

FINFISH AQUACULTURE SECTOR PLAN

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Preface



SEPA has a strong track record of regulating to improve the Scottish environment. We are proud of what we have achieved since we were set up just over two decades ago in 1996. We know we need to do more over the next two decades to build on this success. Much more.

The mounting scientific evidence about climate change, plastics in our oceans, the pressure on our freshwater and more shows us that humanity must rise to tackle major environmental challenges. This scientific knowledge underpins SEPA's strategy for how we will regulate - One Planet Prosperity. If everyone in the world lived as we do in Scotland, we would need three planets. There is only one.

So, we will regulate to help Scotland prosper within the means of our one planet. Successful businesses in future will be those that use low amounts of water, materials and carbon-based energy and create little waste. Prosperous societies will be comprised of these businesses. This can be Scotland.

In every sector we regulate, this means we will have two simple aims:

1. ensure that all businesses fully meet their environmental compliance obligations;
2. help as many regulated businesses as possible move beyond their environmental compliance obligations.

This sector plan outlines how we propose to do this in regulating the finfish aquaculture sector.

Compared to many industries that SEPA regulates, finfish aquaculture is still a relatively new sector which operates at scale in only a handful of nations.

Much of the science about the environmental impact of the sector is complicated and, unlike industrial facilities, there are no stacks and pipes that make measurement of discharges easy. It is a sector that attracts diverse views ranging from strong support to strident opposition.

In preparing this sector plan, SEPA has undertaken more scientific analysis, done more thorough thinking and held more discussions with stakeholders than ever before. I'd like to thank everyone who attended our sessions and made submissions for your efforts to help us develop our thinking. We are now determined to set the best and most up-to-date framework for regulating this sector. The plan outlines enhanced standards for organic waste, encouraging a new approach to siting and design of fish farms, improved methods for licensing medicines, strengthened monitoring and assessment processes and a more comprehensive approach to ensuring fish farm operators comply with all these requirements.

This plan is ambitious. It spells out how we will use traditional environmental protection agency (EPA) regulatory tools, such as permits and enforcement, in clearer and more powerful ways. It sets out some completely new ways, such as novel partnerships, that we will develop and use to support innovation in this sector.

Terry A'Hearn
SEPA Chief Executive Officer

1. Introduction

SEPA’s statutory purpose is to protect and improve the environment in ways that, as far as possible, create health and wellbeing benefits and sustainable economic growth. To help create a prosperous Scotland that lives within the means of our one planet, we need to radically change the way we work. In the past our approach to regulation has been grounded in different sets of rules to protect the environment. This has helped us to deliver, for example, improvements in water quality. However, it will not enable us to make the transformational changes needed to tackle today’s problems.

We are moving instead to ground our regulation in working across whole sectors. In this way we can systematically identify the compliance issues that need to be tackled by the sector. We can also identify where the biggest opportunities are for us to help the sector to go **beyond compliance**. In both ways this will help regulated businesses operate successfully within the means of one planet.

Many businesses in the finfish aquaculture sector are already moving beyond compliance, for example by implementing best practices such as recovering energy through processing organic wastes, increase use of renewable energy sources and moving away from single use plastics in processing. We can also identify where the biggest opportunities are for us to help the sector to go beyond compliance. In both ways this will help regulated businesses operate successfully within the means of one planet.

All businesses that we regulate in a sector use water, energy and raw materials to produce the products and services they sell. In doing so, they also create waste and emissions. We can think of these as environmental flows that need to be managed by the business (Figure 1).

We want to help as many businesses as possible to manage these flows effectively and reduce their use of natural resources and creation of waste in ways that enable them to meet their legal obligations, drive further improvements and operate their business successfully. To do this, we are preparing sector plans for every sector that we regulate.

Sector plans are at the heart of everything we do, shaping the interactions with every sector and the businesses in them. Through them, operators will get the relationship that their attitude and performance earns. Those that demonstrate a commitment to good environmental performance and deliver solid outcomes will receive powerful support through guidance and advice. Those that demonstrate behaviour which leads to significant or chronic non-compliance can expect SEPA to use the most appropriate enforcement tools to bring them into compliance.

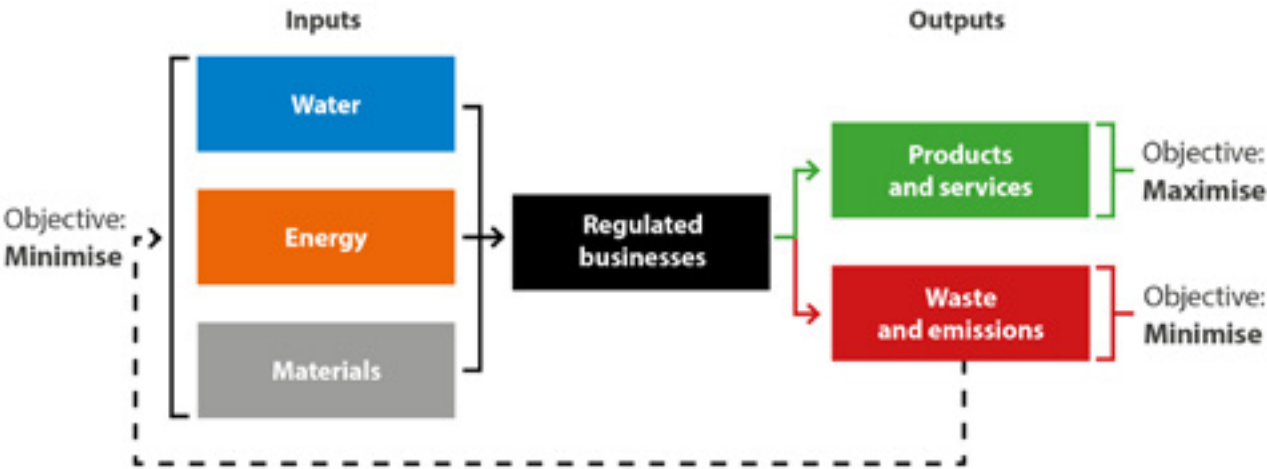
Sector plans are strategic documents, their aims and aspirations will evolve over time. Implementation of the plans will take account of opportunities for example to work across different sectors, improve communications and develop partnerships. SEPA will also consider the relative corporate priority of different work areas.

Scope of the Finfish Aquaculture Sector Plan

This plan is our strategic plan for the finfish aquaculture sector. It covers all aspects of fish farming in Scotland, including: supply chain; feed; hatcheries; freshwater fish pens; marine pen fish farms; and processing facilities.

The sector plan and the accompanying regulatory framework (which is now implemented and available on our website¹) outline how SEPA will regulate the sector. It will also set out how we will work with the sector and other stakeholders to protect and improve Scotland’s environment.

Environmental flows (Figure 1)



¹ www.sepa.org.uk/regulations/water/aquaculture/regulatory-framework/



2. Our vision for the finfish aquaculture sector

- The Scottish finfish aquaculture sector recognises that protecting the environment is fundamental to its success and is foremost in all its plans and operations.
- The sector is a world-leading innovator of ways to minimise the environmental footprint of food production and supply.
- The sector has a strong and positive relationship with neighbouring users of the environment and the communities in which it operates. It is valued nationally for its contribution to achieving global food supply.

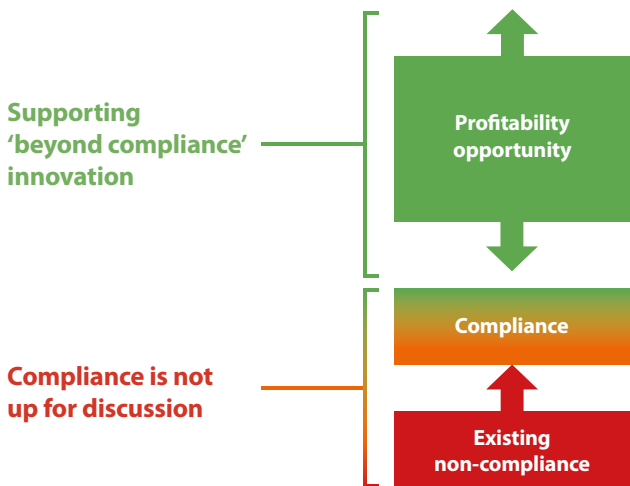
Our objectives

The objectives of the finfish aquaculture sector plan are to:

- ensure all businesses in the sector reach and maintain full compliance with Scotland’s environment protection laws; and
- help as many businesses as possible in the sector to move beyond compliance.

This is illustrated by the sustainable economy diagram (Figure 2):

A sustainable economy (Figure 2)



This sector plan sets out how SEPA will work with the finfish aquaculture sector. To achieve our objectives, SEPA staff will work with partners and facilitate liaison between them and the finfish aquaculture sector to create opportunities that link business success with environmental success.

As well as helping businesses to reduce their impacts on the environment, this sector plan will deliver the ambitions set out in many SEPA and Scottish Government policy frameworks and strategies including for example, the River Basin Management Plans, the Waste to Resources Framework, the Energy Framework, the Climate Change Commitment Statement and the Flood Risk Management Strategies. We want to bring together skilled, experienced and innovative people from across the sector to understand key challenges and opportunities to create innovative solutions. If we get this right, it will mean that the environment is not seen as a constraint, but a platform on which economic and social success can be built, putting the finfish aquaculture sector on a pathway to becoming a “one planet” sector.

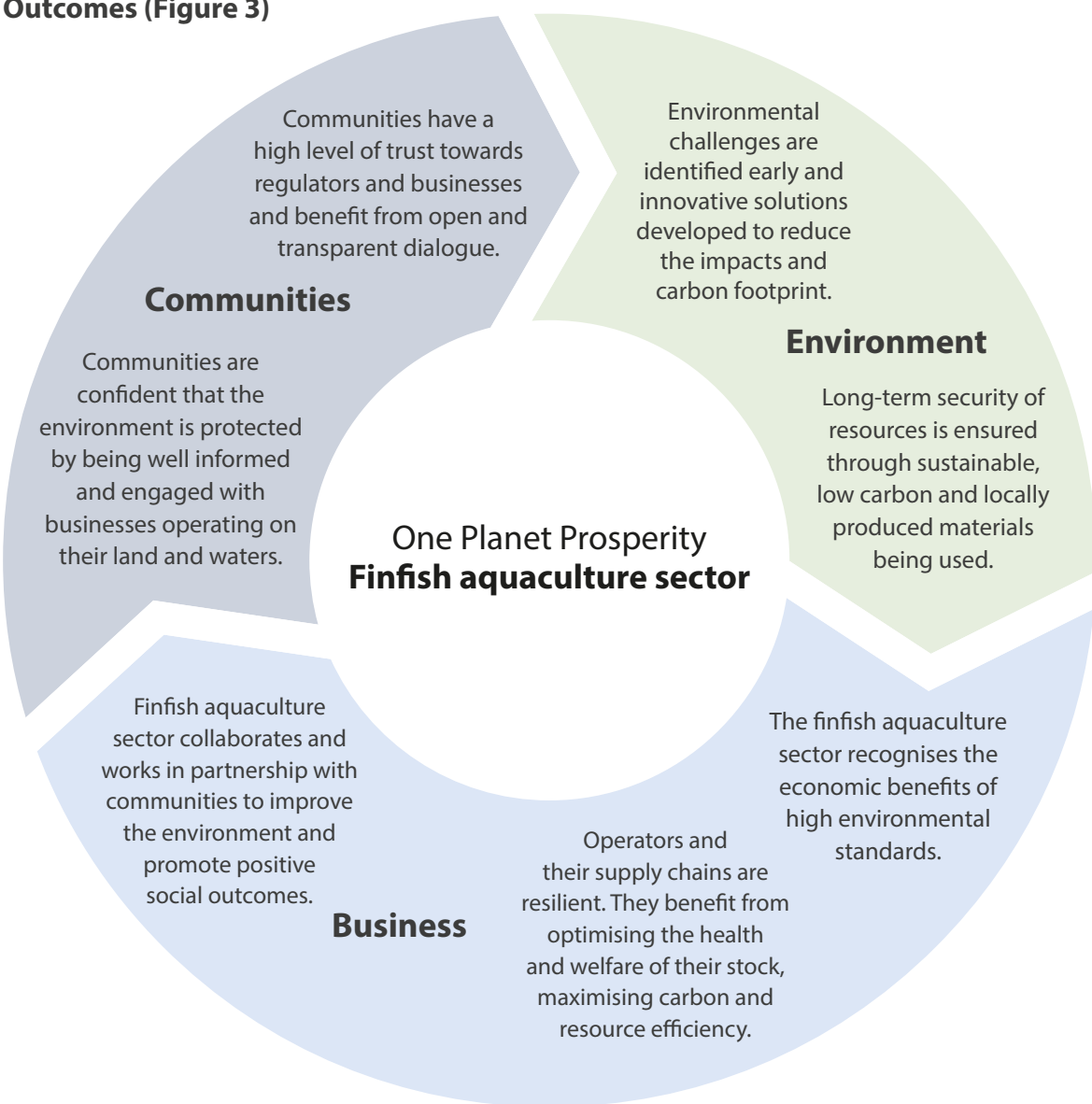
3. Outcomes

If we achieve the vision we have set out in this plan, we expect that we will help to:

- protect and improve the environment;
- protect communities;
- further enable businesses to operate effectively and successfully in their markets.

The figure below shows the outcomes we would like to help the finfish aquaculture sector achieve. These are linked to actions that we will take as outlined in Section 6 of the plan, and all contribute towards achieving United Nations (UN) Sustainable Development Goals and targets set in the Scottish National Performance Framework.

Outcomes (Figure 3)



4. The finfish aquaculture sector

In recent years finfish aquaculture has become an important source of animal protein as wild fish stocks have declined and yield from capture fisheries (fish caught in the wild for consumption) remained static. Globally, aquaculture (fish and shellfish grown in farm conditions) now provides more food for human consumption than capture fisheries, and under certain circumstances could reduce the pressure on capture fisheries to provide fish for human consumption.

Finfish aquaculture is an important socio-economic sector for Scotland (Figure 4). Scotland is the largest Atlantic salmon aquaculture producer in the European Union and third in the world after Norway and Chile. A contributing factor to this is Scotland's combination of unindustrialised, sheltered sea lochs and abundant freshwater resources.

The wide variety of activities and location of feed mills, farms, processing plants and support services means that the sector supports employment in rural areas where farms are located and also in urban areas where the majority of the processing is located.

Scotland's reputation for a high quality environment, our regulatory framework and the sector wide adoption of a code of good practice for finfish aquaculture has also led to Scottish produce attracting a price premium compared with other nation's finfish products. The majority of finfish products produced in Scotland are exported from the UK, primarily to USA (34%), France (23%) and China (12%).

With changes in technology and farm sizes, the sector has undergone a period of consolidation from 69 salmon producing companies in 1995

to 16 companies operating in 2016. The Scottish finfish aquaculture industry has clearly articulated highly ambitious future growth targets for the development of the industry over the short to medium term, with the industry projecting that annual production of 300-400kt of fish may be possible by 2030.

The sector has attracted criticism over farming practices which has been reported in mainstream media, and there are several organisations who oppose the industry or challenge its ability to grow without detriment to the environment, communities and fish welfare.

In the immediate future the development of the sector will be heavily influenced by stakeholder acceptability, regulation and environmental protection. Climate change and in particular increasing sea surface temperatures, ocean acidification and extreme weather are likely to become more significant to the development of aquaculture.

Fish production in the sector is currently dominated by Atlantic salmon and rainbow trout, as illustrated in the table below. Other species of trout are farmed to a lesser extent.

Finfish aquaculture sector production

Annual Atlantic salmon production (tonnes)			
2014	2015	2016	2017
179,002	171,722	162,817	177,202
Annual rainbow trout production (tonnes)			
2014	2015	2016	2017
5,882	8,588	8,096	7,208

Facts and figures (Figure 4)



10,000

Scottish jobs supported by the sector



£620 million

Sector contribution to Scotland's economy



£500 million

Export sales

Supply chain and stages of finfish aquaculture are quite extensive as illustrated in Figure 5 below.

Supply chain of the finfish aquaculture sector (Figure 5)

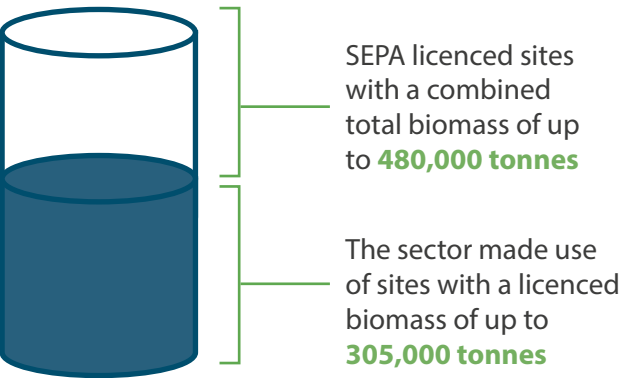
Ingredients, feed and raw materials	<p>Feed production: This has traditionally been sourced from other, less valuable fish that may have been caught from the wild. This provides protein for the farmed fish to eat but has the potential to damage wild fish stocks. Increasingly this is being substituted by vegetable proteins. Feed factories are based both in Scotland and abroad. For those based in Scotland, much of the ingredients and materials are imported from abroad by boat.</p> <p>Eggs: Known as “Ova”, these are sourced both domestically and imported from abroad and supply the hatcheries and farms in Scotland.</p> <p>Medicines: Medicines are developed and produced at a number of facilities across the globe and often by large pharmaceutical companies. In some cases medicines are incorporated into feed at feed mills in Scotland and administered to salmon in their feed.</p>
Freshwater (juvenile) growth stage	<p>Hatchery: The freshwater stages of production starts in hatchery premises where operators hatch and rear young salmon or trout for growing either at sea or freshwater sites. Hatcheries can be operated by small independent producers who then supply the rest of the sector, although some larger companies operate their own.</p> <p>Marine hatcheries are also used to rear cleaner fish such as wrasse or lumpfish – these are fish introduced to the pens to eat parasites that could damage the salmon or trout.</p>
Freshwater (adult) growth stage	<p>Freshwater stage: Freshwater aquaculture is carried out in pens in lochs, on land in tank-based systems or using rearing ponds. The majority of production from freshwater finfish farms is comprised of rainbow trout or young Atlantic salmon up to the “smolt” (10 – 15 months) stage of its growth.</p> <p>Freshwater farms are often operated by small independent producers, including those supplying trout for market. Some larger marine pen farming companies also grow smolts which are then moved to the marine (adult) growth stage.</p>
Smoltification Marine (adult) growth stage	<p>Marine stage: Marine farms are situated in the north and west of Scotland and mainly focus on Atlantic salmon production in pen farms. They are normally positioned in sea lochs, voes and bays where some shelter is provided from the worst of the weather. Increasingly, more exposed locations are being utilised. The operators use specially designed “wellboats” to move the mature fish back to land for onward transport to processing.</p>
Occurs throughout production	<p>Supporting industries: There is a broad variety of companies supporting the sector in Scotland. They include infrastructure supply companies, boat builders and construction companies. Service providers include veterinary and environmental consultancies as well as remote sensing, software and modelling. Transport providers are employed at all stages e.g. feed, smolt transport, processing, fish produce and mortalities.</p> <p>Waste management facilities: Specialist contractors are used to handle wastes and by-products from the various stages of production including sludge from feed production, hatcheries, mortalities and redundant equipment. These include ensiling wastes for further processing, to the recovery of energy by digestion and energy from waste plants. Operators of these facilities tend to be independent to the producers.</p>
Market and distribution	<p>Product to market: The final products are then packaged and transported by refrigerated air, sea and land to retailers, restaurants and outlets both in the UK and globally.</p>

Biomass: used and unused

Biomass in fish farming is the amount of fish, by weight, located in a fish farm. The industry in Scotland is currently licenced to farm more fish than it currently chooses to. This means that there are locations with licences for fish farms where no activity is taking place (Figure 6). These empty, vacant sites exist for a number of reasons, such as:

- the licence was granted but the operator later found that the location was unsuitable for farming;
- legacy sites where the operator has moved on or has not transferred it to another operator to be used;
- fallow sites; and
- sites within an operator’s portfolio that are set aside for purposes of resilience.

Biomass (Figure 6)

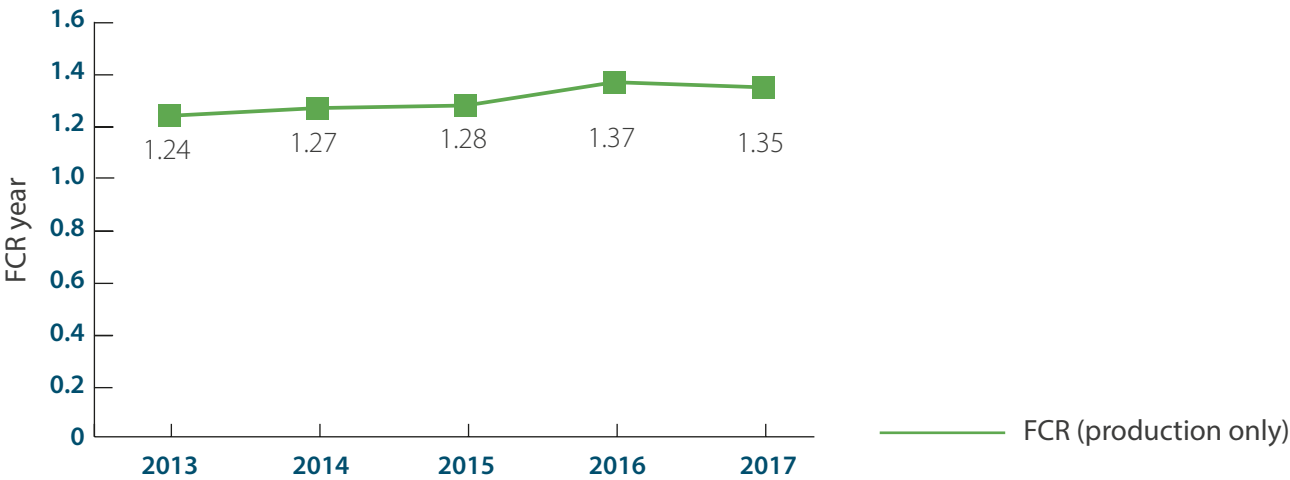


Feed to fish conversion ratio

Feed expenses typically represent 50 – 60% of the operating costs of any finfish farm and the majority of energy costs in the supply chain are linked to the capture, production and distribution of feed.

The feed conversion ratio (FCR) is the ratio between feed given and fish weight gain, and is an indicator of how effective a feed strategy can be and how much feed may be going to waste in a fish farm. The ideal FCR for fish farms in Scotland for both the sector and the environment would be 1:1. Figure 7 illustrates average feed conversion ratio in Scotland 2013 - 2017.

Feed to fish conversion ratio* (Figure 7)



* This excludes the reported weight of mortalities. 2017 data estimated based on incomplete dataset. FCR based on production figures from Scottish Government production surveys and data returns from finfish aquaculture sector, including both mortalities and feed input data. These figures show the relationship between weight of feed input and the whole, wet weight of the fish prior to processing. This should not be compared with industry figures on “fish in:fish out”.

5. Potential environmental impacts and how they are managed

The finfish aquaculture sector is complex, with multiple processes depending on what fish are being grown and where the sites are located. There are a number of environmental factors that can influence the sector and a number of interactions that the sector has with its environment. Consequently there are several activities that SEPA regulates through a variety of regulations. There are also activities regulated by other agencies. Figure 8 on the following page indicates the interactions and the principle regulators:



Interactions and regulators (Figure 8)

	Finfish aquaculture sector	Environmental factors – affecting the sectors operations:	Pressures on the environment as a result of the sectors operations	Principal regulatory authorities
Inputs and raw materials	Feed Cleaner fish Medicines Infrastructure materials, including plastics ↓	<ul style="list-style-type: none">■ Sustainability of sources of omega 3 oil and cleaner fish	Locally regulated interactions: <ul style="list-style-type: none">■ Emissions from feed, medicine and infrastructure manufacture Other interactions: <ul style="list-style-type: none">■ Fisheries for cleaner fish and fish sources of omega 3 oil■ Fossil fuel emissions from transport and manufacturing	SEPA Local authorities
Different types of fish farming activities	Juvenile growth stage (freshwater) ↓ Transfer to sea (salmon and sea trout only) ↓ Adult growth stage ↓	<ul style="list-style-type: none">■ Freshwater quality and availability■ Capacity of environment to accommodate emissions■ Disease outbreaks■ Predators accessing pens■ Escapes of stock due to storm damage■ Activities of other uses of the environment■ Development of resistance to medicines	Locally regulated interactions: <ul style="list-style-type: none">■ Emissions of organic wastes, medicines, Copper, other chemicals and nutrients**■ Abstraction and impoundment of freshwater■ Disposal of mortalities■ Disposal of solid waste■ Risk to wild salmon and sea trout from sea lice Other interactions: <ul style="list-style-type: none">■ Farmed fish escapes■ Interaction with the interests of other users of the environment■ Fossil fuel emissions■ Plastics emissions from infrastructure wear	Marine Scotland SEPA Local authorities Animal & Plant Health Authority (APHA) <i>Veterinary Medicines Directorate</i> <i>Scottish Crown Estate</i> <i>Scottish Natural Heritage</i>
Other activities connected to aquaculture	Processing and added value ↓ Marketing and distribution	<ul style="list-style-type: none">■ Capacity of environment to assimilate emissions and waste from processing operations	Locally regulated interactions: <ul style="list-style-type: none">■ Emissions to air and water from processing operations■ Disposals of solid waste from processing■ Disposal of waste packaging Other interactions: <ul style="list-style-type: none">■ Storage and management of materials■ Fossil fuel emissions from transport	SEPA Local authorities

**denote the key issues which drive non-compliance with environmental permits

Environmental regulation of the finfish aquaculture sector

SEPA’s role as regulator

There are several other bodies which regulate the finfish aquaculture sector in Scotland, such as Marine Scotland through marine licenses and aquaculture production business (APB) authorisations, the Scottish Crown Estate through seabed leasing and local authorities through planning and animal by-products regimes.

SEPA regulates the sector at different stages using our Controlled Activities Regulations (CAR), Pollution Prevention & Control (PPC) and Waste Management Licensing (WML) regimes to protect the environment. Under these regimes, SEPA is the principle regulator for abstractions from and discharges to the water environment, emissions to air from prescribed processes and waste management on land in the sector.

We believe effective partnership working across the sector, and with relevant stakeholders, is essential for success. Through these regimes SEPA aims to protect and improve the environment in the following ways:

1. Matching production to environmental capacity

The capacity of different parts of the water environment to accommodate fish farm development differs. We need to ensure that finfish aquaculture businesses look at the most environmentally suitable locations in their development planning. Our planning consultee, licensing and modelling teams work with operators, local authorities, Marine Scotland and Scottish Natural Heritage to ensure sites are suitably located.

2. Cumulative and spatial planning

We are working with our partners to develop a better understanding of the interaction of all pressures on the marine environment, and their cumulative impacts. The modelling requirements of our new regulatory framework is an important step in that direction.

3. Increasing the capture and beneficial use of waste

Reducing pressure on the environment and reusing waste materials wherever possible are key to One Planet Prosperity. Development of innovative farming systems that reduce pressure on the environment by capturing and making beneficial use of waste is essential. SEPA’s aquaculture specialists and circular economy team work with industry leaders and others to drive forward this innovation.

4. Minimisation of medicine and chemical releases into the environment

It is important that the industry finds ways of ensuring that the quantity of medicine residues discharged into the environment is minimised. SEPA’s scientific teams and aquaculture specialists have been working with the industry and other regulators, especially Marine Scotland, who lead

on fish health to find ways to reduce infection, disease and parasite risks while allowing the capture and treatment of medicine residues.

5. Strengthening the evidence base

Continually strengthening the evidence base on the environmental effects, and performance, of fish farms is important to enable the right decisions. SEPA does this in three ways:

- increase auditing of information provided by fish farm operators, including their monitoring results and processes;
- routine monitoring, model development and investigative surveys; and
- promoting and supporting innovation, including collaboration with universities, research institutes and public body partners. Examples include: supporting a project with the Scottish Crown Estate and others investigating the potential to extract value from aquaculture wastes. In another, SEPA is contributing to the development of novel, eDNA monitoring techniques to rapidly assess seabed conditions.

Wider influences on environmental performance of the finfish aquaculture sector

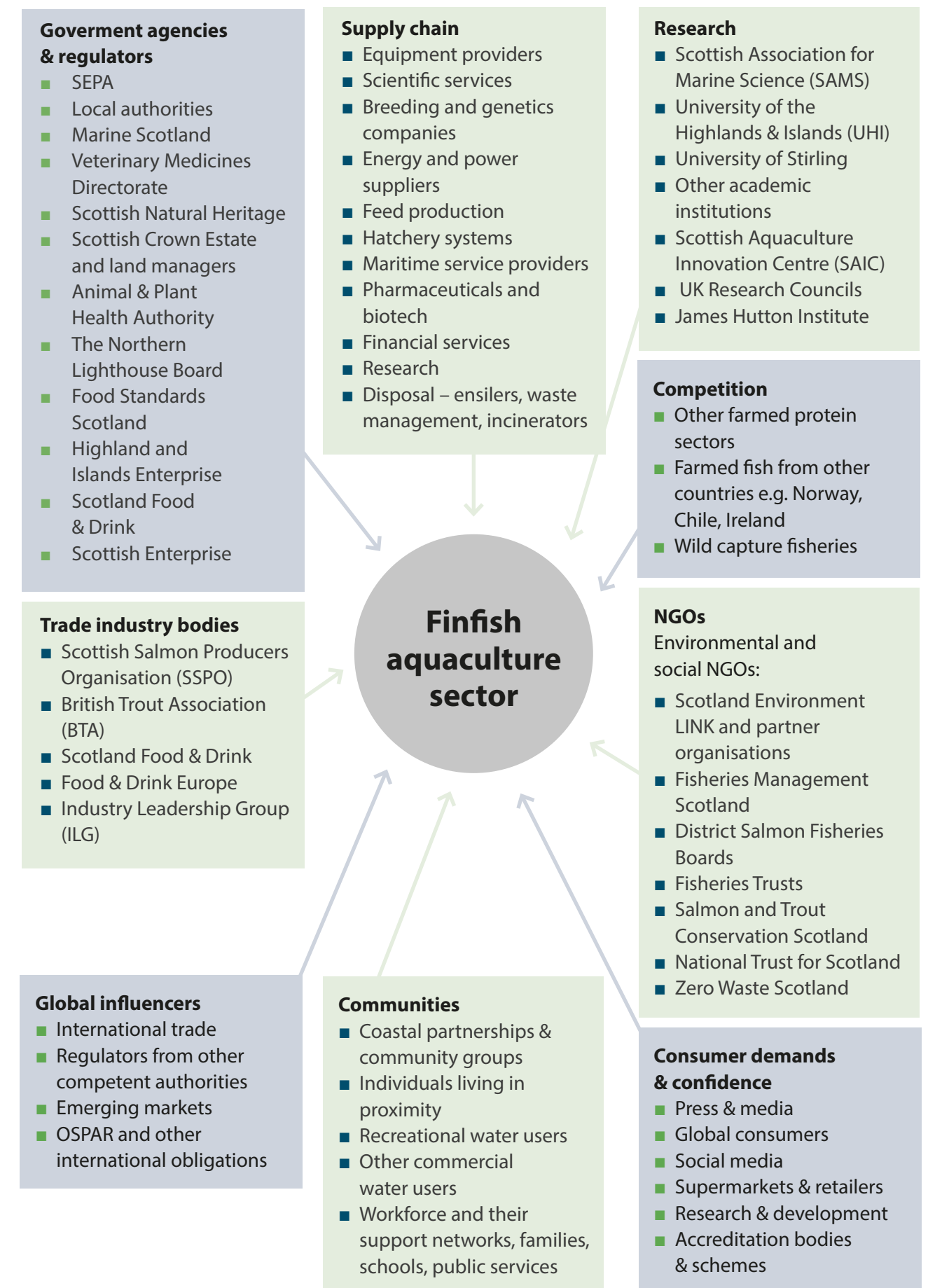
Full compliance with environmental regulations will not, by itself, deliver the transformational change required to secure our One Planet Prosperity objectives. The finfish aquaculture sector plan needs to unlock the potential for businesses to gain strengths in resource efficiency and environmental innovation. We need therefore to combine the actions that we can take to influence the behaviour of a business through our regulatory role with all the other influences. Doing this will be the most effective way to secure full compliance and to help as many businesses as possible to move beyond compliance.

Working with the sector, we will place this more sophisticated way of operating at the heart of our work. Figure 9 summarises the main organisations that influence and are influenced by operators in the finfish aquaculture sector, and identifies those that we are likely to work with in both the short and longer term. We will seek views from all relevant stakeholders at all stages of the finfish aquaculture sector plan. As we implement the plan we will consider the opportunities these relationships provide and how we would like them to develop.

EU exit

Around 80% of environmental legislation in Scotland originates from the European Union. As the UK leaves the EU, environmental legislation is being corrected to make sure the law keeps working as it has been to ensure that the standards of environmental protection we enjoy today, and the principles upon which they are based, are maintained. Therefore, while some of the detail of the legislation we use to regulate may change, our work to protect Scotland's environment will not. Our commitment to work with all sectors that we regulate to tackle non-compliance and to work with as many businesses as possible to help them to go further will not diminish as a result of the UK leaving the EU.

Key influences on the aquaculture sector (Figure 9)





6. Tackling non-compliance and taking opportunities to go beyond

Compliance² with environmental law is non-negotiable and regulated businesses in the sector need to comply.

We believe that those societies and economies that are low resource use, specifically low in energy use, low in water use and low in waste production, will be the most successful in the 21st century. Businesses that are the most innovative will best rise to the challenges of our time, such as over use of resources and climate change and create sustainable economic growth.

To do this, every business must reach full compliance with environmental laws. But mere compliance and small-scale incremental change will not be enough. At SEPA we want to help businesses and sectors to implement successful innovation and support them in their ambitions to do more than they are required to by regulation.

We call this “moving beyond compliance”: helping already high performing businesses to do more for the environment because it makes sense for them to grow in a sustainable manner.

For the finfish aquaculture sector, going beyond compliance and improving environmental performance will help bring better reputation and increased consumer confidence along with produce sourced from a higher quality environment. This stands to benefit those businesses in the sector who pursue these opportunities.

Compliance in the sector

Compliance with environmental law is non-negotiable and regulated businesses in the sector need to comply.

The majority of permitted sites in the sector operate in compliance with environmental regulations enforced by SEPA. This is notable with feed plants, hatcheries, processing plants and tank farms. There are examples where SEPA recognises the sector is going beyond compliance (Figure 10).

Pollution from marine pen fish farms is currently assessed against site specific thresholds modelled prior to authorisation. In some cases the scale of the impact is greater than predicted resulting in a breach of the licence.

Advances in discharge modelling in complex marine environments combined with additional monitoring requirements mean that we can better assess impacts and environmental capacity. This means we can set environment standards to protect the environment with greater confidence than ever before. These requirements have been built into to our new regulatory framework.

The actions set out in this sector plan identify how SEPA, working with partners, will address non-compliances to reduce pollution. We have strengthened our regulatory framework for controlling discharges from marine pen fish farms. We will also play our part with Marine Scotland, as one of a number of other regulators, NGOs, research organisations, academia and sector businesses to improve understanding of where the effect of marine pen salmon farms on sea lice abundance in coastal waters be likely to be contributing significantly to impacts on wild

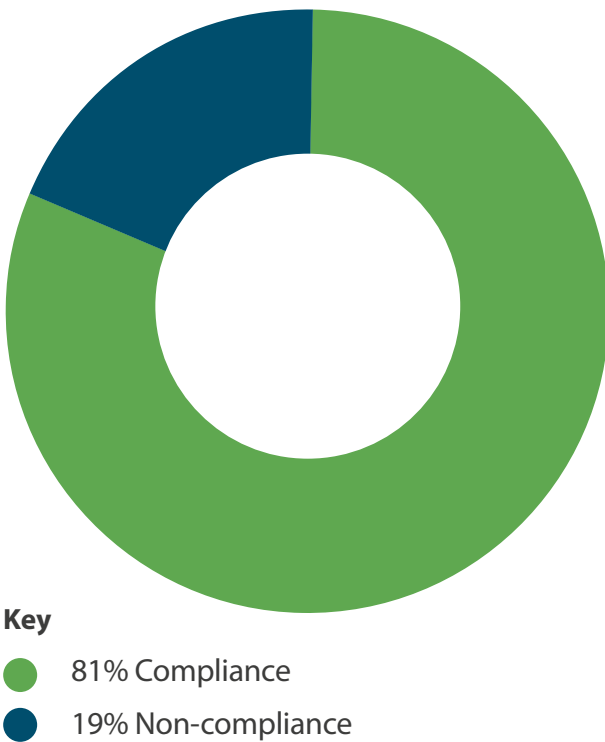
2 Compliance with environmental authorisations is currently measured by our Compliance Assessment Scheme. This scheme is currently being reviewed.

salmon and sea trout populations. This will assist in developing improved strategies for effectively mitigating impacts.

Key issues contributing to non-compliance

- Seabed surveys failing licence conditions
- Medicine/Chemical treatment causing sediment samples to exceed environmental quality standards
- Discharge quality failures
- Other issues include: insufficient or poor data returns; pen configuration and location and stock density or biomass breaches

Compliance (Figure 10)



We will help responsible compliant businesses to operate by making it significantly harder and more expensive for those who persistently fail to comply with environmental legislation to operate. We will achieve this by increasing scrutiny, prescription, fees and the use of enforcement and monetary penalties for those who fail to comply.

Marine pen fish farms (MCFF) – What is causing the non-compliance?

1. Failing seabed surveys

For 70% of the 47 MCFF that failed SEPA’s compliance assessment scheme in 2017, a failing seabed survey was a contributing factor.

Formal action is taken where it is found that the seabed is impacted by the deposition of waste (faeces, food and medicine) to the extent that it fails to meet environmental standards.

Where we find failures of standards, we take appropriate action to secure the protection of the marine environment. This action may include reducing the size of the farm or medicine usage to a point where standards are met.

2. Late submission of monitoring and other reasons

17% of failures at MCFF are due to late submission of monitoring data to assess compliance. The remaining 13% are split between:

- quantities of medicines used exceeding that permitted;
- management and operational issues; and
- pens being sited in a different configuration or slightly different location than that permitted by licence.

Freshwater sites – What is causing the non-compliance?

1. Effluent failing to meet discharge quality standards

44% of freshwater sites that fail SEPA’s compliance assessment scheme do so because of failing effluent discharges. This has the potential to lead to pollution events and impacts on local amenity.

These failures are resolved through working with the operators to improve working practices, seeking further investment in treatment technologies and where necessary undertaking formal action.

33% of non-compliant sites are failing because of failure to provide data to assess compliance.

The remainder are non-compliant due to over abstraction of freshwater and inadequate infrastructure to treat discharges or monitor abstractions.

Improving evidence through partnership working

With partner agencies, academic institutions and industry we will progress the following:

- Strengthening our understanding of impacts on the seabed, in particular the biodiversity of hard substrates including protected habitats.
- Improving diagnostic tools for enhancing the ability to detect and understand the toxicological effects of medicines and other chemical treatments on the environment.
- Better understanding how to manage the interactions between wild fish and finfish aquaculture.

Risks to wild fish

Wild salmon and sea trout are iconic species and important elements of Scotland’s biodiversity. They also provide substantial social and economic benefits, primarily through recreational angling.

The population of Scottish Atlantic salmon has declined by more than 50%, from around 1.25 million in the 1960s to around 600,000 in 2016. Significant declines in adult sea trout numbers have also been widely reported.

Survival of Atlantic salmon during the marine migration phase of their lifecycle has fallen over the last 40 years from up to around 25% survival to less than 5% currently. The causes of losses at sea are not fully understood and likely to be due to a range of factors.

There is increasing international evidence indicating that sea lice abundance in coastal waters can be greatly elevated where open net salmon farming takes place; and that high abundances of sea lice can contribute to some of the losses of wild salmon and sea trout at sea.

Given the importance of trying to improve marine survival where possible, the Scottish Government established an Interactions Working Group in 2018. The initial focus of the Group is on the interaction between farmed and wild salmon. The Working Group includes representatives of wild fisheries interests, environmental organisations, the aquaculture sector, local authorities, Scottish Natural Heritage, Marine Scotland and SEPA.

We are working closely with Marine Scotland, other public bodies and the Interactions Working Group to develop a strengthened framework for managing the hazard posed by sea lice from marine pen fish farms to wild salmon and sea trout. Among other things, the framework will consider how, and in what circumstances, our regulatory powers might be able to be used to help protect these wild fish.

Where are the opportunities to go further?

We believe that those societies and economies that are low resource use, specifically low energy use, low water use and low waste will be the most successful in the 21st century. Businesses that are the most innovative will best rise to the challenges of our time, such as over use of resources and climate change and create sustainable economic growth.

To do this, mere compliance and small scale incremental change will not be enough. At SEPA we want to help businesses and sectors to implement successful innovation and support them in their ambitions to do more than they are required to by regulation.

We call this “moving beyond compliance”: helping already high performing businesses to do more for the environment because it makes sense for them to grow in a sustainable manner.

For the finfish aquaculture sector, going beyond compliance and improving environmental performance will help bring higher quality produce, better reputation and increased consumer confidence. This stands to benefit those businesses in the sector who pursue these opportunities. SEPA will support and encourage the following potential opportunities:

Water

Water in the right place, in the right amount and of the right quality underpins Scotland’s society and economy. Our water environment provides us with vital supplies for drinking and food production; supports business, industry and tourism; maintains places that benefit the health and wellbeing of communities; and sustains wildlife.

The sector plans aim to ensure we live and prosper within our environmental water limits; maximising the efficiency of its use; reducing the input of waste; creating better places for people to thrive and protecting and restoring habitats for wildlife. By doing so, our plans will support and complement the ambitious targets set out in Scotland’s River Basin Management Plans (RBMPs) and Flood Risk Management Plans (FRMPs).

SEPA’s aspirations for the sector:

- Increasing the use of recirculating aquaculture systems.
- Innovation in the methods of collection and neutralisation of medicine residues, with a view to minimise discharges to the environment.
- Increasing the non-medicinal treatment of disease and parasites.

Energy

Energy is an essential resource that enables social and economic development and is one of the most important aspects of the transition to a sustainable low carbon economy. However, electricity and heat production, transmission, storage, and use can have significant environmental impacts. SEPA’s Energy Framework³ recognises that how we use and manage our energy resources is central to our ability to live within the resources of our planet. Cost savings and other benefits for businesses can be made by improving energy efficiency and making use of low carbon sources of energy.

SEPA’s aspirations for the sector:

- Diversifying infrastructure to seize the opportunity of low carbon and renewable energy generation.
- Exploring the use of renewable and low carbon fuels for land and sea transportation.

Materials

SEPA views the circular economy as a game-changing opportunity to manage resources within planetary limits. Our Waste to Resources Framework recognises that reducing the harms associated with waste management can create economic opportunities. We must dramatically cut waste production across the economy, recover more and dispose of only the very minimum. If waste is produced, we will encourage its productive use within a framework of strong environmental protection.

Resource efficiency can improve productivity and reduce costs for business. It can also bring environmental improvements and reduce our reliance on virgin raw materials.

SEPA’s aspirations for the sector:

- | | |
|--|---|
| <ul style="list-style-type: none">■ Pursuing sustainable protein sources for feed through creation of circular economy opportunities.■ Developing alternative sources of omega 3 oil for feed to reduce pressure on existing fish sources of the oil. | <ul style="list-style-type: none">■ Developing means of reducing low value, single use plastics, recovering litter and reusing valuable materials throughout the packaging processes.■ Making best use of faeces and waste food by the capture and recovery of these potential resources for other uses. |
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Improving evidence through partnership working

Delivery of this sector plan is reliant on partnership working with all our stakeholders, partner agencies, academic institutions and industry to progress the following:

- Strengthening our understanding of impacts on the seabed, in particular the biodiversity of hard substrates including protected habitats.
- Improving diagnostic tools for enhancing the ability to detect and understand the toxicological effects of medicines and other chemical treatments on the environment.
- How to manage the interactions between wild fish and finfish aquaculture.

We will also set up a stakeholder advisory panel to advise SEPA on the implementation of our new regulatory framework.

Summary of actions and aspirations

The following table summarises the actions that we have described in previous sections to address non-compliance in the sector and aspirations to help businesses take opportunities to go beyond compliance. These are described according to the key outcomes introduced in Section 3 that we would like to achieve for this sector.

The table combines actions to address compliance and to help achieve beyond compliance. This is because the same action can often both improve compliance and help a business to move beyond compliance. Similarly, actions that businesses choose to take to move beyond compliance can improve their compliance with environmental regulations.

We will prioritise them alongside those in other sector plans and progress powerful actions that contribute towards achieving our one planet prosperity goal for Scotland.



The following table summarises the actions identified for the finfish aquaculture sector plan.

We will prioritise these actions alongside those in other sector plans and progress powerful actions that contribute towards achieving our one planet prosperity goal for Scotland. Key priority actions for 2019/2020 for finfish aquaculture plan have been identified on page 29.

Outcome sought	Action
Enhancing the regulation of marine pen fish farms We will control the risk posed to the water environment and other users of the water environment from: <ul style="list-style-type: none">• discharges of organic matter;• discharges of medicines and other chemicals; and• discharges of nutrients.	We have now implemented a strengthened regulatory framework ⁴ for protecting the marine environment from new farm waste discharges. The framework will ensure that farm developments are matched to the capacity of the sea to disperse and assimilate their waste discharges. This will also form the basis of action to progressively move existing sites to the requirements of new strengthened framework.
Enhancing protection of wild fish	We will: <ul style="list-style-type: none">■ work with Marine Scotland⁵, and other regulators to plan how we can best contribute to the protection of wild salmon and sea trout from any likelihood of significant risks posed by the effects of marine pen fish farms on sea lice abundance in coastal waters.■ work with farms operating within connected sea areas to support and facilitate co-ordinated action (e.g. co-ordinated fallowing; sea lice treatment, etc.) to help reduce the prevalence of sea lice and hence reduce overall medicine usage.
Achieving full compliance across the whole sector We will make clear to sector businesses that compliance with regulatory requirements is non-negotiable	We will: <ul style="list-style-type: none">■ target our regulatory effort to bring non-compliant sector businesses, including feed producers, fish farmers and fish processors, up to full compliance as quickly as possible, including taking immediate regulatory action to address breaches of environmental standards.■ for common breaches, work with sector businesses and trade organisations to develop guidance to help operators comply with the regulations.■ progressively introduce simpler and outcome-focused licences for marine and freshwater fish farms to ensure sector businesses are clear on how to comply with their environmental management responsibilities and legal obligations.■ provide simple and clear explanations of compliance results, which we will continue to make available to the public in a timely and easily accessible way.

⁴ www.sepa.org.uk/aquaculture

⁵ Marine Scotland is a Directorate of the Scottish Government responsible for the integrated management of Scotland's seas and ensuring sustainably-managed freshwater fish and fisheries resources

7. Priority actions for 2019 - 2020

Outcome sought	Action
Supporting innovation We will drive innovation through regulation, to mitigate potential environmental impacts We will bring potential innovation partners together and create opportunities for innovation through the way we regulate.	<p>We will:</p> <ul style="list-style-type: none"> work with sector businesses, trade organisations, other regulators, NGOs and international partners to encourage and support world-leading innovation in disease management, and in medicine design, capture and treatment, to help minimise discharges of medicines into the environment. bring sector businesses together with experts from other sectors to explore innovative opportunities to generate renewable energy; use low carbon transport; and maximise value from wastes. encourage and support investigative research into alternative, environmentally low-impact, sources of protein and omega 3 oils for fish feed. continue to invest in the development of environmental monitoring techniques that significantly increase the amount of environmental evidence that can be collected, and significantly reduce the time needed to interpret that evidence and so inform regulatory responses. This will include the development and use of DNA-based environmental monitoring techniques; and exploration of remote-sensing techniques, such as the use of remotely operated submersible vehicles.
Strengthening our evidence base We will continually work to build understanding of environmental risks and how they can be effectively mitigated.	<p>We will work with other regulators, NGOs, research organisations, academia and sector businesses to:</p> <ul style="list-style-type: none"> improve understanding of where the effect of marine pen fish farms on sea lice abundance in coastal waters may be likely to be contributing significantly to impacts on wild salmon and sea trout populations and work with Marine Scotland, and others, to identify improved strategies for effectively mitigating any such impacts. strengthen understanding of the sensitivity of different seabed habitats to the impact of marine pen fish farms and other pressures. continue to build integrated models for all relevant marine areas of the cumulative effect over time of fish farm discharges and other pressures on the health of marine ecosystems, including the ability of those ecosystems to support protected species and habitats. We will work with partners to develop a risk assessment mapping tool to guide appropriate development. Update and improve Scotland’s Aquaculture website to provide improved and comprehensive information about environmental performance of the sector. <p>We will:</p> <ul style="list-style-type: none"> extend our programme of investigative survey work to assess the individual and cumulative environmental performance of fish farms, coordinating with the sector and other regulators wherever possible.

- 1. SEPA will deal with the ongoing non-compliance issues in the sector:**

 - SEPA will work with individual companies to require improvement at non-compliant sites and drive the sector towards full compliance.
 - by working with partner agencies and regulators we will strengthen our regulatory approach through joint inspections and sharing of evidence where appropriate.
 - implement the use of fixed monetary penalties in response to non-compliance in relation to data returns.

2. We will commence a programme of work to modernise the regulation of existing sites:

 - We have now implemented a strengthened regulatory framework⁶ for protecting the marine environment from new farm waste discharges. Work is ongoing to transition existing sites into the new framework.

3. Develop new licences with simple outcome focussed conditions:

 - new developments will have new licences and conditions. We will vary all existing marine pen licences to require business to introduce the new regulatory framework requirements.
- 4. We will strengthen the environmental evidence available to support the industry’s decisions where it is performing well and hold them to account where they fail to comply with regulation:**

 - we will design and target our environmental survey programmes to (a) check and assess the environmental performance of marine pen fish farms; and (b) continually check and improve the accuracy and reliability of marine modelling.
 - we will continue to develop a strengthened approach to assessing the cumulative effect of existing discharges from all sectors on the status of marine ecosystems.
 - by working in partnership we will improve the availability and access to information.
- 5. Through partnership working, we will undertake a programme of work focussing on assessing environmental outcomes of the use of medicines. In particular:**

 - explore new treatment technologies including treatment using wellboats or other solutions which offer treatment containment and environmental protection.

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www.sepa.org.uk/aquaculture

