedback to the applicant, they will be requested to update all documentation (as required) and re-submit for final approval (or rejection).
8. FIG will then make a final planning decision with the application either rejected or approved.
9. Upon Planning approval, FIG will also provide a Fish Farm Licence which shall include all licence conditions that will need to be met by the farming operation.
10. At the same time FIG will provide the Fishery Product Licence which will give the farmer permission to commence selling their products on the market.

[67] Fishery Products (Hygiene) Regulations 2012
[68] Fishery Products (Vessels, Establishments and Installations) Regulations 2014
[69] Fishery Products (Examination for Contaminants, Residues and Maximum Residue Levels) Regulations 2015

11. Upon receipt of the Fish Farm Licence and Fishery Product Licence the applicant may then request the receipt of a full lease agreement from the Governor. This marks the last step in the consent process.
12. Once a Lease Agreement is received, farming operations may commence and will be subject to all conditions and regular inspections from the authorities.

5.7. Capacity Requirements within FIG

The commencement of a commercial salmon farming sector would represent a significant new industry in the Falklands. Furthermore, our recommendations in this report suggest it is done with the highest environmental sustainability standards possible.

The licensing of such operations is clearly going to require a level of expertise within FIG which does not currently exist. Should it be decided that commercial salmon farming should be undertaken in the Falklands, then it will be imperative that FIG recruit a new individual (or possibly individuals) with a strong background and previous experience in salmon farming (and ideally within the regulation of salmon farming).

Furthermore, the commencement of a new industry is likely to require additional capacity in several additional areas, including the fisheries health department. It will be necessary for any new farms to be regularly inspected by the authorities, and this will need qualified and trained individuals located in the Falklands.

For some of these tasks, it is likely to be possible to sub-contract some of the operations required but this will not be possible for all. FIG will need to be prepared to recruit new staff to handle the application, processing and monitoring of any new salmon farming licences.

5.8. Revenue Generation Considerations

Although not a key consideration for this project, it is worth briefly considering the revenue generation methods that exist within the legislation and could be employed in the Falklands. This is an important consideration since clearly, the production of additional GDP is a key positive for the development of salmon farming in the environment.

Globally, revenue is generated through salmon farming through several mechanisms. The most common significant revenue generator for governments is through the standard tax system. This can vary greatly from country to country, but essentially, the collection of tax through sales (VAT or royalties) or profits (corporation tax) are used. The Fish Farming Ordinance does hint at the use of royalties but no further details are provided. In most cases, this is the most effective and efficient method of ensuring that revenue is collected.

However, it is also common for cost recovery to occur throughout the licensing process (the process can be expensive to run for any Government). Key places where this is completed area as follows;

Seabed Lease: The Governor will lease the seabed to the farmer. Generally, the process of obtaining a LOA is free of charge but one a lease is agreed it is charged. In the UK, this is done at a rate of £27.50 per tonne of harvested fish (net gutted weight). This is not only a cost recovery method, but also generates direct revenue for the government. For example, should the Falklands reach the maximum biomass limit, this would represent a not inconsiderable yearly revenue of £1.1 million (although who benefits from this would need to be confirmed).

Planning Process: Commonly, a fee is charged for submitting a planning application. In the UK a salmon planning application is charged at a higher fee than a standard housing application due to the additional complexity. Currently the charge is set at £183 per 0.1 ha of seabed surface area and £63 per 0.1 ha of seabed. This is capped at a maximum cost of £18,270.

On average, most salmon farms in Scotland will pay around £10,000 for a planning application process to the council. In the Falklands, a standard charge of £103 is levied for all planning applications. Clearly this will need to be increased for salmon farming applications in the Falklands.

CAR Process: The CAR process in Scotland is charged through set scheme fees, which are dependent on the size of the farm. For farms which are smaller than 50 tonnes, an application cost of £3,371 is charged followed by a yearly fee of £4,902. For farms over 50 tonnes, this increases to £4,494 and £11,332 respectively.

MEP is not recommending the setting up of a CAR-based licensing system in the Falklands but the review and approval of licensing requests under the Fish Farming Ordinance will incur significant costs for the FIG which will need to be recharged to the farmer.

Marine Licence: A marine licence in Scotland is chargeable at a set fee depending on the capital expenditure involved. For example, for a capital investment of £5-10 million, a yearly licence fee of £14,175 is payable.

A marine licence is not specifically required under the suggested or current Falklands regulatory system.

Aquaculture Production Business (APB) Licence: The application and receipt of an APB licence are not currently chargeable. Charges are payable under the Fishery Product Ordinance 2006[70] (although those regulations would need to be reviewed in connection with fish farming).

[70] see the Fishery Products (Hygiene) (Fees) Regulations 1998

6. Conclusions & Recommendations

This report has set out the current legislative framework for future salmon farming in the Falkland Islands and made potential recommendations for changes which would allow it to be conducted under best practices should FIG opt to allow salmon farming. To help in determining what these best practices are, the report has also considered both the current legislative system in Scotland, the Faroe Islands, Norway, and Chile.

The current legislation for aquaculture in the Falklands is relatively underdeveloped. This is not a surprise since little aquaculture exists but should large commercial scale salmon farming be permitted in the country it will clearly need to be developed.

In developing the legislation, MEP has attempted to amalgamate the best parts of other countries' systems with a specific focus on the Faroes Islands which is clearly a relevant comparator country. At the same time, the Falklands will not be developing an intricate and highly complex system to base the planning process on as it is unlikely to be a sensible use of resource. As an example, a carrying capacity assessment could be completed for the Falklands which could define how much salmon farming could be completed without significant environmental impact occurring. This though would be an expensive undertaking and not necessarily in line with future plans (i.e., it would be trying to maximise the industry that could be achieved rather than creating a sustainable one based on best practice). For this reason, MEP is of the belief that the process should instead be precautionary in approach with, for example, a slow build up in biomass providing the opportunity to review progress at every stage before moving any further.

MEP has made some key legislative suggestions which it thinks would help ensure the best possible practices in the industry while also helping to mitigate the concerns of stakeholders and in particular residents. Specifically, these include;

A maximum biomass limit: Should farming be approved, we think a maximum biomass should be set for salmon farming in the Falkland Islands, above which no further farming licences will be approved.

Sterile fish only: A major area of concern in the Falklands is that the farming of Atlantic salmon will represent the introduction of a non-native species which can bring about significant risks. For this reason, we are suggesting that farming is only completed using sterile fish that cannot breed in the environment should they escape.

Currently, the only commercial method of producing sterile fish is through triploid inducement. This process does have some remaining concerns which are currently undergoing significant research but we believe the benefits of such use will significantly outweigh any negatives.

Adhering to global best practice as a requirement: All farms should be required to adhere to the principles of the Aquaculture Stewardship Council (ASC) certification requirements. These are considered the highest standards globally and would ensure that farms are operating at the highest possible standards.

Marine Zoning, all in-all out and significant fallowing: The best parts of the Faroe Islands legislation have been used to attempt to reduce the concerns specifically around sea lice. These have proven successful in the Faroes and would be well employed in the Falklands.

Minimum Smolt size: Globally, a significant move is currently being seen to increase smolt sizes through land-based farming operations and hence decrease the time required for salmon to spend in cages at sea. In the Faroe Islands, some companies have moved to smolt sizes as high as 600g. No country though has limited the size of smolts which are allowed to be stocked in sea cages through legislation (mainly due to the vast array of different producers that already exist). We are recommending that a size limit of 400 g is included in any further Falkland's legislation and believe this would represent a significant industry-leading approach to salmon farming.

The following recommendations and next steps are suggested for the further development of salmon farming in the Falkland Islands.

Recommendation 1: FIG Agreement on Approach: A general agreement is first required from FIG on the approach and way forward. MEP has set out its suggested approach and recommends this is discussed with FIG and a broad level of agreement set as a starting point[71].

Recommendation 2: Faroe Islands Visit: MEP sees significant synergies between the Falklands Islands and the industry which has developed in the Faroe Islands. The two states are very similar in many ways and the Faroes has attempted to maintain high standards within its sector. Despite the obvious complication of organising a visit to the Faroe Islands, we do believe that this would be highly beneficial for key members of the FIG. It would allow the processes employed in the Faroes to be seen first-hand and for discussions to be held directly with key legislators in the country. MEP would be able to help organise such a visit should it be agreed as a good next step.

Recommendation 3: Stakeholder Discussion and Review: The decision to allow or not allow future salmon farming in the Falklands is clearly one that needs to involve discussions with stakeholders. Firstly, the island residents will need to be consulted, and concerns and questions addressed. Once the proposed approach set out in the document is agreed upon in FIG, MEP would suggest that we attend such stakeholder meetings in the Falklands.

Also of importance is that the potential industry stakeholders are also consulted on the potential changes (specifically, Unity Marine). The introduction of new rules for potential salmon farming in the Falklands would be pointless if no commercial organisation would be prepared to undertake farming because the rules are too onerous or cannot be achieved.

Following a period of stakeholder consultation with all parties, it is likely that key amendments would need to be made to the suggested legislation and processes which are set out here.

Recommendation 4: Development of Policy and Legislation: Should agreement be made on the policy and legislation and a decision made to move forward with salmon farming, then the next stage would be the development of the specific ordinance and frameworks required under the Falklands legal system.

[71] This does not mean that agreement is required on whether to allow salmon farming but that the possible approach should it be allowed is generally accepted.

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Annex 1: ESIA Requirement Recommendations

The below represent the key requirements for inclusion in an ESIA supporting a fish farm planning application in the Falkland Islands.

1. A description of the development, including its specific location, the physical characteristics of the development and how it will operate.
2. An outline of the potential environmental areas of concern anticipated for the development.
3. A baseline assessment considering the current state of the environment (the 'baseline scenario') and any natural changes which are anticipated (as may be relevant).
4. A consideration of the likely environmental effects (positive and negative) on the development from construction through to operation. This should include (but is not limited to);
   a. Anticipated release of pollutants into the water environment. This should include the use of suitable modelling software to show dispersion effects from the facility.
   b. Any other anticipated releases of pollutants into the environment (land or air)
   c. Anticipated impacts form the facility relating to noise, vibration, light, heat or radiation.
5. A consideration of any human health risks
6. A consideration of any risks to cultural heritage or architecture.
7. A consideration of all likely socially effects (positive or negative) as a result of the facilities development and operation.
8. A consideration of all the effects considered above from that of a cumulative impact (considering other operations/ facilities or existing environmental issues which might be relevant)

a. the impact of the project on climate (for example the nature and magnitude of greenhouse gas emissions) and the vulnerability of the project to climate change;

9. The description of the likely significant effects should cover the direct effects and any indirect, secondary, cumulative, transboundary, short-term, medium-term and long-term, permanent and temporary, positive and negative effects of the development.
10. A risk-based assessment of all the impacts identified by the ESIA and the mitigation measures to be used to avoid, prevent, reduce or, if possible, offset them.
11. A proposed monitoring arrangement for the facility during the operation and ensuring that the effective implementation of mitigation measures can be measured.
12. Specific consideration of any significant adverse risks which might exist, particularly around accidents or natural disasters, and the mitigation which has been implemented in this regard.
13. A non-technical summary of the information above

Annex 2: Operational Plan Requirements

An Operational Plan should include the following requirements at a minimum.

1. Relevant starting and finishing dates for the operation plan
2. Production process flowchart including details of all individual processes being undertaken (reception, grading, harvesting, transport, sale, etc.)
3. Projected number and quantity of fish at the commencement of each process
4. Projected number and quantity of fish at the completion of each process
5. Highest projected biomass during production cycle
6. Highest project density (kg/m^3) during production cycle
7. Planned monitoring to ensure planned levels are being met (and not exceeded) during the production cycle
8. Any other information as may be deemed appropriate to provide a detailed breakdown of activities being undertaken during the production cycle

Annex 3: Operational Logbook Requirements

All farms should be required to maintain an Operational Logbook which should include the following as minimum requirements.

1. Daily Biomass Calculations to include;

   a. Date
   b. Live number of fish at the end of each day
   c. Average weight of fish at the end of each day
   d. Daily Observed Mortality at the end of each day (fish number and weight)
   e. Total Biomass at the end of each day

2. Daily Feed Calculations to include;

   a. Daily feed used per cage unit
   b. Details of feed used on a daily basis
   c. Feed Conversion Ratio for current fish batches

3. Daily Water Quality recordings to include (but not limited to) and covering a representative sample of all licensed farming operations;

   a. Oxygen levels
   b. Carbon Dioxide levels
   c. Ph levels
   d. Salinity levels
   e. Temperature levels (DegC)

4. Stocking and Harvest Records to include;

   a. Date of each stocking and harvesting activities
   b. Volume and number of fish stocked and harvested
   c. Location of fish stocked and harvested
   d. Information on provider or purchaser of stock

5. Grading Records to include;

   a. Date and location of grading activities
   b. Any movement of fish (numbers and biomass)

6. Mortality Records

   a. Daily volumes of mortality
   b. Evidence of post-mortem results for mortality sampling
   c. Disposal records for recovered mortality

7. Disease Records (in case of outbreaks) to include

   a. Date when disease was first suspected
   b. Date when farm's veterinarian was call
   c. Data when FIG was contacted
   d. Any treatments approved including start and end date, name of treatment

e. Any withdrawal periods for products or follow up treatment/diagnosis

8. Parasite Records (as required under licensing requirements) to include;

a. Dates and sampling activity details
b. Number of ovigerous sea lice found per fish during sampling

9. Escape Records to include;

a. Date of any escape events
b. Number and weight of fish escaped
c. Cause of escape
d. Follow up actions completed under ERP
e. Any lessons learnt and implemented mitigation

Annex 4: Overview of Suggested Falklands Approval Process