

Environmental Assessment (Scotland) Act 2005 Aquaculture and Fisheries Bill Consultation Document Environmental Report

**Environmental Assessment (Scotland)
Act 2005 Aquaculture and Fisheries Bill
Consultation Document Environmental
Report**

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The Scottish Government
St Andrew's House
Edinburgh
EH1 3DG

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NON-TECHNICAL SUMMARY

Introduction

1. Marine Scotland is considering the need for new legislation on aquaculture, freshwater and sea fisheries, and is therefore currently consulting on key issues and priority areas for a possible Aquaculture and Fisheries Bill. The Aquaculture and Fisheries Bill consultation document has been published for consultation, and is available at:
<http://www.scotland.gov.uk/Publications/2011/12/06081229/0>.
2. The Aquaculture and Fisheries Bill consultation document has been subject to a strategic environmental assessment, the results of which have been set out in the Environmental Report. This document is the Non-Technical Summary of that Environmental Report.

The Aquaculture and Fisheries Bill Consultation Document

3. The proposed provisions set out in the Bill consultation document cover a wide range of issues in the aquaculture, freshwater and sea fisheries sectors. These comprise:
 - sustainable development of aquaculture;
 - protection of shellfish growing waters;
 - fish farming and wild salmonid interactions;
 - improving salmon and freshwater fisheries management;
 - modernising enforcement provisions;
 - some minor sea fisheries legislative changes; and
 - charging.

Details of these proposed provisions are provided in Table 1.

The Strategic Environmental Assessment

4. The protection of shellfish growing waters, modernising enforcement provisions, the minor changes to sea fisheries legislation, and charging are considered to be the kinds of strategic action that would result in no or minimal environmental effects. The SEA has therefore focused on the potential environmental effects of the provisions proposed to effect sustainable development of aquaculture, fish farming and wild salmonid interactions, and improving salmon and freshwater fisheries management (Table 1).
5. An SEA will be undertaken to identify the potential environmental effects of seaweed cultivation and inform the preparation of a sector-specific framework. The assessment of powers to regulate seaweed cultivation through marine licensing arrangements has been deferred to that SEA, rather than undertaking it as part of the SEA of the Bill consultation document.
6. The focus of the SEA was on the potential effects of the proposed provisions on biodiversity, specifically wild salmonid populations (Atlantic salmon and sea trout). The other environmental topics were scoped out of the assessment, with the agreement of the Consultation Authorities, i.e. Scottish Natural Heritage (SNH), the Scottish Environment Protection Agency (SEPA) and Historic Scotland.

Table 1. Summary of proposed provisions in Bill Consultation Document

Proposed Provision	Scoped In/Out
Sustainable Development of Aquaculture	
<ul style="list-style-type: none"> • legal duty for all finfish farm operators to enter into a Farm Management Agreement (FMAg) • dispute resolution process: powers to arbitrate • industry to determine boundaries of FMAg • Scottish Ministers to have fallback powers to specify Farm Management Agreement boundaries in particular circumstances 	In
Powers to revoke consents	Out
Requirements to collect and publish site-specific sea-lice data	In
Provision of data on fish mortality, movements, etc	
Powers to reduce biomass consent	In
Wellboats: Powers to place additional controls on discharges from wellboats	In
Wellboats: satellite and remote monitoring of wellboat activity	Out
Powers to place controls on discharges from plants processing farmed fish	In
Regulate seaweed cultivation through marine licensing arrangements	Out
Powers to control commercially damaging native species	Out
Protection of Shellfish Growing Areas	
Powers to protect shellfish growing waters	Out
Fish Farming and Wild Salmonid Interactions	
Powers to prescribe lower sea-lice thresholds above which measures need to be taken.	In
Powers to require finfish farms to use equipment that conforms to a Scottish Technical Standard	In
Powers to take samples of fish from fish farms for tracing purposes	Out
Salmon and Freshwater Fisheries Management	
Introduction of a duty on District Salmon Fishery Boards to act fairly and transparently	Out
Powers to give statutory backing to a sector-developed Code of Practice	
Powers to introduce a system of statutory carcass tagging of wild salmonids	Out
Powers to take or require wild fish and/or samples	
Powers to change Salmon District Annual Close Time Orders; to promote combined salmon conservation measures; to attach conditions to statutory conservation measures; and to require provision of comprehensive effort (catch) data on rod fisheries	In
Powers for statutory mediation and dispute resolution	Out
Powers to require record keeping, reporting and inspection of salmon and sea trout fisheries	Out
Powers to recall, restrict or exclude the jurisdiction of District Salmon Fishery Boards to license the introduction of salmonids in their District	In
Modernising Enforcement Provisions / Changes to Sea Fisheries Legislation	
Application of strict liability criteria to certain offences	Out
Powers to extend the use of fixed financial penalties as alternatives to prosecution	
Changes to Sea Fisheries Legislation	
<ul style="list-style-type: none"> • amend section 30(1) of the Fisheries Act 1981; • provide specific powers to detain vessels; • provide specific powers to dispose of property; • power to inspect objects in the marine environment; and • amend Section 1 of the Sea Fisheries (Shellfish) Act 1967 to apply that Act to all shellfish. 	Out
Paying for Progress	
Powers to make provision for charging for services/benefits arising from public sector services	Out

The Results of the SEA

7. The proposed provisions that have been scoped into the assessment would result in:

- the improved control of sea-lice and pathogens;
- improved containment of caged fish and fewer escapes; and
- improved wild salmon and freshwater fisheries management.

These would all be of benefit to wild salmonid populations, specifically Atlantic salmon and sea trout. Details are provided in the following paragraphs.

8. The proposed provisions' focus on the control of sea-lice and pathogens, while benefiting biodiversity, is not considered to have similar benefits for water quality and/or ecological status. In consequence, this topic was scoped out of the assessment with the agreement of SEPA. In addition, the continued sustainability of Atlantic salmon and sea trout is likely to have positive effects on cultural heritage. However, inclusion of this topic was not considered likely to contribute in a meaningful way to this assessment and it was therefore scoped out, with the agreement of Historic Scotland.

9. The measures relating to Farm Management Agreements would make these mandatory, building on the practices set out in the "Code of Good Practice for Scottish Finfish Aquaculture". Although the majority of fish farms currently work with Farm Management Agreements, this would result in coordination of management practices, sharing of information and appropriate delineation of boundaries. Taken together a key outcome would be the improved control of sea-lice and pathogens, thereby reducing the risk of unacceptable sea-lice burdens and the spread of disease (with a consequent reduction in the use of therapeutants). This would benefit wild salmonid populations.

10. The proposals for provision of data are intended to identify treatment/efficacy failures at an early stage and facilitate mitigation and/or remediation measures. A key outcome would be the improved control of sea-lice and pathogens, thereby benefitting wild salmonid populations.

11. The proposed powers to reduce biomass consent are intended to link licensed biomass for a site with the required volume of therapeutant, to manage sea-lice and pathogens. Improved control would benefit wild salmonid populations as well as farmed fish.

12. Proposed powers to place additional controls on discharges from wellboats are intended to control the discharge of sea-lice and pathogens, which would benefit wild salmonid populations as well as farmed fish.

13. Proposed powers to place controls on discharges from plants processing farmed fish are intended to control the discharge of sea-lice and pathogens, which would benefit wild salmonid populations as well as farmed fish.

14. Proposed powers to prescribe lower sea-lice thresholds above which measures need to be taken: the sea-lice management regime and treatment triggers are included in the "Code of Good Practice for Scottish Finfish Aquaculture". In some circumstances this management regime may be insufficient; this intervention is intended to target necessary responses to particular circumstances, thereby reducing the risk of unacceptable sea-lice

- burdens. In consequence, it should have benefits for wild salmonids as well as for farmed fish.
15. The proposed power to require finfish farms to use equipment that conforms to a Scottish Technical Standard is intended to improve containment and reduce escapes, thereby reducing the risk of competition, displacement and inter-breeding, with benefits for wild salmonid populations.
 16. Proposed powers to improve salmon and freshwater fisheries management include: to change Salmon District Annual Close Time Orders; to promote combined salmon conservation measures; to attach conditions to statutory conservation measures; and to require provision of comprehensive effort (catch) data on rod fisheries. These measures are intended to enhance capacity for management of wild fisheries in general and stocks in particular. This would have benefits for wild salmonid populations.
 17. In addition, powers to recall, restrict or exclude the jurisdiction of District Salmon Fishery Boards to license the introduction of salmonids in their District are intended to control introductions and further protect biodiversity, in particular reducing the risk of competition, displacement and inter-breeding, with consequent benefits for wild salmonids.

Cumulative Effects Assessment

18. Cumulative and synergistic effects have been considered in terms of those arising from finfish farms, wellboats and farmed fish processing plants on wild salmonids. Given the nature of the proposed provisions, this has been undertaken as a high-level assessment.
19. Taken together, the proposed provisions for enhanced controls on finfish aquaculture and additional controls on discharges from wellboats and farmed fish processing plants are likely to result in reduced levels of sea-lice and/or pathogens in the marine environment. This is likely to have a cumulative benefit for wild salmonids.
20. Similarly, taken together, the proposals to improve existing salmon and freshwater fisheries management will likely enhance efforts to conserve wild salmon. This is also likely to have a cumulative benefit for wild salmonids.

Next Steps

21. Views on the Bill Consultation Document and the findings of the SEA are now being sought. The Bill Consultation Document sets out the information on how to respond to the consultation. In summary, please send your response (along with the completed Respondent Information Form) to:

Email: aquacultureandfisheriesconsultation@scotland.gsi.gov.uk

Or Mail: 1B-North, Victoria Quay, Edinburgh EH6 6QQ

Telephone: 0131 244 6243

Fax: 0131 244 6512

If you have any queries please contact Catriona Graham on 0131 244 6243.

1.0 INTRODUCTION

Purpose of the Environmental Report

- 1.1 Marine Scotland is considering the need for new legislation on aquaculture, freshwater and sea fisheries, and is therefore currently consulting on key issues and priority areas for a possible Aquaculture and Fisheries Bill. The Aquaculture and Fisheries Bill consultation document has now been published, and is available at: <http://www.scotland.gov.uk/Publications/2011/12/06081229/0>. Key facts about the Aquaculture and Fisheries Bill Consultation Document are provided in Table 1.
- 1.2 Review of the Bill consultation document, and the provisions proposed for inclusion in the Bill, has led to the conclusion that there is the potential to give rise to significant environmental effects. These provisions are deemed to fall under Section 5(4) of the Environmental Assessment (Scotland) Act 2005, and a combined screening and scoping report was submitted to the SEA Gateway in December 2011, inviting formal views from the Consultation Authorities. The outcome of the screening was the determination by Marine Scotland that the provisions proposed for inclusion in the Aquaculture and Fisheries Bill would be likely to have significant environmental effects.
- 1.3 A strategic environmental assessment (SEA) has therefore been undertaken in accordance with the requirements of the Environmental Assessment (Scotland) Act 2005. The purpose of the SEA is to integrate environmental factors into the preparation of the Bill, by identifying potential environmental effects and measures for their mitigation, and ensuring that this information is made available when decisions are made. This Environmental Report sets out the results of the assessment and invites views from the Consultation Authorities (SNH, SEPA and Historic Scotland) and the general public.

Structure of the Environmental Report

- 1.4 The remainder of this environmental report is structured as follows:
- Section 2 describes the Aquaculture and Fisheries Bill Consultation Document and its policy context.
 - Section 3 describes the approach to the SEA.
 - Section 4 provides information on interactions between aquaculture and the marine environment, focusing on wild salmonids.
 - Sections 5-13 present the results of the assessment. Each section covers a different provision proposed for inclusion in the Bill, describing the baseline situation, assessing the potential environmental effects, and identifying mitigation measures where appropriate.
 - Section 14 summarises the results of the assessment.
 - Section 15 outlines the next steps of the SEA and Bill processes.
 - Detailed information is provided in the appendices.

Table 1: Key Facts about the Bill Consultation Document

Responsible Authority	Marine Scotland
Title	Aquaculture and Fisheries Bill Consultation Document
Purpose	To promote sustainable management and development of aquaculture, freshwater and sea fisheries, and to help manage their interactions
What prompted the Bill?	On-going work by Marine Scotland and others identified issues which would benefit from new legislation
Subject	Aquaculture, freshwater and sea fisheries
Period covered	n/a
Frequency of updates	When required
Area covered	Scotland
Summary of nature/ content	<p>The consultation document contains provisions proposed for inclusion in the Bill. These include:</p> <ul style="list-style-type: none"> • sustainable development of aquaculture • protection of shellfish growing waters • fish farming and wild salmonid interactions • improving salmon and freshwater fisheries management • modernising enforcement provisions • some minor sea fisheries legislative changes • charging
Objectives?	No
Date	February 2012
Contact	Catriona Graham, Marine Scotland, Bill Manager Aquacultureandfisheriesconsultation@scotland.gsi.gov.uk or 0131 244 6243

2.0 BILL CONSULTATION DOCUMENT

Relationship with Other Qualifying Plans, Programmes and Strategies

2.1 The existing legislative and policy framework for aquaculture, freshwater and sea fisheries (as these relate to the Bill consultation document) is illustrated in Figure 1.

The Bill Consultation Document

2.2 The proposed provisions set out in the Bill consultation document cover a wide range of issues in the aquaculture, freshwater and sea fisheries sectors. These comprise:

- sustainable development of aquaculture;
- protection of shellfish growing waters;
- fish farming and wild salmonid interactions;
- improving salmon and freshwater fisheries management;
- modernising enforcement provisions;
- some minor sea fisheries legislative changes; and
- charging.

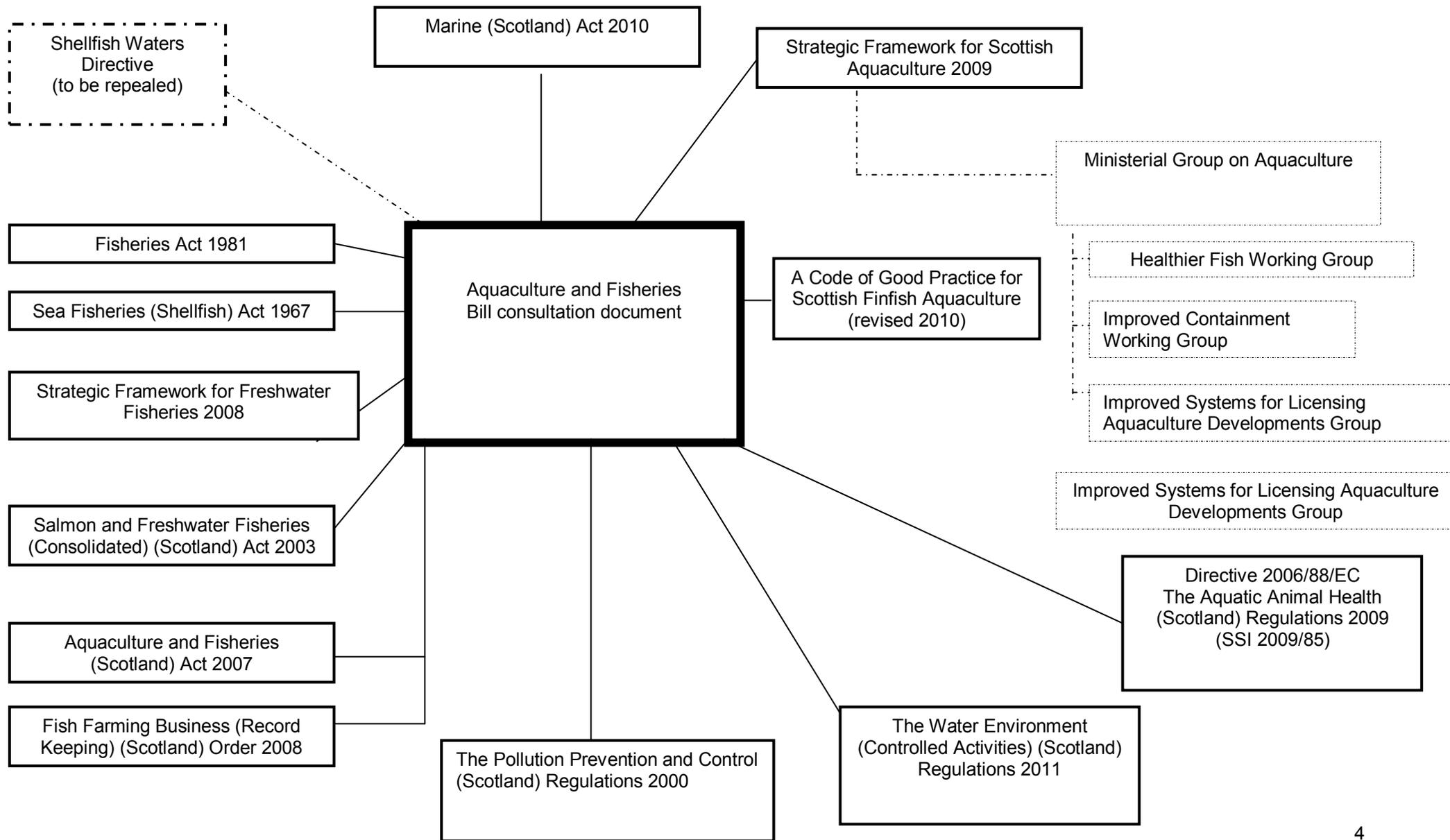
A summary of the provisions proposed for inclusion in the Bill is set out in the following paragraphs.

Sustainable Development of Aquaculture

- 2.3 *Farm Management Agreements*: creating a legal requirement for all finfish farm operators in the marine environment to participate in a Farm Management Agreement (FMAg), where existing operators would take ownership and agree appropriate arrangements for their Farm Management Area (FMA), and new operators entering an area would be required to join into that agreement, or an amended one.
- 2.4 *Appropriate Scale Management Areas*: for the aquaculture industry to retain primary responsibility for determining the boundaries of FMAs in accordance with the Code of Good Practice (CoGP)¹, with Scottish Ministers having powers to specify FMA boundaries, or other relevant measures, where considered necessary and appropriate in the wider public and environmental interest.
- 2.5 *Management Measures and Dispute Resolution*: creating an independent process, with statutory backing, for arbitration between interested parties in cases where agreement has not been reached.
- 2.6 *Unused Consents*: powers for the Scottish Ministers to revoke unused consents in certain circumstances (such as where the owner of a site may not be traceable).

¹ Code of Good Practice Management Group (2006) The Code of Good Practice for Scottish Finfish Aquaculture [online] Available at: <http://www.thecodeofgoodpractice.co.uk/index.php>

Figure 1. Policy Context for the Aquaculture and Fisheries Bill Consultation Document



- 2.7 *Collection and Publication of Sea-Lice Data*: the Healthier Fish Working Group recommended an industry-run database which would provide publicly facing reports on sea-lice numbers, tied to a new statutory reporting requirement to the Scottish Ministers for sea-lice treatment failures. The Bill consultation document invites views on the most appropriate approach to the collection and publication of sea-lice data.
- 2.8 *Surveillance, Biosecurity, Mortality and Disease Data*: powers for Scottish Ministers to require the submission of additional data on fish mortality, movements, results of external surveillance, sea-lice treatments and fish farm production data.
- 2.9 *Biomass Control*: powers for Scottish Ministers to require SEPA to reduce the biomass limit in a site licence, either on a temporary or permanent basis.
- 2.10 *Wellboats*: make enabling legislation giving powers to Scottish Ministers to place additional control requirements on wellboats. These could include satellite and remote monitoring of wellboat movements and activity respectively, and additional controls on discharges (e.g. of sea-lice).
- 2.11 *Farmed Fish Processing Facilities*: additional powers for Scottish Ministers to place controls on farmed fish processing plants, for example to insist on arrangements for filtration of sea-lice, or other treatments, to minimise potential harm from discharges.
- 2.12 *Seaweed Cultivation*: inviting views on the proposal to regulate seaweed cultivation, and whether the most appropriate approach would be through marine licensing under the Marine (Scotland) Act 2010.
- 2.13 *Commercially Damaging Native Species*: inviting views on the proposed additional powers for Scottish Ministers to control commercially damaging species.

Protection of Shellfish Growing Areas

- 2.14 In order to ensure that shellfish water quality continues to be protected after the Shellfish Waters Directive (SWD) is repealed, Marine Scotland proposes to incorporate the aims of the SWD into the Water Framework Directive implementation framework. This would be achieved through the following provisions: powers for Scottish Ministers to identify areas for the protection of economically significant shellfish; setting out objectives and environmental standards that would apply in these waters; a duty to consult interested parties and relevant public bodies before any designations/de-designations are made, or objectives set; a duty for SEPA to secure the necessary monitoring to assess the condition of shellfish waters and the effectiveness of any measures taken for their protection; and a duty to classify the designated waters in line with specified environmental standards.

Fish Farming And Wild Salmonid Interactions

- 2.15 *Sea-Lice*: The Code of Good Practice (CoGP) sets out criteria for triggering sea-lice treatment. This proposed provision would provide powers for Scottish Ministers to determine a lower threshold than that set out in the CoGP, above which remedial action for sea-lice needs to be taken in appropriate circumstances, potentially as part of a wider suite of protection measures.

- 2.16 *Containment and Escapes*: powers for Scottish Ministers to require all finfish farms operating in Scotland to use equipment conforming to a Scottish Technical Standard, with sanctions for non-compliance. The technical content of the proposed standard would not be defined in the Bill but would be defined separately.
- 2.17 *Tracing Escapes*: Introducing additional powers for Scottish Ministers to take or require samples of fish from fish farms, for purposes of tracing escaped fish.

Salmon And Freshwater Fisheries Management

- 2.18 *Modernising the Operation of District Salmon Fishery Boards*: updating the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003 to place a new duty on District Salmon Fishery Boards (DSFBs) to act fairly and transparently. This proposed duty could be supported by a sector-developed Code of Good Practice on the operation of DSFBs. The consultation document seeks views as to whether such a code should be statutory or non-statutory.
- 2.19 *Statutory Carcass Tagging*: powers to introduce statutory carcass tagging of wild Atlantic salmon and sea trout, with sanctions for non-compliance, in line with voluntary trials being undertaken by a number of netting businesses.
- 2.20 *Fish Sampling*: powers for Scottish Ministers to take, or require, fish and/or samples for genetic or other analysis from any fishery.
- 2.21 *Management and Salmon Conservation Measures*: powers for Scottish Ministers to initiate changes to Salmon District Annual Close Time Orders; to promote combined salmon conservation measures at their own hand; and to attach conditions, such as monitoring and reporting requirements, to statutory salmon conservation measures.
- 2.22 *Dispute Resolution*: powers for Scottish Ministers related to mediation and dispute resolution, to help resolve disputes around salmon conservation measures, management, and any related compensation measures..
- 2.23 *Improved Information on Fish and Fisheries*: extending the present annual catch survey to include effort data on the rod fisheries on a mandatory and comprehensive basis, with sanctions for non-compliance or providing false or misleading data.
- 2.24 *Licensing of Fish Introductions to Fresh Water*: powers for Scottish Ministers to recall, restrict or exclude the jurisdiction of DSFBs as licensing authority for the introduction of salmonids in their district, in certain circumstances, e.g. where the DSFB is authorising its own actions.

Modernising Enforcement Provisions/ Changes to Sea Fisheries Legislation

- 2.25 *Strict Liability for Certain Offences Related to Aquaculture Operations*: applying strict liability criteria for offences related to breach of requirements for, or conditions of, Marine Licensing requirements (under the Marine (Scotland) Act 2010), insofar as they apply to aquaculture operations specifically, and potentially in other similar situations.
- 2.26 *Widening the Scope of Fixed Penalty Notices*: extend the use of fixed financial penalties as alternatives to prosecution in relation to marine, aquaculture and

other regulatory issues for which Marine Scotland has a compliance, monitoring and enforcement role; and increasing the maximum sum that can be levied through a fixed penalty notice to £10,000.

- 2.27 *Enforcement of EU Obligations Beyond British Fisheries Limits*: amending section 30(1) of the Fisheries Act 1981 insofar as it relates to Scottish vessels, to create offences and provide enforcement powers for the enforcement of EU fishing restrictions and obligations beyond the 200 mile fisheries limit.
- 2.28 *Powers to Detain Vessels in Port*: providing power to sea fisheries enforcement officers to allow vessels to be detained in port for the purposes of court proceedings.
- 2.29 *Disposal of Property/Forfeiture of Prohibited Items*: provide power to sea fisheries enforcement officers to dispose of property seized as evidence when it is no longer required, or forfeit items which would be illegal to use.
- 2.30 *Power to Inspect Objects*: provide power to allow sea fisheries enforcement officers to inspect objects in the sea and elsewhere that are not obviously associated with a vessel, vehicle or relevant premises.
- 2.31 *Sea Fisheries (Shellfish) Act 1967*: amending the Act to apply to all shellfish rather than certain listed shellfish and to simplify the role of Scottish Ministers regarding the appointment of an inspector to undertake an inquiry into a proposed order.

Paying For Progress

- 2.32 Make enabling provisions for Scottish Ministers to provide, through secondary legislation, for both direct and more generic charges for services/benefits arising from public sector services and activities.

3.0 APPROACH TO THE ASSESSMENT

Background

3.1 Much thought has been given to the time at which it would be appropriate to undertake SEA of the Bill. It was decided to undertake SEA at the Bill consultation stage, to ensure early and effective engagement with members of the public and the Consultation Authorities. It is also at this stage that amendments (arising from responses to the Environmental Report and/or the Bill consultation document) to the provisions proposed for inclusion in the Bill could be made most easily. This reflects the approach taken to the SEA of the Scottish Marine Bill in 2008.

Scope of the Bill Consultation Document to be Assessed

3.2 The provisions proposed for inclusion in the Bill were reviewed as part of the screening and scoping stage of the SEA to ascertain whether they would be likely to give rise to significant environmental effects as a result of changes to the existing management regime. The results are set out in Table 2.

3.3 Provisions with the potential for significant environmental effects include powers for Scottish Ministers:

- regarding Farm Management Agreements;
- to require provision of site-specific sea-lice data, and data on fish mortality, movements, disease, treatment and production;
- to require SEPA to reduce on a temporary or permanent basis the limit on biomass in the site licence;
- to provide for additional controls on discharges from wellboats;
- to regulate discharges from farmed fish processing plants;
- to regulate seaweed cultivation;
- to require measures to manage sea-lice under certain conditions;
- to require finfish farms to use equipment that will improve containment;
- and
- to require particular management and salmon conservation measures, and the provision of comprehensive effort (catch) data.

3.4 These provisions have been scoped into the assessment, apart from those relating to seaweed cultivation. As noted in the Bill consultation document, Marine Scotland is progressing a SEA to identify the potential environmental effects of seaweed cultivation and inform the preparation of a sector-specific framework. Any further consideration of seaweed cultivation will be deferred to that SEA, rather than undertaking it as part of the SEA of the Bill consultation document.

3.5 The provision of sea-lice data was not considered in the screening and scoping report to have the potential for significant environmental effects. However, this provision has now been scoped into the assessment because of the importance of sea-lice counts in identifying treatment efficacy and/or failure.

3.6 The other provisions included in the Bill consultation document, not identified in Paragraph 3.3, have been scoped out of the assessment (as indicated in Table 2).

Table 2: Scope of the Bill Consultation Document to be Assessed

Proposed Provision	Environmental Effect?	In/Out
Sustainable Development of Aquaculture		
<ul style="list-style-type: none"> • legal duty for all finfish farm operators to enter into a Farm Management Agreement (FMAg) • dispute resolution process: powers to arbitrate • industry to determine boundaries of FMAg • Scottish Ministers to have fallback powers to specify Farm Management Agreement boundaries in particular circumstances 	Yes. Taken together, these measures would make FMA practices mandatory, building on the practices set out in the “Code of Good Practice for Scottish Finfish Aquaculture”. Although the majority of fish farms currently work with Farm Management Agreements, this would result in coordination of management practices, sharing of information and appropriate delineation of boundaries. A key outcome would be the improved control of sea-lice and pathogens, thereby reducing the risk of unacceptable sea-lice burdens and the spread of disease (with a consequent reduction in the use of therapeutants). This would benefit wild salmonid populations.	In
Powers to revoke consents	No. At present environmental capacity models assume that all consents are being used, even when they are not. Unused consents may be revoked and re-issued, and sites brought into production. This would not be a significant change from the existing theoretical position, and therefore no environmental effects are anticipated.	Out
Requirements to collect and publish site-specific sea-lice data	Yes. This is intended to identify treatment/efficacy failures at an early stage and facilitate mitigation and/or remediation measures. A key outcome would be the improved control of sea-lice and pathogens, thereby benefitting wild salmonid populations.	In
Provision of data on fish mortality, movements, etc		
Powers to reduce biomass consent	Yes. These are intended to link licensed biomass for a site with the required volume of therapeutant, to manage sea-lice and pathogens. Improved control would benefit wild salmonid populations as well as farmed fish.	In
Wellboats: Powers to place additional controls on discharges from wellboats	Yes. These are intended to control the discharge of sea-lice and pathogens, which would benefit wild salmonid populations as well as farmed fish.	In
Wellboats: satellite and remote monitoring of wellboat activity	These are not considered to give rise to environmental effects. The collection of this data is intended to inform risk-based compliance monitoring.	Out
Powers to place controls on discharges from plants processing farmed fish	Yes. These are intended to control the discharge of sea-lice and pathogens, which would benefit wild salmonid populations as well as farmed fish.	In
Regulate seaweed cultivation through marine licensing arrangements	Yes. The potential environmental effects of seaweed cultivation will be explored through the SEA undertaken to inform the proposed sector framework, so will not be progressed here.	Out
Powers to control commercially damaging native species	No. A ‘commercially damaging native species’ in this context means one which may displace or prejudice the commercial production of traditionally farmed species, but which itself has no commercial value. Disposal of controlled species will be via marine licensing, which will control any negative environmental effects potentially arising from disposal.	Out
Protection of Shellfish Growing Areas		
Powers to protect shellfish growing waters	No. This measure is proposed to enable continued protection once the Shellfish Waters Directive (SWD) is repealed and no change from the existing regulatory framework is anticipated. In consequence, no environmental effects are anticipated.	Out
Fish Farming and Wild Salmonid Interactions		
Powers to prescribe lower sea-lice thresholds above which measures need to be taken.	Yes. The sea-lice management regime and treatment triggers are included in the “Code of Good Practice for Scottish Finfish Aquaculture”. In some circumstances this management regime may be insufficient; this intervention is intended to target necessary responses to particular circumstances,	In

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Proposed Provision	Environmental Effect?	In/Out
	thereby reducing the risk of unacceptable sea-lice burdens. In consequence, it should have benefits for wild salmonids as well as for farmed fish.	
Powers to require finfish farms to use equipment that conforms to a Scottish Technical Standard	Yes. Improvement in containment is intended to reduce escapes, thereby reducing the risk of competition, displacement and inter-breeding, with benefits for wild salmonid populations.	In
Powers to take samples of fish from fish farms for tracing purposes	No. This is procedural, to allow the collection of information in support of enforcement. In consequence, no environmental effects are anticipated.	Out
Salmon and Freshwater Fisheries Management		
Introduction of a duty on District Salmon Fishery Boards to act fairly and transparently	No. These are procedural, regarding the conduct of District Salmon Fishery Boards and, in consequence, no environmental effects are anticipated.	Out
Powers to give statutory backing to a sector-developed Code of Practice		
Powers to introduce a system of statutory carcass tagging of wild salmonids	No. This is procedural, to allow the collection of information. In consequence, no environmental effects are anticipated.	Out
Powers to take or require wild fish and/or samples		
Powers to change Salmon District Annual Close Time Orders; to promote combined salmon conservation measures; to attach conditions to statutory conservation measures; and to require provision of comprehensive effort (catch) data on rod fisheries	Yes. These measures are intended to enhance capacity for management of wild fisheries in general and stocks in particular. This would have benefits for wild salmon.	In
Powers for statutory mediation and dispute resolution	No. This is procedural. Providing powers to mediate will not result in environmental effects.	Out
Powers to require record keeping, reporting and inspection of salmon and sea trout fisheries	No. This is procedural, to allow the collection of information. In consequence, no environmental effects are anticipated.	Out
Powers to recall, restrict or exclude the jurisdiction of District Salmon Fishery Boards to license the introduction of salmonids in their District	Yes. These are intended to control introductions and further protect biodiversity, in particular reducing the risk of competition, displacement and inter-breeding, with consequent benefits for wild salmon.	In
Modernising Enforcement Provisions / Changes to Sea Fisheries Legislation		
Application of strict liability criteria to certain offences	No. This is a procedural change to the existing enforcement regime and will not result in environmental effects.	Out
Powers to extend the use of fixed financial penalties as alternatives to prosecution		
Changes to Sea Fisheries Legislation		
<ul style="list-style-type: none"> • amend section 30(1) of the Fisheries Act 1981; • provide specific powers to detain vessels; • provide specific powers to dispose of property; • power to inspect objects in the marine environment; and • amend Section 1 of the Sea Fisheries (Shellfish) Act 1967 to apply that Act to all shellfish. 	No. These are procedural changes, e.g. to the existing enforcement regime, and will not result in environmental effects.	Out
Paying for Progress		
Powers to make provision for charging for services/benefits arising from public sector services	No. This is a procedural change to the existing charging regime and will not result in environmental effects.	Out

Scope of the Environmental Topics to be Assessed

- 3.7 The provisions proposed in the Bill Consultation Document have been reviewed against the environmental issues identified in Schedule 3 of the Environmental Assessment (Scotland) Act 2005. Table 3 sets out the resulting scope of the environmental topics that have been addressed in the SEA.
- 3.8 The proposed provisions that have been scoped into the assessment would result in:
- the improved control of sea-lice and pathogens;
 - improved containment of caged fish and fewer escapes; and
 - improved wild salmon and freshwater fisheries management.

These are all considered to have potential benefits for wild salmonid populations, specifically Atlantic salmon and sea trout. In consequence, biodiversity has been scoped into the assessment, with the agreement of SNH. The focus is on biodiversity and fauna; flora has not been scoped in, as no benefits for flora have been identified as resulting from the proposed provisions.

- 3.9 The proposed provisions' focus on the control of sea-lice and pathogens, while benefiting biodiversity, is not considered to have similar benefits for water quality and/or ecological status, in consequence, this topic has been scoped out of the assessment with the agreement of SEPA.
- 3.10 Atlantic salmon have played a significant role in Scottish culture for centuries, as is demonstrated by the images of salmon found in Pictish carvings (300-900 AD)². Atlantic salmon have also been an important part of export trade over the past few centuries and of local communities and their economies, particularly on Scotland's west coast. The continued sustainability of Atlantic salmon and sea trout is likely to have positive effects on cultural heritage. However, inclusion of this topic is not likely to contribute in a meaningful way to this assessment and we have therefore scoped it out, with the agreement of Historic Scotland.

Environmental Protection Objectives

- 3.11 The Environmental Assessment (Scotland) Act 2005 requires that the SEA should identify the environmental protection objectives (established at international, European, UK and Scottish levels) relevant to the Bill Consultation Document. The current environmental legislation and policy framework has been reviewed and details of the environmental protection objectives are provided in Appendix 2.
- 3.12 The principles underlying these environmental protection objectives have been incorporated into the SEA objectives shown in Table 4. These SEA objectives are based on two of the eleven Good Environmental Status descriptors included in the Marine Strategy Framework Directive. This approach was agreed with the Consultation Authorities.

² Historic Scotland (2009) Investigating Early Carved Stones, [online] Available at: <http://www.ionahistory.org.uk/investigating-early-carved-stones.pdf>

Table 3. Scope of Environmental Topics to be Assessed

Environmental Topic	Provision	Potential Effect?	Scoped In/Out
Biodiversity, flora and fauna	Farm Management Agreements etc	<ul style="list-style-type: none"> Improved management leading to improved sea-lice and pathogen control Benefits for wild salmonid populations 	In
	Data: site-specific sea-lice data; mortality etc	<ul style="list-style-type: none"> Improved identification of treatment/efficacy failures allowing early introduction of mitigation/remediation measures Improved sea-lice and pathogen control Benefits for wild salmonid populations 	In
	Reduce biomass consents	<ul style="list-style-type: none"> Linkage of biomass and therapeutant treatments Improved sea-lice and pathogen control Benefits for wild salmonid populations 	In
	Controls on wellboat discharges	<ul style="list-style-type: none"> Improved sea-lice and pathogen control Benefits for wild salmonid populations 	In
	Controls on farmed fish processing plant discharges	<ul style="list-style-type: none"> Improved sea-lice and pathogen control Benefits for wild salmonid populations 	In
	Powers for sea-lice treatment measures	<ul style="list-style-type: none"> Improved sea-lice and pathogen control Benefits for wild salmonid populations 	In
	Powers re farm equipment and technical standards	<ul style="list-style-type: none"> Improved controls to prevent farmed fish escapes Reduction in risk of competition and inter-breeding with wild salmonids 	In
	Powers re Annual Close Time Orders, combined salmon conservation measures, conditions, and comprehensive effort data collection	<ul style="list-style-type: none"> Improved management of wild fisheries in general and stocks in particular Benefits for wild salmon 	In
Powers re fish introductions	<ul style="list-style-type: none"> Improved management of fish introductions Reduction in risk of competition, displacement and inter-breeding with wild salmonid populations 	In	
Population and human health	None	None identified	Out
Climatic factors	None	None identified	Out
Air quality	None	None identified	Out
Soil, geology and coastal processes	None	None identified	Out
Water quality / ecological status	None	None identified	Out
Cultural heritage	None	None identified	Out
Landscape	None	None identified	Out
Material assets	None	None identified	Out

Methods

- 3.13 The proposed provisions that have been scoped into the assessment have been assessed against the SEA objectives set out in Table 4. The results are set out in Sections 5-13, and are summarised in Section 14.
- 3.14 Given the nature of the proposals, this SEA has been undertaken as a high-level assessment. Where appropriate, spatial information has been used to inform the environmental baseline information, e.g. the location of Special Areas of Conservation.
- 3.15 Cumulative and synergistic effects have been considered in terms of those arising from finfish farms, wellboats and farmed fish processing plants on wild salmonids. This has been undertaken as a high-level assessment.

Reasonable Alternatives

- 3.16 The proposed provisions contained in the Bill Consultation Document have been suggested as a means of resolving issues in the aquaculture and freshwater fisheries sectors. Given the high-level nature of these proposed provisions, Marine Scotland has not identified alternative means of resolving these issues. Accordingly, it is our view that the reasonable alternatives to the proposed provisions would be to have no powers, which effectively means continuing the status quo. As a way of assessing the reasonable alternatives, the assessment has therefore focused on the implications for the environment of continuing the status quo, with a particular focus on the effects on wild salmonid populations.

Table 4. SEA Objectives

SEA Objectives	Proposed Provision	Proposed Provision	Proposed Provision
Biodiversity and Fauna ³			
1 – Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.			
4 – All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity.			

Key:

↓	Working against achieving SEA objective
↑	Working towards achieving SEA objective
n	Neutral. No effect on delivery of SEA objective
?	Uncertain.

³ based on GES Descriptors 1 and 4, from Annex I of the Marine Strategy Framework Directive

4.0 INTERACTIONS BETWEEN AQUACULTURE AND WILD SALMONIDS

4.1 The key issue identified by the SEA relates to the interactions between salmonid finfish aquaculture and wild salmonid populations. The purpose of this section is to provide background information on wild salmonids (Atlantic salmon and sea trout); their protected status; population trends and abundance; and their interactions with finfish aquaculture, focusing on sea-lice and escapes.

Wild Salmonids

4.2 The two species of primary interest in relation to interactions with finfish aquaculture are Atlantic salmon (*Salmo salar*) and sea trout (*Salmo trutta*).

Atlantic Salmon⁴

- 4.3 Atlantic salmon is an anadromous species, i.e. fish migrate from the sea to spawn in fresh water. Atlantic salmon spawn in freshwater rivers and streams throughout Scotland, and it is in these rivers and streams that the young fish, first known as fry and later as parr, live and grow. After one or more years – commonly two or three years in Scottish rivers – the young fish undergo a range of morphological and physiological changes (at this stage they become known as smolts). It is as smolts that they move down rivers, generally in April and May, to reach the sea and begin their migration to the northern oceans where they feed for a period of one, two or sometimes three years. At the end of this period the salmon return to the Scottish coast and enter the rivers where they previously lived. Relatively little is known about the migration pathways of post-smolts or returning adults. Fish spending one year at sea and then returning are called “grilse”. Those that remain at sea for two or three years before returning are called “multi-sea-winter salmon”.
- 4.4 Salmon return to Scottish rivers throughout the year; the greatest number come back during summer or early summer, with good numbers coming back during the late autumn and spring. Fish returning to Scottish rivers between January and June are called “spring salmon”. In late autumn or early winter they spawn, many of them doing so near to the places where they lived when they were parr. Most salmon (90-95%) die after spawning. Some survive to return to sea.
- 4.5 The eggs hatch in late spring, with the newly hatched fish (alevins) remaining in the gravels of the stream and riverbeds near the nest for several weeks, before leaving into the stream proper in May or June as fry. This behaviour of Atlantic salmon (returning to spawn in the river where they were born) has resulted in genetically distinct stock between rivers⁵.

⁴ This section is based on information provided on Marine Scotland’s website on “Salmon Biology and Life Cycle” Available at: <http://www.scotland.gov.uk/Topics/marine/marine-environment/species/fish/freshwater/salmon> and on information on Atlantic salmon from SNH’s website: salmon: <http://www.snh.gov.uk/about-scotlands-nature/species/fish/freshwater-fish/salmon/>

⁵ JNCC (2010) Vertebrate Species: Fish – Atlantic Salmon, [online] Available at: <http://jncc.defra.gov.uk/ProtectedSites/SACselection/species.asp?FeatureIntCode=S1106>

Sea Trout⁶

- 4.6 Sea trout are the sea-running form of the brown trout (*Salmo trutta*). Some sea trout may migrate to feed in salt water, but all spawn in fresh water in the late autumn. When they return from the sea seems to depend on their place of birth and how far up a river system they hatched. In east coast rivers, for example, sea trout heading for the upper reaches come in from the sea from April to June. They may spend most of the summer in the main river stems, waiting for high water conditions in autumn before moving upstream to spawn. Sea trout tend to live longer than salmon, and may make several annual spawning visits. This tendency is greater in highland than lowland rivers.

Protected Status

- 4.7 The Convention for the Conservation of Salmon in the North Atlantic Ocean (1982) seeks to promote the conservation, restoration, enhancement and rational management of salmon stocks. Atlantic salmon are listed in Appendix III of the Bern Convention (in fresh water only). The Habitats Directive⁷ implements the Bern Convention; Atlantic salmon are listed in Annexes II (in fresh water only)⁸ and V⁹ of the Directive.
- 4.8 The UK population of Atlantic salmon is important in a European context. There are 17 Special Areas of Conservation (SACs) for Atlantic salmon in Scotland (Figure 2) and 33 in the UK as a whole. These SACs are in fresh water only; estuarine and marine sites are excluded.
- 4.9 Scottish Planning Policy (2010) includes a presumption against the development of marine finfish farms on the north and east coasts of Scotland to safeguard migratory fish species.
- 4.10 Both Atlantic salmon and sea trout are identified as priority species in the UK Biodiversity Action Plan, following the review of priority species and habitats in 2007.

Population Trends and Abundance¹⁰

- 4.11 The NASCO Salmon Rivers Database (2011)¹¹ shows that there are 398 rivers supporting salmon populations within Scotland. Of these:
- 341 are “not threatened with loss”;
 - fifteen river systems are “threatened with loss” (on Arran and in Western Scotland);
 - twelve river systems are being restored (on the East Coast, Clyde Coast, north-west Scotland and Solway Firth);

⁶ This section is based on information provided on Marine Scotland’s website on “Sea Trout” Available at: <http://www.scotland.gov.uk/Topics/marine/marine-environment/species/fish/freshwater/seatrout>

⁷ Directive 92/43/EEC on the Conservation of Natural Habitats and of Wild Flora and Fauna

⁸ Annex II of the Habitats Directive identifies animal and plant species of community interest whose conservation requires the designation of Special Areas of Conservation.

⁹ Annex V of the Habitats Directive identifies animal and plant species of community interest whose taking in the wild and exploitation may be subject to management measures.

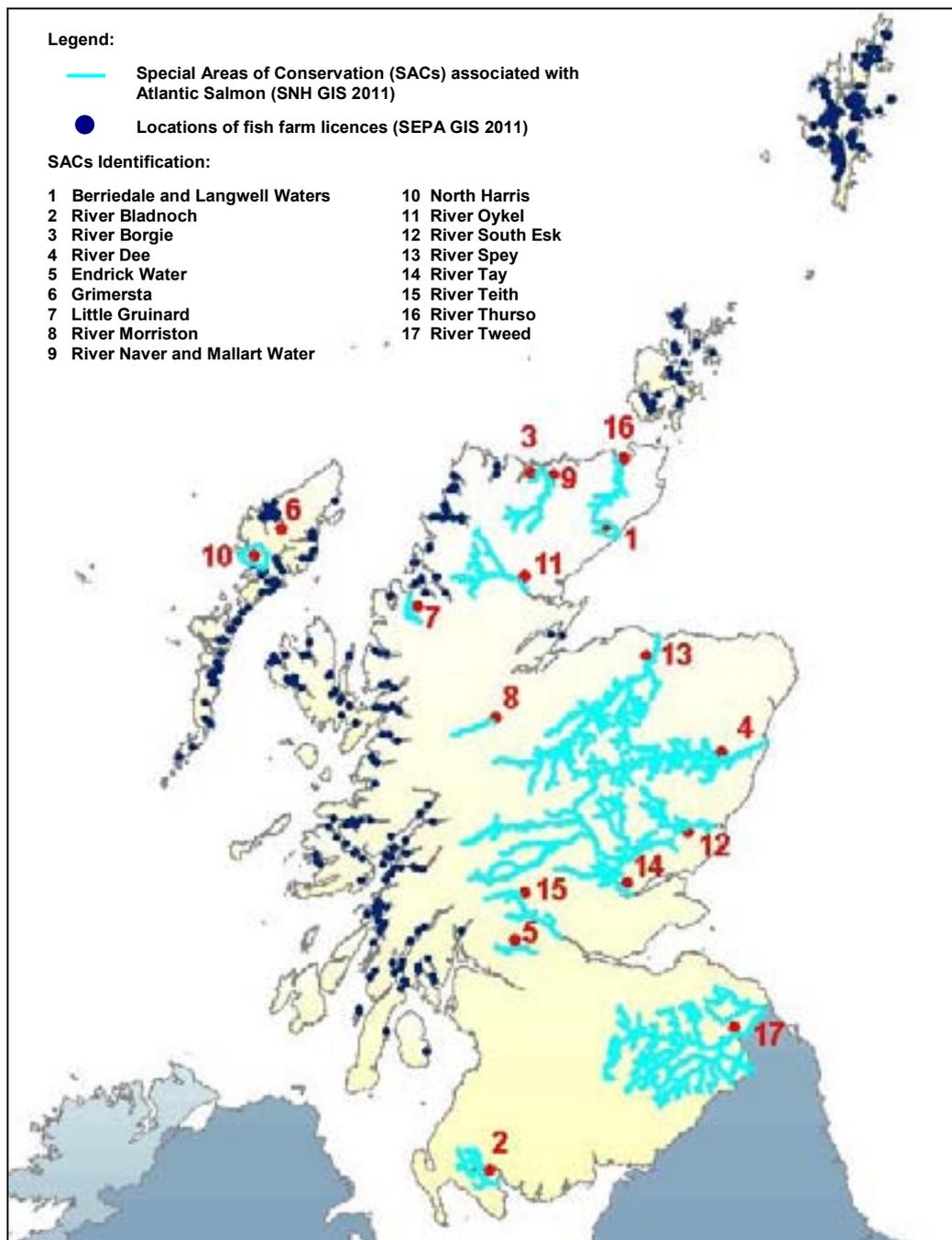
¹⁰ This section is based on information taken from NASCO (2006) EU-UK (Scotland): Report of Implementation Plan for Meeting Objectives of NASCO Resolutions and Agreements and Marine Scotland (2010) Topic Sheet No. 69 v2 – Sea Trout Fishery statistics – 2010 Season, Pitlochry, [online] Available at: www.scotland.gov.uk/Resource/Doc/295194/0121138.pdf.

¹¹ NASCO Rivers Database Report UK- Scotland (2011)

- one river system is “maintained” (on the Clyde Coast); and
- nine river systems are “lost” (on Arran, Clyde Coast and north-west Scotland).

The status of a further 20 systems (on the Clyde Coast, West and north-west Scotland, Outer Hebrides and Moray Firth) is classified as “unknown”.

Figure 2: Locations of SACs designated for Atlantic Salmon and Locations of Fish Farm Licences in Scotland



- 4.12 Atlantic salmon population levels in Scotland are measured using fisheries effort (catch) data from rod and line fisheries and net fisheries. Data collection began in 1952. This collected data shows that annual catches have declined since the late 1960s (Figure 3).
- 4.13 In terms of abundance, it appears that juvenile salmon production remains healthy for the majority of salmon rivers in Scotland, but that the survival of salmon at sea has declined since records began. In consequence, fewer salmon return to the Scottish coast. This decline in abundance appears to be more marked in early-running salmon (“spring salmon”).

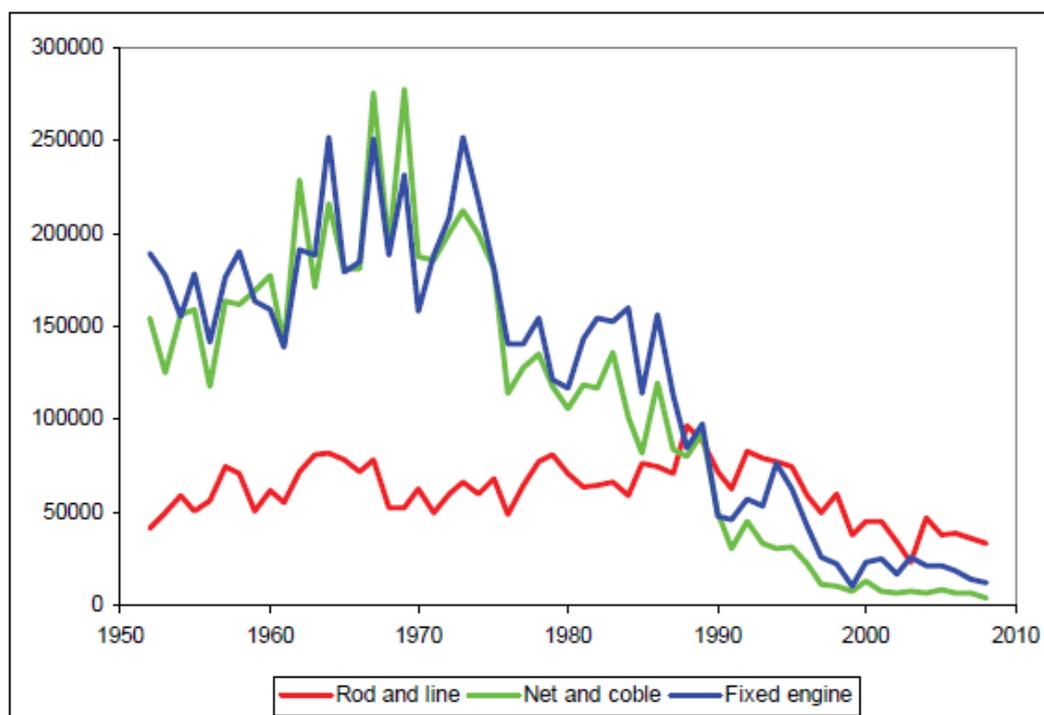


Figure 3. Annual reported catch of salmon (caught and retained) in Scotland, 1952 –2008, by method (source: Crawley 2010¹²)

- 4.14 Marine Scotland catch figures indicate a similar decline in sea trout population numbers since 1952 (Figure 4). Taking the time series as a whole, analysis of the catch data suggests contrasting overall trends on the east and west coasts. In the absence of other evidence to the contrary, the lack of clear trend in the east coast rod catches may be taken to indicate no clear long term trend in the numbers of fish both entering fresh water and escaping to spawn. In contrast, sea trout catches in west coast fisheries have declined markedly over the same period and are currently among the lowest recorded in the time series.
- 4.15 The reasons for these declines in population levels are not clear. Potential reasons include poor marine survival, lower numbers of returning adults, changes to land use, water pollution, predation, non-native species, and the

¹² Crawley, D. (2010) Report of the Scottish Mixed Stock Salmon Fisheries Working Group. Report by the Steering Group of the Freshwater Fisheries Forum.

influence of aquaculture.¹³ Salmon farming is only one of a range of factors which may impact on wild salmon and sea trout. At present it is not possible to determine either the absolute or relative influence of these different factors.

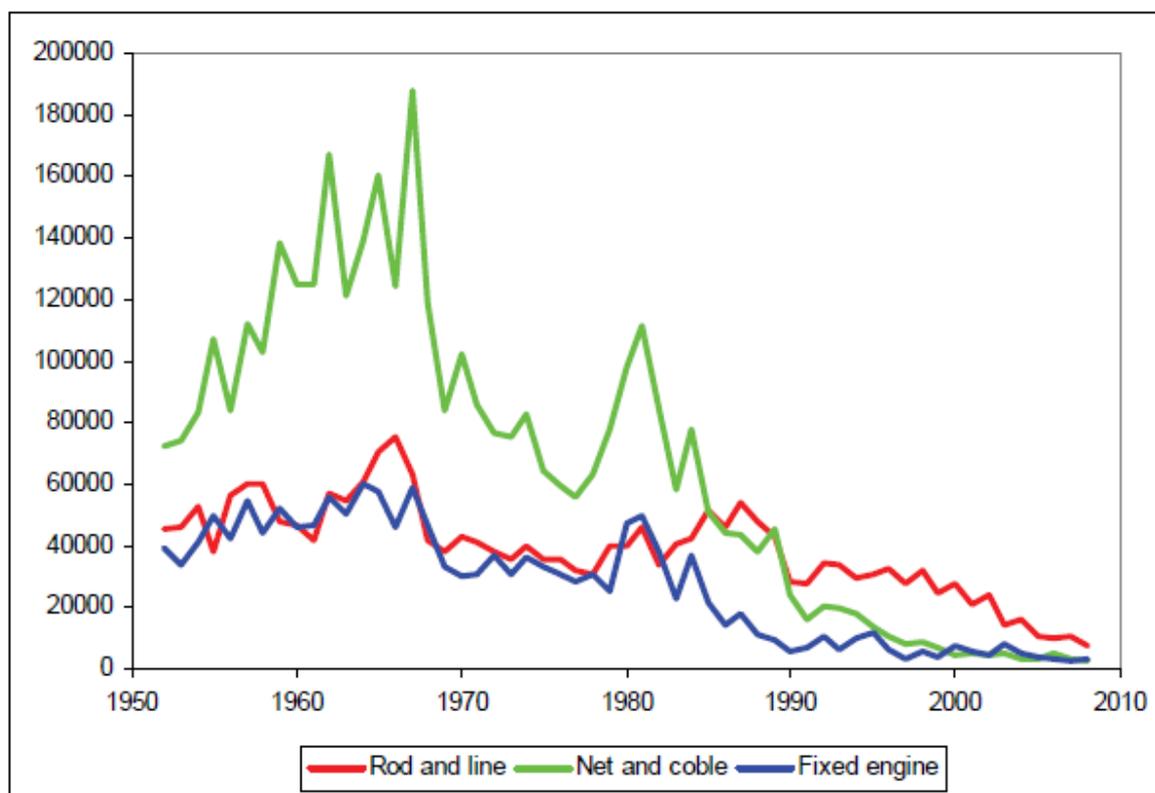


Figure 4. Annual reported catch of sea trout (caught and retained) in Scotland, 1952 –2008, by method (source: Crawley 2010¹⁴)

Wild Salmonid Interactions with Finfish Aquaculture

- 4.16 Salmonid finfish aquaculture is located on the west coast of Scotland, the Western Isles, Orkney and Shetland (Figure 2). Concerns about the influence of salmonid finfish aquaculture on wild salmonid populations centre on the potential effects of sea-lice and escapes of farmed fish.

Sea-Lice

- 4.17 The Sea-Lice Working Group Report¹⁵ prepared by the World Wildlife Fund (WWF) refers collectively to sea-lice as numerous species of copepod crustaceans that are naturally occurring external parasites attaching to and feeding in the skin of marine and anadromous fish. *Lepeophtheirus salmonis* (*L. salmonis*) is a specialist parasite of salmonids and is found on wild salmonids around the UK marine waters throughout the year, and at all stages

¹³ NASCO (2006) op cit, pp 8-14.

¹⁴ Crawley, D. (2010) op cit

¹⁵ WWF (2009) *Working Group Report on Sea Lice – A sub-group of the Working Group on Salmon Disease*, Salmon Aquaculture Dialogue, 30 April 2009 [online] Available at: <http://www.worldwildlife.org/what/globalmarkets/aquaculture/WWFBinaryitem11790.pdf>

- of the parasite lifecycle¹⁶. This species is of concern in Scottish waters, where it is known to affect both wild and farmed salmonid populations.
- 4.18 Sea-lice affect salmon by attaching to and penetrating the epidermal tissues of the host fish. With time, and if in sufficient numbers, they can cause severe erosion of the fins and scales of the host. As skin damage and lesions develop, the underlying tissues are exposed and this can result in bacterial infections and disease.
- 4.19 Sea-lice occur naturally on wild salmonid species. Adult Atlantic salmon caught returning to the Scottish coast from the North Atlantic have been recorded with sea-lice burdens as high as 150 in number, while still reporting good physiological condition¹⁷. Adult wild salmon are able to counter infestation with sea-lice through actions such as jumping out of the water, or returning to freshwater environments (where sea-lice do not survive). These mechanisms are not available to farmed salmon.
- 4.20 Salmon farms have been shown to be a more important contributor than wild fish to the total lice in the marine environment^{18,19} and there is a strong correlation between sea-lice levels on fish farms and in the local environment²⁰, particularly at certain stages of the salmon-rearing cycle^{21,22}.
- 4.21 Sea-lice are capable of travelling large distances. Studies suggest that the extent of lice larvae dispersal depends largely on prevailing winds, currents and local topography²³. There is some evidence to suggest that larvae can disperse as far as 27 km from source under favourable conditions²⁴.
- 4.22 The extent to which wild salmonid populations may be affected by sea-lice is not clear. The WWF report concluded that “the evidence is largely indirect or circumstantial that sea lice emanating from salmon farms can and do exert detrimental effects on wild salmonids ... it is not plausible to draw a single over-riding conclusion regarding the potential negative impacts of sea lice on all wild fish stocks world-wide. Nevertheless, we believe that the weight of

¹⁶ Aas O, Klemetsen A, Einum S (2010) *Atlantic Salmon Ecology*, Blackwell Publishing, Oxford.

¹⁷ WWF (2009) op cit

¹⁸ Penston MJ and Davies IM (2009) An assessment of salmon farms and wild salmonids as sources of *Lepeophtheirus salmonis* (Krøyer) copepods in the water column in Loch Torridon, Scotland. *Journal of Fish Diseases* 32, 75-88.

¹⁹ Revie CW, Gettinby G, Treasurer JW, Rae GH and Clark N (2002) Temporal, environmental and management factors influencing the epidemiological patterns of sea-lice (*Lepeophtheirus salmonis*) infestations on farmed Atlantic Salmon (*Salmo salar* L.) in Scotland. *Pest Management Science* 58, 576–584.

²⁰ Penston MJ, Millar CP, Zuur A and Davies IM (2008) Spatial and temporal distribution of *Lepeophtheirus salmonis* (Krøyer) larvae in a sea loch containing Atlantic Salmon, *Salmo salar* L., farms on the north-west coast of Scotland. *J. Fish Dis.* 31, 361-371.

²¹ Revie C, Dill L, Finstad B, and Todd CD (2009) Salmon Aquaculture Dialogue Working Group Report on Sea-lice, Commissioned by the Salmon Aquaculture Dialogue, [online] Available at: <http://wwf.worldwildlife.org/site/PageNavigator/SalmonSOIForm>.

²² Lees F, Gettinby G and Revie CW (2008) Changes in epidemiological patterns of sea-lice infestation on farmed Atlantic Salmon (*Salmo salar* L.) in Scotland between 1996 and 2006, *Journal of Fish Diseases* 31, 251-262.

²³ Murray AG, Amundrud TL, Penston MJ, Pert CC and Middlemas SJ (2011) Abundance and Distribution of Larval Sea Lice in Scottish Coastal Waters, In: Jones SRM and Beamish RJ (eds) *Salmon Lice: An Integrated Approach to Understanding Parasite Abundance and Distribution*, Chichester, UK: Wiley-Blackwell, pp 117-152.

²⁴ Costello MJ (2009) How sea lice from salmon farms may cause wild salmonid declines in Europe and North America and be a threat to fishes elsewhere, *Proceedings of the Royal Society Biological Sciences*, 2009, 276, 3385-3394, <http://rspb.royalsocietypublishing.org/content/276/1672/3385.full.pdf+html>

evidence is that sea lice of farm origin can present, in some locations and for some host species populations, a significant threat. Hence, a concerted precautionary approach both to sea lice control throughout the aquaculture industry and to the management of farm interactions with wild salmonids is expedient²⁵.

- 4.23 The Code of Good Practice recognises the potential for sea-lice from finfish aquaculture to affect wild salmonids and recommends measures to manage the potential for cross-infection of farmed fish populations, re-infection of farmed fish from lice populations in the vicinity of the cages, and infection of wild salmonids from dispersing sea-lice populations. Studies have also suggested that escaped farm salmonids may act as a conduit for lice transmission between fish farms and for wild salmonid populations²⁶.

Escapes

- 4.24 Escaped salmonids have the potential to interact with wild salmonid populations through inter-breeding, competition for resources and/or displacement, and transfer of parasites or diseases²⁷.
- 4.25 Farmed salmon are genetically different from wild salmon, with farm juveniles typically growing faster and being more aggressive than wild fish, which can provide a competitive advantage during certain life stages. As a result, large numbers of escaped farmed salmon have the potential to impact significantly on wild salmon populations, through resource competition and competitive displacement at the juvenile stages at the local population level. Studies in coastal waters in Norway, for example, have shown that the invasion of escaped farmed salmon, particularly spawning females and juveniles, can result in significant reductions in smolt production through competition and competitive displacement²⁸.
- 4.26 There is also potential for inter-breeding between escaped and wild fish, resulting in changes to the genetic integrity of wild salmon populations. This can pose a significant risk to the genetically distinct wild populations found in Scotland's rivers, through effects such as reduced local adaptation of wild stocks²⁹.

²⁵ WWF (2009) op cit pp 11-12.

²⁶ Butler JRA (2002). Wild salmonids and sea louse infestations on the west coast of Scotland: sources of infection and implications for management of marine salmon farms, *Pest Management Science*, 58, 595-608.

²⁷ Prevent Escape Project Group (2009) Prevent Escape, [online] Available at: http://preventescape.eu/?page_id=15

²⁸ Fleming IA, Hindar K, Mjølnerød IB, Jonsson B, Balstad T, Lamberg A. (2000) Lifetime success and interactions of farm salmon invading a native population, *Proceedings of the Royal Society of London, Series B* 2000;267:1517-1523. [online] Available at: <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC1690700/?tool=pubmed>

²⁹ Ferguson A, Fleming IA, Hindar K, Skaala Ø, McGinnity P, Cross T and Prodöhl P (2007) Farm escapes. In *Atlantic Salmon: Genetics, Conservation and Management* (Verspoor E, Stradmeyer L and Nielsen J eds), Chapter 12: pp 357-398, Blackwell, Oxford, [online] Available at: <http://onlinelibrary.wiley.com/book/10.1002/9780470995846>

5.0 FARM MANAGEMENT AREAS

Current Situation

- 5.1 Farm management areas (FMAs) were originally established in Scottish waters in January 2000 to manage Infectious Salmon Anaemia (ISA)³⁰ and are now used as the basis of an integrated management strategy for controlling disease and sea-lice in finfish aquaculture areas and limiting the potential impacts on the wider marine environment.
- 5.2 A total of 104 Atlantic Salmon farms operated by 31 companies were in active production in Scotland in 2010³¹. The total production of Atlantic salmon during 2010 was 154,164 tonnes. Production was concentrated in larger sites, with over 80% of production concentrated in sites yielding greater than 1,000 tonnes per year.
- 5.3 A total of 87 FMAs are currently established, in Shetland (12), Orkney (4), the Western Isles (22) and the Scottish mainland (49)¹, of which 64 had operating salmon farms stocked with fish (as of August 2011)³². The delineation of the FMAs, detailed in the Code of Good Practice (CoGP), is subject to periodic review to account for changes in finfish farm operations, production and ownership of farms within individual FMAs.
- 5.4 At present, the CoGP website and Scottish Salmon Producers Organisation (SSPO) report, respectively, that between 95% and 98%³³ of Scottish salmon production is undertaken by farmers who have adopted the CoGP. Similarly, approximately 90% of Scottish trout production is undertaken by farmers who are registered and independently audited under an equivalent scheme based on components of the CoGP.
- 5.5 Farming activities within each FMA are covered by either a documented Farm Management Statement (FMS, if a single farm is operating in an FMA) or Farm Management Agreement (FMAg, if multiple farms are operating in an FMA) with conditions of the agreements being specific to each particular FMAg. These agreements are currently voluntary, with operators within an FMA agreeing to adopt similar and co-ordinated farming practices, such as the use of licensed and approved sea-lice treatment medicines, single year class production, area management, synchronisation of production, and fallowing at the end of the production cycle. In some cases, a FMAg will focus mainly on stocking and production cycles, fallowing arrangements and sea-lice management while, in others, they may be limited to issues such as individual fish health.
- 5.6 The CoGP recommends that farm operators undertake non-therapeutic management practices and treatment with veterinary medicines to both disrupt the sea-lice life cycle, and to minimise the quantity of lice present on

³⁰ Scottish Government (2011) Final Report of the Joint Government/Industry Working Group on Infectious Salmon Anaemia (ISA) in Scotland [online] Available at: <http://www.scotland.gov.uk/Topics/marine/Fish-Shellfish/FHI/managementagreement>

³¹ Marine Scotland Science (2011) Scottish Fish Farm Production Survey – 2010 report, [online] Available at: <http://www.scotland.gov.uk/Publications/2011/11/17152846/10>

³² Scottish Salmon Producers Organisation (2011) Regional Reports [online] Available at: [http://www.scottishsalmon.co.uk/science/sea_lice/regional_reports\(1\).aspx](http://www.scottishsalmon.co.uk/science/sea_lice/regional_reports(1).aspx)

³³ Scottish Salmon Producers Organisation (2011) Code of Good Practice [online] Available at: <http://www.scottishsalmon.co.uk/corporate/standards/cogp.aspx>

farms throughout the year. Research reported in the CoGP indicates that best results are achieved through co-ordinated louse treatments undertaken during the early spring and early winter. The CoGP (Annex 11) notes that “a primary objective of the strategy [National Strategy for Sea-Lice Control] should be a target of zero adult female sea-lice on the farmed fish in the spring period when wild salmonids are migrating”.

Proposals

5.7 The proposed provisions include:

- a legal duty for all finfish farm operators to enter into a Farm Management Agreement (FMAg)
- dispute resolution process: powers for Scottish Ministers to arbitrate
- industry to determine boundaries of FMAg; Scottish Ministers to have fallback powers to specify FMAg boundaries in particular circumstances.

Potential Effects

- 5.8 The proposed introduction of the legal requirement that all finfish farm operators in the marine environment must participate in an FMAg follows on from a recommendation of the Healthier Fish Working Group review in 2010³⁴. The proposed provision would make mandatory an activity which is currently voluntary. Although the majority of finfish farms currently work within a FMAg, this measure would result in all fish farms being managed in this way.
- 5.9 At present, operators have the primary responsibility for determining the boundaries of FMAs, and this will not change under the proposals in the Bill. However, the proposal for Scottish Ministers to have powers to specify FMA boundaries and other relevant measures within an FMA when in the wider public and environmental interest, may have several benefits, for example, in the control and management of disease or parasite outbreaks or if there are significant sea-lice problems and significantly challenged wild salmonid populations and evidence of connectivity between sites.
- 5.10 There may be instances where, for a variety of operational or other reasons, it may not be possible for operators readily to agree mutually acceptable arrangements. The proposal for a dispute resolution process is intended to address this. The benefit of this would be the resolution of disputes and the consequent adherence to the appropriate FMAg practices.
- 5.11 Taken together, the key outcome of the proposed provisions would be the co-ordination of management practices, the sharing of information and the appropriate delineation of boundaries, resulting in the co-ordinated control of sea-lice and pathogens in all farms within the designated FMAs, thereby reducing the risk of unacceptable sea-lice burdens and the spread of disease (with a consequent reduction in the use of therapeutant). This would likely have additional benefits for the marine environment and wild salmonid populations.

³⁴ Healthier Fish Working Group (2010) Healthier Fish Working Group Recommendations 10 Aug [online] Available at: <http://www.scotland.gov.uk/Topics/marine/Fish-Shellfish/mingroup/mga22june2010/Healthierfish10Aug>

Mitigation

- 5.12 As no significant negative effects from these provisions have been identified, no mitigation measures are required. Given the high-level nature of the provisions, enhancement measures have not been proposed at this stage of the Bill's development.

Effects of Continuing the Status Quo

- 5.13 At present the CoGP is voluntary and there is no legal requirement for operators to sign up to FMAGs, nor any sanctions for failure to do so. There is a risk that those operators (albeit relatively few) operating outside the CoGP may undermine the efforts of those working on a co-operative basis, with associated risks to those other farmers and the wider environment, i.e. wild salmonids.

6.0 SEA-LICE, MORTALITY, DISEASE AND PRODUCTION DATA

Current Situation

- 6.1 The Fish Farming Businesses (Record Keeping) (Scotland) Order 2008³⁵ requires farm operators to maintain records on the control and treatment of parasites, and the containment, prevention and recovery of farmed fish escapes. The CoGP sets out requirements for the recording of information relating to parasites, escapes, and mortality and disease. The Scottish Salmon Producers Organisation (SSPO) manages a dedicated system for the gathering and exchange of information on lice management across Scotland and publishes regional lice management reports on its website.³² Data collected for Tripartite Working Group Area Management Agreements is also shared between participants.
- 6.2 Marine Scotland is currently notified in certain circumstances, such as where exceedances of the mortality thresholds agreed by the MGA Healthier Fish and Shellfish Working Group are identified. However, there is no legal requirement for the publication of information relating to sea-lice, mortality, disease and production.

Proposals

- 6.3 The proposed provisions include:
- institute statutory requirements to collect and publish site-specific sea-lice data
 - institute a requirement for finfish farms to provide data on fish mortality, movements, disease, treatment and production

Potential Effects

- 6.4 The collection and publication of data, particularly on sea-lice and disease outbreaks, is considered a key element in the co-ordinated and informed management of these issues. The collection of site information on fish mortality, movements, disease, treatment and production by Marine Scotland

³⁵ Scottish Government (2008) Fish Farming Businesses (Record Keeping) (Scotland) Order 2008

would improve the knowledge base on these issues, and help to identify treatment/efficacy failures and the subsequent facilitation of mitigation and remediation measures where necessary. The improved management of fish mortality, disease and sea-lice treatment in particular, will be of benefit to wild salmonid populations.

Mitigation

- 6.5 As no significant negative effects from these provisions have been identified, no mitigation measures are required. Given the high-level nature of the provisions, enhancement measures have not been proposed at this stage of the Bill's development.

Effects of Continuing the Status Quo

- 6.6 At present finfish farm operators collect data but this is not subject to overview and co-ordinated action. There is a risk that continuing the status quo will undermine efforts to control sea-lice and pathogens, with associated risks to wild salmonid populations.

7.0 BIOMASS CONTROL

Current Situation

- 7.1 In addition to planning consent and a marine licence, a licence must be obtained from SEPA for discharges from finfish aquaculture farms, under the Water Environment (Controlled Activities) (Scotland) Regulations 2011 (CAR)³⁶.
- 7.2 The licence includes limits on biomass, i.e. the amount of fish that can be held in the cages, and on the amount of therapeutant and other medicines that can be administered and discharged.
- 7.3 Currently, SEPA have the power under CAR to approve, suspend or revoke a biomass consent (in whole or in part) in the event of non-compliance with licence conditions.

Proposals

- 7.4 The proposed provisions include powers to Scottish Ministers to require SEPA to reduce the limit on biomass in the site licence (the total allowable volume of salmon on the site), for the farm in question, under certain circumstances.

Potential Effects

- 7.5 Our understanding is that separate models are used to determine the permitted biomass of a finfish farm and the use of therapeutant, and that these models are not linked. The absence of information available to regulators at the moment means that we do not know the implications of current practice whereby a site may in certain circumstances be licensed to hold a large tonnage of salmon, but only to use a small amount of therapeutant. This may mean that treatments may be ineffective and/or that

³⁶ SEPA (2011) Marine Aquaculture [online] Available at:
http://www.sepa.org.uk/water/water_regulation/regimes/aquaculture/marine_aquaculture.aspx

operators may be tempted to consider inappropriate approaches to managing sea-lice, with associated fish health, environmental and reputational risk.

- 7.6 These powers are intended to create a link between the licensed biomass and the required volume of therapeutant for the successful management of sea-lice. Improved sea-lice and pathogen control would be a benefit for wild salmonid populations.

Mitigation

- 7.7 As no significant negative effects from these provisions have been identified, no mitigation measures are required. Given the high-level nature of the provisions, enhancement measures have not been proposed at this stage of the Bill's development.

Effects of Continuing the Status Quo

- 7.8 Continuing the current situation would result in the continuing risk that treatments may be ineffective, which would have adverse implications for wild salmonid populations.

8.0 WELLBOAT CONTROLS

Current Situation

- 8.1 Wellboats are used in the Scottish aquaculture industry primarily for the transport of live fish and in the application of therapeutant treatment for sea-lice. Anecdotal evidence indicates that between 20-30 wellboats are currently used in the aquaculture industry in Scotland and these vessels are often shared between the Scottish and Norwegian aquaculture industries. The use of a wellboat in aquaculture is licensed through Marine Scotland, where a licence must be held for each farming site where a wellboat is used.
- 8.2 In addition to transferring live fish between farm cages and, sometimes, between farm management areas, wellboats are commonly used for transporting smolts to on-growing sites and harvest fish to slaughter, with approximately 70% of Scottish salmon production being collected by direct harvest wellboats as of 2006³⁷. So called "dead-boats" are regularly used for the on-site slaughter and transport of harvested salmon to processing plants. All wastes from dead-boats, including wastewater, are required to be disposed of on land under the Pollution Prevention and Control (PPC) permit. No discharges to sea should be made from these vessels.
- 8.3 The CoGP details a cleaning and decontamination regime for wellboats, particularly when transporting fish or moving between FMAs³⁸. While regulatory controls and codes of practice³⁹ are in place for the management

³⁷ Humane Slaughter Association (2006) Fish Welfare During Transport Forum, 25 October 2006 Thistle Hotel, Inverness [online] Available at: www.hsa.org.uk/Resources/Fish%20Transport%20proceedings.pdf

³⁸ Fraser DI, Munro PD and Smail DA (2006) Fisheries Research Services Internal Report No 13/06: Disinfection Guide Version IV - Practical Steps To Prevent The Introduction And Minimise Transmission Of Diseases Of Fish, Produced By Fisheries Research Services, Marine Laboratory, Aberdeen, January 2006 [online] Available at: <http://www.scotland.gov.uk/Topics/Marine/Fish-Shellfish/Fhi/Healthpractice>

³⁹ Joint Government/Industry Working Group On ISA (2000) A Code Of Practice To Avoid And Minimise The Impact Of Infectious Salmon Anaemia (Isa), [Online] Available At: [Http://Www.Scotland.Gov.Uk/Topics/Marine/Fish-Shellfish/Fhi/Healthpractice](http://www.Scotland.Gov.Uk/Topics/Marine/Fish-Shellfish/Fhi/Healthpractice)

and monitoring of sea-lice and diseases in farmed stock in Scotland, the cage to cage, farm to farm and farm to processing plant transfers of fish remain a potential vector for the transmission of sea-lice and pathogens⁴⁰, particularly where vessels collect and deliver fish from multiple sites in separate FMAs. Risks are lower for fish movements within defined FMAs established for the management of sea-lice, disease control and biosecurity, compared with fish movements between separate management areas.

- 8.4 While wellboats can be equipped with oxygenation systems and sensors enabling continuous monitoring of dissolved oxygen, temperature and carbon dioxide in holding bay waters³⁷, it is understood that it may be common practice for wellboat operators to open the valves or “flush” the water in the holding bays to allow fresh oxygenated water in during the transport of live fish. Although the CoGP states that transport water should not be discharged en route directly into natural watercourses and that wellboats must travel with valves closed and not undertake water exchange when within 5km of any finfish farm site, no monitoring controls are in place and this remains a potential source of sea-lice and/or pathogen transmission.
- 8.5 Our understanding is that in-bath treatments are the most common means of sea-lice and pathogen treatment on Scottish salmon farms, but that wellboats are also used for sea-lice treatment. This method can increase the efficacy of therapeutant and reduce the quantity required, as the salmon are exposed to a bath treatment in as little as one-third of the water that would be used in cage treatments using a tarp⁴¹. In this process, the boat is positioned adjacent to the sea cage and the salmon are loaded from the cages into its holding bay for therapeutant application. After the treatment is finished, the treated fish are unloaded and returned to the sea cage, and the residual treatment water is discharged from the wellboat at this location.
- 8.6 As well as the permitted discharge of therapeutant, the discharged treatment water may also typically include dead and surviving sea-lice. Given that this discharge is local, the likelihood of transmission of lice or pathogens between farms and the wider marine environment is considered to be the same as for in-bath treatments done within the cages.

Proposals

- 8.7 The proposed provisions include powers to Scottish Ministers to provide for controls on discharges from wellboats.

Potential Effects

- 8.8 The proposed introduction of additional controls for wellboat discharges and species movements are intended to control and manage sea-lice and pathogens associated with finfish aquaculture. Wellboats have been identified as a potential pathway for the transmission of sea-lice and pathogens.

⁴⁰ Murray AG, Smith RJ, and Stagg RM. (2002) Shipping and the Spread of Infectious Salmon Anemia in Scottish Aquaculture. *Emerg Infect Dis.* [serial on the Internet]. 2002 Jan [online]. Available at: <http://wwwnc.cdc.gov/eid/article/8/1/01-0144.htm>

⁴¹ Atlantic Canada Fish Farmers Association (2011) Evaluation of Well Boat Technology for the Treatment of Sea Lice, [online] Available at: 0101.nccdn.net/.../Final_Report_Mar_19_11_-_Evaluation_of_Well_Boat_Technology_for_the_Treatmen.pdf

- 8.9 Improved control of sea-lice and pathogens has the potential for significant environmental benefit, since these can adversely affect wild salmonid populations.

Mitigation

- 8.10 As no significant negative effects from these provisions have been identified, no mitigation measures are required. Given the high-level nature of the provisions, enhancement measures have not been proposed at this stage of the Bill's development.

Effects of Continuing the Status Quo

- 8.11 Continuing the current situation would result in the continuing risk that sea-lice may be discharged from wellboats, which would have adverse implications for wild salmonid populations.

9.0 FARMED FISH PROCESSING PLANTS

Current Situation

- 9.1 The harvesting of farm-produced salmon in Scottish waters is typically conducted in a number of ways. Live salmon are either transported via wellboat to a killing station, before being sent onwards for processing at a dedicated processing plant, or are transported by wellboat directly to a fish processing plant for killing and processing. A more recent method has been introduced involving transferring farmed salmon directly from the cage to a dead-boat for killing at site, followed by transportation for processing at a designated processing plant⁴².
- 9.2 The fish processing is undertaken in two stages. The primary process is undertaken at a designated processing plant and involves the evisceration of the killed salmon⁴³; the removed solid offal fish waste is ensiled and disposed of in accordance with the Animal By-Products (Scotland) Regulations 2003. The secondary production process involves the preparation of the salmon product for sale (by smoking, deboning, packaging, etc). While some plants are limited to the primary or secondary processing, most fish processing in Scotland is undertaken in mixed facilities undertaking both stages at the one location⁴⁴. The primary production process in Scotland is undertaken separately for wild salmon and farmed salmon, although the secondary processes can be undertaken at the same plant.
- 9.3 Waste discharges from processing plants are authorised under permit or licence, i.e. CAR licence for plants processing less than 75 tonnes/day of carcass, or Pollution Prevention and Control (PPC) permit⁴⁵ for plants

⁴² Nofima (2009) Live salmon in well-boats – a thing of the past? [online] Available at: <http://www.nofima.no/marin/en/nyhet/2009/08/live-salmon-in-well-boats-a-thing-of-the-past>

⁴³ SEPA (2007) Attachment X – Guidance Note On The Ensiling Of Fish And Fish Offal, Version 2.1, 19 September 2007 [online] Available at: http://www.sepa.org.uk/water/aquaculture/marine_aquaculture/idoc.ashx?docid=2715a712-917b-4941-a163-ce7dfd5f2e66&version=-1.

⁴⁴ Scottish Government (2010) Fish Processors, [online] Available at: <http://www.scotland.gov.uk/Topics/Business-Industry/Food-Industry/Seafood/processors>

⁴⁵ Pollution Prevention and Control (Scotland) Regulations 2000

processing more than 75 tonnes/day. (Salmon factories receiving and processing live fish from wellboats are generally considered to be slaughterhouses, and a lower threshold of greater than 50 tonnes/day applies for licensing in these cases.)

- 9.4 Solid wastes from plants are disposed of to land. Waste water is typically treated onsite (via filtering and chemical treatment) prior to discharge into “controlled waters”, under the conditions detailed in the facility permit or licence specifying allowable limits for discharge volumes and environmental parameters (such as biological oxygen demand and chemical concentrations).
- 9.5 International studies have found high concentrations of sea-lice in marine waters in the vicinity of fish processing plants⁴⁶, but there is little evidence to confirm that the source of the sea-lice was the processing plant. Anecdotal evidence suggests that, in Scotland, sea-lice and their eggs are often present in waste water at processing plants, and can survive the waste water treatment process.
- 9.6 Some concerns have been raised about the possibility of the spread of sea-lice or pathogens through discharges associated with farmed fish processing plants, for example sea-lice and/or eggs that have survived the waste water treatment process. Where fish may have been brought in from outside the local area for processing, this could undermine otherwise effective local Farm Management Agreement/Management Area practices and controls.

Proposals

- 9.7 The proposed provisions include additional powers for Scottish Ministers to place controls on discharges from plants processing farmed fish.

Potential Effects

- 9.8 The proposals are intended to control the discharge of sea-lice and pathogens in treated waste water from farmed fish processing plants. Improved control of discharges has the potential for significant environmental benefit, particularly for wild salmonid populations

Mitigation

- 9.9 As no significant negative effects from these provisions have been identified, no mitigation measures are required. Given the high-level nature of the provisions, enhancement measures have not been proposed at this stage of the Bill’s development.

Effects of Continuing the Status Quo

- 9.10 Continuing the current situation would result in the continuing risk that sea-lice may be discharged from farmed fish processing plants, which would have adverse implications for wild salmonid populations.

⁴⁶ Environment News Service (2011) Sea Lice From Salmon Farms Infect Fraser River Sockeye, [online] Available at: <http://www.ens-newswire.com/ens/feb2011/2011-02-08-03.html>

10. SEA-LICE

Current Situation

- 10.1 Operators have a responsibility under the Aquaculture and Fisheries (Scotland) Act 2007⁴⁷ to take satisfactory measures for the control, prevention and reduction of sea-lice and to safeguard the health and wellbeing of the fish in their care. Operators must demonstrate that satisfactory measures are in place to control sea-lice levels through maintenance of records on management area operations.
- 10.2 The management of sea-lice is a complex issue and typically involves the implementation of a range of measures to control sea-lice levels in farmed fish populations. Management measures may include single year class production, farm area management, synchronisation of production across farm areas, fallowing at the end of the production cycle, and the more recent use of “cleaner fish” such as wrasse⁴⁸. These measures are typically undertaken in combination with the regular use of therapeutant. Treatments may be applied in three ways: in-feed, in-bath or using wellboats.
- 10.3 The frequency of therapeutant applications on an individual farm and on farms in a given FMA can vary. Treatment frequencies are dependent on the stage of fish development, time of year, location of the farm and the levels of lice observed during monitoring.
- 10.4 The actual performance and effectiveness of treatments is a subject of concern. The WWF working group report observed that, in recent years, the industry has become increasingly reliant on a few available licensed treatments for sea-lice and that there are concerns about resistance to treatment emerging in sub-populations of lice⁴⁹. The ICES Working Group highlighted similar concerns in Norway⁵⁰.
- 10.5 The CoGP sets out the approach to managing sea-lice, including (at Annex 11) the National Strategy for Sea-Lice Control. This includes non-therapeutic management and sea-lice treatments, on a co-ordinated basis, with an objective to prevent the development of gravid females. If this strategic approach to ‘prophylactic’ treatments is effective, there is a reduced risk of infection of wild salmonids from fish farms.
- 10.6 The CoGP currently suggests the following criteria as thresholds for sea-lice treatment:
- During the period 1st February to 30th June inclusive, the criterion for treatment is an average of 0.5 adult female *L. salmonis* per fish.
 - During the period 1st July to 31st January inclusive, the criterion for treatment is an average of 1.0 adult female *L. salmonis* per fish.

⁴⁷ Scottish Government (2007) Aquaculture and Fisheries (Scotland) Act 2007.

⁴⁸ Scottish Salmon Producers Organisation (2011) Sea Lice, [online] Available at: [http://www.scottishsalmon.co.uk/science/sea_lice\(4\).aspx](http://www.scottishsalmon.co.uk/science/sea_lice(4).aspx)

⁴⁹ External Facilities of the Institute of Aquaculture at the University of Stirling (2011) Sea Lice, [online] Available at: http://www.fishresearch.co.uk/research/sea_lice.

⁵⁰ ICES (2010) Report of the ICES Advisory Committee – 2010, ICES Advice, 2010, Book 10, 94 pp, [online] Available at: <http://www.ices.dk/products/icesadvice.asp>

Proposals

- 10.7 The proposed provisions include additional powers to Scottish Ministers to determine a lower threshold above which remedial action needs to be taken, including at certain times of year, in key areas of Scotland with significant wild fisheries, and/or where fish farming involves high biomasses of fish (meaning the overall burden of lice may be significant). This would be subject to consultation with appropriate local interests in the areas concerned.

Potential Effects

- 10.8 While the CoGP details sea-lice management regimes and treatment triggers, in some circumstances this management regime may be insufficient to assist in the management of risks of outbreaks in farmed stocks and wild salmonids in that area. The proposals have the potential for significant benefits to wild salmonid populations.

Mitigation

- 10.9 As no significant negative effects from these provisions have been identified, no mitigation measures are required. Given the high-level nature of the provisions, enhancement measures have not been proposed at this stage of the Bill's development.

Effects of Continuing the Status Quo

- 10.10 Continuing the current situation would result in the continuing risk that sea-lice outbreaks could occur, in certain times of year in key areas of Scotland with significant wild fisheries, that would have adverse implications for wild salmonid populations.

11.0 ESCAPES

Current Situation

- 11.1 A total of 113 escape incidents from finfish aquaculture farms were reported to Marine Scotland between May 2002 (when reporting began) and December 2011⁵¹. Over this period, almost 2 million Atlantic salmon were reported as having escaped to the marine environment, as well as approximately 280,000 other species of farmed fish (halibut, cod, charr and trout). Incident numbers for all farmed species have generally declined, from 25 incidents in 2006 to 12 incidents in 2010.
- 11.2 These incidents typically involve the escape of juvenile or adult fish from freshwater or sea cages²⁷. Between March 2002 and October 2009, the following causes of escapes were identified:
- a hole in the net (57%;78 incidents);
 - cage and mooring failures (16%;22 incidents);
 - fish handling incidents (5%; 7 incidents);
 - nets under water (4%; 6 incidents);
 - screen failure (4%; 6 incidents); and

⁵¹ Scottish Government (2011) Confirmed Reported Escapes from Fish Farms in Scotland, [online] Available at: <http://www.scotland.gov.uk/Topics/marine/Fish-Shellfish/18364/18692/escapeStatistics>

- other causes (14%)⁵².
- 11.3 For Atlantic salmon, these incidents are largely the result of equipment failures, with fish primarily escaping due to structural failures of containment equipment and through holes in the cage nets⁵². Storm events have proved to be a major cause of escapes and damage to farm equipment, and these events can result in the release of large numbers of fish compared with other incidents. In January 2005, five salmon farm escape incidents were reported during one large storm event, resulting in a total escape of 633,334 fish. Escapes during this one storm accounted for 25% of the escape incidents in 2005, while making up over 72% of the escaped salmon numbers for that year. In December 2011, severe storms led to the loss of approximately 370,000 adult farmed Atlantic salmon in two separate incidents involving the loss of a grid of 12 cages and a separate single cage in Shetland. The incidents are currently being investigated.
- 11.4 Escaped salmonids are known to disperse over large geographic areas, often moving with the currents⁵³, and mixing, migrating and breeding with wild salmonid populations in inland rivers⁵⁴. The number of escaped farm salmonids that successfully spawn is not known, although studies have indicated that there is wide variation in reproductive success for both escaped males and females⁵⁵. Findings of studies conducted in North America⁵⁶ and Norway⁵⁷ suggest that inter-breeding between farmed escapees and wild salmonid populations can result in significant alteration of the genetic integrity of native salmon populations, with possible loss of adaptation to wild conditions.

Proposals

- 11.5 The proposed provision includes powers for Scottish Ministers to require finfish farms to use equipment that conforms to a Scottish Technical Standard.

Potential Effects

- 11.6 The Improved Containment Working Group, established in September 2009 under the auspices of the Ministerial Group on Aquaculture, is making significant progress on a range of actions to improve containment. Other work in this area includes significant investment by the salmon farming industry in new equipment and Marine Scotland Science's containment

⁵² Scottish Aquaculture Research Forum (2010) Assessment Of Protocols And Development Of Best Practice Contingency Guidance To Improve Stock Containment At Cage And Land-Based Sites Volume 1: Report - SARF054 [online] Available at: <http://www.sarf.org.uk/projects/sarf054.php>

⁵³ Hansen LP (2006) Migration and survival of farmed Atlantic Salmon (*Salmo salar* L.) released from two Norwegian fish farms, *ICES Journal of Marine Science* 63, 1211-1217.

⁵⁴ Carr JW and Whoriskey FG (2006) The escape of juvenile farmed Atlantic Salmon from hatcheries into freshwater streams in New Brunswick, Canada, *ICES Journal of Marine Science* 63, 1263-1268.

⁵⁵ Fleming IA, Jonsson B, Gross MR, Lamberg A (1996) An experimental study of the reproductive behaviour and success of farmed and wild salmon (*Salmo salar*). *J Appl Ecol* 33:893-905. [online] Available at: <http://www.jstor.org/pss/2404960>

⁵⁶ Bourret V, O'Reilly PT, Carr JW, Berg PR and Bernatchez L (2011) Temporal change in genetic integrity suggests loss of local adaptation in a wild Atlantic salmon (*Salmo salar*) population following introgression by farmed escapes, *Heredity*, 106: 500-510, [online] Available at: www.ncbi.nlm.nih.gov/pubmed/21224876

⁵⁷ Besnier F, Glover KA, Skaala O (2011) Investigating genetic change in wild populations: modelling gene flow from farm escapees, *Aquaculture Environment Interactions*, Vol. 2: 75-86, 2011, doi: 10.3354/aei00032 [online] Available at: www.int-res.com/articles/aei2011/2/q002p075.pdf

inspection regime. Taken together, this effort, along with increased awareness of containment issues, has led to the lowest reported fish farm escapes in 2010 since statutory reporting began in May 2002.

- 11.7 The CoGP sets out recommendations on containment and notes that installations and holding facilities should be suitable for the purpose. Through the Improved Containment Group, industry has agreed to a Scottish Technical Standard for fish farm equipment. Preliminary work on developing a draft standard is well underway.
- 11.8 The proposed provision would make compliance with the forthcoming Scottish Technical Standard a statutory requirement. It therefore has the potential to reduce escape incidents, and hence further reduce the numbers of farmed salmon entering the marine environment. This measure would reduce the risk of competition, displacement and inter-breeding between escaped farmed salmonids and wild salmonids, and would therefore be of benefit to wild salmonids.

Mitigation

- 11.9 As no significant negative effects from these provisions have been identified, no mitigation measures are required. Given the high-level nature of the provisions, enhancement measures have not been proposed at this stage of the Bill's development.

Effects of Continuing the Status Quo

- 11.10 Continuing the current situation would result in the continuing risk that escapes of farmed salmonids would continue to occur, which would have adverse implications for wild salmonid populations.

12.0 SALMON AND FRESHWATER FISHERIES MANAGEMENT

Current Situation

- 12.1 Scotland is divided into 54 statutory salmon fishery districts for the purpose of salmon fishery management, comprising the natural catchment areas of a specific river or group of rivers. There are currently District Salmon Fishery Boards (DSFBs) constituted for 42 of these districts. The NASCO Salmon Rivers Database (2011) shows 398 rivers supporting salmon populations within Scotland⁵⁸.
- 12.2 The management of Atlantic salmon within Scotland sits within a hierarchy of policy and regulatory bodies at international, EU, national and district levels. In Scotland, conservation measures are predominantly voluntary and mainly implemented at the district level by the DSFBs in consultation with local fishery owners and anglers. This local level of management is conducted through a system of local assessment by the respective DSFB and/or fisheries trust, based largely on statistical fishing data provided by proprietors in the rod and net fishing industries.

⁵⁸ NASCO Rivers Database Report UK- Scotland (2011) op cit

- 12.3 There are long-established statutory annual and weekly close times. The Annual Close Time for Atlantic salmon is a continuous period of not less than 168 days (153 in the Tweed district), which prohibits all fishing methods during this time (except where provision is made for periods during which rod and line fishing is permitted). Weekly Close Times prohibit net fishing between 6pm on Friday until 6 am on the following Monday, with no rod and line permitted on Sundays.
- 12.4 The precise dates of the annual and weekly close times vary between the various Salmon Fishery Districts, but the annual close times generally run from the end of August to mid-February. Angling seasons also vary among districts, with the earliest starts being in mid-January and the latest finishes being at the end of November⁵⁹. As noted in Paragraph 12.3, in addition to the net fishing season, there are periods during the annual close time when fishing by rod and line is permitted.
- 12.5 The main avenue for Scottish Ministers to implement wild salmonid conservation measures in Scotland is through the promotion of secondary legislation under the Salmon and Freshwater Fisheries (Consolidation) (Scotland) Act 2003⁶⁰. At present, under the provisions of the Act, Scottish Ministers can make changes to Annual Close Time Orders for wild salmon fishing, but only when an application is made to them by the DSFB or by two proprietors where there is no district board.
- 12.6 Since 1952, Marine Scotland Science have collected catch, release and net fishing effort data (number and weight) for wild salmon and sea trout direct from the owners of the rights, and this data is compiled and published as an annual statistical bulletin⁶¹.

Proposals

- 12.7 The proposed provisions include powers for Scottish Ministers regarding salmon management and conservation measures, including: to initiate changes to Annual Close Time Orders; promotion of combined salmon conservation measures; and attaching conditions (e.g. monitoring and reporting requirements) to statutory conservation measures. They also include powers for Scottish Ministers to require provision of comprehensive effort data (e.g. catch data) on rod fisheries.

Potential Effects

- 12.8 Where DSFBs have been established by proprietors, the Board is the authority for initiating Annual Close Time Orders. The proposed powers for Scottish Ministers to promote Annual Close Time Orders for salmon districts are intended to enhance management of wild salmon and improve wild stock numbers, particularly in districts with more fragile salmon populations. The

⁵⁹ NASCO (2008) EU-UK (Scotland): Focus Area Report On Management Of Salmon Fisheries, [online] Available at: www.nasco.int/pdf/far_fisheries/FisheriesFAR_Scotland.pdf

⁶⁰ Scottish Government (2010) Report of the Scottish Mixed Stock Salmon Fisheries Working Group: Priority for Action 2.5 from: A Strategic Framework for Scottish Freshwater Fisheries, [online] Available at: <http://www.scotland.gov.uk/Publications/2010/03/31154416/6>

⁶¹ The Scottish Government (2011) Annual Scottish Salmon and Sea Trout Fishery Statistics, [online] Available at: <http://www.scotland.gov.uk/Topics/marine/science/Publications/stats/SalmonSeaTroutCatches>

introduction of reserve powers would offer additional options to enhance coordinated management of the wild salmon fisheries.

- 12.9 Similarly, promotion of combined salmon conservation measures, and the proposed powers for Scottish Ministers to be able to attach conditions such as monitoring and reporting requirements to salmon conservation measures, will likely enhance efforts to conserve wild salmon. This should also enhance a co-ordinated approach to data collection and management of wild salmon. The provision of comprehensive effort (catch) data on rod fisheries will likely result in more data than is presently collected, having the potential for benefits in further informing the decision-making process for the long-term management of wild salmon.

Mitigation

- 12.10 As no significant negative effects from these provisions have been identified, no mitigation measures are required. Given the high-level nature of the provisions, enhancement measures have not been proposed at this stage of the Bill's development.

Effects of Continuing the Status Quo

- 12.11 Continuing the current situation could result in the continued perception of limited accountability of DSFBs, or increased risk of unresolved conflicts with DSFBs as local managers, or undermine potential to maximise the benefits of a holistic approach to management. Taken together, these would not have positive implications for biodiversity.

13.0 LICENSING THE INTRODUCTION OF SALMONIDS

Current Situation

- 13.1 Atlantic salmon return to the river of their birth to spawn after lengthy periods at sea, a behaviour that has resulted in genetically distinct stocks in Scotland's rivers and underpins the biodiversity of the species.
- 13.2 The stocking of fish, including Atlantic salmon and sea trout, in lochs and rivers as a means of supplementing existing wild stocks or via the establishment of new stocks has been a common practice in the past in Scotland⁶². In the past, salmon and trout stocks were often moved among rivers in Scotland, although little information has been identified regarding the impacts on local populations due to these movements.
- 13.3 Since August 2008, the intentional introduction of live fish or spawn of any fish into Scotland's inland freshwaters without the previous written agreement of Marine Scotland (or the local DSFB in respect of licensing of proposed introductions of salmon to fresh water) is prohibited under the Aquaculture and Fisheries (Scotland) Act 2007⁶³. In cases where Atlantic salmon and sea trout are to be introduced, it is often the DSFB that wishes to do so. This

⁶² Marine Scotland (2010) Topic Sheet No. 41 v1 – Scotland's Freshwater Fish Populations: Stocking, Genetics and Broodstock Management, [online] Available at:

<http://www.scotland.gov.uk/Resource/Doc/295194/0099921.pdf>

⁶³ Aquaculture and Fisheries (Scotland) Act 2007

should be undertaken in accordance with best practice policy guidelines, developed by the DSFB, the Association of Salmon Fishery Boards (ASFB) and the Rivers and Fisheries Trusts of Scotland (RAFTS). The guidelines promote a risk-based approach to the artificial stocking of wild salmon fisheries⁶⁴.

Proposals

- 13.4 The proposed provision includes powers for Scottish Ministers to recall, restrict or exclude the jurisdiction of DSFBs to license the introduction of salmon in their District.

Potential Effects

- 13.5 The prohibition of introductions by Section 35 of the Aquaculture and Fisheries (Scotland) Act 2007 (as described in Paragraph 13.3) is intended to protect native biodiversity from the consequences of introductions of non-native fish into Scottish fresh waters. Consequences can include adverse effects such as “deleterious genetic alteration of native populations; increased predation (e.g. predator attraction); competition with wild fish for food and space; antagonistic behaviors that are disruptive for native fish; and disease and parasite transmission”.⁶⁵
- 13.6 The licensing regime came into operation on 1 August 2008. While it is still early days for a full assessment of the operation of the regime, there seems to be a case for reserve powers for Scottish Ministers. This could be in circumstances where, for example, the DSFB is authorising its own actions or where the proposed introduction to inland waters is in, or may affect, a designated site for salmon or species protected by the Habitats Directive.
- 13.7 The proposed provision would have the benefit of enhancing the existing powers under the Act. Given the genetic value of Scotland’s wild salmon populations, and the potential detrimental impacts of introductions, this reserve power offers an opportunity for an enhanced approach to the management of wild salmon, with potential benefits for biodiversity through limiting the risks of competition, displacement and inter-breeding associated with stocking practices.

Mitigation

- 13.8 As no significant negative effects from this provision have been identified, no mitigation measures are required. Given the high-level nature of the provision, enhancement measures have not been proposed at this stage of the Bill’s development.

⁶⁴ NASCO (2010) IP(10)15, Aquaculture, Introductions and Transfers and Transgenics *Focus Area Report – UK (Scotland)*, January 2010, [online] Available at: www.nasco.int/pdf/far_aquaculture/AquacultureFAR_Scotland.pdf

⁶⁵ Webb, J, Youngson, A and E Verspoor. June 2009. Restoration Guidance for West Coast Salmon and Sea Trout Fisheries. Tripartite Working Group. p.17

Effects of Continuing the Status Quo

- 13.9 The potential disbenefits of DSFBs being able to authorise their own stocking would remain if this provision was not made, with potential broader-scale risks to biodiversity such as those set out in Paragraph 13.7.

14.0 SUMMARY OF ENVIRONMENTAL EFFECTS

14.1 The proposed provisions set out in the Bill consultation document cover a wide range of issues in the aquaculture, freshwater and sea fisheries sectors. The proposals that were scoped into the assessment cover the following topics:

- sustainable development of aquaculture;
- fish farming and wild salmonid interactions; and
- improving salmon and freshwater fisheries management.

14.2 These include:

- powers around the adoption of Farm Management Agreements, for example a legal duty for all finfish farm operators to enter into a Farm Management;
- powers to require collection and provision of data on sea-lice, fish mortality, movements, disease, treatment and production;
- powers to alter biomass consents;
- powers for additional controls on discharges from wellboats and farmed fish processing plants;
- powers to prescribe lower sea-lice thresholds above which measures need to be taken;
- powers to require finfish farms to use equipment that conforms to a Scottish Technical Standard;
- powers regarding salmon conservation measures; and
- powers to recall, restrict or exclude the jurisdiction of DSFBs to license the introduction of salmonids in their District, in certain circumstances.

14.3 Overall, the proposed provisions in the Bill consultation document are expected to have benefits for wild salmonid populations, through:

- the improved control of sea-lice and/or pathogens. This is likely to reduce the exposure of wild salmonids to sea-lice and/or pathogens.
- the improved containment of farmed fish, which would result in reduced escapes of farmed fish. This is likely to have benefits for wild salmonids, by reducing the risk of inter-breeding and competition for resources.
- improved salmon and freshwater fisheries management will likely enhance efforts to conserve wild salmon.

14.4 The results of the assessment are summarised in Table 5. Further details are provided in the following paragraphs.

14.5 The measures relating to Farm Management Agreements would make these mandatory, building on the practices set out in the “Code of Good Practice for Scottish Finfish Aquaculture”. Although the majority of fish farms currently work with Farm Management Agreements, this would result in coordination of management practices, sharing of information and appropriate delineation of boundaries. Taken together a key outcome would be the improved control of sea-lice and pathogens, thereby reducing the risk of unacceptable sea-lice burdens and the spread of disease (with a consequent reduction in the use of therapeutants). This would benefit wild salmonid populations.

Table 5. Results of the Assessment

SEA Objectives	Farm Management Agreements	Mortality etc Data Provision	Biomass Consents	Wellboat Discharges	Farmed Fish Processing Plant Discharges	Sea-Lice Treatment Measures	Equipment Standards	Salmon Conservation Measures; Effort Data	Licensing Of Introductions
<i>Biodiversity and Fauna</i> ⁶⁶									
1 – Biological diversity is maintained. The quality and occurrence of habitats and the distribution and abundance of species are in line with prevailing physiographic, geographic and climatic conditions.	↑	↑	↑	↑	↑	↑	↑	↑	↑
4 – All elements of the marine food webs, to the extent that they are known, occur at normal abundance and diversity and levels capable of ensuring the long-term abundance of the species and the retention of their full reproductive capacity.	↑	↑	↑	↑	↑	↑	↑	↑	↑

↓	Working against achieving SEA objective
↑	Working towards achieving SEA objective
n	Neutral. No effect on delivery of SEA objective
?	Uncertain.

⁶⁶ based on GES Descriptors 1 and 4, from Annex I of the Marine Strategy Framework Directive

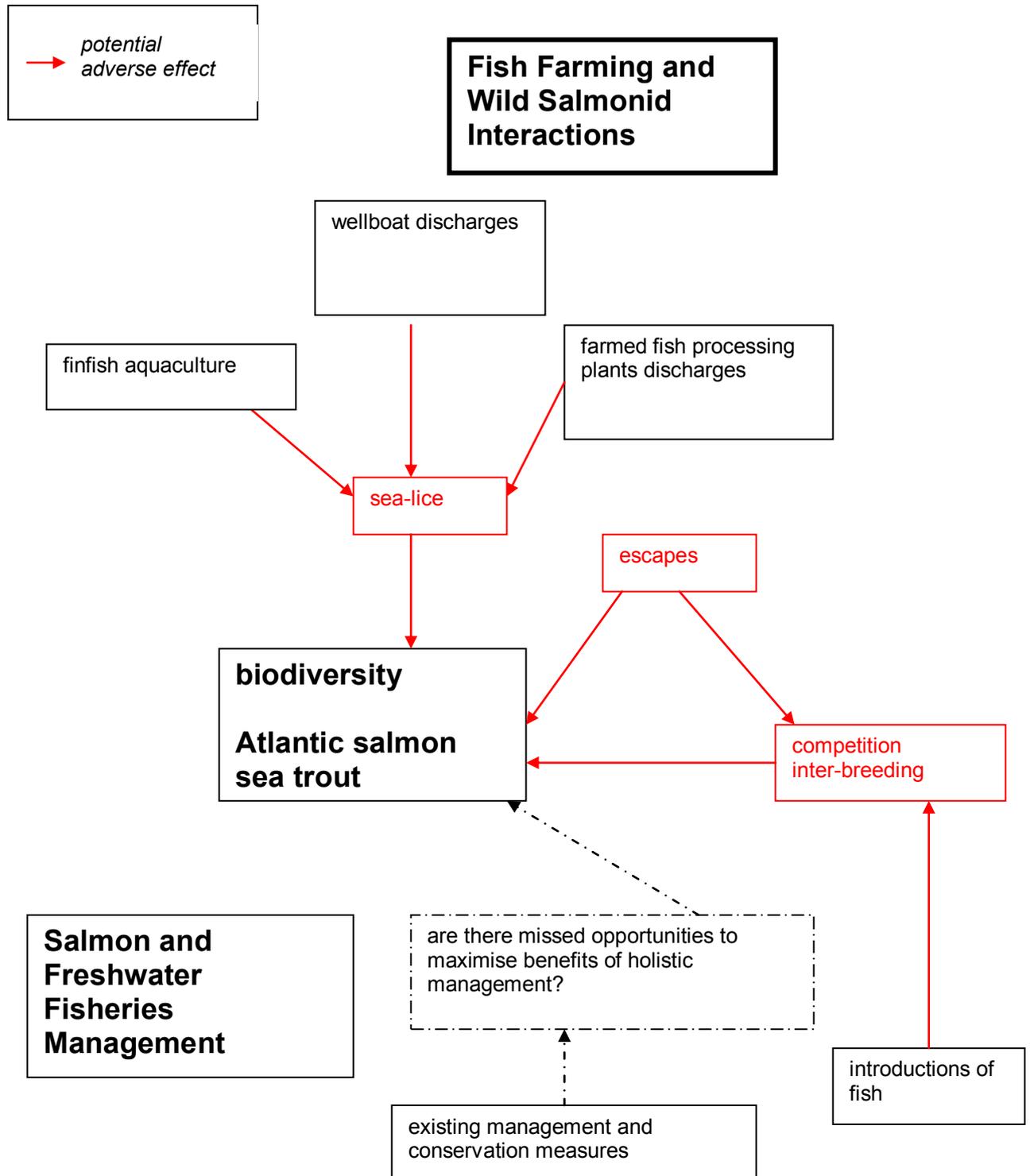
- 14.6 The proposals for provision of data are intended to identify treatment/efficacy failures at an early stage and facilitate mitigation and/or remediation measures. A key outcome would be the improved control of sea-lice and pathogens, thereby benefitting wild salmonid populations.
- 14.7 The proposed powers to reduce biomass consent are intended to link licensed biomass for a site with the required volume of therapeutant, to manage sea-lice and pathogens. Improved control would benefit wild salmonid populations as well as farmed fish.
- 14.8 Proposed powers to place additional controls on discharges from wellboats are intended to control the discharge of sea-lice and pathogens, which would benefit wild salmonid populations as well as farmed fish.
- 14.9 Proposed powers to place controls on discharges from plants processing farmed fish are intended to control the discharge of sea-lice and pathogens, which would benefit wild salmonid populations as well as farmed fish.
- 14.10 Proposed powers to prescribe lower sea-lice thresholds above which measures need to be taken: the sea-lice management regime and treatment triggers are included in the “Code of Good Practice for Scottish Finfish Aquaculture”. In some circumstances this management regime may be insufficient; this intervention is intended to target necessary responses to particular circumstances, thereby reducing the risk of unacceptable sea-lice burdens. In consequence, it should have benefits for wild salmonids as well as for farmed fish.
- 14.11 The proposed power to require finfish farms to use equipment that conforms to a Scottish Technical Standard is intended to improve containment and reduce escapes, thereby reducing the risk of competition, displacement and inter-breeding, with benefits for wild salmonid populations.
- 14.12 Proposed powers to improve salmon and freshwater fisheries management include: to change Salmon District Annual Close Time Orders; to promote combined salmon conservation measures; to attach conditions to statutory conservation measures; and to require provision of comprehensive effort (catch) data on rod fisheries. These measures are intended to enhance capacity for management of wild fisheries in general and stocks in particular. This would have benefits for wild salmonid populations.
- 14.13 In addition, powers to recall, restrict or exclude the jurisdiction of District Salmon Fishery Boards to license the introduction of salmonids in their District are intended to control introductions and further protect biodiversity, in particular reducing the risk of competition, displacement and inter-breeding, with consequent benefits for wild salmonids.

Cumulative Effects Assessment

- 14.14 As noted in Paragraph 3.15, cumulative and synergistic effects have been considered in terms of those arising from finfish farms, wellboats and farmed fish processing plants on wild salmonids. Given the nature of the proposed provisions, this has been undertaken as a high-level assessment.
- 14.15 As noted in the preceding paragraphs, the operation of finfish aquaculture farms and discharges from wellboats and farmed fish processing plants may result in increased levels of sea-lice and/or pathogens in the marine

environment. Cumulatively, these may have an adverse effect on wild salmonids (Figure 5).

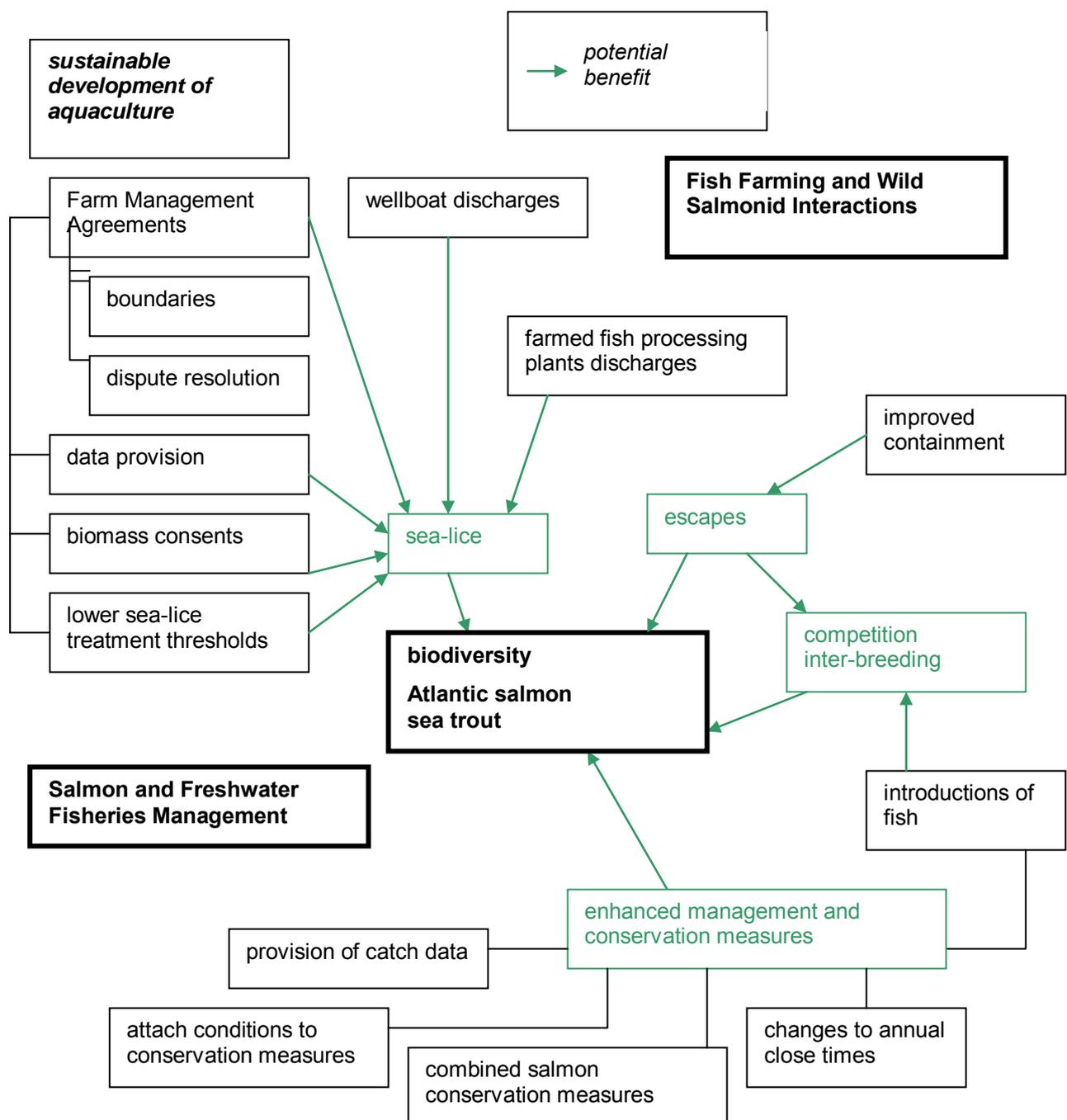
Figure 5. Potential cumulative effects of finfish aquaculture and salmon conservation measures on biodiversity: baseline



14.16 Taken together, the proposed provisions for enhanced controls on finfish aquaculture and additional controls on discharges from wellboats and farmed fish processing plants are likely to result in reduced levels of sea-lice and/or pathogens in the marine environment. This is likely to have a cumulative benefit for wild salmonids.

14.17 Similarly, taken together, the proposals to improve existing salmon and freshwater fisheries management will likely enhance efforts to conserve wild salmon. This is also likely to have a cumulative benefit for wild salmonids (Figure 6).

Figure 6. Potential cumulative effects of finfish aquaculture and salmon conservation measures on biodiversity: with proposed provisions



15.0 NEXT STEPS

15.1 Future milestones in the development of the Bill are listed in Table 6 below, including dates for when the key stages are expected to be completed.

Table 6. Bill Consultation and Environmental Report Timeframe

Milestone	Expected date
Consultation period on the Bill Consultation Document	December 2011 – 2 March 2012
Consultation period on the Environmental Report	February – 2 March 2012
Consideration of consultation responses	March 2012
Bill introduced to the Scottish Parliament	Spring 2012
Publication of the SEA Post Adoption Statement	Once Bill has been passed in Parliament

15.2 Views on the Bill Consultation Document and the findings of the SEA are now being sought. The Bill Consultation Document sets out the information on how to respond to the consultation. In summary, please send your response (along with the completed Respondent Information Form) to:

Email: aquacultureandfisheriesconsultation@scotland.gsi.gov.uk

Or Mail: 1B-North, Victoria Quay, Edinburgh EH6 6QQ

Telephone: 0131 244 6243

Fax: 0131 244 6512

If you have any queries please contact Catriona Graham on 0131 244 6243.

Appendix 1: Screening Summary of the Aquaculture and Fisheries Bill Consultation Document

Proposed Provision	Environmental Effect?
Aquaculture	
<p><i>Farm Management Agreements</i></p> <ul style="list-style-type: none"> creation of a legal duty for all finfish farm operators to enter into a Farm Management Agreement (which would cover stocking, fallowing, biosecurity, management practices including control of sea-lice, information sharing) dispute resolution process: powers to arbitrate boundaries: <ul style="list-style-type: none"> industry to determine boundaries of Farm Management Agreements (using the Code of Good Practice) Scottish Ministers to have fallback powers to specify Farm Management Agreement boundaries in particular circumstances review and address the question of unused consents; SG powers to revoke consents 	<p>Yes. Taken together, these measures would make mandatory an activity which is currently voluntary, building on the practices set out in the “Code of Good Practice for Scottish Finfish Aquaculture”. Although the majority of fish farms currently work with Farm Management Agreements, this would result in all fish farms being managed in this way. This would have the following benefits:</p> <ul style="list-style-type: none"> coordination of management practices sharing of information appropriate delineation of boundaries <p>A key outcome would be the improved control of sea-lice and pathogens, thereby reducing the risk of unacceptable sea-lice burdens and the spread of disease (with a consequent reduction in the use of therapeutants). This would benefit wild salmonid populations.</p> <p>The proposed revocation of unused consents has been reviewed as part of this screening. At present environmental capacity models assume that all consents are being used, which includes the generation of waste (e.g., faecal matter), even when they are not. It has been assumed that unused consents may be revoked and re-issued, and sites will therefore be brought into production. This would not be a significant change from the existing theoretical position, and therefore no environmental effects are anticipated.</p>
<p><i>Sea-lice Data</i>: institute statutory requirements to collect and publish site-specific sea-lice data</p>	<p>No. The collection and publication of data in itself will not result in environmental effects.</p>
<p><i>Mortality, Disease, etc Data</i>: requirement for fish farms to provide data to Marine Scotland on fish mortality, movements, disease, treatment and production.</p>	<p>Yes. The collection and publication of data is intended to identify treatment/efficacy failures at an early stage and facilitate mitigation and/or remediation measures. A key outcome would be the improved control of sea-lice and pathogens, thereby benefitting wild salmonid populations.</p>
<p><i>Biomass Control</i>: powers to Scottish Ministers to require SEPA to reduce biomass consent</p>	<p>Yes. These powers are intended to create a link between the licensed biomass for a site and the required volume of therapeutant and/or the successful management of sea-lice and pathogens. Improved sea-lice and pathogen control has a potential significant environmental benefit, since these affect wild salmonid populations as well as farmed fish.</p>
<p><i>Wellboat control</i>: powers to Scottish Ministers to provide for control requirements on wellboats. Provisions may include:</p> <ul style="list-style-type: none"> satellite monitoring, including remote monitoring, of wellboat activity additional controls on discharges additional information/controls on species movements 	<p>Yes, additional controls on discharges from wellboats are intended to control the discharge of sea-lice and pathogens. Improved control of sea-lice and pathogens has the potential for significant environmental benefit, since these affect wild salmonid populations as well as farmed fish.</p> <p>The remaining provisions (monitoring of wellboat activity, and the collection and publication of data) are not considered to give rise to environmental effects. The collection of this data is intended to inform risk-based compliance monitoring.</p>
<p><i>Farmed fish processing plants</i>: additional powers for Scottish Ministers to place controls on plants processing farmed fish (spread of sea-lice, pathogens)</p>	<p>Yes. Additional controls on discharges from farmed fish processing plants are intended to control the discharge of sea-lice and pathogens. Improved controls have the potential for significant environmental benefit, since these affect wild salmonid populations as well as farmed fish.</p>

Proposed Provision	Environmental Effect?
<i>Seaweed cultivation</i> : regulate seaweed cultivation through marine licensing arrangements	Yes. Seaweed cultivation has the potential for significant environmental effects, and licensing will act to control adverse effects. The potential environmental effects of seaweed cultivation will be explored through the SEA undertaken to inform the proposed sector framework.
<i>Commercially damaging species</i> : additional powers for Scottish Ministers to control commercially damaging native species	No. A 'commercially damaging species' in this context means one which may displace or prejudice the commercial production of traditionally farmed species, but which itself has no commercial value. This proposed measure is therefore intended to protect commercial interests and will not have environmental effects.
Shellfish Growing Waters	
Powers for Scottish Ministers to protect shellfish growing waters (identify shellfish protection areas, set objectives and environmental standards, consultation, monitoring, classification)	No. To ensure that shellfish water quality continues to be protected after the Shellfish Waters Directive (SWD) is repealed, Scottish Ministers propose to incorporate the aims of the SWD into our Water Framework Directive implementation framework. To do this, new legal powers will be required. There would therefore be no change from the existing regulatory framework and, in consequence, no environmental effects are anticipated.
Fish Farming and Wild Salmonid Interactions	
<i>Sea-lice treatment</i> : powers to Scottish Ministers to determine a lower threshold above which remedial action needs to be taken, including at certain times of year, in key areas of Scotland with significant wild fisheries, and/or where fish farming involves high biomasses of fish (meaning the overall burden of lice may be significant). This would be subject to consultation with appropriate local interests in the areas concerned.	Yes. The sea-lice management regime and treatment triggers are included in the "Code of Good Practice for Scottish Finfish Aquaculture". Scottish Ministers believe that there is a case for additional measures, thereby reducing the risk of unacceptable sea-lice burdens. In consequence, it should have benefits for wild salmonids as well as for farmed fish.
<i>Containment / aquaculture escape prevention</i> : powers to require finfish farms to use equipment that conforms to a Scottish Technical Standard	Yes. This measure would require a minimum technical standard that will set out specifications for fish farm equipment such that it is fit for purpose. It is intended to reduce escapes, thereby reducing the risk of competition, displacement and inter-breeding, with consequent benefits for wild salmonid populations.
<i>Samples</i> : powers to take samples of fish from fish farms for tracing purposes (i.e. trace escaped fish back to their farm of origin)	No. This is procedural, to allow the collection of information in support of enforcement. In consequence, no environmental effects are anticipated.
Salmon and Freshwater Fisheries Management	
Operation of District Salmon Fishery Boards: introduction of a duty on boards to act fairly and transparently	No. These are procedural, regarding the conduct of District Salmon Fishery Boards and, in consequence, no environmental effects are anticipated.
Powers for Scottish Ministers to give statutory backing to a sector-developed Code of Practice on the operation of District Salmon Fishery Boards	
Powers for Scottish Ministers to introduce a system of statutory carcass tagging of wild salmonids	No. This is procedural, to allow the collection of information. In consequence, no environmental effects are anticipated.
Powers for Scottish Ministers to take or require wild fish and/or wild fish samples for genetic or other analysis	
<ul style="list-style-type: none"> Powers for Scottish Ministers regarding management and salmon conservation measures, including: to initiate changes to Salmon District Annual Close Time Orders; promotion of combined salmon conservation measures; and attaching conditions (e.g. monitoring 	Yes. These measures are intended to enhance capacity for management of wild fisheries in general and stocks in particular. This would have benefits for wild salmonid populations.

Proposed Provision	Environmental Effect?
<p>and reporting requirements) to statutory conservation measures.</p> <ul style="list-style-type: none"> • Powers for Scottish Ministers to require provision of comprehensive effort data (e.g. catch data) on rod fisheries 	
Powers for Scottish Ministers to prescribe procedures for statutory mediation and dispute resolution (through regulations)	No. This is procedural. Providing powers to mediate will not result in environmental effects.
Powers for Scottish Ministers to require District Salmon Fishery Boards and others to undertake record keeping, reporting and inspection of salmon and sea trout fisheries	No. This is procedural, to allow the collection of information. In consequence, no environmental effects are therefore anticipated.
New reserve powers for Scottish Ministers to recall, restrict or exclude the jurisdiction of District Salmon Fishery Boards to license the introduction of salmonids in their District, in certain circumstances.	Yes. These changes to the licensing authority for existing regulated activities are intended to protect biodiversity, in particular reducing the risk of competition, displacement and inter-breeding, with consequent benefits for wild salmonid populations.
Enforcement	
Changing the way liability is defined to facilitate enforcement (application of strict liability criteria to certain offences; identification of responsibility for non-compliance)	No. This is a procedural change to the existing enforcement regime and will not result in environmental effects.
Powers to widen the scope of offences for which Fixed Penalty Notices can be used; extending existing powers to include all marine- and aquaculture-related offences which fall within the responsibility of Marine Scotland; powers to increase maximum penalty	No. This is a procedural change to the existing enforcement regime and will not result in environmental effects.
Changes to Sea Fisheries Legislation	
<ul style="list-style-type: none"> • amend section 30(1) of the Fisheries Act 1981, insofar as it relates to Scottish vessels and nationals, to create offences and provide enforcement powers for the enforcement of EU fishing restrictions and obligations beyond the 200 nautical mile limit; • provide specific powers to detain vessels for the purposes of court proceedings; • provide specific powers to allow enforcement officers to dispose of property and forfeit prohibited items; • provide enforcement officers with the power to inspect objects in the marine environment; • amend Section 1 of the Sea Fisheries (Shellfish) Act 1967 to apply that Act to all shellfish specified in an Order; and • amend paragraph 4(2) of Schedule 1 to the Sea Fisheries (Shellfish) Act 1967 to remove the reference to actions by Scottish Ministers in light of material concern. 	No. These are procedural changes, e.g. to the existing enforcement regime, and will not result in environmental effects.
Charging	
Powers for Scottish Ministers to make provision for charging for services/benefits arising from public sector services and activities	No. This is a procedural change to the existing charging regime and will not result in environmental effects.

Appendix 2: Environmental Protection Objectives

Legislation/Policy/Programme/Strategy/Plan	Objectives
Biodiversity, Flora & Fauna	
<i>International</i>	
UN Convention on Biological Diversity (1992)	Article 6 requires that all parties to the Convention develop national biodiversity strategies, plans or programmes, and that they seek to integrate the provisions of these across other policy sectors. Article 7 requires the identification of key resources and their protection. Monitoring of potentially damaging processes and activities should also be undertaken. To establish representative networks of protected areas in the maritime environment by 2012.
Bonn Convention on the Conservation of Migratory Species of Wild Animals 1979	Aims to conserve terrestrial, marine and avian species through international co-operation.
Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention).	This Convention led to establishment of a cross-regional commission promoting an ecosystems approach to marine management, including establishment of a network of Marine Protected Areas. Its five work areas are biodiversity and ecosystems, eutrophication, hazardous substances, offshore industry, and radioactive substances). Climate change is also a key cross-cutting theme. Also includes a Biological Diversity and Ecosystems Strategy.
UN Agreement on Straddling Fish Stocks and Highly Migratory Fish Stocks 2001	Sets out principles for the conservation and management of specified fish stocks and establishes that such management must be based on the precautionary approach and the best available scientific information. The Agreement elaborates on the fundamental principle, established in UNCLOS, that States should co-operate to ensure conservation and promote the objective of the optimum utilisation of fisheries resources both within and beyond the exclusive economic zone.
The Convention for the Conservation of Salmon in the North Atlantic Ocean of 2 March 1982	Seeks to promote the conservation, restoration, enhancement and rational management of salmon stocks.
<i>European</i>	
Council Directive 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive)	Established a commitment to designating networks of sites of ecological importance across Europe. These are known as Natura 2000 sites and include special protection areas (SPAs designated under the Birds Directive – see following paragraph) and special areas of conservation (SACs).
Bern Convention on the Conservation of European Wildlife and Natural Habitats (1979)	Aimed to promote co-operation between European states to protect biodiversity.
The Pan-European Biological and Landscape Diversity Strategy (1995)	The Strategy aims to reverse the decline of landscape and biological diversity, by promoting innovation and proactive policy making. It supports preceding measures for protecting natural heritage, and aims to supplement this by further promoting a number of action themes relating to different environmental resources. Emphasises the rapid decline of some key characteristics and resources, including traditional human-made landscapes, coastal zones, marine areas, wetlands, mountains and grassland.
EU Biodiversity Strategy (1998)	Aims to “anticipate, prevent and attack” any reduction or loss of species and habitats across Europe. Supports implementation of the Habitats and Birds Directives, supports the establishment of networks of protected sites, aims to achieve conservation by making plans for priority resources. Also notes the importance of biodiversity outside of protected areas. Refers to agriculture and its role in relation to biodiversity conservation.
<i>United Kingdom</i>	
Wildlife and Countryside Act 1981 as amended by the Wildlife and Natural Environment (Scotland) Act 2011	Provides the framework for protection of species other than European Protected Species. Sets out protection objectives for specified birds and wild animals. The Act’s various schedules detail the species that are protected under the Act, including dolphins, porpoises, and numerous birds such as geese and ducks. This was reviewed and updated in December 2008 and it was recommended that several further species of marine fish should be added to the lists attached to the Act, including shark, seahorse and ray species.

Legislation/Policy/Programme/Strategy/Plan	Objectives
	The amendments to the Wildlife and Countryside Act 1981 resulting from the Wildlife and Natural Environment (Scotland) Act 2011 comprise: protect game species under the 1981 Act (which includes provision for close seasons and “poaching” offences); abolish “areas of special protection” for wild birds; provide further for the use of snares to catch animals; extend the regime for controlling non-native and invasive species; amend licensing functions under the Act, and enable the delegation of those functions; provide for new wildlife offences, including for vicarious criminal liability for certain offences; provides for offences by Scottish partnerships and unincorporated associations; provide for Part 1 of the 1981 Act to apply to the Crown; and extend the powers of wildlife inspectors.
The Conservation (Natural Habitats, &c) Regulations 1994 as amended	Transposes the requirements for protection of designated sites under the Habitats and Birds Directives, and the framework for protection of European Protected Species. Applies within 12nm. Several marine species are protected by various development consenting regimes covered by the Act. This includes marine turtles, all species of dolphins, porpoise and whale, seals and several types of marine fish (Atlantic salmon, barbel etc.)
The Offshore Marine Conservation (Natural Habitats, &c) Regulations 2007 (the Offshore Marine Regulations)	The Regulations extend protection to important species and habitats under the Birds and Habitats Directives beyond UK territorial waters (i.e. outside 12nm). Give protection to marine species, wild birds and habitats, mainly through the creation of offences and site protection mechanisms. Provide the definition of deliberate disturbance applicable to cetaceans, turtles and the Atlantic sturgeon
UK Biodiversity Action Plan 1994 (UKBAP)	In response to the 1992 Convention on Biological Diversity, this describes the UK’s biological resources, commits a detailed plan for the protection of these resources. Sets out 1150 species and 65 habitats which are priorities for conservation action in the UK. The list was last updated in 2007 and includes 87 species in the marine group. Numerous habitats are also relevant to Scotland’s marine environment, including several which are specific to coastal areas (salt marsh, sand dunes) or the marine environment (including machair, maerl beds, mud habitats in deep water, estuarine rocky habitats, blue mussel beds, carbonate mounds, tide swept channels, reefs, and intertidal mudflats).
Scotland	
Nature Conservation (Scotland) Act 2004	Introduced a ‘duty to further the conservation of biodiversity’ for all public bodies, and sets out more specific provisions within this including for Sites of Special Scientific Interest. Also states a requirement for the preparation of a Scottish Biodiversity Strategy, to which all public bodies should pay regard. Applies to 12nm around Scotland and includes protection measures for marine species.
Scotland’s Biodiversity – It’s In Your Hands. A strategy for the conservation and enhancement of biodiversity in Scotland (2004)	Sets out Scottish aims relating to biodiversity over 25 year period. Seeks to go beyond a previous emphasis on protecting individual sites to achieve conservation at a broader scale. Aims to halt loss and reverse decline of key species, to raise awareness of biodiversity value at a landscape or ecosystem scale, and to promote knowledge, understanding and involvement amongst people. The Strategy notes the importance and health of Scotland’s ecosystems, and summarises key trends.
Marine Nature Conservation Strategy	The strategy outlines Marine Scotland’s vision, aims and objectives for protecting marine biodiversity. It sets out Marine Scotland’s vision and framework for marine nature conservation based on a three pillar approach: species conservation; site protection; and wider seas policies and measures. The strategy outlines how Marine Scotland is implementing the 3 pillar approach to marine nature conservation and how this work fits with wider marine planning and other work under the Marine (Scotland) Act 2010 and the Marine and Coastal Access Act 2009.
Water	
European	
Water Framework Directive 2000/60/EC	This provides an overarching strategy, including a requirement for EU Member States to ensure that they achieve ‘good ecological status’ by 2015. River Basin Management Plans (RBMPs) were defined as the key means of achieving this. Recent Marine Strategy Directive will extend coverage of coastal waters beyond 1nm.
United Kingdom	
Pollution Prevention and Control Act 1999	Implements Directive 96/61/EC (Integrated Pollution Prevention and Control). Regulating industrial and commercial activities

Legislation/Policy/Programme/Strategy/Plan	Objectives
	which may cause environmental pollution and to prevent and control emissions that are capable of causing any pollution.
<i>Scotland</i>	
Water Environment and Water Services (Scotland) Act 2003 (WEWS Act)	Transposes the Water Framework Directive into the Scottish context. Aims to protect the water environment by ensuring a reliable and high quality supply of water, reducing groundwater pollution, and protecting marine and other waters.
The Water Environment (Controlled Activities) (Scotland) Regulations 2005	Sets out the process by which activities that have the potential to affect Scotland's water environment are regulated. Authorisation under the CAR is required for discharging to waters, disposal of pollutants to land, abstractions, impoundments and engineering works affecting water bodies.
Pollution Prevention and Control (Scotland) Regulations 2000	See Pollution Prevention and Control Act 1999
SEPA (2008) River Basin Management Plans Scotland River Basin District / Solway Tweed River Basin District	Notes the key pressures and their environmental impacts on Scottish water bodies including coastal areas. Key issues affecting coastal areas include diffuse and point source pollution, organic matter and ammonia, faecal pathogens, toxic substances, and loss of intertidal areas. Some of these issues may be exacerbated by climate change. Objectives for specific water bodies can be found in an interactive map on SEPA's website ⁶⁷ . This also shows the variation in quality of coastal water bodies at present.
Industry and Other	
<i>International</i>	
UN Convention on the Law of the Sea 1982 (UNCLOS)	Defines the rights and responsibilities of nations in their use of the world's oceans, establishing guidelines for businesses, the environment, and the management of natural resources.
<i>European</i>	
EU Marine Strategy Framework Directive 2007 (MSFD)	The MSFD is the most recent marine obligation on EU Member States. It extends the requirements of the Water Framework Directive (WFD) into seas beyond 1nm. The MSFD requires Member States to "take necessary measures to achieve or maintain good environmental status in the marine environment by the year 2020...".
European Integrated Maritime Policy 2007	Aims to deliver a sustainable development approach for Europe's oceans and seas. Its scope includes: a marine transport strategy and new ports policy; research and data collection and management strategies, and work to mitigate the effects of climate change on coastal regions.
<i>United Kingdom</i>	
Marine and Coastal Access Act 2009	The key issues covered by the Act comprise: the creation of a Marine Management Organisation (MMO); planning in the marine area; licensing activities in the marine area; marine nature conservation; managing marine fisheries; reform of inland and migratory fisheries; modernisation and streamlining of enforcement powers; administrative penalties scheme for domestic fisheries offences; and access to coastal land.
Our seas – a shared resource 2009	Sets out high level objectives for the UK marine environment. This includes achieving a sustainable marine economy, ensuring a strong, healthy and just society, living within environmental limits, promoting good governance and using sound science responsibly. Renewable energy is strongly supported by the strategy.
<i>Scotland</i>	
Marine (Scotland) Act 2010	Aims to manage activities with Scotland's marine environment in a sustainable way. Notes the importance of protecting seas whilst facilitating sustainable economic growth. Introduces a new statutory marine planning system, a simpler licensing system, improved marine nature and historic conservation with new powers to protect and manage areas of importance for marine wildlife, habitats and historic monuments; improved protection for seals and enforcement powers.

⁶⁷ http://www.sepa.org.uk/water/river_basin_planning.aspx

Legislation/Policy/Programme/Strategy/Plan	Objectives
Aquaculture and Fisheries (Scotland) Act 2007	Details amongst other things, the circumstances for an inspector carrying out inspections of fish farms and shellfish farms, the collection of samples, viewing and copying records and documents, specifically in relation to the control of sea-lice and fish escapes. Outlines the purposes for which enforcement notices can be served, specifically relating to sea-lice, fish containment, prevention of fish escapes and the recovery of escaped fish.
The Aquatic Animal Health (Scotland) Regulations 2009	Governs the health of farmed animals (finfish and shellfish) through authorisation of aquaculture farms and processing facilities, ensure that non-commercial undertakings (put and take fisheries and specialist transporters) are registered, requires that disease prevention measures are during live and harvest transport, and obliges reporting in the event of the suspicion or confirmation of diseases or increased mortality in aquatic animals. Details the obligations and powers available to competent authorities and inspectors in relation to these topics.
The Fish Farming Businesses (Record Keeping) (Scotland) Order 2008	Does not set objectives as such, but details the required maintenance and retention of records on the prevention, control and reduction of parasites, disease containment, prevention and recovery of farmed fish.
The Animal By-Products (Scotland) Regulations 2003	Does not set objectives as such, but prescribes appropriate methods of disposal of "high risk material" including fish that have died but were not slaughtered for human consumption, via rendering, incineration or, in exceptional circumstances only, burial.
Non-statutory Fishery Management Plans (Voluntary charitable rivers and fisheries trusts)	Developed, typically at the catchment level by the applicable voluntary Fisheries Trust, and can set out programmes and objectives for gathering data on the applicable catchment(s) and fish stocks, to improve understanding and inform management of the salmon and freshwater fish and fisheries in the plan area.



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