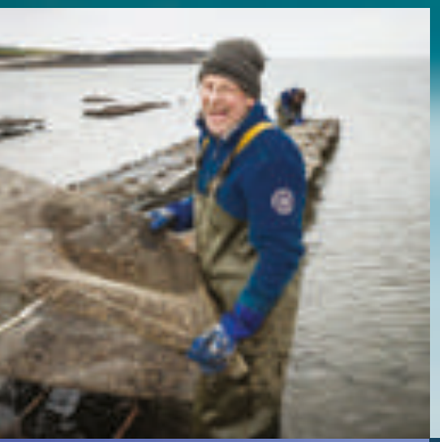
Aquaculture Growth to 2030



A Strategic Plan for farming Scotland's seas

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Aquaculture contributes over £1.8bn annually to Scotland's economy

1 Executive Summary

In 2016, a Working Group of leading aquaculture businesses and organisations came together to create a growth strategy for aquaculture in Scotland to 2030. The aim was to deliver an ambitious, industry-led plan for sustainable growth across the entire aquaculture value chain.

Aquaculture in Scotland is diverse, from the farming of salmon and other finfish species, to the production of mussels and oysters, to the harvesting of seaweed. It contributes over £1.8bn annually to Scotland's economy and sustains the economic and social fabric of the Highlands and Islands in particular. But the potential contribution of farming Scotland's seas is far greater. Research points to a potential annual contribution of £3.6bn or more by 2030. The number of jobs supported by the sector could reach 18,000.

STRATEGIC PRIORITIES FOR THE SECTOR

For Scotland to deliver high levels of sustainable growth by 2030 and beyond, the Working Group identified six strategic priority areas for effective collaboration between regulators, industry, researchers and other stakeholders. These are:

- industry leadership and ambition
- enabling and proportionate regulation
- accelerating innovation
- skills development
- finance
- infrastructure.

In addressing these, aquaculture policy and regulation should give equal weight to the three pillars of sustainable growth: economic development, social development and environmental protection.

KEY RECOMMENDATIONS

Within these six areas of strategic focus, the Working Group recommended 20 specific actions. In particular, the Working Group believe three actions are critical to the sustainable growth of aquaculture in Scotland:

- the formation of an Industry Leadership Group (ILG) to drive sector growth and ensure alignment between industry and government
- an examination of the role of Marine Scotland as both regulator and policy advocate for development. There is an opportunity to align with other food and drink sectors in Scotland by moving the development role into the Scottish Government's Food, Drink & Rural Communities Division
- the introduction of Innovation Sites, to allow controlled trials and development of innovative equipment, technologies, disease control measures, and regulation.

In 2030, Scotland has the opportunity to be a world-leading player in an industry that is vital for future food security and has one of the lowest carbon footprints of any major form of animal protein production.

The delivery of these 20 recommendations should permit the sector to grasp that opportunity and reap long-term social and economic benefits for Scotland.

2 A vision for aquaculture growth in Scotland

A thriving aquaculture sector could boost the Scottish economy by £3.6bn per annum.

Scottish farmed salmon was voted best in the world in 2014 by retail and foodservice buyers

£600M salmon and seafood exported annually

The farming of Scotland's seas contributes over £1.8 billion annually to the Scottish economy. The aquaculture sector supports around 8,800 jobs, many in remote and rural areas.[1] And it sustains the economic and social fabric of the Highlands and Islands, as an anchor industry that keeps communities and career prospects alive.

But the success and substantial social and economic contribution of Scotland's finfish, shellfish and seaweed producers and their supply chain, is not even close to its full potential. By 2030, sustainable growth in aquaculture production, the wider supply chain and the value-adding sectors in Scotland could double the sector's contribution.

Research among key stakeholders points to a potential contribution to Scotland of £3.6 billion or more each year. This Strategic Plan sets out a vision and route for achieving that growth and for ensuring that the sector can deliver the priorities in Scotland's economic strategy: innovation, internationalisation, investment and inclusive growth. It provides a key contribution to the development of the new Scotland Food & Drink 2030 industry strategy, encompassing the entire food and drink sector.

A LEADER IN A KEY GLOBAL SECTOR

The importance of farming Scotland's seas goes beyond economic considerations.

With world population projected to rise to well over 8.5 billion in 2030, growing per capita consumption of protein and wild-catch volumes stagnating, aquaculture has a crucial role in food security. As a source of protein, finfish and shellfish production is highly efficient in terms of water consumption, CO^2 emissions and feed conversion.

The further development of aquaculture in Scotland would ensure we make a major and growing contribution to strengthening global food security and tackling climate change, arguably the defining issues of our time.

A world-class aquaculture industry here will position Scotland as a global leader in sustainable protein production.

A COMPELLING OPPORTUNITY

In this global landscape – where the vision of the European aquaculture industry is to provide 4.5 million tonnes of sustainable food products annually[2] – Scotland is a key player. We are one of a handful of countries with the climatic and hydrographic conditions to farm salmon. Our pristine waters make our seas and coasts an ideal location for growing finfish, shellfish and seaweeds.

Our ambitions for sustainable growth should therefore match the richness of our resources and the size of the global opportunity. This is a sector in which Scotland can be world-leading, but only if all stakeholders – government, industry, academics, regulators – address the industry's challenges.

We set out here the actions we believe necessary for the industry to deliver this accessible opportunity for Scotland.

"We must start using the sea as farmers instead of hunters. That is what civilisation is all about – farming replacing hunting."

Jacques Cousteau

Towards 2030: potential gains and growth.

Setting precise targets for finfish and shellfish production in Scotland is beyond the scope of this Strategic Plan, but sustainably achievable projections for 2030 could be in the range of 300,000 to 400,000 tonnes per annum for finfish production. In shellfish production there is potential to reach 21,000 tonnes of mussels per annum by 2030 and to significantly increase the value of oyster production.

Extrapolating from the figures set out in Marine Scotland's An Assessment of the Benefits to Scotland of Aquaculture (2013), a median production figure of 350,000 tonnes of salmon would double aquaculture's current economic value of £1.8 billion to the Scottish economy, to £3.6 billion. To reach this tonnage from current levels would require year-on-year production growth of less than 5%.

According to An Assessment of the Benefits to Scotland of Aquaculture, the sector directly employs over 4,500 people in its supply chain. Using the report's methodology for calculating the employment gains linked to raising aquaculture production, an increase in finfish and shellfish production to approximately 300,000–400,000 tonnes and 21,000 tonnes respectively in 2030 could increase the number of jobs in the sector to approximately 18,000, with a move from production-only jobs towards job creation in the supply chain.

It is clear that aquaculture has a critical role to play in protecting and strengthening Scotland's rural communities and economy, both now and in the decades to come.

3 How to unlock growth

Aquaculture stakeholders must focus on six key strategic priorities to develop market share and realise the industry's growth potential.

The economic opportunity for Scotland's aquaculture sector is huge. But growth in production, exports or the supply chain is not guaranteed.

The global market share of Scottish salmon has fallen from around 10% in 2005 to less than 7%, as other aquaculture nations raise productivity. A variety of factors have slowed production growth in Scotland and – without work to address them – will continue to do so.

CHALLENGES FOR THE SECTOR

The biological challenges facing producers in Scotland are well known and also face producers in competitor nations. The salmon industry in Scotland has been investing almost £30 million annually over the past five years in measures to improve sea lice control and it is driving forward industry-academic collaboration through the Scottish Aquaculture Innovation Centre (SAIC). Its investments in biological and engineering-based solutions for sea lice control will help to reduce the use of medicinal treatments – a demonstration of the sector's commitment to environmental sustainability.

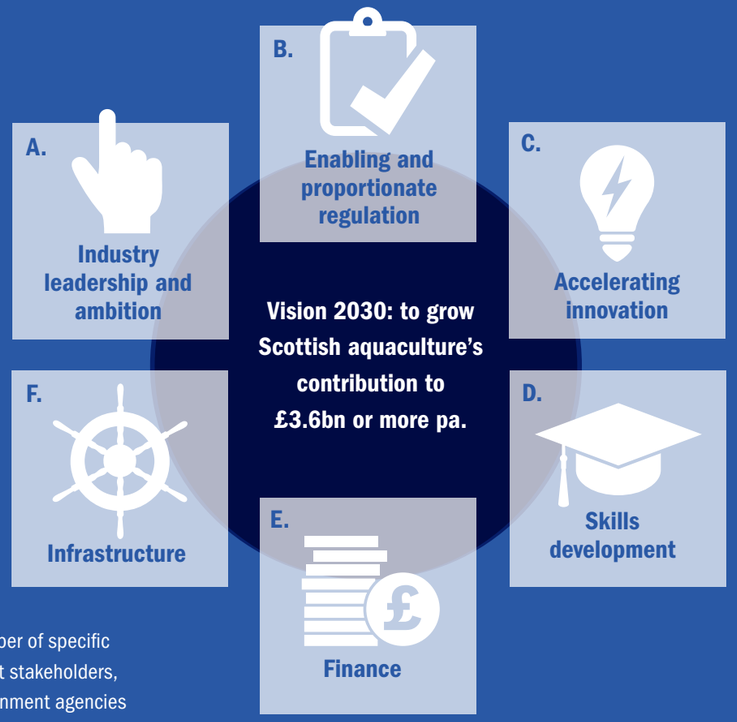
Yet, biological challenges are far from the only obstacles in the way of Scotland's aquaculture sector achieving its huge potential.

Other blockers to sustainable growth include: the lack of an industry-led, all-stakeholder growth strategy; issues around consenting for aquaculture sites and the application of planning policy; workforce issues; access to finance; and the limitations of Scotland's rural infrastructure.

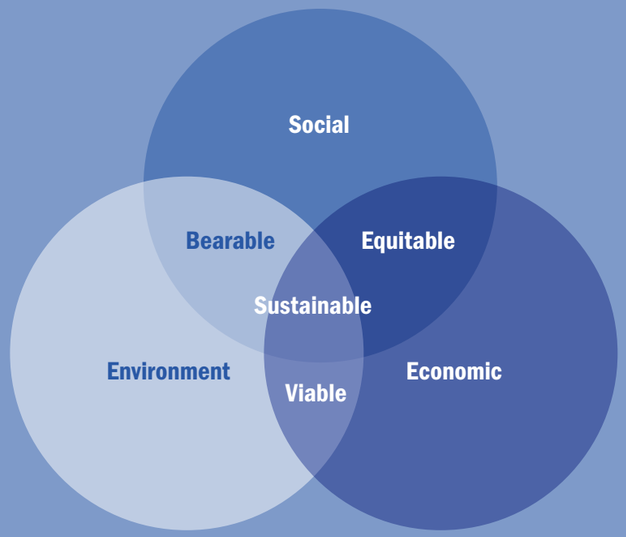
STRATEGIC PRIORITIES

To tackle these blockers, the sector must focus on six inter-related strategic priorities, spread over the short, medium and longer term. These priorities are:

A. Industry leadership and ambition
B. Enabling and proportionate regulation
C. Accelerating innovation
D. Skills development
E. Finance
F. Infrastructure



Within each area of strategic focus are a number of specific actions requiring to be undertaken by different stakeholders, including industry, regulators, ministers, government agencies and Scotland's research base. These are set out in this Strategic Plan.



BALANCING THE THREE PILLARS OF SUSTAINABILITY

Government agencies and regulators in Scotland tend to use subtly different interpretations of sustainability and this can blur clarity when policy and regulation are implemented.

The 2005 World Summit on Social Development identified that sustainability is a combination of three pillars: economic development, social development and environmental protection.[3]

We support this definition and recommend that all three pillars be given equal weight in the development and implementation of aquaculture policy and regulation in Scotland. This may require a re-balancing of existing approaches.

Sustainable development and growth sits at the confluence of three constituent parts: social development, economic development and environmental protection (source: Scott Cato)[4].

4 Snapshot: a world-leading sector in 2030

The characteristics of a thriving aquaculture sector range from globally-leading regulation to world-class research and skills.

With key challenges addressed, the Scottish aquaculture sector can flourish, offering long-term prospects to young people all over Scotland and keeping communities sustainable. It can compete globally in the blue economy and farm the seas profitably and sustainably.

In planning a growth strategy for the industry to 2030, we wish to see an industry with the following characteristics.

A globally-leading regulatory/policy landscape, allowing Scottish businesses to compete on cost as well as quality. When aquaculture policy is developed and regulation is applied, all three pillars of sustainability – social development, economic development and environmental stewardship – should be balanced.

A diverse industry. While Atlantic salmon will continue to dominate the Scottish production for the foreseeable future, there is an opportunity to increase the value of non-salmonid farmed fish including halibut and trout, and shellfish and seaweed.

There are also opportunities to support diversity of ownership. Evidence from other sectors suggests that resilience is strengthened if business ownership across the value chain extends from global groups to micro-enterprises. This requires a regulatory and financial landscape that supports the growth of innovative SMEs across the value chain and allows for new entrants and new business models.

Growth in scale. Production growth in the salmon industry will be facilitated by new and expanded farms, including the development of exposed sites and new site architecture. Crucial for this will be a planning framework that enables innovation and a faster decision-making process.

Within the shellfish sector, production will be more balanced across the regions, with current low-volume production areas gaining critical mass to support new infrastructure in these locations. The current permitted capacity in Scotland will be almost fully utilised. At least one commercial hatchery will be in operation providing mussel and oyster seed along with spat for new farmed species. Highly efficient farming practices will be the norm and costs of farming will be well understood and competitive.

An internationally-competitive equipment manufacturing and supply sector. Increased scale will also encompass the aquaculture supply chain. This will have at least doubled in size, having grown its market share of goods and services for Scottish suppliers to Scottish aquaculture by 2030; it will have developed export markets for these goods and services of similar scale to its Scottish market and there will be a substantial number of new, well-paid technology-based jobs in the sector.

World-class aquaculture research, development and education. World-class science is the foundation for a successful industry. The higher education courses relevant to aquaculture and provided by Scotland's universities (on-site or remotely) will be regarded as the gold standard at home and abroad.

Scottish research establishments will operate at the highest international research levels, collaborating closely with the industry on commercially-relevant applied research.

A skilled and diverse workforce. Aquaculture recruits will have a range of relevant qualifications or experience, including in fish health and husbandry, engineering, environmental science, software development and business management. Aquaculture in Scotland will be seen as an attractive and responsible industry, offering compelling career prospects and development opportunities.

The workforce will be diverse – in terms of gender, nationality, experience and age – and will have access to a wide and ongoing range of opportunities for training and skills development.

5 Strategic priorities and recommendations

Lead Recommendations !!

Recommendation	Strategic Priority	Responsibility	Timeframe	No. and Page
Formation of an Industry Leadership Group (ILG)	Industry leadership and ambition	Lead responsibility: Vision 2030 Working Group Co-responsibility: SG, SFD, HIE, SSPO, ASSG, SAIC	By July 2017	Rec 1 (p 08)
The role of Marine Scotland	Enabling and proportionate regulation	SG	By July 2017	Rec 5 (p 09)
Development of Innovation Sites in Scotland	Accelerating innovation	Lead responsibility: ILG when formed Co-responsibility: SAIC, Marine Scotland Science, SEPA, Industry	Ongoing	Rec 11 (p 11)
Mapping of future skills requirements	Skills development	ILG when formed, SDS, HIE, SAIC	Commencing immediately and ongoing	Rec 16 (p 13)
Finance for Scottish aquaculture	Finance	SE, SIB, HIE	By end 2017	Rec 17 (p 14)
Essential investment in infrastructure	Infrastructure	HITRANS, with input from ILG when formed	By November 2017 and then ongoing	Rec 19 (p 15)

High Priority Recommendations !

Recommendation	Strategic Priority	Responsibility	Timeframe	No. and Page
Aquaculture to become a core growth sector	Industry leadership and ambition	Lead responsibility: HIE Co-responsibility: SE	By July 2017	Rec 2 (p 08)
Short-term improvements to consenting processes	Enabling and proportionate regulation	Marine Scotland and as outlined in Independent Review of Scottish Aquaculture Consenting and overseen by ILG when formed	By May 2017	Rec 6 (p 10)
Clarity in the Scottish Planning Policy and National Planning Framework	Enabling and proportionate regulation	Chief Planner	By end 2018	Rec 7 (p 10)
Medium and longer-term improvements to planning	Enabling and proportionate regulation	Marine Scotland, overseen by ILG when formed	By 2020	Rec 8 (p 10)
SEPA modelling and collaboration: **Implementation of DEPOMOD and DZR** **Development of new models**	Enabling and proportionate regulation	SEPA Industry, led by SSPO, supported by SAIC	By May 2017 Ongoing	Rec 10 (p 11)
Alignment and delivery of RD&I in Scotland to support growth	Accelerating innovation	Lead responsibility: SAIC in conjunction with ILG when formed Co-responsibility: Marine Scotland Science, SEPA, Scottish Funding Council, UK Research Councils	Ongoing	Rec 12 (p 12)
Approaches to sea lice	Accelerating innovation	Lead responsibility: Industry Co-responsibility: SSPO, SAIC, SEPA, Marine Scotland Science	Ongoing	Rec 13 (p 12)
Support for the indigenous supply chain, including processing	Accelerating innovation	Lead responsibility: HIE Co-responsibility: SAIC	By end 2017	Rec 14 (p 13)

Lower Priority Recommendations

Recommendation	Strategic Priority	Responsibility	Timeframe	No. and Page
Marketing of Scottish farmed seafood	Industry leadership and ambition	SG, Seafood Scotland, SSPO, SFD	By November 2017	Rec 3 (p 08)
Crown Estate fees and benefits to local communities	Industry leadership and ambition	Crown Estate	By November 2017	Rec 4 (p 09)
Development of a Social and Economic Benefits Report	Enabling and proportionate regulation	Scottish Aquaculture Industry	With immediate effect for new applications	Rec 9 (p 10)
Manufacturing excellence and continuous improvement	Accelerating innovation	ILG when formed	Ongoing	Rec 15 (p 13)
Export finance	Finance	SG	By November 2017	Rec 18 (p 14)
Digital connectivity	Infrastructure	SG	By 2021	Rec 20 (p 15)

Abbreviations

ASSG Association of Scottish Shellfish Growers
HIE Highlands and Islands Enterprise
ILG Industry Leadership Group
SAIC Scottish Aquaculture Innovation Centre
SDS Skills Development Scotland
SE Scottish Enterprise
SEPA Scottish Environment Protection Agency
SFD Scotland Food & Drink
SG Scottish Government
SIB Scottish Investment Bank
SSPO Scottish Salmon Producers Organisation

A: INDUSTRY LEADERSHIP AND AMBITION

In the global aquaculture sector, Scotland competes against nations with huge ambitions, more competitive regulatory frameworks and clear roadmaps for growth. To increase market share and exports, the Scottish aquaculture sector requires its own industry-wide strategic vision and for government and industry to join together in driving sustainable growth. Sector-wide leadership, alignment, ambitions and roadmaps are required for individual companies to thrive in a competitive global marketplace.

Recommendation 1: Formation of an Industry Leadership Group

!!

A number of successful sectors in Scotland, from technology to tourism, have Industry Leadership Groups (ILGs). These are pivotal to developing and delivering industry-led sector strategies and to creating productive collaboration between government and industry.

We strongly recommend the formation of an ILG for aquaculture, representing the wider stakeholder group, bringing together key figures from the private and public sectors to drive sector growth and ensure alignment between industry and government.

The aquaculture ILG should have clear objectives for growth and monitor progress through quantifiable outcomes and impacts. These will include the measures set out in this Strategic Plan and its successors and be updated from time to time. The implementation of these recommendations, through the formation of the ILG, will ensure effective implementation of this Strategic Plan. We expect an aquaculture ILG will work closely and collaboratively with, and form part of, the food and drink sector wide ILG, Scotland Food & Drink

Lead responsibility: Vision 2030 Working Group
Co-responsibility: Scottish Government, Scotland Food & Drink, Highlands and Islands Enterprise, Scottish Salmon Producers Organisation, Association of Scottish Shellfish Growers, Scottish Aquaculture Innovation Centre
Timeframe: By July 2017

Recommendation 2: Aquaculture to become a core-growth sector for Highlands and Islands Enterprise

!

The aquaculture sector supports some 5,000 jobs across the Highlands and Islands economy[5] and Highlands and Islands Enterprise (HIE) is supportive of the industry's growth. However, at present, aquaculture straddles two different Scottish Enterprise and HIE growth sectors: Life Sciences and Food and Drink. This perhaps diminishes awareness of the sector's economic and social importance and growth potential.

In order to optimise support for the sector, we recommend that aquaculture be elevated to a core growth sector within HIE, with an increased funding allocation. This would focus support more productively and enable a more joined-up approach to growing the sector.

Lead responsibility: Highlands and Islands Enterprise
Co-responsibility: Scottish Enterprise
Timeframe: By July 2017

Recommendation 3: Marketing of Scottish farmed seafood

There is a strong and growing market domestically and internationally for farmed seafood, which presents huge opportunities for Scotland. A strengthening reputation for premium quality and provenance are key to our marketing success, as demonstrated by Scottish farmed salmon which is the nation's top food export and is exported to over 60 countries.

Yet, despite a strong market position developed in recent years, there are still significant opportunities for market development at both home and overseas for all our farmed seafood species. Indeed, this will be critical in the context of growing production that this report sets the framework for. There is scope in particular to capitalise further on provenance through innovation in, for example, product development, packaging and marketing.

The bulk of salmon marketing overseas is done in-house by individual companies, complemented by generic reputation work led by the Scottish Salmon Producers Organisation (SSPO) and supported by Seafood Scotland, Scotland Food & Drink and Scottish Development International. Alongside that, shellfish and smaller finfish producers consider that Seafood Scotland is doing a good job of helping to promote Scottish aquaculture produce in key markets and providing them with an affordable platform to develop their own export business.

The development of the Scotland, a Land of Food & Drink brand in international markets is still in its relative infancy but early success has been noted. To that end, the continued collaboration of the aquaculture sector with other sectors of food and drink to raise awareness of Scotland as the source of world-class products will be critical. The Scotland Food & Drink Export Partnership has brought both the industry and government together behind a single export strategy and operating plan. Continued support for that approach by both industry and government is central to the sector's market development ambitions.

It is recognised, however, that the current funding of Seafood Scotland is tenuous and we recommend that further discussion about its future role and sustainable funding are prioritised in order to provide the platform for increased market development activity.

Responsible: Scottish Government, Seafood Scotland, SSPO, Scotland Food & Drink
Timeframe: By November 2017

Recommendation 4: Crown Estate fees and benefits to local communities

The Scottish Government has committed to ensuring that coastal and island communities benefit from net revenues from Crown Estate property in Scotland from marine activities out to 12 nautical miles.

We recommend going further, with all Crown Estate lease fees channelled back to host communities. This would ensure that communities across Scotland benefit further from the nation's coastal resources and are incentivised by and share in the benefits of a growing industry.

To ensure parity of treatment for aquaculture across Scotland, we recommend that independent arbitration be in place to review rents.

Responsible: Crown Estate
Timeframe: By November 2017

B: ENABLING AND PROPORTIONATE REGULATION

For Scotland's aquaculture producers and wider supply chain to compete globally, the regulatory and policy environment in Scotland must be conducive to sustainable economic growth.

In setting policy and applying regulation, it is important that government and local government consider what aquaculture means for Scotland's economy and communities and take into account that sustainability has three pillars: economic development, social development and environmental stewardship. All three pillars should be given equal weight by public-sector stakeholders in their determination and implementation of aquaculture policy and regulation.

The delivery of sustainable growth by the industry also requires a fit-for-purpose planning framework that provides better consistency of response and speed of process. The framework should enable regulators to keep pace with innovation and change in the industry – not just in finfish and shellfish production, but in emerging areas such as seaweed growing or harvesting.

Recommendation 5: The role of Marine Scotland

!!

Marine Scotland's purpose is to 'manage Scotland's seas for prosperity and environmental sustainability'. These dual roles as regulator and policy advocate for development are unusual within government and even contradictory.

There is an opportunity here to align aquaculture with other food and drink sectors in Scotland, by moving away from the current model where the regulator is also responsible for the development of the sector.

We recommend that Marine Scotland's industry development remit would sit more logically with the Scottish Government's Food, Drink & Rural Communities Division and that Marine Scotland could focus on regulation. We recommend that, in regulating the sector, Marine Scotland use a proportionate and enabling approach, with decision-making and weighting that take account of aquaculture's potential economic contribution to the Scottish economy.

We also recommend that Marine Scotland consider the formation of a virtual Aquaculture Scotland Public Body – with relevant staff seconded and matrix managed, from organisations that interface with industry, for example Marine Scotland, the Scottish Government Food & Drink team, the Scottish Environment Protection Agency (SEPA) and Scottish Natural Heritage (SNH).

The body should be led by a senior official tasked with delivering the public-sector elements of this Strategic Plan and with enabling the industry to deliver on its responsibilities.

Responsible: Scottish Government
Timeframe: By July 2017

Recommendation 6: Short-term improvements to consenting processes

!

The processes governing the establishment of new marine aquaculture operations are often viewed by industry as slow, disjointed and unpredictable in terms of application outcomes.

Under the current system of consenting for aquaculture activity, there is perceived duplication, with overlaps between the input of Local Planning Authorities (LPAs), Marine Scotland, the Scottish Environment Protection Agency (SEPA) and other bodies. These can cause delays, expense and avoidable uncertainty of outcome.

The Independent Review of Scottish Aquaculture Consenting (IRSAC), published in 2016, made eight quick-win recommendations to reduce duplication and cut timeframes for consenting. An action plan has been prepared by the current Capacity Working Group for the implementation of these quick wins; the issue is the time taken to implement them, since many should have been implemented long before now.

We therefore recommend the implementation of all the quick-win recommendations in IRSAC within six months.

Responsible: Marine Scotland and as outlined in the Independent Review of Scottish Aquaculture Consenting (IRSAC) and overseen by ILG when formed
Timeframe: By May 2017

Recommendation 7: Clarity in the Scottish Planning Policy and National Planning Framework

!

The Scottish Planning Policy (SPP) is consistently supportive of the sustainable development of aquaculture to meet industry targets. However, its application is inconsistent across Local Planning Authorities (LPAs). Moreover, there is insufficient clarity in some parts of the SPP, in particular with regard to the consideration given to the benefits of economic and social development in aquaculture planning applications.

We recommend that in the next review of the SPP the definition of 'sustainable development' be refined to spell out more clearly the weighting to be given to economic development and social benefits in relation to environmental impact. We also recommend that the revised 2030 industry targets for aquaculture production set out in this Strategic Plan be included in the SPP. Additionally, LPAs should be provided with further guidance on meeting their obligations to work towards enabling this target.

Furthermore, for consistency, the National Planning Framework should specifically state, 'we will support the sustainable economic growth of the aquaculture sector in meeting its 2030 targets'.

Responsible: Chief Planner
Timeframe: By end 2018

Recommendation 8: Medium and longer-term improvements to planning

!

The Independent Review of Scottish Aquaculture Consenting (IRSAC) considered five options for change to the consenting approach, in addition to the quick-win recommendations referred to in Recommendation 6 above. We recommend the consideration of these five options, noting that further industry dialogue is required around actions relating to option 5.

Longer-term, we believe the sustainable growth of aquaculture is not effectively served within the Town and Country Planning system as it currently stands. The planning of most marine activities, other than aquaculture, is controlled through the marine planning framework. Given that the industry is now developing open-water aquaculture sites, it is timely to address this anomaly. Consideration should be given to a marine licensing system, similar to that for other marine activities such as marine renewables.

Within the National Marine Plan and to enable the delivery of the sustainable aquaculture growth targets in this Strategic Plan, we recommend the development of a Spatial Plan for Scotland's marine resource. This should set out: areas that are presumed to be suitable for aquaculture developments; areas that are deemed unsuitable, including areas set aside for other marine activities and areas that share the resource with other activities but could be considered for aquaculture developments.

Responsible: Marine Scotland, overseen by ILG when formed
Timeframe: By 2020

Recommendation 9: Development of a Social and Economic Benefits Report

To supplement the currently required Environmental Impact Assessments (EIA), we recommend that the industry develop a template for a Social and Economic Benefits Report to accompany all planning applications for aquaculture developments. This could spell out the economic and social benefits of the development, including investment and spend with the Scottish supply chain. It should use established Scottish Government economic multipliers and align with Scottish Planning Policy.

The use of such a template could lead to coherent and consistent consideration of planning applications across Local Planning Authorities and of each application's social and economic benefits.

Responsible: Scottish Aquaculture Industry
Timeframe: With immediate effect for new applications

Recommendation 10: SEPA modelling and collaboration

!

The Scottish Environment Protection Agency's (SEPA) new DEPOMOD model has been on the horizon for some time and time-slips on the launch of the model have delayed the introduction of the new Deposition Zone of Regulation (DZR) in aquaculture licensing.

The industry is broadly supportive of DZR; however, there is uncertainty over its implementation. We recommend that SEPA set out a clear timetable and inform industry well in advance how to use DZR and DEPOMOD.

Longer-term, there is an opportunity for SEPA and the industry to develop new and innovative ways to monitor benthic impacts and the industry may benefit greatly in investing in new models. There is also scope for SEPA and the industry to collaborate more actively to ensure that the regulatory framework and its delivery are fit for purpose and to consider 'beyond compliance' approaches.

We invite the industry – supported by SEPA, academics and the Scottish Aquaculture Innovation Centre (SAIC) – to consider investing in real-time, responsive modelling and monitoring systems, which will balance sustainable growth with environmental protection. We also invite the industry and SEPA to continue to collaborate actively, at senior level, to enable this Strategic Plan for growth.

Implementation of DEPOMOD and DZR
Responsible: SEPA
Timeframe: By May 2017

Development of new models
Responsible: Industry, led by SSPO, supported by SAIC
Timeframe: Ongoing

C: ACCELERATING INNOVATION

Research, development and innovation (RD&I) in Scotland must address the challenges faced by the aquaculture industry, including climate change. Investment in RD&I in Scotland must support the sustainable growth and global competitiveness of the sector (including the supply chain) and reflect the industry's priorities.

Currently, these priorities include reducing the risk and impact of biological threats; a shift to new production models, including exposed sites and on-shore 'super-smolt' facilities;the availability of shellfish spat and the development of a commercial hatchery for the Scottish shellfish industry and greater knowledge of shellfish biology.

In addition, there is an opportunity to provide economic and social benefit from the commercialisation of Scottish innovation. The innovation landscape in Scotland must support this, facilitating the export of Scottish know-how and fostering growth in the Scottish supply chain.

A new Industry Leadership Group (proposed in Recommendation 1) could play an important role in determining and monitoring Scotland's RD&I priorities and ensuring they meet the needs of industry.

Recommendation 11: Development of Innovation Sites in Scotland

!!

Successful RD&I requires an ability to trial new techniques. Yet with the outcomes and impacts of these not fully known, this can carry some risk. Since positive outcomes could yield significant economic and environmental benefits, tolerance for risk-inherent innovation needs to be embraced by regulatory bodies.

We therefore recommend that regulators consider how to enable the growth of the Scottish industry through the selective use of Innovation Site status for controlled trials and development of equipment, technologies or disease control measures and regulation.

Proposals could be invited from the market for Innovation Sites with applicants stating the potential social and economic benefits to Scotland along with the Environmental Impact Assessment (see Recommendation 9). Applicants should also state what aspects of current equipment and practice are to

be trialled, how they propose to share the learning and how that would benefit the Scottish Aquaculture Industry and its supply chain as a whole. Collaborative developments would be encouraged.

We recommend that an Industry Leadership Group, when formed, collaborate with Marine Scotland, the Scottish Aquaculture Innovation Centre (SAIC), Scottish Environment Protection Agency (SEPA) and the industry to develop a workable scheme, including developing the arrangements for how long Innovation Site status is granted; options for reverting to normal operations after that period; the number of Innovation Sites permitted, both overall and per operator and the eligibility of new operators to apply.

Lead responsibility: ILG when formed
Co-responsibility: Marine Scotland, SAIC, SEPA, industry
Timeframe: Ongoing

Recommendation 12: Alignment and delivery of RD&I in Scotland to support growth

RD&I priorities for the Scottish Aquaculture Innovation Centre (SAIC), Highlands and Islands Enterprise (HIE), Marine Scotland Science, Scottish Environment Protection Agency (SEPA), Scottish Funding Council, UK Research Councils and other publicly-funded organisations must mesh fully with the needs and ambitions of the industry, across the full supply chain in Scotland. The major issues prioritised by industry must be funded and applied research on them accelerated along with improved direct funding and support for supply chain innovation.

To this end, in 2016 SAIC commissioned an innovation roadmap and sector needs study, carried out by Imani, entitled 'Scottish Aquaculture: A View towards 2030'. We recommend that an Industry Leadership Group adopt Imani's detailed innovation roadmap to 2030 in order to drive innovation across the supply chain and in public-sector regulatory bodies.

We also recommend further pre-competitive cross-industry collaboration on a variety of applied research and innovation projects, in line with SAIC's current and future priority innovation areas.

Finally, we support the growth and development of SAIC beyond 2019 through to 2030, through continued public and private sector collaboration.

Lead responsibility: SAIC in conjunction with ILG when formed
Co-responsibility: Marine Scotland Science, SEPA, Scottish Funding Council, UK Research Councils
Timeframe: Ongoing

Recommendation 13: Approaches to sea lice

Sea lice are currently one of the factors limiting growth in salmon production in Scotland – not just through lost production, but by impacting regulatory confidence and therefore, investment in the sector. The aquaculture industry recognises the imperative to address the sea lice challenge and has been investing almost £30 million annually over the past five years to enhance and add new techniques to its longstanding approach to integrated pest management strategies.

We support the industry's continuing commitment to investing in innovative methods to control sea lice, including biological and engineering-based solutions. The industry should consider sea lice as a pre-competitive issue.

Regulators must also work in collaboration with industry to fully understand sea lice and other fish health challenges and to support industry in its work on dealing with these.

Producers should continue to provide the comprehensive information published by the Scottish Salmon Producers Organisation (SSPO) on a quarterly basis and Marine Scotland should work with SSPO to ensure that a supportive narrative comes from government.

Lastly, regulators, industry and researchers in Scotland should continue to share information on sea lice control with other jurisdictions and continue to draw on the best international knowledge and expertise.

Lead responsibility: Industry
Co-responsibility: SSPO, SAIC, SEPA, Marine Scotland Science
Timeframe: Ongoing

Recommendation 14: Support for the indigenous supply chain, including processing

Supporting innovation in Scottish equipment manufacturing and technology, including processing technology, could create substantial economic gain through import substitution and create global export opportunities. Other aquaculture nations such as Norway and Iceland offer valuable models in terms of developing indigenous manufactured equipment and technology for aquaculture and processing and recognising its strategic importance.

To support the development of the indigenous Scottish equipment supply chain, we recommend the allocation of additional funding – in the region of £5 million pa – to supplement current Highlands and Islands Enterprise (HIE) and Scottish Aquaculture Innovation Centre (SAIC) support for innovation. This could be administered through an 'Accelerating Aquaculture Innovation' scheme which would extend HIE's potential to increase current intervention rates and directly support SME-generated innovation in equipment and technology. The delivery of such a scheme could draw on SAIC's networks and expertise.

Lead responsibility: HIE
Co-responsibility: SAIC
Timeframe: Launch of 'Accelerating Aquaculture Innovation' scheme by end 2017

Recommendation 15: Manufacturing excellence and continuous improvement

In recent decades, industries from car-making to media have been transformed by the introduction of new technologies and business models. Like all sectors, aquaculture can learn from this.

In particular, in subsectors such as processing, where many operations are repetitive in nature, there is potential for fresh thinking about the technology and processes involved. Given the global nature of aquaculture and the potential transferability of processing technology to other food sectors, the market opportunity is vast.

We therefore recommend that the equipment supply and processing sector in Scotland and the Scottish research base, give focused and ongoing consideration to supporting innovation and improvement in this sphere.

Responsible: ILG when formed
Timeframe: Ongoing

D: SKILLS DEVELOPMENT

To thrive globally, the aquaculture sector in Scotland needs a diverse workforce with the right skills – for 5 years' time, 15 years' time and beyond.

As technologies and competition change, these skills must evolve. Collaboration between the private and public sectors is essential to ensure the current and future workforce is equipped to make Scottish aquaculture a world leader.

In addition, there is an opportunity for Scotland to develop globally-respected executive education provision in the food and drink sector, including aquaculture – not only developing its own cohort of skilled industry leaders but attracting people from all over the world to study for Scottish qualifications.

Recommendation 16: Mapping of future skills requirements

To plan for a thriving industry in the future requires mapping of the current workforce composition and future workforce requirements.

We recommend that Skills Development Scotland (SDS) and Highlands and Islands Enterprise (HIE), in collaboration with the industry and the Scottish Aquaculture Innovation Centre (SAIC), map the existing workforce skills composition of the aquaculture sector, including the supply chain. Based on planned increased tonnages in 2030 and beyond, a gap analysis should be undertaken and skills development delivery planned.

Such mapping would allow HIE and SDS to provide the right skills for growth in the industry – from apprenticeships to leadership development and executive education. It will also facilitate the promotion of aquaculture careers to young people throughout Scotland.

We also recommend the formation of an industry skills group within a newly-formed Industry Leadership Group to liaise with SDS and HIE on an ongoing basis. This will ensure that skills development planning is fit for purpose and takes account of new skills required.

Responsible: ILG when formed, SDS, HIE, SAIC
Timeframe: Commencing immediately and ongoing to 2030

E: FINANCE

Access to finance is an ongoing challenge for many SMEs in the sector. This can stifle their ability to invest in innovation and growth or compete with larger or overseas competitors. Scottish equipment manufacturers' ability to compete with overseas competitors is hampered by overseas competitors' ability to offer finance and by restrictions on the export finance available to Scottish manufacturers. A further limit on growth is lack of awareness among investors of the growth potential in Scottish aquaculture. There are good opportunities to address all of these issues.

Recommendation 17: Finance for Scottish aquaculture

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We recommend the launch of a dedicated investment fund for aquaculture, through Scottish Enterprise, Highlands and Islands Enterprise (HIE) and the Scottish Investment Bank.

This could improve SMEs' access to funding, including co-investment and gap funding and improve investor awareness of the sector.

Responsible: Scottish Enterprise, Scottish Investment Bank, HIE
Timeframe: By November 2017

Recommendation 18: Export finance

In order to grow Scottish aquaculture technology and equipment, manufacturers must be able to compete internationally in terms of trade finance. We recommend that consideration be given to the creation of an export finance scheme comparable to that available in Norway which would allow Scottish manufacturing companies in target sectors to extend credit finance to customers in target markets with shared risk. Such a scheme need not be limited to aquaculture equipment and technology and the wider benefit to the whole Scottish economy could be considerable.

Responsible: Scottish Government
Timeframe: By November 2017

F: INFRASTRUCTURE

Growth in aquaculture in Scotland will require – but also facilitate – investment in infrastructure such as ports and piers and innovation in the design of vessels and vehicles.

Scottish producers and supply chain have the capacity and expertise to develop the logistics, vessels and infrastructure required to support a flourish industry in 2030. However, a number of developments are critical to the industry's sustainable growth.

Recommendation 19: Essential investment in infrastructure

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We recommend a sectoral mapping exercise to determine aquaculture's current transport and logistical constraints and future requirements to 2030, in terms of roads, ports, harbours and ferry services, along similar lines to HITRANS's Whisky Logistics Study (2011). This should be used to inform future investment plans in infrastructure improvement in Scotland.

We also recommend the industry feed into Transport Scotland's Strategic Transport Projects Review over the next 12–24 months.

Responsible: HITRANS, with input from ILG when formed
Timeframe: By November 2017 and then ongoing

Recommendation 20: Digital connectivity

To compete effectively, aquaculture companies all over Scotland need access to fit-for-purpose IT and phone connectivity.

As aquaculture will require to be carried out in more remote and exposed areas and equipment will require to be remotely operated and more technology dependent, the digitally connected infrastructure will become a critical barrier to growth in remote areas if not addressed.

We therefore recommend that the Scottish Government's plan for digital connectivity in terms of area coverage and broadband speeds take account of the planned industry footprint to 2030. Specifically, a Spatial Plan produced by Marine Scotland (see Recommendation 8) should be considered when digital coverage is being planned and in line with Scottish Government commitments, all aquaculture shore-based properties should have superfast broadband by 2021.

Responsible: Scottish Government
Timeframe: By 2021

6 REFERENCES

[1] Marine Scotland (2013), An Assessment of the Benefits to Scotland of Aquaculture.

[2] EATIP (2012), The Future of European Aquaculture.

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Gilpin Bradley, Wester Ross Salmon – from the independent finfish production sector

Heather Jones, Scottish Aquaculture Innovation Centre – representing innovation and research

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