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Scotland's 10 Year Farmed Fish Health Framework



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Ministerial Foreword

Globally, aquaculture is the world's fastest growing food producing sector and it is without question one of Scotland's great food success stories. It produces animal protein in one of the most resource and carbon efficient means possible and if you work in one of the many rural communities of Scotland, you will find family members either working within the industry or involved in projects and initiatives that have been supported by local aquaculture businesses. Many of us enjoy the high quality home – grown product of that work on more than a regular basis. Aquaculture, and through that Scottish farmed salmon and rainbow trout, are now-synonymous with Scotland and the land of food and drink.



As with any successful sector and particularly with one that aspires to grow sustainably over the next decade, there remain challenges, many of which for aquaculture are directly associated with the environment in which they work. Aquaculture is just one of a number of industries which relies on our marine environment and its protection for the long term is vital.

There is more to do and this Farmed Fish Health Framework with a range of short, medium and long term actions will enable us to pick up the pace of change. This is a collaborative initiative, deliberately so, with the aquaculture sector working with the Scottish Government and its agencies to develop and produce this Framework to address the main challenges that the sector will face, some known, and some yet to emerge. The aim is to enable the sector to grow sustainably but crucially also to minimise impacts for Scotland's marine and wider environment. Some of the actions are already underway, others require further development, but all are important to ensure the sustainable growth of aquaculture in Scotland and to ensure that its success continues to be enjoyed across our nation and further afield.

The framework must now translate into action and deliver tangible progress. There are clear reporting mechanisms with transparency and open communication embedded as key principles. I expect to be kept fully updated, beginning with an update in three months detailing clear timelines for delivery on the identified work streams. This will ensure the momentum and drive exists to achieve real and concrete gains throughout the ten year lifetime of the framework.

I look forward to further progress.

A handwritten signature in black ink that reads "Fergus Ewing". The signature is written in a cursive style with a large loop at the end of the last name.

FERGUS EWING, MSP
CABINET SECRETARY FOR RURAL ECONOMY AND CONNECTIVITY

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Overview

From its coastal crofting roots, aquaculture has grown to become a vital part of Scotland's economy and the benefits are most keenly felt in our rural, coastal and island communities. Scotland's entire aquaculture supply chain, which includes Atlantic salmon, trout and shellfish production, contributes £620 million every year in Gross Value Added (GVA) to the Scottish economy, supports over 12,000 full time jobs and makes significant social contributions to remote and rural areas by generating highly skilled employment opportunities. The farmed salmon industry makes up over 90% of all Scotland's aquaculture production by value, with trout production and cleaner fish production becoming increasingly important both economically and strategically.

HMRC export statistics show that in 2017, 92,000 tonnes of fresh Atlantic salmon worth £600m was exported from the UK, representing a 35 per cent increase in value and 26 per cent increase in volume from 2016. Those 2017 statistics also indicate that the EU remains the biggest single regional market, importing £282m or 47 per cent of the UK's salmon exports by value in 2017. And that the EU's share of the UK's salmon exports is increasing – in 2014, 34 per cent of UK salmon exports by value went to the EU.

The Scottish Government reaffirmed its approach to sustainable growth in aquaculture in 2017 in a [joint Ministerial Statement](#) by the Rural Economy Secretary Fergus Ewing and Environment Secretary Roseanna Cunningham. The salmon and trout farming industry is committed to sustainable growth with due regard to the environment on which they and others depend. The health and welfare of farmed fish throughout their lifecycle is a core commercial priority for fish farmers. The industry understands that it makes business sense to produce healthy fish and that doing so depends on the marine and coastal environment. Producers recognise that sustainable growth can only come as a consequence of continuous improvement in biological performance. They also understand their responsibilities to uphold the highest standards of welfare in how they care for their fish. Aquaculture is important economically, but must be delivered and developed sustainably, with appropriate regulatory frameworks which minimise and address environmental impacts.

In recent years changing coastal environmental conditions have contributed to the industry's challenges and it recognises the need for continuous improvement in its practices, building on a strong tradition of innovation. This framework document therefore sets out an ambitious and measurable road map for improving farmed salmonid survival, including a programme for developing industry-leading standards for disclosure of on-farm health information. The aim is to further underpin the sustainability of the aquaculture industry and safeguard its vital role in Scotland's rural economy.

Background to the Framework

The Scottish Government committed within the 2017/18 [Programme for Government](#) to develop a strategic farmed fish health framework for Scotland, recognising that such an initiative was an essential component part for the consideration of the work of the Aquaculture Industry Leadership Group (AILG) and the industry 2030 strategy. This framework will ensure that fish health remains the focus of sustainable production and growth in Scotland.

The Scottish aquaculture sector has looked to demonstrate its commitment to protecting the health and welfare of farmed fish. Healthy farmed fish have better survival rates and require fewer interventions by farmers, and so it is in the interests of farmers and other stakeholders that farmed fish are reared in good health. It is recognised that some have concerns about the environmental sustainability of aquaculture and its impact on wild salmon in particular, and there remains improvements to be made which could have wider environmental benefits, including the potential for reduced farmed – wild fish interactions. The challenges for aquaculture going forward are multi-faceted. That is why the Scottish Government and industry take a long-term strategic approach to ensuring that fish health and survival improve, and that Scotland can lead in fish health status.

Global marine ecosystems will be affected by climate change (warming of the seas) and ocean acidification and the aquaculture industry will need to be able to adapt as necessary. Changes include increased plankton community variability and fluctuations in environmental conditions. In particular, fish farmers have experienced increased sea temperatures in successive years, and this can be linked to increased fish mortality. The characteristics of natural jellyfish and phytoplankton blooms are such that they lead to high mortalities in farmed fish.

Climate change is set to continue. The combination of ocean acidification with sea temperature rise and deoxygenation is of particular concern. In the absence of the production of new medicinal products, medicine efficacy declines. When this is coupled with environmental variability, the pressures on salmon and trout health and welfare will only increase without appropriate intervention. Salmon and trout farmers must constantly adapt to the changes if the industry's success is to continue and expand. Changes will present both threats and opportunities to aquaculture. By working in partnership to plan and prepare for change now, the aquaculture sector will be better placed to face any consequences that the combination of ocean acidification, sea temperature rise and deoxygenation will bring.

Just as humans face fresh strains of seasonal flu each year so too do the disease challenges facing animals naturally evolve and change over time. The finfish industry, in common with other food animal production systems, recognises the need for continual adaptation, and the Scottish Government will continue to support the sector's resilience.

Like its global competitors farming in other parts of the world the Scottish fish farming industry has had to tackle the emergence of amoebic gill disease, which was first associated with farmed salmon mortality in Scotland in 2006 with wide scale re-emergence in 2011. Since then, researchers have developed a complex

understanding of gill health, including evidence of the coincidence of amoebic gill disease, proliferative gill disease and several interacting gill pathogens, complicating the overall management of fish health.

Sea lice, gill disease and treatment losses are common features of salmon aquaculture internationally and international collaboration and data sharing will be vital to increasing our understanding of their characteristics, interactions and management. There is a constant need for greater understanding of pathogens and parasites and how these are adapting with respect to the Scottish environment and farm production methods.

Aims of the Farmed Fish Health Framework

To plan and be able to respond to new and developing challenges, the maintenance of high standards of fish health requires further strategic planning and co-ordinated action. This framework aims to provide the focus and mechanism to do this, and ensure the right people, organisations and resources come together to address these challenges efficiently. This framework looks to the long-term and therefore will continue to evolve as our knowledge of the fish health challenges and possible mitigation evolves.

In December 2017 a [Working Group](#)¹ was established to deliver the farmed fish health framework for Scotland.

The Working Group is co-chaired by Ben Hadfield, MD of Marine Harvest Scotland Ltd, and Professor Colin Moffat, Head of Science, Marine Scotland.

Membership includes finfish farming businesses, trade associations/networks, the Scottish Aquaculture Innovation Centre and veterinary professionals, as well as regulatory and advisory bodies.

Farmed Fish Health Framework Objectives

- To provide a strategic, evidence-based approach to the short and long-term improvement of fish health;
- To lead in information sharing and transparency and encourage consistent industry reporting of fish survival, disease and parasite status;
- To support and promote innovation in fish health management and secure improved productivity, performance, survival and production of high quality and marketable fish;
- To identify and evidence areas where the regulatory framework could be demonstrably improved;
- To establish a forum with a long-term view on managing and pre-empting challenges to fish health; and to identify options on the way forward;
- To set out well-defined work themes for activity with measurable actions and timelines to be identified, including clarity on the most appropriate responsible bodies to conduct the work and how they could be resourced; and

¹ Farmed Fish Health Working Group (FFHWG)

- To ensure regular public reporting of the Farmed Fish Health Working Group's progress and that the framework is reviewed regularly by the Working Group.

Areas of Action

Delivery of this Farmed Fish Health Framework will require commitment and resource from all of its partners. Interaction with a number of related activities, including farmed-wild fish interactions, will help to inform the future development of the framework and its working activities. Central to the success of this Framework is the consideration of a number of core cross-cutting work streams, namely:

- Information Flow and Transparency
- Gill Health
- Sea Lice
- Cleanerfish
- Production Cycle and on-Farm Management
- Licensing Regime and Medicine Use
- Climate Change and Ocean Acidification

For each key work stream, a Sub-Group will be established **within three months of publication** of this Framework to take forward the key initial priority objectives, determining milestones and long term work streams to help meet the objectives of this Framework. Membership of each the Sub-Groups will be adaptable and able to reflect the areas of work. The role of Chair for each Sub-Group will interchange between industry and Scottish Government, with a regular reporting mechanism to the overarching Framework Working Group. This will allow for progress to be assessed and the impact of developments to be incorporated into the thinking of the Framework Working Group and thus the creation of new, or the revision of current, milestones.

The Framework Working Group will be tasked to produce an annual update to the Scottish Government and the Scottish Parliament against progress made against the Farmed Fish Health Framework. The group will also identify appropriate vehicles and opportunities for the publication and sharing of best-practice that emerges as the result of the Sub-Group for the various work streams.

Further work will need to be progressed around the availability and need for focussed training/ professional development structures in light of the many activities outlined within this framework document. That may well necessitate a further work stream once the other areas of work have started to deliver.

The priorities identified for the work streams to date are;

Work Stream 1: Information Flow and Transparency

Mortality in farmed salmonids has many causes and is a primary area of focus for fish farming businesses. There has been a recognised deterioration (in the years to and including 2017) in farmed fish survival in Scotland.

Although this marine survival data has historically been collected in Scotland, the information has never been pulled together into one single reference point of mortality across the entire sector. The Farmed Fish Health Working Group (FFHWG) aims to work towards presenting the annual mortality rates in the fish farming industry by cause. This will require standardised data collection. The FFHWG will set out clear ambitions to reduce mortality.

The FFHWG will work to ensure that the industry, Government and principal regulators agree ambitious targets to achieve a significant and evidenced reduction in mortality for salmon and trout, which will be world-leading and based on international comparisons of major farmed salmonid producing nations.

Activities

- Develop a consistent reporting methodology for collection of information on the causes of farmed fish mortality over recent years.
- Analysis of losses to inform priorities of the Farmed Fish Health Framework to ensure work is evidence based and focused.
- Develop an action plan to tackle the underlying causes of mortality.
- Provide survival data for marine rainbow trout and marine salmon and ensure that the Farmed Fish Health Framework activities remain appropriate.
- Move to pro-active open site-level reporting of key statistics concerning fish health, including sea lice and mortality.
- Develop a national approach to data-sharing and evidence-gathering that can enable evidence based decision making, best practice and promote openness and transparency within the Scottish industry.

Work Stream 2: Gill Health

Gill health has emerged as the key challenge to the farmed fish industry in the marine environment and is the most significant contributor to increasing marine mortality.

Activities

- Establish a clearer understanding of the underlying environmental factors and increase awareness of key factors which contribute to gill health challenges.
- Support research to better define interactions between farms environmental characteristics, gill health and risk of losses.
- Better define best gill health surveillance practice and establish good practice on gill health for Scottish fin fish aquaculture.
- Formulate a long-term approach to minimise losses from gill diseases
- Convene appropriate best-practice events and workshops (e.g. on availability and use of anti-fouling solutions to reduce net cleaning requirements).

Work Stream 3: Sea Lice

Sea lice treatment strategies have evolved from one which was based predominantly on medicinal control to a more balanced strategy, including the use of cleaner fish and physical removal, alongside the use of licensed medicines. This transition has brought with it a number of challenges related to biosecurity and welfare, primarily because it has increased the need for fish to be handled, which is a contributory factor in mortality. The activities of this work stream aim to continue improving control of sea lice on Scottish fish farms, building on and recognising current good practice and the wider environmental benefits, including a potential reduction in farmed – wild fish interactions.

Activities

- Review Scotland's voluntary farmed fish [sea lice compliance policy](#), including reporting requirements and intervention thresholds, and make recommendations to ensure that it remains fit for purpose.
- Industry to further evolve its sea lice strategy from primarily a medicinal one to a balanced combination strategy (medicinal, physical and cleaner fish) through development of new best practice guidance. Treatment strategies will be site and area specific.

- Develop and introduce a desk based pilot study (funded through members of the FFHWG) to look at the potential fish health and environmental benefits of consolidation of existing fish farms and identify how this could be made achievable through the current regulatory framework.
- Create a sea lice modelling and farm connectivity action plan, identifying required resources and responsible parties. The plan should explore the use of hydrodynamic and other modelling types to manage sea lice infection pressure over larger areas and be complimentary to other environmental models used to support optimal site identification.
- Based on the findings of the pilot study and sea lice connectivity action plan - review current Farm Management Area (FMA) boundaries and their operation based on the latest scientific evidence and advice.
- Develop an easily accessible information source which outlines the sea lice management 'tool box' available to the Scottish fish farming industry.
- Develop and disseminate guidance on operational best practice for physical sea lice treatments

Work Stream 4: Cleanerfish

Cleanerfish offer a sustainable and environmentally positive method for reducing the impact of sea lice on salmonid growth, and assessment of the potential contribution of wild caught and hatchery cultivated supplies relative to future demand is essential.

Activities

- Building on agreed management measures with the Scottish Government, define industry demand for farmed cleaner fish (wrasse and lumpfish) and the barriers to delivery.
- Map out required research and development, investment and timescale to deliver total industry demand.
- Review and assess the potential for cleanerfish use in rainbow trout cultivation.
- Assess whether management measures are appropriate and proportionate to the current and anticipated future levels of sustainable wild wrasse fishing in Scotland.
- Establish an international forum or platform in order to share cleaner fish husbandry best practice and establish best practice husbandry measures for the Scottish industry.

Work Stream 5: Production Cycle and on-Farm Management

Industry and research have improved fish farming cycles to allow for growth to an acceptable harvest weight and include good fish health and husbandry techniques such as fallowing. The increased ability to grow larger smolts provides the opportunity to reduce the marine grow out phase of farmed salmon, thus reducing the time spent in sea and the length of exposure to marine challenges such as sea lice. Reduction in time spent at sea may also in turn reduce treatment requirement, thereby extending the shelf life of sea lice medicines and slow down the build-up of chemical resistance within sea lice. Reduced time spent in the sea also has corresponding benefits in reducing environmental impacts, including those in the water column and sea bed.

Fallowing allows for a break in sea lice and other pathogen biological life cycles and could be done more frequently under shorter farming cycles. Contiguous area fallowing would also provide benefit for rainbow trout fish health and welfare, a concept which is yet to be explored fully.

The activities under this work stream aim to explore the potential mechanisms to optimise farmed salmonid health and welfare. This includes supporting the use appropriate and effective use of Acoustic Deterrent Devices on Scottish fish farms.

Activities

- Review evidence to support the potential environmental and health benefits arising from input of larger smolts (and associated decrease in marine phase) and increased fallow frequency
- Recommend best-practice to maximise smolt survival in the first 30 days at sea and the ability to shorten the marine phase of the production cycle.
- Review rainbow trout production methods (inc. continuous stocking) and identify areas where the industry could support the move to contiguous fallowing if evidentially justified
- Review how the regulatory framework can better encourage deployment of larger smolts, increased fallowing and improved health for salmon and rainbow trout.
- Develop standards for the use of Acoustic Deterrent Devices (ADDs) or alternatives on marine salmon farms.
- Identify where support to fish farming companies is necessary and assist industry to prioritise robust ova selected for disease resistance to maintain and enhance Scotland's good health status.
- Revise the recommendations of the Code of Good Practice with regards to ova selection.

Work Stream 6: Licensing Regime and Medicine Use

Ensure that the licensing regime remains fit for purpose and supports the innovation and adaptation of new fish treatment methods.

Activities

- Revisit the conclusions of the Wellboat Working Group and progress to date, including;
 - the industry's current capacity for sea lice/particulate matter filtration and treatment of wellboat discharge, providing a timeline for industry-wide implementation and updating best practice standards for wellboat discharge within Scotland's regulatory regime.
 - explore new treatment technologies, including alternatives to wellboat treatment, which offer treatment containment and environmental benefits
 - exploration of assigned wellboat discharge zones where wellboat residues could be discharged following movement or treatment allowing for greater dilution of discharges.
- Explore and progress ability to treat fish with medicines using well boats in addition to Controlled Activity Regulation consents which permit in cage bath treatments on farms.
- Progress hydrodynamic modeling to demonstrate cumulative water body impacts in order to deliver the capability to identify optimum locations for organic deposition and water column measures
- Encourage development of new medicines with the aim of increasing treatment flexibility and allowing the potential to explore treatment rotation in Scotland, within environmentally sustainable limits, appropriate use of veterinary medicines through 'cascade', and treatment residue containment and neutralization.

Work Stream 7: Climate Change and Ocean Acidification

Monitor, review and assess the impact of climate change and ocean acidification on Scottish waters and the implications for the marine aquaculture industry.

Activities

- Consider the creation of real time monitoring of plankton in and alert of the occurrence of potentially harmful phytoplankton species.
- Determine how best to measure changing climatic conditions in Scotland particular to aquaculture leading to an annual mapping exercise. This should include an assessment of currently available environmental data from around fish farms, for example real-time temperature data.



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