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Rural Economy and Connectivity Committee Comataidh Eaconomaidh Dùthchail is Co- cheangailteachd

Salmon farming in Scotland



DRAFT

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Rural Economy and Connectivity Committee

To consider and report on matters falling within the responsibility of the Cabinet Secretary for Rural Economy and Connectivity.



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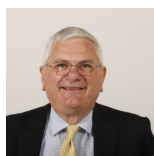
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Summary of conclusions and recommendations

Economic and social impacts of salmon farming

The Committee acknowledges both the economic and social value that the salmon farming industry brings to Scotland. It provides jobs to rural areas, investment and spend into communities and stimulates economic activity in the wider supply chain. (see paragraph 30)

RECOMMENDATION 1

However, the industry also creates a number of economic, environmental and social challenges for other businesses which rely on the natural environment and the Committee recognises this impact. Therefore, if the industry is to grow, the Committee considers it to be essential that it addresses and identifies solutions to the environmental and fish health challenges it faces as a priority. (see paragraph 31)

Growth of the industry

RECOMMENDATION 2

The Committee strongly agrees with the view of the Environment, Climate Change and Land Reform Committee (ECCLR) Committee that if the industry is to grow, the “status quo” in terms of regulation and enforcement is not acceptable. It is of the view that urgent and meaningful action needs to be taken to address regulatory deficiencies as well as fish health and environmental issues before the industry can expand. (see paragraph 60)

RECOMMENDATION 3

The Committee notes calls for a moratorium on new salmon farm development and expansion of existing sites, it considers that there is insufficient evidence to support this. (see paragraph 61) ⁱ

RECOMMENDATION 4

The impact of expansion plans on other sectors which share the marine environment needs to be recognised and the impact reduced. The Scottish Government, SEPA and all other responsible authorities should therefore ensure that the needs of other industries are fully considered in setting the strategic context for the sector. (see paragraph 62)

ⁱ John Finnie and Colin Smyth dissented.

The Committee believes that if these challenges are effectively addressed then the many economic and social benefits of the farmed salmon industry can grow as both the industry, and the communities it works with, continue to develop. (see paragraph 63)

Impact of Brexit

The Committee recognises the negative impact that Brexit may have on the access to EU export markets. It is particularly concerned about the ability of Scotland's food and drink sector to deliver fresh produce to European markets to current timescales and the impact tariffs may have on profitability. (see paragraph 72)

The Committee also recognises concerns about the capacity of the salmon farming industry to retain and recruit staff given the likely loss of access to EU labour markets. The Committee notes that the industry may find it challenging to retain and attract the workers required, particularly in the salmon processing sector. (see paragraph 73)

RECOMMENDATION 5

The Committee calls elsewhere in this report for the highest possible environmental and fish health regulatory standards to apply to the farmed salmon sector in Scotland. However, it is concerned that these standards could become technically misaligned with those in the EU post-Brexit and that this could lead to problems in accessing EU markets. It therefore calls on the Scottish Government to indicate how it intends to work with the UK Government to ensure that this issue is addressed. (see paragraph 74)

Workforce, skills and infrastructure

The Committee acknowledges the findings of the HIE report highlighting a range of skills gaps and recruitment and retention issues facing the industry. It notes that the report suggests that there is a pressing need to address these and commends its recommendations on how improvements might be made in education and training, developing leadership skills and in recruitment. (see paragraph 82)

RECOMMENDATION 6

The Committee also acknowledges the infrastructure constraints faced by the sector that were raised in evidence, particularly a lack of available housing, which can make it difficult to attract and retain staff. The Committee recognises that a lack of housing can cause difficulty for many businesses in rural and remote areas. It calls on the Scottish Government to work with enterprise agencies and local authorities to consider what work might be done to help ease this constraint. (see paragraph 83)

Branding and accreditation

The Committee recognises the importance of the Scottish brand in selling a wide range of food and drink products, including salmon, both abroad and in the UK. This brand is built upon a high quality product and robust environmental and regulatory standards. (see paragraph 95)

The Committee notes that the challenges referred to elsewhere in this report could and may be affecting consumer's perceptions of the product. To maintain the Scottish brand, Scotland's salmon farmers must excel in responsible and sustainable production methods and communicate this effectively to consumers, retailers and other stakeholders. (see paragraph 96)

RECOMMENDATION 7

Many marketing and quality assurance accreditation schemes exist for farmed salmon. These often set more stretching environmental standards than are currently in place in Scotland. The Committee calls on the Scottish Government to take the requirements of existing accreditation schemes into account when considering regulatory change to establish where alignment might be appropriate and feasible. (see paragraph 107)

RECOMMENDATION 8

The Committee calls on industry representatives, accreditation bodies, retailers and other stakeholders to work together to consider ways in which clarity and simplicity for consumers in a potentially confusing accreditation landscape can be provided. (see paragraph 108)

Challenges facing the farmed salmon industry

Farmed salmon mortalities

The Committee understands that there will be a level of mortality in all livestock production. It recognises the challenges that the industry faces in managing a range of fish health and welfare issues that contribute to increasing mortality levels. (see paragraph 144)

RECOMMENDATION 9

However, the Committee considers the current level of mortalities to be too high in general across the sector and it is very concerned to note the extremely high mortality rates at particular sites. It is of the view that no expansion should be permitted at sites which report high or significantly increased levels of mortalities, until these are addressed to the satisfaction of the appropriate regulatory bodies. (see paragraph 145)

RECOMMENDATION 10

The Committee welcomes the statement in the Scottish Government's Fish Health Framework that ambitious targets should be agreed "to achieve a significant and evidenced reduction in mortality for salmon and trout" and that these should be world-leading. However, it is strongly of the view that practical action is also

required and that there should be a process in place which allows robust intervention by regulators when serious fish mortality events occur. It considers that this should include appropriate mechanisms to allow for the limiting or closing down of production until causes are addressed. (see paragraph 146)

The Committee is in no doubt that there needs to be far greater transparency in reporting mortality rates and disease outbreaks at salmon farms. Whilst it welcomes the publication by the SSPO of monthly mortality data for each salmon farm in Scotland in August 2018, it notes that this information is very limited and does not provide detailed information on the causes of mortality on each farm. (see paragraph 147)

The Committee notes the Scottish Government's Fish Health Framework (FHF) proposal to develop a consistent reporting methodology for farmed salmon mortality, and to move towards the production of pro-active open site reporting of mortality statistics. It considers that this initiative provides an opportunity to develop proposals which will build on and enhance the information which the industry has recently started to provide on a voluntary basis. (see paragraph 148)

RECOMMENDATION 11

The Committee considers it to be essential that this work delivers high levels of transparency that will provide confidence to all stakeholders. It therefore recommends that the information provided in future should provide an accurate, detailed and timely reflection of mortality levels including their underlying causes across the whole sector. It should also incorporate a mechanism for reporting where early harvesting has been carried out because of a disease outbreak. (see paragraph 149)

RECOMMENDATION 12

The Committee calls on the FHF working group to seek the views of all industry, scientific, environmental and other stakeholders to ensure that the methodology that it is tasked with developing for reporting mortalities is sufficiently robust. It is strongly of the view that it should be a mandatory requirement for all farmed salmon producers to provide this data. (see paragraph 150)

RECOMMENDATION 13

The Committee further recommends that there should be coordination with the data that is to be provided on sea lice infestation levels to ensure that a package of data is available which provides an up-to-date and comprehensive overview of all fish health, welfare and treatment issues across the sector.(see paragraph 151)

The Committee notes the concerns expressed about the transportation and disposal of dead fish, and some members noted negative media reports on the matter. Whilst the Committee has not received any substantive evidence that points to any particular weakness or failing in the specific regulatory regime which covers such matters, it seeks reassurance that it is being both complied with by producers and properly enforced by regulators. (see paragraph 152)

RECOMMENDATION 14

The Committee therefore recommends that a review should be conducted by the Animal and Plant Health Agency of the relevant regulatory and enforcement regime which applies to the transportation and disposal of dead fish to ensure that it remains fit for purpose. This recommendation is consistent with the Committee's general view that there should be a strengthening of regulation which applies to the farmed salmon sector. (see paragraph 153)

Gill Health

The Committee does not underestimate the serious challenge which gill health disease presents to the industry. Indeed, it has difficulty in understanding how expansion of the industry can reasonably occur if this issue is not satisfactorily resolved. (see paragraph 162)

The Committee notes that, as suggested by many witnesses, one of the primary factors contributing to the increase in the prevalence of gill disease is thought to be rising sea temperatures. It considers that the prevailing sea temperature may also become a discussion point around the location of salmon farms in future and whether siting these in deeper, colder water might assist in overcoming the challenge presented by complex gill disease. (see paragraph 163)

The Committee welcomes the prominence given to the gill health issue by the Scottish Government in the Fish Health Framework and its focus on developing a clearer understanding of its causal factors and a treatment approach to mitigate its effect. However, given the acknowledged complexities of this disease and the limited knowledge which exists as to its causes, it would appear that this is not an issue that will be resolved easily or quickly. (see paragraph 164)

Sea Lice

The Committee notes the variety of actions and interventions being undertaken by the sector to address the significant challenge presented by sea lice infestation. However, it is clear that the industry has not as yet identified a means to fully and effectively deal with this parasite. (see paragraph 192)

The Committee welcomes the wide-ranging proposals in the FHF sea lice workstream, such as the review of voluntary sea lice compliance policy, including reporting mechanisms; the development of sea lice modelling; and an exploration of the potential benefits of site consolidation. (see paragraph 193)

RECOMMENDATION 15

The Committee notes the various views expressed in evidence relation to the different sea lice trigger levels and thresholds that are applied by the industry itself and by Marine Scotland for reporting and intervention purposes. It considers that the work of the FHF provides an opportunity to remove confusion around this issue and develop proposals that are appropriate both to the fish

health management needs of the Scottish industry and to the regulatory regime. It considers, however, that these should be challenging and set a threshold that is comparable with the highest international industry standards. (see paragraph 194)

RECOMMENDATION 16

Whilst the Committee recognises that it will take time for the outcomes of the FHF sea lice workstream to emerge, it is strongly of the view that there should in general terms be a move away from a voluntary approach to compliance and reporting with regard to sea lice infestation. The working group should therefore seek to bring forward proposals which make compliance and reporting a mandatory requirement. (see paragraph 195)

RECOMMENDATION 17

The Committee notes the concerns expressed in evidence that enforcement action in relation to breaches of sea lice levels has not been sufficiently robust to date. It is therefore of the view that if the revised compliance policy is to be effective it must be robust, enforceable and include appropriate penalties. (see paragraph 196)

RECOMMENDATION 18

The Committee also considers it to be essential that appropriate staff and financial resources are provided by Marine Scotland to ensure that compliance is effectively monitored and enforcement action taken where required. (see paragraph 197)

Sea lice data

RECOMMENDATION 19

The Committee welcomes the recent voluntary commencement of sea lice data provision by the SSPO on an individual farm basis. However, it agrees with the ECCLR Committee's position that the provision of sea lice data should in future be mandatory for all salmon farms in Scotland. (see paragraph 212)

RECOMMENDATION 20

The Committee notes that the SSPO produces sea lice data 3 months in arrears, whereas such data in Norway is produced weekly in arrears. It considers that sea lice data in Scotland should be published in a similarly timely fashion, as close as possible to the collection date. (see paragraph 213)

RECOMMENDATION 21

The Committee also considers that it is essential that the data provided should be that which is required to inform the regulatory and enforcement regimes, as opposed to that which the industry itself takes it upon itself to produce. (see paragraph 214)

RECOMMENDATION 22

The Committee is strongly of the view that, in order to increase transparency, there needs to be a significant enhancement in the way sea lice data and other key information related to the regulation of salmon farming is presented. It considers that a comprehensive, accessible reporting system of a similar standard to that which is already in operation in Norway should be introduced in Scotland. (see paragraph 215)

RECOMMENDATION 23

If the industry has aspirations to develop and grow, having a comprehensive reporting system which is transparent, reliable and, above all, trusted can only serve it well. The Committee is therefore of the view that there should be a suite of data available covering mortality, sea lice infestation, medicine application and treatment information. (see paragraph 216)

RECOMMENDATION 24

The Committee recognises that there would be a cost element in developing and operating such a system but is of the view that this should not preclude this work being taken forward. It considers that the associated costs should be borne by the industry, and calls on the Scottish Government to discuss with industry representatives how this might be achieved. (see paragraph 217)

RECOMMENDATION 25

The Committee recommends that the working group charged with taking forward the FHF sea lice work stream should consider the production and presentation of sea lice data as an integral part of its work and bring forward proposals in line with the Committee's views. (see paragraph 218)

Sea lice and the use of 'cleaner fish'

The Committee acknowledges the benefits that cleaner fish may have for the salmon industry. However, it recognises that these benefits can only be achieved through careful management of the environmental implications and sustainable use of cleaner fish stocks. (see paragraph 245)

RECOMMENDATION 26

It endorses the ECCLR recommendations on cleaner fish and agrees that there is an urgent need for an assessment of future demand as well as all associated environmental implications of the farming, fishing and use of cleaner fish. (see paragraph 246)

RECOMMENDATION 27

The Committee welcomes the Scottish Government's commitment to "assess whether management measures are appropriate and proportionate to the current

and anticipated future levels of sustainable wild wrasse fishing in Scotland” as part of its Fish Health Framework. It would urge the Scottish Government to complete this assessment as a matter of urgency. (see paragraph 247)

RECOMMENDATION 28

The Committee strongly recommends that the Scottish Government consider the need for regulation of cleaner fish fishing to preserve wild stocks and avoid negative knock on impact in local ecosystems. (see paragraph 248)

The Committee welcomes the recent developments in industry breeding programmes as it is aware of the long period required for wrasse to reach sexual maturity. It also welcomes the potential for international cooperation and knowledge sharing on this issue. (see paragraph 249)

Environmental impact of salmon farming

Waste

RECOMMENDATION 29

The Committee believes that it is essential that the issue of waste collection and removal is given a high priority by the industry, the Scottish Government and relevant agencies. It is clearly one of the main impacts on the environment and needs to be addressed as a matter of urgency. (see paragraph 274)

RECOMMENDATION 30

The Committee is concerned that the announcement of SEPA’s proposals for a new regulatory framework for managing the waste input to the marine environment from fish farm cages, as part of the outcomes of its wider sectoral review, was delayed until November 2018, shortly before this report was finalised. This meant that the Committee was unable to consider the proposals in detail. However, the Committee notes that the proposed new regulations are intended to more effectively manage the waste from salmon farms and avoid adverse impact on the seabed and the biodiversity of sea. The Committee calls on SEPA to keep it updated on the output from its consultation on the proposed framework and ultimately on the detail of how this will be implemented. (see paragraph 275)

Medicine use

RECOMMENDATION 31

The Committee strongly believes in the benefits of transparency for the industry and those interacting with it. It endorses the ECCLR Committee’s recommendation that any data and analysis gaps related to the discharge of medicines and chemicals into the environment should be addressed by both the industry and regulators. (see paragraph 289)

The Committee recognises the need to ensure that the licensing regime for medicines is fit for purpose and sufficiently robust to prevent environmental damage or impact on other species. It notes and welcomes the Fish Health Framework workstream which is dedicated to the licensing of fish treatment. (see paragraph 290)

The Committee recognises that as farmers the industry must use medicines to treat illness or disease in their stocks. However, it notes with concern the conclusion of the recent SEPA research which concluded that medicine from Scottish salmon farms “is significantly impacting local marine environments.” (see paragraph 291)

RECOMMENDATION 32

The publication of this research leaves the Committee in no doubt that effective regulation of medicine used by the farmed salmon industry is a requirement. In this regard, it welcomes the action by SEPA to the UK Technical Advisory Group (UK TAG) to make recommendations to the Scottish Government on new environmental standards for Emamectin Benzoate. It also calls on SEPA and the Scottish Government to similarly consider the environmental impact of other medicines by the industry. (see paragraph 292)

RECOMMENDATION 33

The Committee also recommends that information and data on medicine use by the industry should be made publicly available, on the same platform as that relating to sea lice and mortality rates. (see paragraph 293)

Deterring marine predators

The Committee notes the salmon farming industry’s action to reduce the number of seals shot and shares the aspiration that this should be reduced to zero. It notes that a range of methods to deter seals are being applied by the industry including physical net barriers and shields. (see paragraph 309)

RECOMMENDATION 34

The Committee shares the view of the ECCLR Committee that such physical barriers should be used ahead of deterrents such as Acoustic Deterrent Devices which potentially have a harmful impact on cetacean species such as whales and dolphins. The Committee considers it important that the use of such devices is fully assessed and it welcomes the fact that Marine Scotland has been asked to review the science to inform future policy in this area. It looks forward to an update on this from the Scottish Government in due course. (see paragraph 310)

RECOMMENDATION 35

The Committee considers it to be important that this work results in the production of appropriate guidelines and best practice advice for use by the industry in responding to various scenarios, such as when seals are trapped in salmon farm cages or in nets. (see paragraph 311)

RECOMMENDATION 36

The Committee also looks forward to an update from the Scottish Government on its investigations into how the upcoming legislation change in the United States regarding seal shooting may negatively impact on its imports of Scottish salmon. (see paragraph 312)

Wild fish/farmed fish interactions

The Committee has heard from the industry that escapes do not currently appear to be a significant issue in Scotland. However, it cautions against complacency on this issue as there is potential for even a single escape event to have a significant impact on the genetic integrity of wild salmon. (see paragraph 344)

RECOMMENDATION 37

The Committee notes that strict penalties are in place in Norway to deal with escapes and recommends that appropriate sanctions should be developed and introduced in Scotland. (see paragraph 345)

The Committee understands the concerns expressed by some in evidence that the presence of sea lice around salmon farms could be impacting on wild salmon migratory routes, in particular on smolts. (see paragraph 353)

The Committee acknowledges that there are likely to be a range of factors that have contributed to the decline in wild salmon stocks over recent decades, and considers that it is possible sea lice attracted by the presence of salmon farms could be one. However, it also recognises that there is a lack of definitive scientific evidence on this issue. (see paragraph 354)

The Committee welcomes the SG initiative to set up a working group to look at existing policy and advice governing these issues and to produce recommendations on how interaction between wild and farmed salmon can be taken forward in the future. (see paragraph 355)

RECOMMENDATION 38

However, it suggests that there needs to be a recognition that any work taken forward on this issue in the short term may be hampered by a lack of scientific data. The Committee supports the proposal from the ECCLR committee for more research into the interactions between farmed and wild salmon, as a matter of priority, although it acknowledges the evidence heard which suggests that this may be difficult to deliver. (see paragraph 356)

RECOMMENDATION 39

The Committee also encourages both the farmed salmon and wild salmon sectors to share information and data as transparently as possible in order to improve understanding as to why wild salmon stocks are decreasing. (see paragraph 357)

RECOMMENDATION 40

Although there is a lack of definitive scientific evidence of the various factors that are contributing to the decline of wild salmon stocks, the Committee is nevertheless of the view that a precautionary approach should be taken which will seek to minimise the potential risk to wild salmon stocks wherever possible. (see paragraph 358)

RECOMMENDATION 41

The Committee suggests that the siting of salmon farms is key to managing any potential risk to wild salmon stocks and ensuring that the sector is managed responsibly and sustainably. (see paragraph 359)

RECOMMENDATION 42

The Committee notes concerns expressed in evidence that none of the existing regulatory bodies currently has responsibility for the impact of salmon farms on wild salmon stocks. The Committee believes that clarity must be provided by the Scottish Government as to how this apparent regulatory gap will be filled and which agency will assume responsibility for its management. (see paragraph 360)

Collaboration between salmon farming and wild fisheries sectors

The Committee notes that significant friction exists between the farmed salmon and wild fisheries sectors in particular catchment areas close to wild salmon migratory routes, with disagreements focussing on the impact of salmon farms on wild fish health and stocks. (see paragraph 370)

Whilst the Committee understands why such friction and mistrust develops, it recognises that the situation is not helped by the fact that there is a distinct lack of scientific evidence and data to support or dismiss claims. This further highlights the need for more research to be conducted on the reasons behind the decline in wild salmon stocks and the potential contribution that salmon farming may have on these. (see paragraph 371)

RECOMMENDATION 43

The Committee is of the view that there is a need for both sectors to co-exist and it considers it to be essential that there is greater collaboration to resolve local management issues and other areas of concern. (see paragraph 372)

The Committee notes that there are examples of good relationships between the sectors in certain areas of Scotland. During its inquiry, the Committee was fortunate in being able to undertake a fact-finding visit to hear at first hand about innovative and collaborative working between a fisheries board and a farmed salmon operator on a project which aimed to boost wild salmon stocks. It is in no doubt that if issues of mutual interest to both sectors are to be properly managed, there needs to be close, constructive and effective engagement between representatives of both sectors on a widespread basis. This needs to occur at both a local level, between local fisheries boards and farmed

salmon operators and at a national, strategic level between the relevant representative groups. (see paragraph 373)

RECOMMENDATION 44

The Committee recommends that mechanisms to encourage such collaboration between the sectors should be further developed and introduced. It further recommends that the Scottish Government's wild salmon interactions group should, as part of its work, address this matter as a priority. (see paragraph 374)

Location of salmon farms

RECOMMENDATION 45

The Committee shares the view of the ECCLR Committee that the siting of farms in the vicinity of known migratory routes for wild salmon must be avoided. (see paragraph 383)

The Committee understands that there is at present only limited empirical scientific evidence to suggest that wild salmon are infected by sea lice as they pass salmon farms. However, it is noted that the Norwegian Government has taken the decision to act decisively on this matter. It applies a strict precautionary approach and does not issue licences for salmon farms in the vicinity of wild salmon routes. (see paragraph 384)

RECOMMENDATION 46

The Committee is of the view that a similar precautionary approach must be taken in Scotland to assist in mitigating any potential impact of sea lice infestation on wild salmon. It therefore recommends that there should be an immediate and proactive shift towards siting new farms in more suitable areas away from migratory routes and that this should be highlighted in the strategic guidance on the siting of salmon farms. (see paragraph 385)

RECOMMENDATION 47

The Committee recognises that it will take time for the range of current activity by the Scottish Government (e.g. Fish Health Framework initiatives, consenting review) and regulatory bodies (e.g. SEPA finfish sector review) and action on the Committee's recommendations to be completed, with outcomes known, agreed and implemented. (see paragraph 386)

Therefore, until this work is completed and the enhanced regulatory and enforcement regime is in place, the precautionary principle should be applied in a meaningful and effective manner in relation to applications for new sites and expansion of existing sites. (see paragraph 387)

RECOMMENDATION 48

The Scottish Government should provide strong and clear leadership in ensuring that the precautionary principle is applied, producing appropriate policy and guidance documents as necessary. These should make clear that the potential impact on the environment, known wild salmon migratory routes and other species must be comprehensively and robustly assessed and fully taken into account as part of the consideration of salmon farm applications. (see paragraph 388)

RECOMMENDATION 49

The Scottish Government should support and assist planning authorities by producing planning guidance which sets out clearly how the precautionary principle should be applied and managed. (see paragraph 389)

RECOMMENDATION 50

Support should also be provided to local authorities to enable planning committees to have access to appropriate training resources so that decisions on applications for salmon farms can be better informed. (see paragraph 390)

The Committee is in agreement with evidence which suggests that taking a more strategic approach to the siting of salmon farms in Scotland would be beneficial, not least in identifying the environmental suitability of both inshore and offshore locations for such developments. (see paragraph 406)

RECOMMENDATION 51

It is therefore of the view that the Scottish Government should, as a matter of priority, initiate a spatial planning exercise with a view to developing strategic guidance specifying those areas across Scotland that are suitable or unsuitable for siting of salmon farms. This work should take full account of existing strategic documents such as the Marine Plan, and incorporate an assessment of the potential impact of salmon farms on MPAs and PMFs and the species which inhabit them. (see paragraph 406)

The Committee recognises that such work will require input from the wide range of regulatory and advisory bodies which have responsibility for or engage with the sector and may therefore take some time to produce. However, it notes that Marine Scotland is already working to develop heat maps which would identify areas suitable for farmed salmon expansion and is of the view that this work might usefully inform a wider spatial planning exercise. (see paragraph 407)

RECOMMENDATION 52

The Committee acknowledges the role of planning authorities in considering and deciding on planning applications for salmon farms, taking into account a range of social, economic and environmental factors. However, it is of the view that strategic guidance on the siting of salmon farms should also be viewed as a material consideration in planning terms, which would help guide the industry in making applications and planning authorities in deciding on these. The Committee calls on the Scottish Government to consider how this might operate

in practice and to consider whether any changes in planning guidance might be required. (see paragraph 408)

Potential relocation of existing sites

The Committee notes that as the salmon industry in Scotland has evolved in recent decades, farms may have been located in areas which are now recognised as being environmentally sensitive (such as MPAs or PMFs) or are less well-suited to production for a variety of reasons. It welcomes the fact that some operators are already actively looking to relocate poorly sited farms or to consolidate farms in less sensitive areas. (see paragraph 416)

RECOMMENDATION 53

However, the Committee considers that there should be immediate dialogue with the industry to identify scope for moving existing poorly sited farms. It recommends that this should be led by Marine Scotland and encouraged with appropriate incentives for operators, such as giving favourable consideration towards allowing increased capacity at replacement sites that are known not to be environmentally sensitive. The Committee considers it to be important, however, that there is no deviation from due process in terms of granting approval for replacement sites. (see paragraph 417)

Challenges of moving to more exposed sites

RECOMMENDATION 54

The Committee recommends that work to examine the scope for siting salmon farms in suitable offshore and other locations where there are higher energy water flows should also be treated as a high priority by the industry. It acknowledges that there are significant technological challenges associated with locating farms in these areas, as well as risks in terms of workforce health and safety. However, it also notes the benefits this could bring in terms of addressing fish health issues, reducing the environmental impact of waste and providing scope for the industry to develop higher capacity sites. (see paragraph 424)

RECOMMENDATION 55

The Committee further recommends that the Scottish Government should consider how the regulatory framework which applies to the industry might need to be adapted to suit the particular circumstances of offshore aquaculture. (see paragraph 425)

Closed containment

The Committee recognises that the development of closed containment facilities could have a significant positive impact on the farmed salmon industry and has the potential to address many of the environmental challenges it faces. However, it also recognises that the development of this technology has its own challenges in terms of large scale roll out. These include its physical footprint whether on land or at sea; energy costs; carbon output; stock welfare issues; and the potentially negative impact on perceptions of provenance and quality. (see paragraph 443)

RECOMMENDATION 56

The Committee endorses the ECCLR Committee's recommendation for urgent research on the subject and the consideration of ways to incentivise the industry to explore further use of the technology. However, it is aware that RAS is not the only closed containment option and would encourage wider research on alternative technologies. (see paragraph 444)

Climate change

The Committee acknowledges the wider impact of climate change and the challenges it brings to both the wild and farmed salmon sectors. It welcomes the Scottish Government's focus on climate change in its Fish Health Framework and looks forward to receiving early feedback on its progress. (see paragraph 448)

Research on the impact of salmon farming

RECOMMENDATION 57

The Committee notes that the ECCLR Committee's report identified a range of significant gaps in knowledge, data, analysis and monitoring around the adverse risk the sector poses to the environment. It strongly endorses the ECCLR Committee recommendation on the need for more research in these areas. (see paragraph 467)

RECOMMENDATION 58

However, the Committee acknowledges the challenges inherent in the collection and processing of this data. It calls on the industry and all other relevant bodies and organisations to work together to overcome the barriers of the scale of the task and the challenge of securing appropriate funding for that research. In particular, it agrees that there should be a requirement for the industry to contribute finance, expertise and other relevant resources to independent research. The Committee calls on the Scottish Government to consider how an appropriate mechanism can be introduced. (see paragraph 468)

Regulation and consent

The Committee notes the views provided by stakeholders on the efficacy of the current regulatory and consenting regime. Whilst some of those who have commented consider it to be adequate, the Committee shares the views of the majority of those who provided evidence who consider that a more robust and integrated regime is required. (see paragraph 489)

From the evidence it has received, the Committee has gained the strong impression that the farmed salmon sector in Scotland has been subjected to what might be described as “light touch” regulation and enforcement to date as the relatively young industry has developed. (see paragraph 490)

However, in recent years a range of fish health and environmental challenges have emerged and whilst it is clear that the industry is working hard to address these, the Committee is of the view that the regulatory regime has failed to keep pace with them. (see paragraph 491)

RECOMMENDATION 59

The Committee also notes and shares the concerns expressed in evidence that the current consenting and regulatory framework which is spread across several regulatory bodies is confusing and is poorly coordinated. It is of the view that the co-ordination of and interaction between the various elements of the regulatory regime needs to be significantly improved. The Committee recommends that Marine Scotland should be tasked with taking responsibility in delivering the necessary improvements and in taking on an overarching co-ordinating role. (see paragraph 492)

It is also clear to the Committee that the application of visible enforcement by regulatory bodies has been limited. It is of the view that robust enforcement of regulatory standards is absolutely essential if they are to meet their intended purpose. (see paragraph 493)

The farmed salmon industry is of significant value to Scotland’s rural and wider economy. If this value is to be maintained and the industry is to grow, the Committee is in no doubt that it must be seen by consumers and markets to be meeting highest international production, fish health and environmental standards. It notes that should other producing nations operate under significantly more robust regulatory frameworks designed to raise standards, this could provide them with an advantage in terms of provenance. (see paragraph 494)

RECOMMENDATION 60

The Committee is therefore of the view that maintaining the status quo in terms of the regulatory regime in Scotland is not an option. It considers that there is a need to raise the bar in Scotland by setting enhanced and effective regulatory standards to ensure that that fish health issues are properly managed and the impact on the environment is kept to an absolute minimum. The Committee therefore recommends that a comprehensively updated package of regulation should be developed by Marine Scotland and other regulatory bodies, both to ensure the sector will be managed effectively and to provide a strong foundation on which it can grow in a sustainable manner. (see paragraph 495)

The Committee is firmly of the view that a stricter regulatory and consenting regime - that is also fair and proportionate - can only benefit the sector, helping to drive improvement and giving it confidence that it is meeting its environmental responsibilities. (see paragraph 496)

The Committee is aware that some of the larger salmon farming companies in Scotland are already operating under a stricter regulatory regime in Norway and suggests that they would have little difficulty in making a transition should stricter regulations come into force in Scotland. Indeed, the Committee notes that some producers indicated in evidence that they recognise the benefits of enhanced regulation relevant to Scotland and would not be opposed to it. (see paragraph 497)

The Committee recognises that there are a range of current exercises such as the Scottish Government's consenting review; the consultation by SEPA on the new regulatory proposals set out in its draft Finfish Aquaculture Sector Plan; and the Fish Health Framework workstreams which provide an opportunity to make tangible improvements to the way in which the sector is operated and managed. It welcomes this package of work and considers it essential that the outcomes from it result in proposals for change in certain elements of the regulatory framework. (see paragraph 498)

RECOMMENDATION 61

However, the Committee calls on the Scottish Government to conduct a review of those other aspects of the regulatory framework that are not covered by these exercises. (see paragraph 499)

Role of SEPA in consenting and regulation

The Committee shares the view of the ECCLR Committee that the regulatory tools currently available to SEPA are neither adequate nor effective. It also endorses that Committee's concerns that SEPA has not been performing well in monitoring the environmental performance of the industry or in enforcing the regulations which relate to its responsibilities. (see paragraph 512)

The Committee is concerned that the sector has shown very poor rates of compliance with SEPA's current standards. This is borne out by the results of its compliance assessment process for 2017 which showed an increase in the number of salmon farms had failed to meet the required standards. (see paragraph 513)

The Committee welcomes SEPA's acceptance that a strengthening of environmental protection measures is necessary and that proposals for delivering this feature in its draft Sector Plan. However, the Committee again states its concern that the publication of the sector plan was delayed and that it has therefore been unable to comment in detail on these proposals in this report. (see paragraph 514)

RECOMMENDATION 62

The Committee considers it to be essential that SEPA introduces a significantly enhanced regulatory and monitoring regime under which it will robustly and

effectively enforce compliance with environmental standards. It therefore welcomes the inclusion in SEPA's draft sector plan of consultation proposals to more effectively monitor the environmental performance of the industry and, improve compliance levels. (see paragraph 515)

Regulator information and transparency

RECOMMENDATION 63

The Committee is of the view that a key part of any improvement in the enforcement of regulation should be the introduction of mechanisms to provide more open and transparent reporting of regulatory breaches. It is also strongly recommends that any changes to the enforcement regime should incorporate measures which will ensure that there is a move away from the self-assessment culture that appears to be prevalent at present. (see paragraph 519)

Local authorities and the planning process

RECOMMENDATION 64

The Committee notes that the Scottish Government is currently undertaking a consenting review. It requests an update on this exercise, including details of whether the outcome is likely to impact on the role of planning authorities in considering applications for salmon farms. (see paragraph 528)

Financing of regulation

The Committee considers effective enforcement with appropriate penalties to be of significant importance in ensuring the industry complies with regulatory standards. It is also of the view that this is a necessary requirement should the industry wish to expand in a sustainable manner without causing damage to the environment. The Committee notes that SEPA now has additional tools at its disposal to raise revenue through enforcement action. However, it is concerned that it has taken four years since the relevant statutory powers were granted for these tools to be introduced (see paragraph 536).

The Committee welcomes SEPA's statement in its draft Finfish Aquaculture Sector Plan that it will apply monetary penalties to those who fail to comply with its proposed strengthened regulatory standards (see paragraph 537).

RECOMMENDATION 65

The Committee notes the indication that consideration of licence auctions for farmed salmon sites will be included as part of the Scottish Government's consenting review. It also notes the Cabinet Secretary's suggestion that licence fee structures could be used in Scotland to incentivise the use of new

technologies. However, the Committee cautions that careful thought would have to be given as to how the implementation of any such measures would ensure a fair market and avoid smaller operators and local communities being marginalised or excluded. The Committee calls on the Scottish Government to provide it with details of the outcomes of its consideration of these matters in due course. (see paragraph 538)

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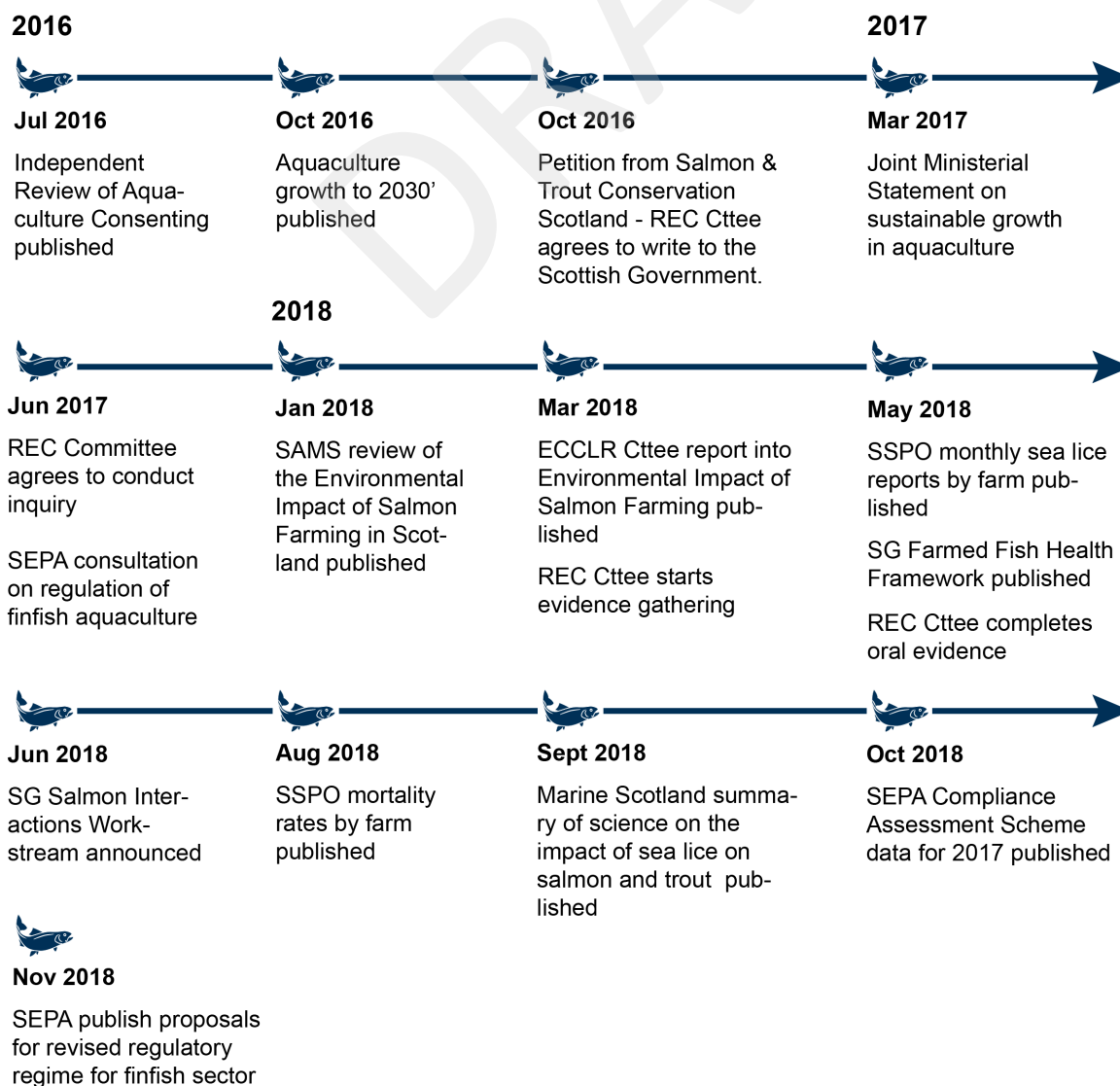
Introduction

1. The remit of the Rural Economy and Connectivity Committee's inquiry was to consider the current state of the salmon farming industry in Scotland, identify opportunities for its future development and explore how the various fish health and environmental challenges it currently faces can be addressed. The Committee agreed to undertake the inquiry on 31 January 2018. This followed on from its consideration in 2016 and 2017 of a petition lodged by Guy Linley-Adams on behalf of Salmon and Trout Conservation Scotland, which related to the regulatory control of marine fish farms to limit the impact of sea lice on wild salmonids.
2. The membership of the Committee changed during the consideration of this report. Kate Forbes MSP was replaced by Maureen Watt MSP on 6 September 2018.
3. The Environment, Climate Change and Land Reform Committee ("ECCLR Committee") agreed to consider the environmental impact of salmon farming on the marine environment in advance of the REC Committee's wider inquiry into the aquaculture industry. Both the REC and ECCLR Committees asked SPICe to commission a review of research on aquaculture and the environment, building on a 2002 Scottish Government commissioned review and synthesis of the environmental impacts of aquaculture. SAMS Research Services Limited (SRSL) completed a comprehensive literature review to assess and summarise—
 - the environmental impacts of salmon farming in Scotland
 - the scale of the impacts and
 - approaches to mitigating the impacts.
4. The ECCLR Committee took evidence from the report's authors, stakeholders and regulatory and consenting authorities in February 2018. It also sought written views from the public and stakeholders on the commissioned report. The ECCLR Committee reported to the REC Committee on [5 March 2018](#), setting out its views on the environmental impact of aquaculture in Scotland and the farmed salmon sector in particular.



5. Other pertinent factors taken into account by the Committee in the production of this report include:
- The Scottish Government's response to an **Independent Review of Aquaculture Consenting** which took place in 2016. The review considered the whole of the aquaculture consenting process; determined the concerns of the key players in the consenting process; identified strengths and weaknesses, and examined the scope for improvement. This contained a number of quick wins and longer-term objectives.
6. Following the conclusion of the Committee's formal evidence gathering the following also occurred:
- The publication of the **Scottish Government's 10 Year Farmed Fish Health Framework** in May 2018. This document was produced by the Farmed Fish Health Working Group and identified seven work streams including: Information Flow and Transparency; Gill Health; Sea Lice; Cleaner fish; Production Cycle and on-Farm Management; Licensing Regime and Medicine Use; as well as Climate Change and Ocean Acidification,;
 - The announcement of a **salmon interactions working group** in June 2018 which will examine and provide advice on the interactions between wild and farmed salmon. The Group will consider the conclusions from this Committee's inquiry, evaluate current Scottish Government policy and review any existing and planned projects around interactions as well as create recommendations and a delivery plan for the future,;
 - In September 2018 Marine Scotland published an **updated summary of science** on information relating to impacts of salmon lice from fish farms on wild Scottish sea trout and salmon.

- In August 2018, the Scottish Salmon Producers' Organisation (SSPO) published details of mortality rates for all salmon farms in Scotland; and
- In October 2018, SEPA published details of the results of its [Compliance Assessment Scheme for 2017](#) which included regulatory compliance information for salmon farms.
- In November 2018, SEPA published a draft [Finfish Aquaculture Sector Plan](#) which included proposals for a revised regime to strengthen the regulation of the sector; new standards for the organic waste deposited by fish farms; enhanced environmental monitoring and creation of a new SEPA enforcement unit; and a new approach to the sustainable siting and operation of fish farms that could allow for larger farms.
- At the same time, SEPA also [published a research report on the evaluation of a new seabed monitoring approach to investigate the impact of marine cage fish farms](#). This report concluded that medicine from Scottish salmon farms “is significantly impacting local marine environments”.



7. In this report, the Committee details its consideration of the economic, social and environmental issues pertinent to the salmon farming industry in Scotland and provides its views and recommendations on the way forward for the sector

Evidence received

8. The Committee launched a written call for evidence for the inquiry on 8 February 2018 with a closing date of 27 April which received over 160 submissions. There were six oral evidence sessions held with aquaculture research bodies; environmental organisations; regulatory and development bodies; salmon farming industry and wild fisheries representatives; and the Cabinet Secretary for the Rural Economy and Connectivity, Fergus Ewing MSP (“the Cabinet Secretary”). The Committee also invited major supermarket retailers to provide oral evidence, instead submitting written evidence. It was disappointed that none of these retailers were willing to attend, and that it was unable to question them on the evidence they submitted.
9. As part of its evidence gathering, the Committee also undertook a fact-finding visit on 30 April 2018 to a wild salmon fishery at River Lochy, Drimsaille Mill Salmon Hatchery, and Marine Harvest facilities at Lochailort Recirculation Hatchery and Gorsten Fish Farm.



10. In March 2018, Members of the Committee discussed issues related to its inquiry during a meeting at the Scottish Parliament with the then Norwegian Fisheries Minister, Per Sandberg, while discussing wider aquaculture and sea fisheries

matters. Committee members also held an informal video-conference with representatives of the Aquaculture Stewardship Council.

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Economic and social benefits of salmon farming

11. This section of the report considers the economic and social impact of salmon farming. Those in favour of the industry stated that it could provide jobs, community benefits, offshoot industries and economic stability in fragile rural economies. However, others argued that the economic and social impact on local industries and communities was detrimental and unsustainable. For example, the impact on ecotourism and other types of local fisheries. Potential benefits and concerns are looked at in turn.

Positive economic and social impact

12. Several salmon farming companies stated that they contribute significantly to Scotland's economy by providing jobs directly on the fish farms as well as further up the supply chain. Some also stated that they contribute on a social level by providing further benefits to the communities in which they operate.
13. The Cabinet Secretary for the Rural Economy told the Committee that—
 - ” ...aquaculture contributes enormously to the rural economy. It supports more than 12,000 jobs and contributes £620 million a year to the economy.

Source: Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 127¹
14. This value to the Scottish economy was established in the 2017 Highlands and Islands Enterprise research report on the “ [Value of Scottish Aquaculture](#) ”.
15. Grieg Seafood Shetland Ltd described the wider benefits of providing these jobs in rural areas—
 - ” Many of these jobs are helping to support sustainable rural communities by providing year-round stable employment. This in turn helps to keep rural schools, post offices, shops and community halls open. ²
16. Marine Harvest described how the quality of jobs had also changed over time to become much more complex and technical, which was reflected in the higher wages being paid by that company. Ben Hadfield said —
 - ” It used to be a job with a farm manager and farm hands; now it has become more technical, and we are employing a lot of scientists, veterinarians, people with information technology skills and so on. The wage structure reflects that.

Source: Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield (Marine Harvest Scotland), contrib. 109³
17. In written evidence, the company highlighted some examples of what they considered to be their wider social economic contribution to local communities—

” ...on Muck we resurfaced the main road and deliver the shopping from Mallaig when the weather is too stormy for the regular ferry service, on Colonsay we provide transport for school trips and on Rum we are about to build new houses and infrastructure, a pontoon and facilities for visiting yachts. ⁴

18. Katrine Johnson, a fish farmer from the island of Unst in north Shetland, highlighted the importance of fish farming in maintaining this remote community as “immeasurable” ⁵, particularly in the context of the loss of other employers like the oil industry and the air force. It was argued that in addition to over 100 jobs in the industry and the associated local spend, economic benefits were generated for a range of local businesses ranging from ferries to education providers.

19. The Committee notes that the Scottish Salmon Producers Organisation have a community engagement charter designed to benefit communities, which they described as—

” ... a commitment to give the local communities some direct benefit from the yield from the local farm...last year, we contributed about £1 million to local communities through various schemes...It is not all financial support—some of it is the giving of time, offering education and support and getting into schools and even nurseries. For example, we bought small minibuses to transport people to community youth facilities.

Source: Rural Economy and Connectivity Committee 02 May 2018, Scott Landsburgh, contrib. 114⁶

20. The Committee also heard about the benefits of the industry providing supply chain jobs and spin off industries. This resulted in increased spend in local economies as well as job apprenticeships for young people. Stewart Graham, Gael Force Group, said that—

” There are about five jobs in the supply chain for every one in the production companies.

Source: Rural Economy and Connectivity Committee 02 May 2018, Stewart Graham, contrib. 140⁷

21. Cargill Aqua Nutrition Scotland said that —

” ...our Scottish salmon feed business...helps support numerous Scottish businesses (everything from farmers and local hauliers, to marketing consultants and caterers) who we work in partnership with as part of our supply chain. ⁸

22. Inverlussa Marine Services which provides service vessels to the industry described how they take on school leavers on Mull as apprentices, who are then retained as paid employees in the rural economy. It said—

” This allows young people within these rural communities relatively unique opportunities for highly skilled labour in an otherwise relatively limited employment market, restricted to predominantly fishing and hospitality. ⁹

Negative economic and social impact

23. However, many submissions provided an alternative view, suggesting that salmon farming has detrimental economic and social impacts.
24. Representatives of other fin and creel fisheries told the Committee that salmon farms can make their work difficult and potentially dangerous, as they can push these industries, which are often small and locally based, out of the most productive areas. The Scottish White Fish Producers Association Ltd and Mallaig & North-West Fishermen's Association stated—
- ” The locations the salmon farms use, protected in inlets, are often rich fishing grounds or safety areas for fishermen in bad weather. When farms are put in these areas, fishermen are forced to work outside these protected areas, losing important fishing grounds and creating dangerous situations. ¹⁰
25. Other respondents expressed the view that salmon farms have a negative impact on the environment and, in some cases, a consequential economic impact on their businesses such as marine tourism or wild salmon fisheries. For example, [Anna Novak](#), described the risk of contamination of storm-washed seaweed by toxins from salmon farms on her business. The Committee discusses the potential impact of salmon farming on wild salmon in more detail later in this report.
26. Some respondents said they did not have the resources and political lobbying resources to ensure their viewpoint was considered on a par with the larger, multi-national companies. Some respondents voiced the opinion that the Scottish Government supported the industry despite its impact on local businesses. For example, Dive & Sea The Hebrides stated—
- ” The Aquaculture industry, which has a detrimental impact on most other marine users, would appear to have the might of the Scottish Government behind them, with the political will, support, and funding to create innovation and growth at any cost. This disparity of power is unjust and is crippling investment in those small local businesses, who ironically do not have an impact on the marine and coastal environment. ¹¹
27. Several respondents questioned whether the full economic impact of salmon farming was being considered adequately once the environmental impact is considered. Michael Wigan wrote that “If the salmon farm industry was subjected to a scrupulous cost-accounting the economic benefits to Scotland might well be negative. Far from being a pillar of the economy this industry may be a costly cul-de-sac.” ¹²
28. The Committee also heard about the relative economic and social value of other industries (such as angling, creeling and wildlife tourism). Some respondents, such as [‘SaveSeilSound’](#) stated that Scottish Government figures show that the tourism and leisure sector generates a significantly greater amount of revenue than aquaculture.
29. Quoting Scottish Government [figures](#) ¹³, member of the public, Gavin Pennycook said that “Despite their high profile, fish farms employ very few people - less than 1800 in the whole of Scotland” ¹⁴

30. Other contributors highlighted the lack of a statutory community or regional wealth fund within the salmon industry to provide longer term and more stable support for local communities. Corin Smith, an owner/operator of a small specialist fly fishing travel business agency based in the Highlands, said—

” It seems extraordinary in today’s climate that there are no statutory community or regional wealth funds associated with salmon farming. It is even more extraordinary that none of the political representatives of these constituents have ever led or advocated on this issue. ¹⁵

31. **The Committee acknowledges both the economic and social value that the salmon farming industry brings to Scotland. It provides jobs to rural areas, investment and spend into communities and stimulates economic activity in the wider supply chain.**

32. **RECOMMENDATION 1**

However, the industry also creates a number of economic, environmental and social challenges for other businesses which rely on the natural environment and the Committee recognises this impact. Therefore, if the industry is to grow, the Committee considers it to be essential that it addresses and identifies solutions to the environmental and fish health challenges it faces as a priority.

33. The Committee discusses action that is required to meet these challenges later in this report.

Growth of the industry

34. In 2016 a strategy document was produced outlining the salmon farming industry's ambitions for growth [Aquaculture Growth to 2030: A strategic plan for farming Scotland's Seas](#)¹⁶.

35. According to [Scottish Government figures](#)¹⁷ 162,817 tonnes of salmon were produced in Scotland in 2016. By 2020 the industry aims to sustainably produce 210,000 tonnes of marine finfish, increasing to 350,000 tonnes per year by 2030. This represents an increase of 115% and is anticipated to boost the value of Scottish aquaculture from £1.8bn in 2016 to £3.6bn by 2030.

36. In its letter to the REC Committee the ECCLR Committee stated that—

” Scotland is at a critical point in considering how salmon farming develops in a sustainable way in relation to the environment. The planned expansion of the industry over the next 10-15 years will place huge pressures on the environment. Industry growth targets of 300,000 - 400,000 tonnes by 2030 do not take into account the capacity of the environment to farm that quantity of salmon. If the current issues are not addressed this expansion will be unsustainable and may cause irrecoverable damage to the environment.

Source: Environment, Climate Change and Land Reform Committee (5 March 2018) Report to the Rural Economy and Connectivity Committee on the Environmental Impact of Salmon Farming, 2018¹⁸

37. The Committee acknowledges the work of the ECCLR Committee on the impact of salmon farming on the environment. It notes that whilst the ECCLR Committee was supportive of aquaculture it stated that it could only occur based on the precautionary approach being taken and environmental problems being resolved. It stated clearly that—

” The status quo is not an option.

Source: Environment, Climate Change and Land Reform Committee (5 March 2018) Report to the Rural Economy and Connectivity Committee on the Environmental Impact of Salmon Farming, 2018¹⁸

38. This position was also supported from a regulator's perspective by the Chief Executive of SEPA who said in a [letter to the ECCLR committee that](#)—

” I am also in complete agreement that the status quo is not an option for securing the protection of the environment alongside ongoing increases in production.

Source: Letter from the Chief Executive Officer of the Scottish Environment Protection Agency to the Environment, Climate Change and Land Reform Committee in response to the letter the Committee sent on 3 March 2018, 2018¹⁹

39. The industry's growth strategy document [Aquaculture Growth to 2030](#) states—

” 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.

Source: Scotland Food & Drink, 2016²⁰

40. When questioned by the Committee, industry representatives were clear that this growth will only be possible if it occurred on a sustainable basis and if various challenges it currently faces were addressed. The SSPO stated in its submission that—

” The industry has an aspiration to grow to meet increasing demand but remains resolute that any future growth will be steady and sustainable.

Source: Scottish Salmon Producers Organisation, 2018²¹

41. Echoing this point, Stewart Graham from Gael Force Group said—

” Because the whole strategy for growth is about taking a sustainable approach, none of us in the industry expects to move on until we are on top of the existing challenges.

Source: Rural Economy and Connectivity Committee 02 May 2018, Stewart Graham, contrib. 179²²

42. James Withers from Scotland Food and Drink noted that –

” ...our environmental integrity and pristine waters are a key asset, so it is critical that we grow the industry, in value as much as in volume, collectively with the environmental agencies.

Source: Rural Economy and Connectivity Committee 25 April 2018, James Withers, contrib. 122²³

43. He also opined that relationships with industry and regulatory bodies have improved significantly in the last 18 months and that there are more opportunities for collaboration and partnership to support sustainable growth.

44. The Committee heard a range of views related to these growth targets. The RSPCA called for a period of consolidation for the industry. It stated that —

” We would also assert that success is not necessarily defined simply by producing more numbers, but by making more of what we already have, a pursuit that in itself will result in more fish (for example, through improved survival rates) being produced

Source: Royal Society for the Prevention of Cruelty to Animals (RSPCA) and RSPCA Assured, 2018²⁴

45. It also heard from retailers, who asserted that increased production will be required to meet future demand. Sainsbury's said—

” It is clear that significant increases in sustainable aquaculture production will be required, both at a domestic and global level, in order to deliver improved population health and food security in future.

Source: Sainsbury's Supermarkets Ltd, 2018²⁵

46. The Committee was told that if Scotland fails to meet the growing demand for farmed salmon or does not do so in a sustainable manner, then retailers will simply look elsewhere. For example, in written evidence Argyll and Bute Council noted that—

” Scottish farmed salmon has historically had a premium over Norwegian farmed salmon. However, Scotland may be at risk of losing its status as a premium supplier if it cannot satisfy growing demand. This is because retailers need a reliable product supply and may be obliged to source Norwegian or Chilean salmon because of the greater volumes that these countries can produce.

Source: Argyll and Bute Council, 2018²⁶

47. Whilst the industry acknowledges that the growth targets proposed by the industry are aspirational, some questioned whether they could be achieved. [The Scottish Salmon Company](#) stated—

” doubling capacity in the next 12 years would be unrealistic as this would only be four generations of salmon production. Therefore the focus for the sector should be to create a more realistic target to achieve steady sustainable growth.

Source: The Scottish Salmon Company, 2018²⁷

48. Waitrose noted that because of salmon farming’s high visibility in coastal waters it can be an easy target for criticism and that public support would be necessary to achieve growth. [Waitrose](#) stated—

” If the 2030 vision is to be realised, even partially, then the industry needs to accept that it must work towards a social license to expand.

Source: Waitrose, 2018²⁸

49. Marks and Spencer noted that they were concerned about the lack of efficiency of some production sites in Scotland which is often driven by their small scale and their inability to expand.

50. However, some organisations were strongly opposed to growth in the salmon industry. [Craignish Restoration of Marine and Coastal Habitat](#) stated —

” ...we are appalled by the intention of the industry to expand on a massive scale...without first addressing the toxic pollution that is devastating the wild salmonid stocks, poisoning the seabed and killing crustaceans.

Source: Craignish Restoration of Marine and Coastal Habitat, 2018²⁹

51. In written evidence to the Committee, Fisheries Management Scotland stated—

” We do not consider that industry growth targets should be adopted by Scottish Government, or included in the National Marine Plan, without a robust assessment of the environmental carrying capacity for increased growth, including existing farms.

Source: Fisheries Management Scotland, 2018³⁰

52. It was also suggested that rather than seeking to expand production, it should be reduced. [Scottish Salmon Watch](#) stated that—

- ” Far from promoting the expansion of salmon farming or even considering a doubling or trebling by 2030, the Scottish Parliament should be recommending drastic reductions in salmon farming production immediately.

Source: Scottish Salmon Watch, 2018³¹

53. Other organisations such as Salmon and Trout Conservation Scotland called for a moratorium on expansion until environmental issues have been resolved.

54. This position was supported by [Scottish Environment LINK Marine Group](#) which said —

- ” ...there must be no new marine fish farms using current ‘open cage’ practices or any expansion of existing fish farm sites, including any increases in farmed fish biomass at existing sites until the current failings in the regulation of the salmon farming industry and the environmental problems the industry causes...are understood and resolved.

Source: Scottish Environment LINK Marine Group, 2018³²

55. The [National Trust for Scotland](#) also said it would like to see a moratorium on any new farms or expansion of existing farms until environmental challenges have been overcome and effectively controlled. It felt that—

- ” This is in line with the application of the precautionary principle under Scottish Planning Policy (2014) for the protection of the environment, and of the ecosystems services approach under the United Nations Sustainable Development Goals.

Source: The National Trust for Scotland, 2018³³

56. This sentiment was also supported by a number of members of the public who contributed to the call for views as well as organisations such as the Marine Conservation Society, FIDRA and Flora and Fauna International.

57. Other organisations noted the negative consequential impact that expansion in salmon farming may have on other inshore fishing industries. For example, North Minch Shellfish Association cautioned that—

- ” To reach the production figures the salmon industry is talking about, the amount of sea area involved would be extreme and that is unacceptable to static gear fishermen and divers who supply a high quality market using sustainable fishing methods with minimal impact on the fishing grounds they fish.

Source: North Minch Shellfish Association, 2018³⁴

58. When questioned about support for the salmon industry’s growth targets, the Cabinet Secretary emphasised that these have not been adopted as Scottish Government targets, although it supports the industry achieving its potential. He noted that increasing growth is not necessarily predicated on an increase in stock numbers and that the Scottish Government would look to the increased value of the product, for example, through smoked salmon production. When asked whether the

Scottish Government should employ a moratorium the Cabinet Secretary stated that—

” I certainly do not think that a moratorium would be justified. I contend that we already apply the precautionary principle.

Source: Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 141³⁵

59. In considering the evidence submitted on the issue of whether a moratorium on new sites and expansion of existing sites should be applied, the majority of the Committee were of the view that there was insufficient evidence to support this. However, two members of the Committee dissented from this view. John Finnie dissented as he supports a moratorium being applied with immediate effect. Colin Smyth dissented on the grounds that a moratorium should be considered if sufficient progress is not made to address regulatory deficiencies and fish health and environmental concerns.

60. Mike Palmer of Marine Scotland advised the Committee that although the Scottish Government support for the industry’s growth target was on the basis that it would be achieved sustainably. He said —

” We would not be supportive of growth at any cost. Growth has to be balanced with the protection of the environment...we need to find and constantly improve and enhance our regulatory approach to ensure that the environment is protected as we move towards the sector’s aspirations.

Source: Rural Economy and Connectivity Committee 09 May 2018, Mike Palmer, contrib. 147³⁶

61. **RECOMMENDATION 2**

The Committee strongly agrees with the view of the ECCLR Committee that if the industry is to grow, the “status quo” in terms of regulation and enforcement is not acceptable. It is of the view that urgent and meaningful action needs to be taken to address regulatory deficiencies as well as fish health and environmental issues before the industry can expand. The Committee discusses these issues in more detail later in the report.

62. **RECOMMENDATION 3**

The Committee notes calls for a moratorium on new salmon farm development and expansion of existing sites, it considers that there is insufficient evidence to support this.ⁱⁱ

63. **RECOMMENDATION 4**

The impact of expansion plans on other sectors which share the marine environment needs to be recognised and the impact reduced. The Scottish Government, SEPA and all other responsible authorities should therefore ensure that the needs of other industries are fully considered in setting the strategic context for the sector.

ii John Finnie and Colin Smyth dissented.

64. **The Committee believes that if these challenges are effectively addressed then the many economic and social benefits of the farmed salmon industry can grow as both the industry, and the communities it works with, continue to develop.**

The Impact of Brexit

65. The issue of the UK leaving the European Union also has the potential to significantly influence the growth of the salmon farming industry. Currently the UK's membership of the single market means that zero tariffs and very low 'non-trade measures' apply in its business with the EU.
66. A [research report](#)³⁷ produced by the Scottish Government suggests that increases in tariffs and costs linked to 'non-trade measures' would have negative impacts on farmed salmon output and exports. When asked about the potential impact of Brexit on the growth of the industry the SSPO said—
- ” As we approach Brexit, we seek frictionless, tariff free and uninterrupted trade with our European partners during the transition period and after the UK exits the EU. If the UK is not able to secure a trade deal with the EU, that would result in a tariff of 13% being applied to smoked salmon products and a 2% tariff on fresh salmon exports to a major trading bloc.²¹
67. The Committee also heard concerns about the impact of Brexit on the ability of the sector to get fresh, high quality produce to market on time. Marine Harvest stated—
- ” When exporting fresh salmon, the time it takes to reach the end user is the most critical factor. Any future regulations which would make it harder for our salmon to reach its destination would be of concern to us.⁴
68. Other contributors, acknowledging that Brexit could impact negatively on business with Europe, were open to the idea of trading beyond the EU. Professor Phillip Thomas said—
- ” ...salmon sales will be subject to whatever trading arrangements for foodstuffs are agreed between the UK and the EU, and these could disadvantage UK sales into the EU. However, Scottish Farmed Salmon is a global food product and any contraction in EU market access would release product to be sold on the wider international market³⁸
69. Some from within the industry shared this view. Grieg Seafood stated—
- ” Industries such as salmon farming, which can help address the trade deficit will become even more important to the UK post-Brexit. There is a strong demand for Scottish salmon and while free-trade with the EU would be beneficial we are confident that there will be a strong market for our product whatever the eventual terms of Brexit may be.

Source: Grieg Seafood Shetland Ltd, 2018²

Impact of Brexit on workforce availability

70. The Committee also heard in evidence that a large proportion of the staff working in the salmon farming industry are from other EU member states, and that this was particularly the case in the fish processing sector. Scottish Government figures state that Scotland's seafood processing industry relies on non-UK EEA workers for 58% of its labour force (rising to 70% in some areas such as Grampian)³⁹
71. Concerns were raised by the industry in terms of allowing current staff to continue in employment as well as the possible impact of future immigration policies on recruitment. Wester Ross Fisheries Ltd said—
- ” 95 % of our processing staff originate from Eastern Europe, and we have experienced significant recruitment challenges since the referendum vote, in common with all food processing businesses in Scotland.⁴⁰
72. Shetland Islands Council stated—
- ” Shetland is home to many EU nationals which live, work and invest and study in our local communities. A significant number of these workers are employed in the salmon farming sector in a range of skilled and semi-skilled positions. Our ability to retain and attract the workers needed, whether EU or further afield, is essential to avoid a post-Brexit recruitment crisis.

Source: Shetland Islands Council, 2018⁴¹

73. **The Committee recognises the negative impact that Brexit may have on the access to EU export markets. It is particularly concerned about the ability of Scotland's food and drink sector to deliver fresh produce to European markets to current timescales and the impact tariffs may have on profitability.**
74. **The Committee also recognises concerns about the capacity of the salmon farming industry to retain and recruit staff given the likely loss of access to EU labour markets. The Committee notes that the industry may find it challenging to retain and attract the workers required, particularly in the salmon processing sector.**
75. **RECOMMENDATION 5**
- The Committee calls elsewhere in this report for the highest possible environmental and fish health regulatory standards to apply to the farmed salmon sector in Scotland. However, it is concerned that these standards could become technically misaligned with those in the EU post-Brexit and that this could lead to problems in accessing EU markets. It therefore calls on the Scottish Government to indicate how it intends to work with the UK Government to ensure that this issue is addressed.**

Workforce, skills and infrastructure

76. Notwithstanding the recruitment and retention challenges presented by Brexit, the aquaculture industry envisages an increase in employment to up to 18,000 staff by 2030. The Scottish Aquaculture Innovation Council's report '[Scottish Aquaculture: a view towards 2030](#)' highlights that a key area of constraint for the industry is the ability to find and retain skilled staff.
77. The HIE report '[Skills Review for the Aquaculture Sector in Scotland](#)' also states that there are a number of current and future skills challenges facing the sector.
78. HIE suggests that the need to fill these skills gaps is pressing, both now and in the future. This includes a need for more engineering and boat skills, and high-quality research and development as well as leadership, management and wider business skills. In addition, it suggests the industry needs specific expertise in fish husbandry, fish health, feeding and biology to address fish health and disease control.
79. It also noted that the workforce is ageing and younger staff must be attracted. However, it is recognised that there can be challenges in recruiting and retaining talent in remote rural areas where the fish farms are based. These more remote areas have small local populations to draw on and often lack the digital infrastructure, housing and opportunities that new workers and their families look for.
80. In discussing this problem with the Committee, Elaine Jamieson from HIE agreed that, infrastructure is key to having a successful sector, and highlighted that Norway is further ahead than we are on roads and information technology infrastructure.
81. Ms Jamieson gave an example of an area where the industry had accelerated the improvement of digital connectivity on the Isle of Mull, which although motivated by a business need, has also resulted in a community asset.
82. Industry representatives also agreed that a lack of infrastructure for employees was a problem. Examples were given of companies building houses (which might be sold to employees after they have spent time working for the company and become resident in that area) or offering housing which was tied to being employed by the company. Other examples included forming partnerships with affordable homes schemes, where money was contributed as part of a wider build.

83. **The Committee acknowledges the findings of the HIE report highlighting a range of skills gaps and recruitment and retention issues facing the industry. It notes that the report suggests that there is a pressing need to address these and commends its recommendations on how improvements might be made in education and training, developing leadership skills and in recruitment.**

84. **RECOMMENDATION 6**

The Committee also acknowledges the infrastructure constraints faced by the sector that were raised in evidence, particularly a lack of available housing, which can make it difficult to attract and retain staff. The

Committee recognises that a lack of housing can cause difficulty for many businesses in rural and remote areas. It calls on the Scottish Government to work with enterprise agencies and local authorities to consider what work might be done to help ease this constraint.

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Branding and accreditation

The Scottish Brand

The Scottish Brand

85. Several written submissions highlighted the importance of Scottish provenance, and the “Scottish brand” in marketing Scottish farmed salmon.

86. The Committee also heard from development bodies who gave evidence that the Scottish brand is multi-faceted, with an emphasis on high quality standards—

” A large part of the growing market here and overseas is about Scotland’s broader provenance story, and there are a number of parts to that. It is about a mixture of heritage and tradition, but it is also about innovation, family businesses and environmental integrity.

Source: Rural Economy and Connectivity Committee 25 April 2018, James Withers (Scotland Food & Drink), contrib. 98⁴²

87. The Scottish brand is particularly strong in marketing farmed salmon to the UK, according to Steve Westbrook, with the UK market accounting for 50% of Scottish salmon sales. However, further local branding is sometimes evident when marketing salmon abroad—

” In America, the company sells its product as Wester Ross salmon rather than as Scottish salmon.

Source: Rural Economy and Connectivity Committee 07 March 2018, Steve Westbrook, contrib. 59⁴³

88. Both producers and development bodies highlighted the importance of high regulatory standards and provenance to the Scottish Brand—

” There is a premium for Scottish salmon both in our domestic market and externally. That is because of the provenance—we are growing our salmon in beautiful wild Scotland—and because the regulatory standards in Scotland are very highly regarded internationally. We are seen as having very high standards and delivering a product that reflects that.

Source: Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 125⁴⁴

89. The Cabinet Secretary also referred to the importance of salmon being farmed in pristine waters to high standards to the Scottish brand—

” ...that perception is extremely important, because salmon is our biggest food export.

Source: Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 125⁴⁵

Maintaining the brand

90. It was suggested in both written and oral evidence that there was potential for the Scottish brand to suffer damage because of the environmental and health issues facing the industry—
- ” Increasing and persistent controversy around fish health, environmental degradation and doubts about the quality of farmed salmon means that brand Scotland itself is at risk with far-reaching implications for other producers of food labelled “Scottish”.
- Source: Lynn Schweisfurth, 2018⁴⁶
91. Marks and Spencer PLC also pointed to negative publicity coverage of the polarised debate impacting on consumer confidence—
- ” We are also concerned about how contentious the issues in Scottish salmon farming are and how polarised and vocal the stakeholder debate has become. Negative publicity like we have seen in recent months could undermine consumer confidence in Scottish salmon over the medium term and risks undermining business and investor confidence too.⁴⁷
92. For a brand to succeed, consumers need to believe in it and the brand needs to meet their expectations. James Withers from Food and Drink Scotland highlighted that consumers in most export countries and the UK are increasingly environmentally conscious. For [Waitrose](#) their “customers want to see consistency both in terms of the quality of the product and consistency of supply”.⁴⁸ Maintaining the brand will therefore require consistent transparency as well as strong environmental and health standards. James Withers said—
- ” They want to understand the regulatory system that sits behind the product. They might not want to go into the detail, but they want to have faith that our production systems work in harmony with the environment and enhance it where possible.
- Source: Rural Economy and Connectivity Committee 25 April 2018, James Withers, contrib. 101⁴⁹
93. The Hebridean Whale and Dolphin Trust highlighted a potential restriction regarding the US market—
- ” Under United States import regulations, future exports of Scottish salmon to the major export market in the US will no longer be possible if any exported fish have come from fish farms where seals have been deliberately shot within the lifecycles of those fish.⁵⁰
94. Many written submissions suggested that if the Scottish brand is to be maintained, there is a need to make further environmental, and regulatory and production improvements (discussed elsewhere in this report) to address consumer concerns and meet specific international requirements.
95. The Committee also notes that some written submissions suggested that there could be a negative impact on other Scottish brands such as other fishing products

and notably tourism if the reputation of the Scottish salmon industry was to suffer damage.

96. **The Committee recognises the importance of the Scottish brand in selling a wide range of food and drink products, including salmon, both abroad and in the UK. This brand is built upon a high quality product and robust environmental and regulatory standards.**
97. **The Committee notes that the challenges referred to elsewhere in this report could and may be affecting consumer's perceptions of the product. To maintain the Scottish brand, Scotland's salmon farmers must excel in responsible and sustainable production methods and communicate this effectively to consumers, retailers and other stakeholders.**

Accreditation

98. There are many accreditation or certification schemes for farmed salmon, some of which have been operating for over 20 years. The Committee heard from Ben Hadfield of Marine Harvest that there are around 20 schemes in operation.
99. Schemes range in geographic reach from Global schemes (GLOBAL G.A.P), to Scottish specific (Code of Good Practice for Scottish Finfish Aquaculture, which all members of the SSPO sign up to) and even retailer specific (Marks and Spencer PLC Lochmuir). Schemes also vary in terms of their range of products. There are schemes which indicate quality across a range of products (e.g. Label Rouge) and there are salmon or aquaculture only schemes (e.g. RSPCA welfare standards for farmed Atlantic salmon).
100. Most standards cover a range of elements such as traceability, fish health and welfare as well as production standards (including environmental standards). Some extend wider to cover social responsibility, relationships with workers and local communities. Standards at farms are reviewed and certified normally through auditors.
101. The Committee heard from the Aquaculture Stewardship Council (ASC) about their salmon standard for farms. Several written submissions also put forward the Aquaculture Stewardship Council's standard, or aspects of it, as an exemplar of best practice. However, Scott Landsburgh from SSPO said that—

” The most widely used accreditation scheme is GlobalGAP.

Source: Rural Economy and Connectivity Committee 02 May 2018, Scott Landsburgh, contrib. 161⁵¹

102. The purpose of accreditation is varied. One role it fulfils is to provides clarity to consumers and retailers about how salmon has been farmed, which can assist in marketing it as a product —

- ” This ability to demonstrate the provenance and quality of Scottish farmed salmon product and production methods has been one of the major factors behind the success Scottish farmed salmon commands in both the UK and wider international markets today.

Source: ACOURA, 2018⁵²

103. Accreditation is frequently a requirement for suppliers to access certain markets and stores. The supermarkets who provided written submissions, (Aldi, Marks and Spencer PLC, Sainsbury's and Waitrose) all require suppliers or producers to meet certain standards or codes of practice. For example Sainbury's said—

- ” Sainsbury's sources farmed Atlantic salmon exclusively from independently certified and RSPCA Assured farms in Scotland.²⁵

Levels of accreditation in Scotland

104. As noted above there are many different types of accreditation. The Committee received evidence that Scottish salmon farms are often signed up to multiple schemes, with almost daily inspections as a result of this and the regulatory framework—

- ” Audits and fish health inspections are carried out almost every day of the year by Scottish Government Fish Health Inspectors, retailers, RSPCA, CoGP, and other quality assurance schemes. Daily fish health checks are carried out on every single farm in Scotland by fish farmers. The combination of professional health checks and audited schemes means that the standard of fish husbandry on Scottish farms is very good and independently monitored.

Source: Northwards Limited, 2018⁵³

105. The Committee heard that very few sites are certified by the Aquaculture Stewardship Council (ASC) Standard in Scotland. This anomaly was particularly pronounced for Marine Harvest, which has only one Scottish site accredited whereas a large number of its sites in Norway are accredited. The ASC explained that there are various reasons why Scottish sites haven't pursued certification. However, a particular issue is that the standard prohibits the rearing of smolts in open cage freshwater systems, before they are transferred to sea cages - a common practice in Scotland. This prohibition is due to concerns that young smolts could integrate with wild salmon.
106. ASC are currently consulting on relaxing the prohibition of the production of smolts in open cage freshwater systems. Marine Harvest indicated that should this occur, it would move all its sites in Scotland to ASC accreditation.
107. Fisheries Management Scotland (FMS) wrote to the Committee detailing their concerns about freshwater smolts and ASC's plans for change (correspondence, further to original submission). However, FMS also stated that ASC's changes for farming in freshwater would provide additional safeguards (if the process continued) and they supported these safeguards.

108. **RECOMMENDATION 7**

Many marketing and quality assurance accreditation schemes exist for farmed salmon. These often set more stretching environmental standards than are currently in place in Scotland. The Committee calls on the Scottish Government to take the requirements of existing accreditation schemes into account when considering regulatory change to establish where alignment might be appropriate and feasible.

109. **RECOMMENDATION 8**

The Committee calls on industry representatives, accreditation bodies, retailers and other stakeholders to work together to consider ways in which clarity and simplicity for consumers in a potentially confusing accreditation landscape can be provided.

Challenges facing the farmed salmon industry

110. As the Committee acknowledges earlier in this report, the farmed salmon industry is clearly of great significance in economic terms to Scotland and has plans to develop and increase production. However, it is also clear that the industry currently faces some serious challenges in managing such issues as the health and welfare of farmed salmon; its environmental impact (often because of efforts to address fish health issues); and climate change. If it is to meet its growth targets and continue to meet accreditation standards it must deal with these challenges effectively.
111. The Committee is aware of the significant level of stakeholder debate and media attention in recent years covering issues related to the farmed salmon industry. This has focused mainly on concerns related to sea lice infestation and the treatment thereof, the level of mortality amongst farmed salmon stocks, interactions with wild salmon and the environmental impact of the industry.
112. The marine environment falls within the remit of the Environment, Climate Change and Land Reform (ECCLR) Committee, which reported on the marine environment in advance of the REC Committee's wider inquiry into the aquaculture industry.
113. This section of the report will discuss each of the main challenges currently faced by the sector, taking into account the views expressed by the ECCLR Committee in its report and evidence submitted to its inquiry.
114. The Committee will also refer to how similar challenges are currently being addressed by the Norwegian Government and farmed salmon sector in Norway. This is not to suggest that action being taken in other salmon producing countries should necessarily always be applied in a Scottish context, rather that it serves as a useful comparator.
115. Other important factors considered by the Committee in discussing sectoral challenges include the publication of the Scottish Government's Fish Health Framework in May 2018 and the announcement of a salmon interactions working group in June 2018. In addition to the anticipated SEPA sectoral review and the Scottish Government's previous response to 'An Independent review of Aquaculture Consenting'.

Fish health and welfare

116. Several of the key areas identified as currently being of a significant challenge to the salmon farming industry in Scotland relate to fish health and welfare.
117. These were summarised by Professor James Bron, a professor in aquatic animal health at the University of Stirling—

” We are in a period with a diverse range of health challenges. In the past, the situation was much simpler but, at the moment, there is an axis between sea lice and complex gill pathologies, which are caused by a range of pathogens and environmental influences. There are viral pathogens, bacterial pathogens and parasites, as well as the effects of water temperature on algal blooms, which cause gill problems and feed back to sea lice, too. There are a number of pathogens and, in part, the mortalities result from the combination of different pathogens.

Source: Rural Economy and Connectivity Committee 07 March 2018, Professor Bron, contrib. 117⁵⁴

118. The industry is working to improve the situation. For example, the RSPCA stated in written evidence that in its view “the Scottish Atlantic salmon industry is unique in the way that it has applied itself to focusing on the welfare of the fish” which has provided a template which is applied in other countries. However, challenges remain.
119. As mentioned earlier in this report, it is clear from much of the evidence received by the Committee that the prevailing view amongst many stakeholders was that these issues would need to be addressed before the industry pursued its expansion ambitions. For example, in its written submission, the [RSPCA](#) stated that it would—
- ” ...urge caution about rushing headlong into such an expansion programme now, when some of the health and welfare issues relating to the fish appear to be an often daily and unpredictable challenge, in terms of being able to plan robust methods of dealing with them. ²⁴
120. Onekind express concern about fish health and welfare as well as the treatment of fish. It argued that it “causes stress to fish because handling, crowding and exposure to adverse environments are all part of the process. There is also no guarantee that treatment will work, meaning that fish are often exposed to multiple, stressful treatments.” Onekind were also concerned about the health and welfare of cleaner fish.
121. From a salmon industry perspective, the SSPO stated in its written submission that “Fish Health is fundamental to the continued success of the salmon sector”.

Farmed salmon mortalities

122. The Committee notes that one of the main issues highlighted by the ECCLR Committee as part of its work on the environmental impact of salmon farming related to the increased level of mortalities in the sector in recent years. In its letter to the REC Committee, the ECCLR Committee states –
- ” The Committee is concerned that diseases are still leading to large numbers of farmed fish being slaughtered. The Committee is concerned that the industry and regulators appear to be incapable of reducing the level of mortality. These levels would not be considered acceptable in other livestock sectors and should not be considered to be acceptable in the salmon farming industry. ¹⁸

123. The ECCLR Committee also highlighted its concern that salmon mortality levels would increase if fish health problems were not addressed prior to any significant expansion of the sector.¹⁸
124. Scotland's Aquaculture website provides Monthly Biomass & Treatment Reports for all fish farms, including a figure for kilograms of biomass lost per month. This indicates that mortality was relatively flat at about 1% per month until 2010 and began to increase thereafter. A 1% mortality per month is equivalent to just under 20% mortality over an 18-month production cycle.
125. Several witnesses provided the Committee with information on the various contributory factors that had led to increases in mortality, including Heather Jones of the Scottish Aquaculture Innovation Centre, who said—

” The causes of mortality in fish farming can involve bacteria, viruses and parasites in the environment, insufficient or poor nutrition and feeding, human error, and physical trauma through, for example, big storms slamming fish into the nets and bruising them. There are lots of causes of mortality, and every farming company that I know is seeking to minimise its mortalities because they represent a significant amount of lost profits.

Source: Rural Economy and Connectivity Committee 25 April 2018, Heather Jones, contrib. 166⁵⁵

126. There is an acknowledgement within the sector that the level of farmed fish survival in Scotland has deteriorated in recent years. For example, in written evidence to the Committee, the SSPO said that—

” New problems like gill diseases have emerged and require management alongside the management of naturally occurring sea lice. Mortality levels in Scottish farms have risen since 2011 because of Amoebic Gill Disease (AGD). Farmers have developed good husbandry techniques for controlling the problem, but it recurs, and with it more complex gill health problems have developed.⁵⁶

127. Ben Hadfield of Marine Harvest confirmed that whereas the sector had performed well in managing and controlling mortality levels up until 2011, a combination of factors have since contributed to increases. He told the Committee—

” We had El Niño conditions, which raised the Atlantic's temperature and meant that we had warmer seas and coastal areas. We have also had reduced efficacy of sea lice medicines, which has meant using less medicine and using other treatments. In that period, mortality levels have increased.

Source: Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 170⁵⁷

128. Industry representatives were keen to emphasise that they were not complacent about fish mortality. They made clear that the sector viewed this as a serious issue and highlighted action being taken to make improvements in fish health management to reduce mortality levels. Craig Anderson said—

” We all employ veterinarians and have biology departments to investigate problems as quickly as possible by sampling fish every day to ensure that they are healthy, because we want zero mortality. Mortality is not good, and we want the lowest possible rate. We are doing an awful lot to improve the situation, but we will never be satisfied until we reach zero—if that is possible.

Source: Rural Economy and Connectivity Committee 02 May 2018, Craig Anderson, contrib. 197⁵⁸

129. Other witnesses expressed the view that there was no evidence of complacency within the industry in relation to the mortality issue and that it was acting to address it. For example, James Withers of Scotland Food and Drink said—

” I do not think that any sector of the food and drink industry has a future if it does not embrace an almost zero tolerance of mortality and any disease issue. There should be a continual appetite to improve... Having worked with the industry, I think that it is up for embracing world-class standards of production and it absolutely accepts that there are improvements to be made. No one has more interest in achieving such improvements than companies and the industry itself.

Source: Rural Economy and Connectivity Committee 25 April 2018, James Withers, contrib. 151⁵⁹

130. The Committee sought comments on the ECCLR Committee’s view that mortality levels in the salmon farming sector were much higher in comparison with those in other livestock sectors. The common theme to emerge from those discussions was that it was perhaps not appropriate to make such a comparison. Heather Jones of the Scottish Aquaculture Innovation Centre said—

” ...the mortality rates of fish are not analogous to the mortality rates of land animals. That is according to Scotland’s chief vet.

Source: Rural Economy and Connectivity Committee 25 April 2018, Heather Jones, contrib. 173⁶⁰

131. In responding to a question on whether high levels of farmed fish mortality presented an environmental concern, Richard Luxmoore of Scottish Environment LINK told the Committee—

” The death of fish on fish farms is a waste of good food, but it is primarily a welfare issue. From an environmental perspective, if all the fish on a fish farm die, it will not necessarily have an impact on the environment outside the fish farm; it is just a commercial problem for the farm.

Source: Rural Economy and Connectivity Committee 14 March 2018, Richard Luxmoore (Scottish Environment LINK), contrib. 44⁶¹

132. Responding to the evidence received by the Committee on the increase in mortality rates in recent years, the Cabinet Secretary for the Rural Economy and Connectivity indicated that one of the key objectives of the Scottish Government’s Fish Health Framework (FHF) would be to directly tackle this issue. He said—

- ” It will include a commitment to present the annual mortality rates in the fish farming industry by cause. We all wish to drive down mortality rates. A mortality rate of zero is what any farmer, on land or sea, would aspire to, whether it be farmed salmon, lambs, or dairy cattle. Sadly, however, life shows that that aspiration is extremely challenging. The fish health framework will take the issue head on.

Source: Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 150⁶²

133. When the Fish Health Framework was published in June 2018 it stated that—

- ” 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.

Source: Scottish Government, 2018⁶³

134. Although the FHF had not been published when the Committee was taking oral evidence on its inquiry, there was some discussion with witnesses about its development and whether its implementation would be on a voluntary or statutory basis. Giving a view from a farmed salmon industry perspective, Ben Hadfield of Marine Harvest said—

- ” The framework will be predominantly voluntary, because we all want healthier fish and better growing fish. Where something is needed that cannot be achieved voluntarily, I imagine that that would move into regulation and policy within the regulators.

Source: Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 218⁶⁴

Early harvesting following disease outbreak

135. The Committee also explored with witnesses the practice of the early harvesting of fish when an outbreak of disease has been identified. The ECCLR Committee had highlighted in its report that “The overall number of deaths as result of disease, ill health and stress may be masked by the early harvesting of fish with disease or life-threatening conditions”. Industry representatives confirmed that early harvesting occurred, was taken on veterinary advice and was viewed as a means of reducing mortality rates. Grant Cumming of Grieg Seafood Scotland said—

- ” ...we would not treat fish that have such damage to their gills that they probably would not cope with the treatment. In such circumstances the fish are not sick, but one of the main organs and the tissue that helps them to have normal swimming behaviour and to be in good health are not in a condition that would allow the fish to cope with the treatment.

Source: Rural Economy and Connectivity Committee 07 March 2018, Professor Migaud, contrib. 143⁶⁵

Provision and transparency of data on mortalities

136. Scotland's Aquaculture website provides Monthly Biomass & Treatment Reports for all fish farms, including a figure for kilograms of biomass lost per month. However, the Committee noted from evidence that data on mortality was not, as a matter of course, produced by farmed salmon producers, although some companies published this on a voluntary basis. When questioned on this, industry representatives acknowledged that publishing such data would be a positive step. Ben Hadfield of Marine Harvest said—

” We are very knowledgeable about the health status of our fish and the challenges that we face...but I accept that communicating such information in an open and transparent way is something that we have done badly. The information is sometimes complex, but we have to explain it. The SSPO has recently published sea lice data and proposes to publish mortality data, and Marine Harvest has published that data by site since 2016.

Source: Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 205⁶⁶

137. In announcing its [Fish Health Framework](#) on 23 May 2018, the Scottish Government acknowledged that information on mortality levels in fish farming had never been made available on a sector-wide basis. It indicated its intention that the Farmed Fish Health Working Group (FFHWG) should work towards presenting the annual mortality rates in the fish farming industry at an open-site level by cause and on a consistent and standardised basis. It stated that this data should be used to “enable evidence based decision making, best practice and promote openness and transparency within the Scottish industry.”
138. The Committee notes that the SSPO started to publish monthly mortality figures in arrears for all Scotland's salmon farms on a voluntary basis for the first time in August 2018. It notes in particular that this data highlights unusually large variation in the levels of fish lost each month, with some sites showing mortality levels as low as 0.1% with others as high as 7.9% ([May 2018 figures](#)).
139. The SSPO data also provides information on 'Cumulative mortality over full production cycle', which it presents in percentage terms. The SSPO defines this data as “the percentage of fish that have died on a farm during the entire production cycle, given as a percentage of the total number of fish that were initially stocked on the farm”. This data can only be reported once the entire farm has been fully harvested and fallowed. The Committee notes that the [data published for May 2018](#) indicates production cycle mortality rates for those individual farms who reported to be as high as 34%.

Transportation of dead fish

140. There was some discussion during the Committee's evidence sessions on the transportation and disposal of slaughtered fish. The ECCLR Committee had highlighted its concern about this matter.
141. The Committee was also aware of some negative media coverage around such issues in the lead up to and during its inquiry. This coverage often included a

suggestion that the level and nature of mortalities in salmon farms was being covered up by producers.

142. When questioned on this, the Cabinet Secretary confirmed that the Animal and Plant Health Agency (APHA) has the regulatory role in respect of the transportation issue.
143. Following a request for further information, the [APHA informed the ECCLR Committee](#) about the protocols which are in place surrounding the transportation of dead fish to prevent risks to public and animal health. It stated that animal by-products must be collected, identified and disposed of without undue delay. They must be transported in sealed new packaging, covered leak-proof containers or special vehicles. Dedicated containers must be used or where they are not they must be cleaned and disinfected after each use to prevent cross contamination. Mixtures of different categories of animal by-products must be treated in accordance with the rules relating to the highest risk material and labelled accordingly. Appropriate documentation must accompany the transport and contain a detailed specification of the material, where it's from and date of transport. Records must be kept for at least two years. Plants handling animal by-products should be approved or registered by APHA who will carry out routine risk based inspections.
144. The Committee sought information on whether any evidence existed that the transportation of dead fish to disposal sites might present a risk of a crossover of disease to wild fish populations. Richard Luxmoore of Scottish Environment Link confirmed that he was not aware of any such evidence.

145. **The Committee understands that there will be a level of mortality in all livestock production. It recognises the challenges that the industry faces in managing a range of fish health and welfare issues that contribute to increasing mortality levels.**

146. **RECOMMENDATION 9**

However, the Committee considers the current level of mortalities to be too high in general across the sector and it is very concerned to note the extremely high mortality rates at particular sites as highlighted in the data recently produced by the SSPO. It is of the view that no expansion should be permitted at sites which report high or significantly increased levels of mortalities, until these are addressed to the satisfaction of the appropriate regulatory bodies.

147. **RECOMMENDATION 10**

The Committee welcomes the statement in the Scottish Government's Fish Health Framework that ambitious targets should be agreed "to achieve a significant and evidenced reduction in mortality for salmon and trout" and that these should be world-leading. However, it is strongly of the view that practical action is also required and that there should be a process in place which allows robust intervention by regulators when serious fish mortality events occur. It considers that this should include appropriate mechanisms

to allow for the limiting or closing down of production until causes are addressed.

148. The Committee is in no doubt that there needs to be far greater transparency in reporting mortality rates and disease outbreaks at salmon farms. Whilst it welcomes the publication by the SSPO of monthly mortality data for each salmon farm in Scotland in August 2018, it notes that this information is very limited and does not provide detailed information on the causes of mortality on each farm.

149. The Committee notes the Scottish Government's FHF proposal to develop a consistent reporting methodology for farmed salmon mortality, and to move towards the production of pro-active open site reporting of mortality statistics. It considers that this initiative provides an opportunity to develop proposals which will build on and enhance the information which the industry has recently started to provide on a voluntary basis.

150. **RECOMMENDATION 11**

The Committee considers it to be essential that this work delivers high levels of transparency that will provide confidence to all stakeholders. It therefore recommends that the information provided in future should provide an accurate, detailed and timely reflection of mortality levels including their underlying causes across the whole sector. It should also incorporate a mechanism for reporting where early harvesting has been carried out because of a disease outbreak.

151. **RECOMMENDATION 12**

The Committee calls on the FHF working group to seek the views of all industry, scientific, environmental and other stakeholders to ensure that the methodology that it is tasked with developing for reporting mortalities is sufficiently robust. It is strongly of the view that it should be a mandatory requirement for all farmed salmon producers to provide this data.

152. **RECOMMENDATION 13**

The Committee further recommends that there should be coordination with the data that is to be provided on sea lice infestation levels (see paragraph 215) to ensure that a package of data is available which provides an up-to-date and comprehensive overview of all fish health, welfare and treatment issues across the sector.

153. The Committee notes the concerns expressed about the transportation and disposal of dead fish, and some members noted negative media reports on the matter. Whilst the Committee has not received any substantive evidence that points to any particular weakness or failing in the specific regulatory regime which covers such matters, it seeks reassurance that it is being both complied with by producers and properly enforced by regulators.

154. RECOMMENDATION 14

The Committee therefore recommends that a review should be conducted by the Animal and Plant Health Agency of the relevant regulatory and enforcement regime which applies to the transportation and disposal of dead fish to ensure that it remains fit for purpose. This recommendation is consistent with the Committee’s general view that there should be a strengthening of regulation which applies to the farmed salmon sector.

Gill health

155. It is suggested in the evidence received by the Committee that the principal contributor to the increase in farmed fish mortality is that of complex gill disease. The Committee heard that salmon go through major physiological changes when they move from fresh water to sea water environments. This involves restructuring the way its gills work. The gills are also extremely important to fish when dealing with phytoplankton. Any issues or weakness in the gills can cause significant problems to the health of the salmon.
156. In its written evidence to the inquiry, Marine Harvest states—
- ” Our main challenge is gill disease which we believe has become more common in recent years largely as a result of farming fish in water which is now significantly warmer than it was when salmon farming began.⁴
157. Alan Wells from Fisheries Management Scotland informed the Committee that the gill issues that the fish farmers have been experiencing are not a single disease but a range of challenges.
158. Professor Migaud from Stirling University explained that—
- ” A number of factors have an impact on inflammation of the gills to the point at which fish welfare becomes an issue—we would not treat fish that have such damage to their gills that they probably would not cope with the treatment.
- Source: Rural Economy and Connectivity Committee 07 March 2018, Professor Migaud, contrib. 143⁶⁵
159. The HIE report states that one of the key actions to maximise the value of the sector into the future is to address gill disease. The ECCLR Committee considered this as part of its inquiry.
160. The Committee also received evidence which suggests that prevalence of gill disease compounded difficulties in treating fish with other conditions. Professor James Bron of the University of Stirling said—

” There is a particular problem at the moment with the axis of sea lice and gill problems, which makes it much more difficult to treat the sea lice or the gill problems, because the physiological gill problems make it more difficult for the fish to respire effectively; if their respiration is challenged, any handling stress or treatment stress may tend to impact their welfare or health.

Source: Rural Economy and Connectivity Committee 07 March 2018, Professor Bron, contrib. 122⁶⁷

161. Other evidence suggested that, given that gill health disease represents a significant challenge for the salmon industry internationally, an opportunity existed for Scotland to become the centre for collaboration and research in this area of fish health. Heather Jones of SAIC said—

” One of the things that Scotland would like to do is to become the expert and host of that international forum, so that we do as much research as we possibly can to resolve the problems that we know are happening both here and around the world. That can come through academic, industry and international research collaborations.

Source: Rural Economy and Connectivity Committee 25 April 2018, Heather Jones, contrib. 171⁶⁸

162. The Committee notes that the Scottish Government’s Fish Health Framework, in recognition of the significance of gill health disease to the sector, has a separate work stream dedicated to it, which lists the following 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).

163. The Committee does not underestimate the serious challenge which gill health disease presents to the industry. Indeed, it has difficulty in understanding how expansion of the industry can reasonably occur if this issue is not satisfactorily resolved.

164. The Committee notes that, as suggested by many witnesses, one of the primary factors contributing to the increase in the prevalence of gill disease is thought to be rising sea temperatures. It considers that the prevailing sea temperature may also become a discussion point around the location of salmon farms in future and whether siting these in deeper, colder water might assist in overcoming the challenge presented by complex gill disease.

165. **The Committee welcomes the prominence given to the gill health issue by the Scottish Government in the Fish Health Framework and its focus on developing a clearer understanding of its causal factors and a treatment approach to mitigate its effect. However, given the acknowledged complexities of this disease and the limited knowledge which exists as to its causes, it would appear that this is not an issue that will be resolved easily or quickly.**

Sea lice

166. Another key fish health issue to be raised with the Committee during the inquiry was that of sea lice infestation and the impact this has on salmon in fish farms.
167. Many submissions raised concerns that the presence of large numbers of salmon in farms attracted sea lice which, in turn, could increase infestation levels in wild salmon passing farms on their migratory routes. Concerns were also raised about the impact of sea lice treatment on the environment and other species. These concerns are discussed later in this report.
168. Adult sea lice live on the skin of fish and occur naturally in the marine environment. Sea lice damage their hosts skin through feeding. This can lead to infections by viruses and bacteria. Infestation can cause stress and immune suppression with greater susceptibility to secondary infection and the onset of disease.
169. According to Marine Scotland, sea lice numbers peaked in 2015 and have been falling since. Quarterly [Fish Health Management Reports](#) based on the SSPO Fish Health Management System show lice counts on a regional basis.
170. Some of the evidence received by the Committee was positive about the trends in sea lice numbers and the treatments used by the industry. For example, Benchmark, a UK-headquartered global aquaculture biotechnology company supplying health products, genetics, advanced nutrition and knowledge services to the farmed salmon industry, stated in a written submission that—
- ” substantial progress has been made by the industry in recent years with respect to sea lice. Observations by Marine Scotland Science’s epidemiologists (Hall and Murray 2018) that average adult and ovigerous female sea lice numbers are at their lowest in four years are in line with the field experience of our veterinary surgeons and technicians working on Scottish sites.
- Source: Benchmark Holdings, 2018⁶⁹
171. The RSPCA said—
- ” The misleading impression often given is that sea lice are a problem at all sea sites, but in our experience this is not the case, and there are some areas/sites where sea lice are not an issue, and chemical treatments have not been used for a number of years.⁷⁰

172. Industry representatives also advised the Committee of the improvements being made in reducing sea lice levels and the resources they are applying to address the issue. In its written submission, [Marine Harvest](#) states—

” we have been at the forefront of developing new systems to treat sea lice and we treat our fish if they have an average of 0.5 gravid female lice per fish. The range of treatment methods we now use resulted in our lice levels being six times lower at the end of 2017 than at the end of 2016...We are constantly working to develop more innovative and sustainable practices and technologies to treat sea lice. ⁴

173. Indication of the progress being made by the industry in treating and reducing the prevalence of sea lice was also provided by Professor Bron of the University of Stirling who said—

” The ECCLR report sort of suggests that the industry has just sat back. In fact, I think that there has been more innovation and more development of the tools that are needed to treat sea lice in the past five years than there has been across a much longer period before that. The industry is very concerned about sea lice and is being effective in treating the problem.

Source: Rural Economy and Connectivity Committee 07 March 2018, Professor Bron, contrib. 146⁷¹

174. However, Salmon and Trout Conservation Scotland disagreed with the point of view of the industry that sea lice levels were decreasing. It [wrote to the Committee](#) highlighting the Marine Harvest Group's 1st Quarter Report 2018 which it believes demonstrates that although sea lice levels fluctuate from year to year they are actually increasing again in 2018. Quoting that report, it highlighted the following in terms of Marine Harvest—

” Biological costs per kg increased by 43% in the first quarter of 2018 compared to the corresponding quarter of 2017, mainly due to increased health costs, mortality and negative scale effects.

Source: Marine Harvest Group, 2018⁷²

175. Professor Migaud, also of the University of Stirling, provided details of the wide range of measures currently being used and new innovations that are being brought forward to treat sea lice. These include—

- cleaner fish,
- preventive measures such as skirts around the cages and lighting systems that can keep fish away from the sea lice
- snorkel cages which keep the fish lower down in the water column.
- optical delousing, which uses a laser system that has been developed in Norway.
- functional feeds which include additives to boost mucus production, which can reduce sea lice attachment, or to boost the immune function of the fish so that they can defend themselves better against some diseases.
- bath treatment with fresh water.

- warm bath treatment.

Sea lice - regulation, management and trigger levels

176. When giving evidence to the Committee, Scottish Government officials explained that the Aquaculture and Fisheries (Scotland) Act 2007 gives the Fish Health Inspectorate powers to inspect salmon farms in respect of sea lice issues. This allows the Inspectorate to look at the measures that are in place to control, prevent and reduce sea lice; and to look at the number of sea lice. Charles Allan of the Fish Health Inspectorate provided details of the 2017 review of this policy—

” Moving forward by a decade, we reviewed the policy, which we considered in respect of satisfactory measures to control sea lice... Under the previous regime, a farm could have a very high sea lice number but still be compliant. We now require farmers to demonstrate that they can treat sea lice positively by reducing their number to an acceptable level.

Source: Rural Economy and Connectivity Committee 09 May 2018, Charles Allan, contrib. 173⁷³

177. The Committee was advised that in the first decade of the legislation, no warning letters were sent by the FHI and no enforcement notices were served. However, since the change in policy in 2017 and the introduction of the requirement for farms to demonstrate satisfactory levels, a number of warning letters and enforcement notices have been served. Charles Allan told the Committee that the Inspectorate intended to review this policy in July 2018 and stated that—

” ...it is most likely that the numbers will be changed significantly.

Source: Rural Economy and Connectivity Committee 09 May 2018, Charles Allan, contrib. 175⁷⁴

178. In its written submission to the Committee, the SSPO expressed the view that the new regulatory measures introduced in 2017 “should be given sufficient time to allow any targeted improvements in lice levels to be realised.”²¹

Sea lice treatment “trigger levels”

179. One issue which emerged during the Committee’s discussion of the management of the sea lice issue was that of the different “trigger levels” governing treatment which exist. The farmed salmon industry’s own Code of Good Practice for Scottish Finfish Aquaculture (CoGP) provides the following levels to indicate when salmon should be treated for sea lice—

- 0.5 adult female lice per fish during 1st February to 30th June inclusive.
- 1.0 adult female lice per fish during 1st July to 31st January inclusive.

180. However, Marine Scotland has different trigger levels in their revised sea lice policy which applied from July 2017 (which will be reviewed in July 2018). These are—

- 3 adult female lice per fish - farms report to FHI and FHI increase monitoring
- 8 adult female lice per fish - implementation of action plan agreed with the FHI

181. In September 2017, following a decision by the Information Commissioner, Salmon and Trout Conservation Scotland [published](#) information on fish farms that had breached Scottish Government reporting or intervention levels for the numbers of adult female sea lice on farmed salmon.
182. [In its letter to the Committee](#), the ECCLR Committee questioned the basis of setting the trigger levels. It subsequently [wrote to Marine Scotland](#) seeking further information on how the levels were decided and why they differ so much from the levels in the industry's Code of Good Practice.
183. In a [written response to the ECCLR Committee](#), the Director of Marine Scotland referenced a [recent scientific article](#) which explained that—

” The reporting level of three and the intervention level of eight adult or ovigerous female sea lice were developed following detailed and lengthy discussions within Marine Scotland and with stakeholders. It was a significant development of lice management policy and largely measures with observations made of the average lice loadings on farmed salmon populations [in Scotland] over the previous three years.

Source: Marine Scotland, 2018⁷⁵

184. The Marine Scotland response also explained that these reporting and intervention levels differed from the trigger levels set out in the CoGP as the latter are used to prompt salmon farmers and veterinary surgeons to consider whether a sea lice treatment is appropriate and, as such, serve a different purpose.
185. Some who gave evidence to the Committee questioned the usefulness of trigger levels, as they did not take into account other factors which would allow the impact of the presence of sea lice to be quantified. For example, Jon Gibb of Lochaber District Salmon Fishery Board said—

” If a lice target does not take into account the number or biomass of fish in a fish farm or, indeed, the path of a smolt from a river to the open ocean, whether the number is one, three or eight lice per fish or whatever is meaningless.

Source: Rural Economy and Connectivity Committee 14 March 2018, Jon Gibb, contrib. 109⁷⁶

186. [In its letter to the Committee](#), the ECCLR Committee recommended that the level of 0.5 lice per fish set out in the CoGP should be mandatory. The ECCLR Committee also stated that “There is also a need for further investigation and development of good practice in the adaptive management of lice at the farm level, the disease management area level and the regional level. This should be based on reduced trigger levels, using real time data.” Commenting on this, Guy Linley-Adams suggested that measuring lice levels per fish was not a sensible approach and that they should instead be set at a farm level. He also suggested that—

” It would be sensible to put in a ceiling above which farms should not operate and should be required to harvest early in order to remove the fish.

Source: Rural Economy and Connectivity Committee 14 March 2018, Guy Linley-Adams, contrib. 112⁷⁷

187. It was also suggested to the Committee that it would be more appropriate to manage sea lice in Scotland in farm management areas. Dr Wells stated that—

” ...we should not look at individual farms but at groupings of farms. Farm management areas are ones in which there is synchronous stocking of fish; there is an element of synchronisation between the treatments and all the rest of it.

Source: Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 113⁷⁸

188. Other witnesses cautioned against the application of mandatory levels, on the basis that this might lead to increased levels of treatment which could have unintended consequences. Professor Bron of Stirling University noted—

” ...if the fish have to be treated every time a small number of lice are found, that means repeated treatment with drugs and, because the lice become resistant to veterinary medicines, the more the fish are treated, the more likely the lice are to develop resistance. Mandatory treatment whenever a louse is seen is a very dangerous practice.

Source: Rural Economy and Connectivity Committee 07 March 2018, Professor Bron, contrib. 169⁷⁹

189. The Committee notes that there are differing approaches taken in managing sea lice infestation levels in other salmon producing countries. It is aware, for example, that Norway has lower targets for female lice limits per fish before treatment, compared with Scotland. Some witnesses agreed that these lower levels are an aspiration that we should seek to achieve in Scotland. It was, however, pointed out that differing marine conditions meant that it was not always possible to take a like for like approach. Ben Hadfield of Marine Harvest stated—

” Yes. I think that we should seek to achieve those levels. Norway is colder, however. It is harder to control lice in Scotland, and it is harder to control lice in Ireland than it is in Scotland. The targets are very arbitrary, but people get fixated with them. A target that is acceptable for one water body is not acceptable for another. More collaborative research is required between the parties.

Source: Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 253⁸⁰

190. Another witness suggested that the lower levels of wild fish stocks in Scotland could also have a bearing on whether the approach taken in Norway might be successfully applied in Scotland. Dr Alan Wells of Fisheries Management Scotland said—

” It is an example of adaptive management but it would not necessarily work in Scotland if we used the specific thresholds that are permitted in Norway. My understanding is that the Norwegians permit up to about 30 per cent of the wild stock to be impacted negatively before it goes up to the top level. Our stocks on the west coast are not able to withstand such a level...

Source: Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 125⁸¹

191. The Committee also heard that a robust system was in place in the Faroe Islands to encourage effective management of sea lice infestation by producers, which included a requirement to harvest stocks when required levels are exceeded on a recurring basis. Guy Linley-Adams, giving evidence on behalf of Salmon & Trout Conservation Scotland said—

” Salmon farming in the Faroe Islands operates under a fairly rigorous scheme. The Faroese require their farms to report their lice figures fortnightly and, when they exceed 1.5 lice per fish in three consecutive reports, they have to harvest out their farms within two months—three strikes and you are out.

Source: Rural Economy and Connectivity Committee 14 March 2018, Guy Linley-Adams, contrib. 122⁸²

192. The Committee notes that one of the workstreams forming part of the Scottish Government’s recently announced Fish Health Framework is specifically focussed on the control of sea lice. This notes the shift by the industry from medicinal treatment to a more balanced strategy, utilising a range of control methods. It sets out a range of activities aimed at delivering continued improvement in the control of sea lice on fish farms in Scotland. Key activities of the sea lice workstream include—

- a review of Scotland's voluntary farmed fish sea lice compliance policy, including reporting requirements and intervention thresholds
- Industry to further evolve its sea lice strategy from primarily a medicinal one to a balanced combination strategy. 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.
- 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 information source on the sea lice management 'tool box' and guidance on operational best practice for physical sea lice treatments.

193. **The Committee notes the variety of actions and interventions being undertaken by the sector to address the significant challenge presented by sea lice infestation. However, it is clear that the industry has not as yet identified a means to fully and effectively deal with this parasite.**

194. **The Committee welcomes the wide-ranging proposals in the FHF sea lice workstream, such as the review of voluntary sea lice compliance policy, including reporting mechanisms; the development of sea lice modelling; and an exploration of the potential benefits of site consolidation.**

195. **RECOMMENDATION 15**

Committee notes the various views expressed in evidence relation to the different sea lice trigger levels and thresholds that are applied by the industry itself and by Marine Scotland for reporting and intervention

purposes. It considers that the work of the FHF provides an opportunity to remove confusion around this issue and develop proposals that are appropriate both to the fish health management needs of the Scottish industry and to the regulatory regime. It considers, however, that these should be challenging and set a threshold that is comparable with the highest international industry standards.

196. **RECOMMENDATION 16**

Whilst the Committee recognises that it will take time for the outcomes of the FHF sea lice workstream to emerge, it is strongly of the view that there should in general terms be a move away from a voluntary approach to compliance and reporting with regard to sea lice infestation. The working group should therefore seek to bring forward proposals which make compliance and reporting a mandatory requirement.

197. **RECOMMENDATION 17**

The Committee notes the concerns expressed in evidence that enforcement action in relation to breaches of sea lice levels has not been sufficiently robust to date. It is therefore of the view that if the revised compliance policy is to be effective it must be robust, enforceable and include appropriate penalties.

198. **RECOMMENDATION 18**

Committee also considers it to be essential that appropriate staff and financial resources are provided by Marine Scotland to ensure that compliance is effectively monitored and enforcement action taken where required.

Sea lice - data

199. The Committee notes that the ECCLR Committee was also critical of the level of sea lice data on sea lice prevalence on individual salmon farms that was published in Scotland. Although that Committee welcomed the indication by the SSPO that it planned to publish sea lice data on a farm by farm basis, it was of the view that the industry should be required to publish the data in real time and on a consistent and comparable basis. The ECCLR Committee was also of the view that the reporting of sea lice data should be a statutory requirement for all salmon farms in Scotland.
200. The SSPO has for several years produced and published average sea lice numbers quarterly on a fishery board area basis. Marine Harvest Scotland Ltd, the largest producer of farmed salmon in Scotland, has been [publishing sea lice and mortality](#) information on a site by site basis, in arrears, since April 2017.
201. On 30 April 2018, the [SSPO wrote](#) to both the REC and ECCLR Committees announcing the salmon industry's introduction of sea lice data for all salmon farms

in Scotland – whether members of the SSPO or not. This will be produced monthly on a voluntary basis and time delayed by 3 months.

202. In giving evidence to the Committee following this announcement, Scott Landsburgh, former Chief Executive of the SSPO, provided some further background information. He said—

” We have now gone to a more granular reporting base. It has been difficult to ensure that we have absolutely accurate information; there is no point in putting information out there that has to be withdrawn and reset... There is a three-month lag in the information, which is because we ensure that we have the right data: the data is checked and double checked to ensure that it is accurate.

Source: Rural Economy and Connectivity Committee 02 May 2018, Scott Landsburgh, contrib. 223⁸³

203. The Committee notes that the SSPO proposals were not considered to be sufficient by some stakeholders. For example, Salmon and Trout Conservation Scotland argued that such a time lag for the release of individual farm sea lice data would be unacceptable and unwarranted. It also argued that the presentation of the data could be misleading and understate the scale of the problem.

204. Following the publication of the sea lice data by the SSPO, the [ECCLR Committee wrote to the SSPO](#) requesting further information on why the data provided by the SSPO did not go as far as it had recommended. The [SSPO responded](#) on 7 June that their sea lice data for February was at the lowest levels since they started making detailed reports on the subject. It also highlighted that their data collection is ongoing and it expects to publish new data on its website every month. This response initiated further calls from organisations such as Salmon and Trout Conservation to push for legislation to compel the release of data rather than rely on a voluntary method. It was argued that an amendment to ‘The Fish Farming Businesses (Record Keeping) (Scotland) Order 2008’ could require proactive publication of all relevant records which are already required to be kept by fish farmers (though not published).

Sea lice - international comparisons

205. The Committee is aware that in Norway, comprehensive data is available on sea lice levels, with a traffic light system in operation to show the status of conditions in production areas. Parasite levels on individual salmon farms, disease status and details of veterinary treatments are reported on a weekly basis. Information on sea temperature and any escape incidents is also available.

206. These data are published on a user-friendly, interactive website which gives full public and management access to information on a near real-time basis - <https://www.barentswatch.no/en/>. It is understood that the Norwegian Government is currently assessing whether the discharge of nutrients should also be integrated into the traffic light system as an additional indicator.

207. The Committee was keen to establish the views of witnesses on whether this more comprehensive approach should be taken in Scotland. Ben Hadfield of Marine Harvest indicated that he supported such move. He said—

- ” The ideal would be for the industry to move forward and mirror the Norwegian level of granularity in its publications, and for us all to come together to create a solution-focused culture in which we can develop the industry in a sustainable way. I strongly advocate that that is the right way to go.

Source: Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 233⁸⁴

208. The Committee also followed up on the ECCLR Committee’s recommendation that this data should be provided in real time. When questioned on this, Scott Landsburgh, representing the SSPO, said—

- ” Much of it is there on Scotland’s Aquaculture website and in the SEPA report on compliance assessment scheme data. However, I take your point that it would be a good step for data on performance to be nearer to real time. However, it requires a lot of resource to do that. Let us go one step at a time. We took a very considered step to get to where we are on reporting. There is no doubt that we will keep enhancing that.

Source: Rural Economy and Connectivity Committee 02 May 2018, Scott Landsburgh, contrib. 229⁸⁵

209. Farmed salmon industry representatives also gave their view on the level of data transparency that they aspired to for the sector. Ben Hadfield of Marine Harvest told the Committee—

- ” As an industry, and through the farmed fish health framework working group, we are pushing for a gold standard of transparency, under which all diseases and all lice levels will be published by farm. We need to make that cultural shift, which has been difficult.

Source: Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 221⁸⁶

210. The Committee also explored with witnesses whether the publication of data on sea lice, mortality etc. should be made compulsory for all salmon farms in Scotland. Stewart Graham said—

- ” I have a small point to contribute that may be more difficult for producers to make because it might appear defensive. Ben Hadfield touched on the subject of Norway having a much more pragmatic valuation of the use of the marine environment. The risk of right up-to-date, full disclosure of data is that there will be malicious attacks on a commercial basis and personal attacks on the back of the data. We need to be aware of that risk in making decisions about what we disclose and, in particular, when.

Source: Rural Economy and Connectivity Committee 02 May 2018, Stewart Graham, contrib. 236⁸⁷

211. Grant Cumming from Grieg Sea Food said—

- ” In an ideal world it would be voluntary. However, if there was a feeling that the voluntary information was not suitable and MSPs decided that regulation was the way to go, that would be okay.

Source: Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 237⁸⁸

212. The Committee asked the Scottish Government to provide additional figures outlining the cost of running the Norwegian data website. It said that the website

draws on seven, already operational public data sources, and is managed by a workforce of 1-2 people per year. It suggested that estimated costs behind the website were in the range of £700k. However, this does not include the costs of the already operational data sources which would be additional.

213. RECOMMENDATION 19

The Committee welcomes the recent voluntary commencement of sea lice data provision by the SSPO on an individual farm basis. However, it agrees with the ECCLR Committee's position that the provision of sea lice data should in future be mandatory for all salmon farms in Scotland.

214. RECOMMENDATION 20

The Committee notes that the SSPO produces sea lice data 3 months in arrears, whereas such data in Norway is produced weekly in arrears. It considers that sea lice data in Scotland should be published in a similarly timely fashion, as close as possible to the collection date

215. RECOMMENDATION 21

The Committee also considers that it is essential that the data provided should be that which is required to inform the regulatory and enforcement regimes, as opposed to that which the industry itself takes it upon itself to produce.

216. RECOMMENDATION 22

The Committee is strongly of the view that, in order to increase transparency, there needs to be a significant enhancement in the way sea lice data and other key information related to the regulation of salmon farming is presented. It considers that a comprehensive, accessible reporting system of a similar standard to that which is already in operation in Norway should be introduced in Scotland.

217. RECOMMENDATION 23

If the industry has aspirations to develop and grow, having a comprehensive reporting system which is transparent, reliable and, above all, trusted can only serve it well. The Committee is therefore of the view that there should be a suite of data available covering mortality, sea lice infestation, medicine application and treatment information.

218. RECOMMENDATION 24

The Committee recognises that there would be a cost element in developing and operating such a system but is of the view that this should not preclude this work being taken forward. It considers that the associated costs should be borne by the industry, and calls on the Scottish Government to discuss with industry representatives how this might be achieved.

219. RECOMMENDATION 25

The Committee recommends that the working group charged with taking forward the FHF sea lice work stream should consider the production and presentation of sea lice data as an integral part of its work and bring forward proposals in line with the Committee's views above.

Sea lice - the use of cleaner fish

220. As the Committee heard when taking evidence on sea lice infestation, one means of controlling this is the use of cleaner fish. These fish are increasingly being used on farms as a more environmentally friendly option of lice control. Wrasse species and lumpsuckers are natural predators of lice and breeding is being encouraged to provide a supply for fish farm use. The SRSL report notes that official statistics state that "1,752,000 lumpsuckers and 1,000,000 wrasse were bought by the Scottish salmon farming industry in 2016". It says that—
- ” Wrasse and lumpsucker appear to provide an effective means to control lice infestations, or, at least, to reduce the frequency of chemical treatment of infected salmon.⁸⁹
221. The Committee is aware of the Scottish Government's view that “cleaner fish offer a sustainable and environmentally positive method for reducing the impact of sea lice on salmonid growth”. The Scottish Government's Fish Health Framework also states that “an assessment of the potential contribution of wild caught and hatchery cultivated supplies relative to future demand is essential.”
222. The Committee notes the view of the ECCLR Committee which argued that there is an urgent need for an assessment of future demand for cleaner fish. It stated that this assessment must consider all associated environmental implications of the farming and use of cleaner fish, including what happens at the end of a production cycle.
223. The Committee heard a variety of concerns about cleaner fish welfare. Compassion in World Farming summarised the concerns in its submission—
- ” This includes welfare during capture from the wild (which also raises questions of sustainability), predation by the salmon (especially during feed withdrawal), transfer of bacterial infection and parasites, behavioural and ecological needs not being met (e.g. requirement for shelter as protection from currents in the water), a lack of supplementary feed when lice numbers are not sufficient, and stressful handling when moving salmon and cleaning cages and nets.⁹⁰
224. It argued that the welfare of cleaner fish should be no less important than the welfare of the salmon being farmed and that this welfare should include behavioural and cognitive aspects as well as physical condition.
225. In addition, Onekind argued that the projected industry need for 10 million cleaner fish by 2020 raises concerns. It stated—

” There is very little research into how the biology and behaviour of cleaner fish is suited to captivity. Furthermore, cleaner fish welfare can be compromised on salmon farms through aggressive interactions with salmon, poor husbandry, disease spread, disposal after a production cycle, and treatment mortalities.

Source: OneKind, 2018⁹¹

226. In evidence the Committee heard a variety of concerns about the lack of regulation on wrasse fishing in Scotland, for example, from the North Minch Shellfish Organisation, Sustainable Inshore Fisheries Trust, Argyll and Bute Fisheries Trust and Angling Trust and Fish Legal.
227. The Committee heard that the full impact of wrasse fisheries on wild populations in the coastal waters of Scotland and the SW of England is unknown, but is likely to be considerable. It also noted that lumpfish are now classified as near threatened (NT) on the [IUCN Red List of threatened species](#)⁹⁰

228. Ayrshire Rivers Trust said—

” ...using wrasse or any other species to control lice levels creates another environmental problem elsewhere. Harvesting wrasse from the wild has already depleted stocks of these fish in their natural environments with little or no regard for the impact. This can't continue unchecked...

Source: Ayrshire Rivers Trust, 2018⁹²

229. Aileen Robertson, a resident of Skye and small business owner (related to diving and wildlife), stated that removing wrasse from the wild is also having a damaging impact on local ecosystems. She said that—

” The unregulated and unsustainable harvesting of cleaner wrasse is compounding this problem as the absence of wrasse which feed on and regulates octopus eggs means octopus are thriving. Octopus eat shellfish and obviously if you adjust the balance of one creature in the ecosystem you will disrupt that balance. So, the creel fishermen are currently experiencing a double damage strike from the fish farm industry.

Source: Aileen Robertson, 2018⁹³

230. Ocean Breeze Marine Services LLP stated—

” Independent research must be carried out to assess the level of change being forced onto Scotland's coasts by this permanent extraction; “permanent” because the cleaner fish are destroyed at the end of the production cycle.

Source: Ocean Breeze Marine Services LLP., 2018⁹⁴

231. FIDRA highlighted an article by Open Seas in its written submission which argued that their unusual breeding cycle makes wrasse unsuited to intensive production. Open Seas stated—

” ...all wrasse are born female and will not reach sexual maturity until they are around six years old. It’s at this point when half of wrasse will transform into males – breeding can therefore only take place when these males mature. This slow maturity makes them particularly vulnerable to overfishing, and particularly slow to recover from it when it does occur.

Source: Open Seas, 2018⁹⁵

232. The Committee also heard that the the requirement for wrasse has increased significantly in recent years and that Scottish salmon farm companies have started to source wild wrasse from the south coast of England. Concerns were expressed that, given no real government oversight, the fishery has grown with no stock assessment, effort limitation or minimum landing sizes. In short, it has grown in an unregulated, non-precautionary and unsustainable way.

233. To respond to these concerns, the Committee is aware that the Scottish Government has recently published a suite of voluntary measures to address the potential over-exploitation of the stock. Open Seas highlighted concerns about—

” the apparent self-monitoring, lack of stock assessment or evidence base, and the handing of partial responsibility for a wild capture fishery to the salmon industry.

234. It noted concerns that a number of boats catching wrasse for supply to the salmon farming sector will be maintained by the SSPO. It argued that wild fish are a public resource and that responsibility for management should fall to a public body and be subject to public scrutiny. It also argued that the methodology for data gathering would only require partial catch data to be required. In addition, it argued that “a voluntary and self-reporting approach does not tally with best practice in fishery management” and it, like any other fish stock, Marine Scotland should be responsible for its responsible management.

235. The Scottish Wildlife Trust voiced concerns about the sustainability of wrasse fishing, the fact that cleaner fish hatcheries will have all the same issues as salmon hatcheries and that at the end of the production cycle cleaner fish will all be killed to reduce any spread of disease. It stated—

” The Trust considers cleaner fish to be an inefficient and resource intensive approach to managing sea lice, and believe the industry should instead invest in new technologies.

Source: Scottish Wildlife Trust, 2018⁹⁶

236. Orkney Fisheries Association also questioned their suitability for farming and suggested that—

” ...domestic rearing of Ballan wrasse looks unlikely to be economical due in part to their slow growth and the high tonnages required by the fish farm industry and that their ‘cleaner’ instinct is lost with the learned behaviour of artificial feeding outwith the wild.

Source: Orkney Fisheries Association, 2018⁹⁷

237. The Scottish Wildlife Trust voiced concerns about the sustainability of wrasse fishing, the fact that cleaner fish hatcheries will have all the same issues as salmon hatcheries and that at the end of the production cycle cleaner fish will all be killed to reduce any spread of disease. It stated—

” The Trust considers cleaner fish to be an inefficient and resource intensive approach to managing sea lice, and believe the industry should instead invest in new technologies.

Source: Scottish Wildlife Trust, 2018⁹⁶

238. The REC Committee pursued the issue of cleaner fish in questioning. It heard from Professor Migaud of Stirling University that farming of cleaner fish species at sufficient volume is possible and that it was the aspiration for the industry to have a full supply from commercial farmed cleaner fish as soon as possible.

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241. Professor Migaud informed the Committee that there has been a concerted effort to fast track research and investigation into cleaner fish use. He stated—

” A lot of work has been done on how to feed the fish, breed them and keep them healthy, and now there is a focus on looking at the pathogens and bacterial infections that need vaccines to be developed. Vaccines have already been prototyped and they are being tested at present.

Source: Rural Economy and Connectivity Committee 07 March 2018, Professor Migaud, contrib. 213⁹⁸

242. He also noted that work has been done on the impact of cages and temperature on the fish. He noted that—

” Lumpsucker are extremely active in winter and the cold months, while Ballan wrasse are very active and efficient during the summer months. Together, the two species provide very good biological control in the industry.

Source: Rural Economy and Connectivity Committee 07 March 2018, Professor Migaud, contrib. 217⁹⁹

243. The Committee heard in written evidence from Benchmark FAI Aquaculture that as a relatively new species to aquaculture, challenges remain to be addressed in collaboration with Scotland’s academic and research communities. However, results

looked promising as sites deploying farmed lumpfish in Scotland have documented a sustained 70% reduction in sea lice burden within 8 weeks of deployment.

244. It also stated that its investment in cleaner fish programmes in Argyll, Wester Ross and Shetland has the capacity to meet a substantial part of the growing industry demand, while supporting 26 skilled jobs across these regions.
245. The Committee is also aware of the view of the RSPCA which believes that the most sustainable approach to the use of cleaner fish is for the industry to depend on hatchery reared fish. The RSPCA are also writing new lumpfish standards with this in mind. The Committee notes that salmon farming companies such as Grieg Seafood and Seafood Scotland are working towards only using farmed cleaner fish. For example, Grieg Seafood are farming lumpsucker on all sites.
246. Scottish Natural Heritage said—
- ” ...formal management measures should be urgently introduced and should include mitigation for potential impacts on protected sites and species. Spatial information on the location and intensity of current fishing and an understanding of stock levels will be required to inform the development of management measures. SNH is proposing to carry out some research on the interactions between the wrasse fishery and protected sites/species in the coming year to inform our future advice.¹⁰⁰
247. The Scottish Government has a workstream in the Fish Health Framework on the use of cleaner fish which includes mapping out required research and development, investment and timescale to deliver total industry demand. As well as an assessment of whether management measures are appropriate and proportionate to the current and anticipated future levels of sustainable wild wrasse fishing in Scotland.
248. The Committee notes that other countries are also dealing with the issue of using cleaner fish and that Norway is also addressing similar issues about regulation and cleaner fish welfare. One of the activities in the Fish Health Framework is also the development of an international forum or platform to share cleaner fish husbandry best practice.

249. **The Committee acknowledges the benefits that cleaner fish may have for the salmon industry. However, it recognises that these benefits can only be achieved through careful management of the environmental implications and sustainable use of cleaner fish stocks.**

250. **RECOMMENDATION 26**

It endorses the ECCLR recommendations on cleaner fish and agrees that there is an urgent need for an assessment of future demand as well as all associated environmental implications of the farming, fishing and use of cleaner fish.

251. **RECOMMENDATION 27**

The Committee welcomes the Scottish Government’s commitment to “assess whether management measures are appropriate and proportionate to the current and anticipated future levels of sustainable wild wrasse fishing in Scotland” as part of its Fish Health Framework. It would urge the Scottish Government to complete this assessment as a matter of urgency.

252. RECOMMENDATION 28

The Committee strongly recommends that the Scottish Government consider the need for regulation of cleaner fish fishing to preserve wild stocks and avoid negative knock on impact in local ecosystems.

253. The Committee welcomes the recent developments in industry breeding programmes as it is aware of the long period required for wrasse to reach sexual maturity. It also welcomes the potential for international cooperation and knowledge sharing on this issue.

Environmental impact of salmon farming

254. The Committee heard a wide range of evidence concerning the environmental impact of salmon farming. This was also the focus for the activities of the ECCLR Committee in its inquiry. The ECCLR Committee reported that it was “deeply concerned that the development and growth of the sector is taking place without a full understanding of the environmental impacts. The Committee considers an independent assessment of the environmental sustainability of the predicted growth of the sector is necessary.”

255. The evidence to the REC Committee focused mainly on the impact of fish waste and the chemicals used by fish farms on the local environment. The Committee also noted the secondary impact that the quality of the environment can have on local tourism, diving and other fishing industries. (These associated economic issues were covered above in the section on economic and social impacts.)

Waste

256. The Committee heard that waste feed and faeces from fish farms can collect on the seabed under fish cages. This increase in organic matter can have an impact on an area called the ‘benthic zone’. This is the lowest layer of water closest to the sea bed and includes the sediment, surface and some sub surface layers. The impact of the waste may negatively affect the nature and chemistry of sediments, and can potentially reduce the diversity of animals living there.

257. [The Angling Trust and Fish Legal](#) stated that—

” The fish farming industry successfully externalises its costs through the dumping of large quantities of pollution and toxic chemicals into Scotland’s marine environment. The industry is largely foreign owned and whilst Scotland’s people bear the costs of the pollution it would not appear that they benefit from the profits.

Source: The Angling Trust and Fish Legal, 2018¹⁰¹

258. [Ayrshire Rivers Trust](#) stated—

” Pharmaceutical, chemical and organic wastes from aquaculture facilities have been allowed to pollute the sea-bed and freshwater lochs... Little or no effort is made to contain any wastes within these sites and virtually no monitoring of benthic habitats or species is possible within the current regulatory system.

Source: Ayrshire Rivers Trust, 2018¹⁰²

259. Concerns were also raised that the environmental impact can have a further negative knock on effect on local eco-tourism and diving businesses. For example, the owner of [Dive & Sea The Hebrides](#) stated in relation to waste that—

” It is unsightly, it pollutes, it changes the chemical and physical character of the seabed, destroys biodiversity and kills ecosystems. Nothing lives in anoxic mud except worms feeding on dead organic matter

Source: Dive & Sea The Hebrides, 2018¹⁰³

260. Concerns were also raised about Marine Protected Areas (MPA). Scottish Wildlife Trust called for a review of all fish farms and in particular farms located within MPAs. It noted that many fish farms began operation prior to the establishment of Scotland’s MPA network and, therefore, their impact on the now protected features was not considered. It said—

” It is likely that many of these fish farms would not be granted permission if the application was made today. This is particularly evident for those farms located above maerl beds, as identified in the ECCLR Committee inquiry.

Source: Scottish Wildlife Trust, 2018⁹⁶

261. The ECCLR Committee focused its investigations into the environmental impact of salmon farming. It stated that it was very concerned that current monitoring of the benthic environment has not provided a full understanding of the impact of chemical discharge. It also voiced concerns about the lack of research and the long-term sustainability of sites affected by organic waste. The ECCLR Committee stated that further sustained and long-term research is needed in a number of areas, including—

- how waste is recycled in inshore areas;
- the relationship between waste and pathogenic organisms;
- the cumulative effect of fish farms, including in inshore areas, which have different hydrodynamics to lochs and voes;
- environmental impacts in freshwater environments;

- acceptable levels of sediment loading for different sediment types; and
 - resolving lack of recently synthesised data on the conditions of the benthos near fish farms.
262. SNH called for a greater emphasis on collaborative analysis of post consent surveys and monitoring to develop our understanding of benthic impacts, particularly focussing on Priority Marine Features (PMFs) and protected features, including those outside the modelled impact zone.
263. The Committee heard that SEPA has proposed and consulted on new regulations related to deposits of matter on the sea bed, this is the 'Depositional Zone Regulation' (DZR). The depositional zone is the maximum area of seabed that can be adversely affected by an individual site because of uneaten food and fish wastes. Fish farms receive discharge consents which control how much waste they can expel into the environment. It is anticipated that this will allow a rationalization of existing sites, increasing volumes in some, and reducing volumes in others on the basis that disease, water quality and other parameters are met. HIE suggested in a recent report that up to 25-30% of growth in current annual volumes could come through this process. ([Value of Scottish Aquaculture 2017](#))
264. The DZR draws on the DEPOMOD model. DEPOMOD is a computer modelling programme used by SEPA as a guide to determine licenced discharge quantities of anti-parasitic chemicals and organic waste arising from marine fish-farm operations.
265. In evidence to the ECCLR Committee Dr Hughes said that the current biomass maximum limit "was an arbitrary figure" and that the DZR will allow more "adaptive and responsive management of the biomass". SEPA wrote to the REC Committee and said—
- ” “The changes we will be making to the way we regulate emissions of organic waste will:
- (a) deliver a step change in the scientific monitoring and modelling of organic waste releases into the marine environment; and
 - (b) help fish farm businesses locate their operations where the sea has the necessary environmental capacity to accommodate the scale of production they are planning.
- Exposed parts of the coast with strong tides can quickly dilute and disperse organic wastes.”
- Source: The Scottish Environmental Protection Agency, 2018¹⁰⁴
266. However, the ECCLR Committee raised concerns in its report about the lack of peer review of the new DZR model and that "there is a lack of available scientific and published evidence to support the model".
267. Concerns were also raised by Scottish Environment Link. When speaking on the phase 1 and phase 2 version of the DEPOMOD model Richard Luxmoore cautioned that "none of them is particularly good at modelling complex currents"¹⁰⁵. He

noted that the new DZR model is based on the DEPOMOD model which focuses on an area with 1km². He said—

” Once the waste leaves that modelled 1km², it is forgotten about completely, but we know where some of that waste goes. Some of it is channelled into very specific locations and deposited quite a long way from fish farms. At the moment, none of the models really captures that. The DZR model, which is based on another iteration of DEPOMOD will have exactly the same problems.

Source: Rural Economy and Connectivity Committee 14 March 2018, Richard Luxmoore, contrib. 157¹⁰⁶

268. Fisheries Management Scotland cautioned that—

” the DZR proposals as they stand should not be taken forward in isolation from a broader review of regulation more generally.

Source: Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 160¹⁰⁷

269. In terms of industry reaction, economist Steve Westbrook suggested that the impact of the new regulation on the industry would balance itself out. Many current and new sites may have an increased biomass limit which would outweigh the sites where their biomass limits were reduced by the DZR.

270. The Committee had understood that SEPA’s proposals for revised regulation would be published in June 2018. However, publication was delayed until November 2018, when SEPA announced proposals to consult on a new regulatory framework which is intended to deliver tighter and more consistent control of the spatial extent of mixing zones for organic waste discharges. The proposed framework forms part of SEPA’s draft Finfish Aquaculture Sector Plan and is intended to—

- continue to control the maximum intensity of impact permitted at cage edges;
- require that, by the edge of the mixing zone, deposition is sufficiently low for the status of sea life on the seabed to be good; and
- where there is any accumulation of organic waste outside of the mixing zone, the level of that accumulation remains low enough to avoid adverse impacts on the status of sea life on the part of the seabed where the accumulation occurs.

271. SEPA has suggested that this approach will allow it to better match biomass to the capacity available in the environment and continue to assess that through the operation of the site. SEPA’s view is that this may allow for the approval of larger farms than would have been traditionally approved previously, provided they are appropriately sited in sustainable locations.

272. The Committee was keen to explore practical solutions which may help to mitigate the impact of waste on the environment. When challenged by the Committee on the environmental impact of waste from salmon farms Ben Hadfield from Marine Harvest said—

” We recognise that there are environmental problems, and we are humble about that, as we must be when we use the environment to assimilate the waste from our activities. We try to do that in a predictable, monitored and sustainable way.

Source: Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 184¹⁰⁸

273. The Committee heard that there are a wide range of technical solutions that may address some of the challenges associated with salmon farming. For example, SE LINK and SEPA written evidence to ECCLR referenced approaches in Tasmania where a funnel is used underneath salmon farms. This catches 60 to 70 per cent of the waste. It is then funnelled out, part of it is converted into fertiliser, and the rest is treated. SE Link highlighted technologies which can be combined with a funnel system to create closed containment systems. For example, putting a skirt around the farm, so that it is cut off from the surface water, but water can come in from underneath.

274. Grant Cumming from Grieg Seafood said that the industry is interested in the removal of waste. He said—

” What limits the sustainable size of a fish farm just now is the environment’s ability to assimilate waste. If we can remove waste, we can increase the environment’s potential to hold more salmon, which allows us to hit those markets.

Source: Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 263¹⁰⁹

275. When asked about waste recovery Grieg Seafood said—

” If we can recover the waste, we could not just reduce the impact on the environment and possibly produce more salmon, but have a potential energy source, too. It could be used in anaerobic digestion to produce biogases. We are very interested in that area and we will continue to monitor it.

Source: Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 263¹⁰⁹

276. Professor Bron from Stirling University also highlighted the use of ‘on-demand’ feeding systems which allow feeding to be monitored rather than allow uneaten food to fall to the seabed. Scott Landsburgh representing SSPO noted that the industry is also bringing in hydrodynamic modelling to enhance the accuracy of discharge predictions from salmon farms.

277. ECCLR Committee shared the view that adaptive management which takes account of the precautionary principle, (using real-time, farm by farm data) could have the potential to reduce environmental impacts, but additional detail is needed on how it would be applied in practice.

278. **RECOMMENDATION 29**

The Committee believes that it is essential that the issue of waste collection and removal is given a high priority by the industry, the Scottish Government and relevant agencies. It is clearly one of the main impacts on the environment and needs to be addressed as a matter of urgency.

279. **RECOMMENDATION 30**

The Committee is concerned that the announcement of SEPA’s proposals for a new regulatory framework for managing the waste input to the marine environment from fish farm cages, as part of the outcomes of its wider sectoral review, was delayed until November 2018, shortly before this

report was finalised. This meant that the Committee was unable to consider the proposals in detail. However, the Committee notes that the proposed new regulations are intended to more effectively manage the waste from salmon farms and avoid adverse impact on the seabed and the biodiversity of sea. The Committee calls on SEPA to keep it updated on the output from its consultation on the proposed framework and ultimately on the detail of how this will be implemented.

Medicine use

280. The Committee heard concerns that synthetic chemicals (including antibiotics) used to treat lice infestation or salmon diseases, to prevent fouling of farm structure, or as dietary supplements, might be harming other organisms and, perhaps, ecosystems.
281. As part of the Water Framework Directive, a European '[priority list](#)' of substances posing a threat to or via the aquatic environment was established, with the aim of reducing (or eliminating) pollution of surface water by the pollutants on the list. The Committee heard that medicines used in fish farms could potentially be contributing to the discharge of these 'priority substances'. The Scottish Fish Farm Production Survey 2016 states that, in that year, a total of 42.6 million fish were vaccinated across 47 sites.
282. The Committee notes the views of the ECCLR Committee which stated—
- ” The Committee is concerned that there appear to be very significant data and analysis gaps related to the discharge of medicines and chemicals into the environment, including analysis of cumulative or additive effects. This requires to be addressed. The Committee has seen little evidence of proactive activity or action to systematically address the data gaps, either by the industry or the regulator. ¹⁸
283. In evidence to the ECCLR Committee John Aitchison referred to an internal document from SEPA accessed via a freedom of information request which stated—
- ” “Fish farming is unique in that it is a sector which is allowed to discharge substantial quantities of biocides, some of them Priority Substances in terms of the Water Framework Directive and all at least List II substances in terms of the old EU 'Dangerous Substances Directive' ... the waters in which salmon farming is practiced are usually the same waters in which Scotland's valuable crustacean fisheries are located ... it is not tenable for SEPA to adopt a position where commercial shellfish species are impacted by the day-to-day activities of fish farms”

Source: Environment, Climate Change and Land Reform Committee 06 February 2018, John Aitchison, contrib. 57¹¹⁰

284. [Orkney Fisheries Association](#) told the Committee that the continuation of the current method of combating fish health and environmental challenges is damaging non-target commercial crustacean stocks. [Dr Sally Campbell](#) states that “research shows very clearly that neurotoxin applications against sea lice are causing lifecycle changes in other arthropods (shellfish including prawns, crabs and lobsters)”.
285. Others questioned the efficacy of using such chemicals as the salmon may be becoming resistant to medicines. [Lynn Schweisfurth](#) stated in written evidence that “Antibiotics and chemicals, such as emamectin benzoate, added to the fish feed, have been used in such quantities that some fish have become resistant to them.”
286. [MSD Animal Health](#) stated in written evidence that “Licenced, well-regulated animal vaccines and medicines in addition to professional expertise help ensure that salmon remains a healthy, nutritious, affordable and economically important product which is exported across the globe.”
287. The objective of the Fish Health Inspectorate (FHI) is to support the Scottish Government's vision of a sustainable, growing, diverse aquaculture industry whilst maintaining the high health status of farmed and wild fish and shellfish stocks in Scotland.
288. The Scottish Government acknowledges the importance of appropriate medicine use and its Fish Health Framework has a work stream dedicated to the licensing regime for fish treatment. This includes encouraging the development of new medicines with the aim of increasing treatment flexibility and allowing the potential to explore treatment rotation in Scotland, working on treatment residue containment and neutralisation as well as exploring the ability to treat fish with medicines using well boats in addition to cage bath treatments on farms.
289. SSPO stated that—
- ” The environmental impact of use of licensed veterinary medicines is appraised through the licensing process. Their use and discharge are strictly controlled by SEPA, through CAR licences. This framework incorporates an Environmental Quality Standard (EQS)-based approach to regulation, which is supported through European legislation, and includes high safety margins.
- Source: Scottish Salmon Producers Organisation, 2018⁵⁶
290. The Scottish Salmon Company outlined the measures that they take to ensure good veterinary practices as well as site specific Environmental Management Plans (EMPs) as well as Environmental Impact Assessments for all new sites. It said—
- ” Our Biology department provides site-specific veterinary health planning, in-house veterinary diagnostic services and professional health checks to promote optimal health and welfare for the salmon in our care. Together with audited schemes this ensures that there are high standards of fish husbandry and independent monitoring.
- Source: The Scottish Salmon Company, 2018¹¹¹
291. Greig Sea Food voiced an interest in pest management and how that can be flexibly integrated into regulations. Grant Cummings said—

” That has pushed our sea lice figures down over the past year. We have used a number of factors, rather than relying too much on medicines. Medicine usage has gone down, and a number of alternative methods of reducing settlement and of dealing with sea lice once they are on the fish have been used. We have made a lot of progress.

Source: Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 251¹¹²

292. The Committee notes that at the same time as it published its draft Finfish Aquaculture Sector Plan In November 2018, SEPA published [a research report on the evaluation of a new seabed monitoring approach to investigate the impact of marine cage fish farms](#). This report concluded that medicine from Scottish salmon farms “is significantly impacting local marine environments”. As a consequence of this report, SEPA has asked the UK Technical Advisory Group (UK TAG) to make recommendations to the Scottish Government on new environmental standards for Emamectin Benzoate, which is used for the treatment of sea lice. In announcing this step, SEPA stated—

” While this UK TAG work continues, SEPA will adopt a precautionary principle position which imposes a much tighter interim standard for the use of Emamectin Benzoate at any new site. This is based on the now substantial weight of scientific evidence that the existing standards do not adequately protect marine life. This interim standard will set a limit so low that it will, effectively, mean Emamectin Benzoate can only be discharged in very limited quantities at any new site.

Source: Scottish Environment Protection Agency, 2018¹¹³

293. **RECOMMENDATION 31**

The Committee strongly believes in the benefits of transparency for the industry and those interacting with it. It endorses the ECCLR Committee’s recommendation that any data and analysis gaps related to the discharge of medicines and chemicals into the environment should be addressed by both the industry and regulators.

294. **The Committee recognises the need to ensure that the licensing regime for medicines is fit for purpose and sufficiently robust to prevent environmental damage or impact on other species. It notes and welcomes the Fish Health Framework workstream which is dedicated to the licensing of fish treatment.**

295. **The Committee recognises that as farmers the industry must use medicines to treat illness or disease in their stocks. However, it notes with concern the conclusion of the recent SEPA research which concluded that medicine from Scottish salmon farms “is significantly impacting local marine environments.”**

296. **RECOMMENDATION 32**

The publication of this research leaves the Committee in no doubt that effective regulation of medicine used by the farmed salmon industry is a

requirement. In this regard, it welcomes the action by SEPA to the UK Technical Advisory Group (UK TAG) to make recommendations to the Scottish Government on new environmental standards for Emamectin Benzoate. It also calls on SEPA and the Scottish Government to similarly consider the environmental impact of other medicines by the industry.

297. **RECOMMENDATION 33**

The Committee also recommends that information and data on medicine use by the industry should be made publicly available, on the same platform as that relating to sea lice and mortality rates (see paragraphs 215).

Deterring marine predators

298. Another issue of importance to the salmon farming industry in Scotland relates to how it deals with seals who are attracted to fish farms. In 2011, Part 6 of the Marine (Scotland) Act 2010 came into force which seeks to balance seal conservation with sustainable fisheries and aquaculture. This introduced a new seal licensing system which made it an offence to kill or injure a seal except under licence or for welfare reasons. It also created a number of seal conservation areas.

299. Statistics about the number of licences, broken down by region, company and the number of seals shot is [published online](#) quarterly by the Scottish Government. The overall trend is for a reduction in the number of seals shot. In 2016, 49% of all licences shot no seals at all.

300. The Committee heard that the industry is making a concerted effort to reduce the number of seals killed with an aspiration of reducing the number to zero. Grieg Seafood said—

” Since January 2015, we have had to shoot one seal, which is still one too many, in my opinion, but we are working down to zero. I think that it is the same for the whole industry.

Source: Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 272¹¹⁴

301. Ben Hadfield from Marine Harvest highlighted the fact that the industry must balance a desire to reduce the number of seal deaths with the need to protect their fish stocks. He said—

” It is negative and embarrassing and is not something that the industry is proud of, but we have a legal requirement to protect our stock as well, so there is a rock-and-a-hard-place element...

Source: Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 276¹¹⁵

302. The Committee also heard anecdotal evidence that overall seal numbers are significantly increasing. Craig Anderson, from the Scottish Salmon Company stated in relation to the north-west and the Hebrides that —

” ...in the past two years more and more grey seals and common seals have been appearing, sometimes in their thousands. We have third-generation families working for us and they have never seen so many seals in the Outer Hebrides as we get today. It is an issue.

Source: Rural Economy and Connectivity Committee 02 May 2018, Craig Anderson, contrib. 273¹¹⁶

303. When asked about various ways in which the industry stop seal and salmon interactions the industry said that it uses a variety of methods. For example, Grieg Seafood said that it had invested a lot in physical barriers—

” There are a lot of different kinds of netting to try and prevent the seals from getting at our salmon. That is our first choice of barrier. We use some acoustic deterrents where we find that necessary, but that is the next step down. We do not want to do that. There is potential for acoustic deterrents to interfere with other marine mammals, so we want to minimise their use as much as possible, but they are probably preferable to having to shoot a seal.

Source: Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 272¹¹⁴

304. Some respondents voiced concerns that the licensing system lacks oversight. FIDRA said —

” The use of lethal control measures for marine mammals and birds is also lacking in effective monitoring and regulation. Significant improvements since 2011 have resulted in a marked decrease in seal deaths, but a reliance on self-reporting and lack of independent verification means license conditions can be breached.

Source: FIDRA, 2018¹¹⁷

305. There is also some concern that the shooting of seals by fish farms will mean that they will be in contravention of forthcoming legislation from the United States of America. US National Oceanic and Atmospheric Administration (NOAA) is proposing to ban imports from fishing industries that kill marine mammals in 2022. The aim is to apply the same animal protection standards to foreign fisheries as in the US. This could mean that Scotland may lose access to a lucrative market for its salmon if it continues to shoot seals that endanger stocks.

306. When questioned on this issue the Scottish Government confirmed that it intends to have discussions with the US authorities to fully understand the extent of the regulation and how it might affect Scotland. It also confirmed that it has been in dialogue with other countries involved in aquaculture such as Norway, Canada and Chile.

Acoustic Deterrent Devices (ADDs)

307. Acoustic Deterrent Devices (ADDs), which produce a loud underwater noise, are widely used as non-lethal seal deterrents. However, according to the SRSL report, there is little evidence about their efficacy. SRSL states that their use adds to underwater noise pollution, which is known to cause behavioural changes in

acoustically sensitive marine mammals (in particular cetaceans such as whales, dolphins or porpoises).

308. The Committee notes the view of the ECCLR Committee which advocates the use of double skinned predator nets over ADDs. ECCLR noted in its letter to the REC Committee that it was particularly concerned as most ADDs are left to operate continuously creating cumulative, unintended and widespread underwater noise pollution. It also noted a concern that there appears to have been no assessment by government or regulators of the scale of ADD related noise pollution and its impact on marine species since 2014. It stated that it —

” ...has significant concerns about the use and operation of ADDs and their cumulative impact and considers all fish farms in Scotland should be required, via legislative or any other appropriate means, to follow the position of the Aquaculture Stewardship Council in relation to ADDs. This ensures fish farms cannot use ADDs. ¹⁸

309. Some respondents argued that Scotland may be in breach of legislation as all cetacean species are protected under both EU (Habitats Directive) and national (Nature Conservation (Scotland) Act) legislation and a range of other international agreements. [Hebridean Whale and Dolphin Trust](#) noted that under the Nature Conservation (Scotland) Act, it is an offence to deliberately or recklessly disturb or harass any species of cetacean. It stated—

” ADDs are known to disturb cetaceans and this has been confirmed by many scientific studies, yet many aquaculture facilities are situated in critical areas of habitat

Source: Hebridean Whale and Dolphin Trust, 2018⁵⁰

310. Others were concerned that regulation is too light in this and other areas. For example, [Jean Ainsley](#) is concerned about the “continued light touch by the statutory regulators of the industry as it continues to fail to meet standards on cetacean disturbance, shooting of seals, pollution and sealice and the regulators failure to enforce these standards.”

311. Heather Jones from the Scottish Aquaculture Innovation Centre told the Committee that many innovative research projects have been undertaken to ensure that ADDs work appropriately. She said that —

” The sea mammal research unit at the University of St Andrews has a great deal of expertise and does a great deal of research to ensure that those ADDs use frequencies and patterns of noise that are effective and not harmful.

Source: Rural Economy and Connectivity Committee 25 April 2018, Heather Jones, contrib. 149¹¹⁸

312. When the Scottish Government was asked about the use of ADDs the Cabinet Secretary stated that the devices had contributed to a reduction in the number of seals shot. However, he was aware of the possible disturbance to cetacean species. He informed the Committee that Marine Scotland has been instructed to review the issue to inform future policy decisions on the use of such devices.

313. The Committee notes the salmon farming industry's action to reduce the number of seals shot and shares the aspiration that this should be reduced to zero. It notes that a range of methods to deter seals are being applied by the industry including physical net barriers and shields.

314. **RECOMMENDATION 34**

The Committee shares the view of the ECCLR Committee that such physical barriers should be used ahead of deterrents such as Acoustic Deterrent Devices which potentially have a harmful impact on cetacean species such as whales and dolphins. The Committee considers it important that the use of such devices is fully assessed and it welcomes the fact that Marine Scotland has been asked to review the science to inform future policy in this area. It looks forward to an update on this from the Scottish Government in due course.

315. **RECOMMENDATION 35**

The Committee considers it to be important that this work results in the production of appropriate guidelines and best practice advice for use by the industry in responding to various scenarios, such as when seals are trapped in salmon farm cages or in nets.

316. **RECOMMENDATION 36**

The Committee also looks forward to an update from the Scottish Government on its investigations into how the upcoming legislation change in the United States regarding seal shooting may negatively impact on its imports of Scottish salmon.

Interactions between wild and farmed fish

317. Another important and contentious issue to be considered as part of the Committee's inquiry was the impact of farmed fish on the wild salmon population. In a 2017 [analysis of the value of wild fisheries in Scotland](#) it was reported that the Scotland-wide economic impact assessment of wild fisheries (including netting) indicated around £135m of angler expenditure, 4,300 full-time equivalent jobs and £79.9m Gross Value Added (GVA) – the monetary value of the contribution to the economy made by an industry. The concerns raised by the wild salmon industry and its supporters mainly focused on sea lice infestation and disease as well as farmed salmon escaping and interacting with wild salmon population.

Sea lice and disease

318. One of the key concerns expressed was that the presence of large numbers of salmon in farms attracted sea lice which, in turn, could increase infestation levels in wild salmon passing farms on their migratory routes. Indeed, it was concerns about the impact of sea lice on wild salmon raised in petition PE1598 which contributed to the Committee's decision to undertake an aquaculture inquiry.

319. Many of the submissions received expressed concern about the impact farmed fish have on wild fish populations. A number of fisheries trusts and boards submitted evidence expressing considerable concern about this. Concerns relate particularly to disease, sea lice, and escapes.
320. Salmon and Trout Conservation who lodged the petition stated that it had commissioned the Norwegian Institute for Nature Research to look at the issue. The institute concluded that "...there is significant evidence of a pervasive and general impact of sea lice from salmon farms on wild salmonid populations". Indeed, Guy Linley Adams acting on behalf of Salmon and Trout Conservation suggested that the issue could go further than just sea lice. He said—

” I am concerned that we concentrate on sea lice because we can see them and count them. There are other salmonid diseases in salmon farms, but there is not much evidence of whether those viral and bacterial diseases impact on wild salmonid populations.

Source: Rural Economy and Connectivity Committee 14 March 2018, Guy Linley-Adams, contrib. 21¹¹⁹

321. The Committee also received a submission in the form of a petition from [SumOfUs](#) on behalf of “32,762 members of public who are concerned that the current regulations around salmon farming are inadequate to protect wild salmon populations from infectious diseases.”
322. [Atlantic Salmon Trust](#) quotes Marine Scotland Science’s online [Summary of Science for Aquaculture Interactions](#) . It stated, "Salmon aquaculture can result in elevated numbers of sea lice in open water and hence is likely to increase the infestation potential on wild salmonids. This in turn could have an adverse effect on populations on wild salmonids in some circumstances".
323. There were also concerns about the impact that this reduction in wild salmon stocks was having on local business and the local economy. For example, Alan Macdonald from Doonside Fishings shared the view in written evidence that sea lice were to blame for the closure of the beat he owns on the River Doon. He believes that this is "...due to almost extinction of wild fish undoubtedly caused by sea lice infestation all along the west coast" and that the closure "has cost one gillie’s job, and over 500 bed nights, meals, etc. were lost to the local Ayrshire economy".
324. The Committee heard that more work should be done to assess the potential impact on wild salmon stocks when locations for new sites were being identified. Jon Gibb of Lochaber District Salmon Fishery Board suggested that knowing and understanding the migration paths of wild salmon smolts from rivers would be beneficial to this process. He said—

” If that were to be done as a pre-application piece of work, we might find from it that, on the issue of sea lice, parts of the inner isles or elsewhere in those higher-energy sites might impact migrating fish far less than other sites. If we knew that, it might offer an incentive for the industry to meet expansion targets. It would also satisfy a great deal of wild fish concerns.

Source: Rural Economy and Connectivity Committee 14 March 2018, Jon Gibb, contrib. 158¹²⁰

325. The industry acknowledges that sea lice are a serious concern for both farmed and wild salmon and it is acting to address the issue. For example, the Committee heard

that young salmon, or smolts, are more vulnerable to sea lice. To combat this, the industry informed the Committee that it is to agree when locations will be stocked and to share information on any known diseases to work to find solutions. Marine Harvest informed the Committee that it has taken the policy decision to expand in locations away from rivers to minimise any discharge of farm-derived lice during the sensitive period for wild smolts (the location of farms will be discussed in more detail later in the report). Ben Hadfield from Marine Harvest said—

” I suggest that the way forward for the industry is a gold standard of transparency and then to minimise lice levels and the farming presence in sensitive areas over time. We need to grow in areas that are away from migratory fish systems.

Source: Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 244¹²¹

326. In a [letter to the ECCLR Committee](#), Marine Scotland outlined the disease management and movement controls on fish, equipment and personnel which are used in the case of the outbreak of listed diseases. It stated that locally the impact of the statutory controls is potentially severe with farms having to be cleaned and disinfected, prior to lying fallow for significant periods of time.
327. The Fish Health Framework also has a workstream on the production cycle and on farm management in order to reduce the amount of time that farmed salmon are at sea in order to increase the potential for fallow periods and reduce the likelihood for diseases and sea lice.

General decline wild salmon populations

328. Whilst the industry, academics and other bodies have made clear that the impact of sea lice from farmed salmon on wild salmon should be taken seriously, the Committee also heard that this should not be viewed as the principal factor in the decline in wild salmon stocks. For example, Dr Martin Jaffa argued that sea trout stocks have been declining since records began in 1952 whereas salmon farming in Scotland was not properly established in Scotland until the 1980s.
329. There was also a recognition of this by the wild fisheries sector. Fisheries Management Scotland stated that—

” It has never been our position, either as Fisheries Management Scotland or previously, that fish farming is the only problem or pressure that wild fish face. There are a series of them.

Source: Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 67¹²²

330. Jon Gibb, a wild salmon fishery owner said—

” We have never seen aquaculture as the main culprit for the decline of salmon and sea trout. However, it is clear that it is certainly adding an extra pressure to already threatened stocks.

Source: Rural Economy and Connectivity Committee 14 March 2018, Jon Gibb, contrib. 68¹²³

331. Paul Tett, one of the authors of the SRSL report, informed the Committee that—

” We could not find definitive evidence in Scotland that sea lice from farmed salmon are having an impact on wild salmon populations...

Source: Rural Economy and Connectivity Committee 07 March 2018, Professor Tett, contrib. 148¹²⁴

332. Marine Scotland told the ECCLR committee about the research that it has undertaken to date. The research has concluded that it is not yet possible to quantify impacts of sea lice on populations of sea trout and salmon in Scotland. However, it stated that the knowledge of the distributions of the fish and sea lice, and hence the information available for informing salmon farm planning, is steadily increasing.
333. The Committee notes that in September 2018 Marine Scotland published an [updated summary of science](#) on information relating to impacts of salmon lice from fish farms on wild Scottish sea trout and salmon. In October 2018, Marine Scotland published [a list of 12 high level pressures](#) which impact on Atlantic salmon, together with details of various pieces of work being undertaken to address these.
334. In terms of the potential for the transfer of disease, representatives of the salmon farming industry suggested that from a farming point of view disease is unlikely to transfer the short distance between pens. It was argued that it would be much more difficult for a wild salmon to be impacted by disease from a salmon farm, taking into account the dilution in a loch system with an area of open ocean.
335. Professor Bron from Stirling University also argued that the potential to introduce disease to the wild population is low and that—
- ” ...without any fish farming, wild fish can get very high numbers of sea lice. It is normal for the prevalence to be 70 to 100 per cent
- Source: Rural Economy and Connectivity Committee 07 March 2018, Professor Bron, contrib. 146⁷¹
336. SSPO argued that to move forward the debate it would also be helpful for wild fisheries to publish their data to enhance understanding and analysis of the position and help move the debate forward. Other respondents such as Grant Cumming from Grieg Seafood and Dr Martin Jaffa, from Callander McDowell highlighted that salmonids are struggling in areas in which there are no farmed salmon. For example, the east coast of Scotland as well as regions in England, Wales and France.
337. Fisheries Management Scotland told the Committee that climate change affects the ability of wild fish populations to find food in the marine environment. Rising temperatures also mean an increase in gill-health issues.
338. Heather Jones from the SAIC argued that sea lice constitute about 1 per cent of all causes of mortality among wild salmon. She acknowledged that it does have an effect but it is one among many. She said—

- ” Many things could be done to improve the return rates of wild salmon stocks, but there are also many things that we cannot do anything about. We cannot change the fact that sea water temperatures are rising off the Faroes, that what salmon predate is less available to them, or that a lot of wild seals eat a lot of wild salmon.

Source: Rural Economy and Connectivity Committee 25 April 2018, Heather Jones, contrib. 188¹²⁵

339. [Nick Joy, ex Managing Director of Loch Duart Limited](#), called for a proper statistical review by an impartial group of statisticians, to evaluate the decline of wild salmon on both Scottish coasts.
340. The Committee notes that the Scottish Government took action on the issue of salmon interactions when it announced in June 2018 the creation of a Salmon Interactions Working Group. The Group will examine and provide advice on the interactions between wild and farmed salmon. The Group will consider the conclusions from this Inquiry, evaluate current Scottish Government policy and review any existing and planned projects around interactions as well as create recommendations and a future delivery plan.

Escapes from salmon farms

341. Farmed salmon escaping from farms creates a number of concerns for the wild salmon population. In addition to the potential for contamination from sea lice or disease, respondents were also concerned about cross breeding and the potential for large numbers of escapees to swamp the wild population. [Uig and Hamanavay Estate](#) said—

- ” There is only one explanation for the damage to the genetic integrity of fish in the Grimersta/Langavat system. It is that there has been inter-breeding between wild fish and fish that have escaped from fish farms in or near Loch Roag.

Source: Uig and Hamanavay Estate, 2018¹²⁶

342. Uig and Hamanavay Estate (UHE) state—

- ” Those engaged in salmon farming should be required to deposit with Marine Scotland or other appropriate body, samples of the genetic make up etc of all salmon held in containers, so that if there is an escape, the escape can be traced to a particular farm/operator. In the event of an escape, the operator should be required to pay for all necessary remedial action, in addition to appropriate compensation. ¹²⁶

343. Both the UHE and the Angling Trust and Fish Legal also called for penalties to be established for escapes and suggested that all farms should stock with fish that have genetic markers so that escapees can be traced.
344. Fisheries Management Scotland and David Cosh highlighted to the Committee that there is no penalty for fish escapes in Scotland, whether due to negligence or natural events such as storms, only for failing to report, and the same applies to

outbreaks of notifiable diseases. This will be raised in the section of the report which discusses regulation.

345. The industry states that the number of escapes has been declining over the past 10 years and that investment is being made in terms of improved moorings and barriers. Marine Harvest stated that its last freshwater escape was over 10 years ago and that the ASC standards address escapees through the implementation of a gold-level practice of containment, using things such as Kevlar nets, a minimum size of fish and a count-in, count-out system. The Committee also heard that the industry has been working to address human error to ensure that nets are maintained to a high standard.
346. The Committee is aware that in Norway penalties are applied under the Aquaculture Act for breaches of provisions relating to escapes from salmon farms. There is a sliding scale of fines from small administrative fines for minor breaches up to large fines or even imprisonment for a maximum of one year where a breach is caused by wilful intent or gross negligence.
347. Producer companies also have to pay a fee to finance the removal of escaped fish from certain designated rivers and estuaries. All operators holding an aquaculture licence are obliged to be a member of the Aquaculture Industry Association for the recapture of escaped farmed fish which manages the recapturing of escaped fish. Last year the association paid for recapturing efforts in 52 rivers.

348. **The Committee has heard from the industry that escapes do not currently appear to be a significant issue in Scotland. However, it cautions against complacency on this issue as there is potential for even a single escape event to have a significant impact on the genetic integrity of wild salmon.**

349. **RECOMMENDATION 37**

The Committee notes that strict penalties are in place in Norway to deal with escapes and recommends that appropriate sanctions should be developed and introduced in Scotland.

Regulatory responsibility for managing the impact of aquaculture on wild fish

350. In addition to gaps in knowledge and research one frequently highlighted gap in the regime is clarity on which body has responsibility for the impact of fish farms on wild fish. Richard Luxmoore, a Senior Nature Conservation Adviser at the National Trust for Scotland, on behalf of Scottish Environment LINK said—

” The problem is that we have three regulators, all of which deny that it is anything to do with them. We have the unedifying spectacle of everyone taking a collective step backwards and scrambling for the exit. SEPA argues that it is nothing to do with it because there is not a pollutant, the fish health inspectorate says that it is interested only in farmed fish, and the local authorities are more interested in garages.

Source: Rural Economy and Connectivity Committee 14 March 2018, Richard Luxmoore, contrib. 134¹²⁷

351. Fisheries Management Scotland said—

” We have a situation where the fish health inspectorate has a remit for the health and welfare of the fish in the cages but not for anything outwith them... The Scottish Environment Protection Agency is responsible for consenting that biomass, but it does not view sea lice or sea lice leaving the cages as part of its remit.

Source: Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 131¹²⁸

352. Scottish Natural Heritage argued that if a regulator (with adequate knowledge base and resourcing) was given a specific remit for this issue then it would help to ensure that monitoring, reporting and enforcement are effectively managed.

353. [The Angling Trust and Fish Legal](#) called for —

” a dedicated regulatory body that has statutory responsibility for managing the impacts of aquaculture on wild fish and has the necessary powers and expertise to do this. Such a body must be independent from the industry and free from the apparent current pressure on Government Agencies for the relentless expansion of the industry.¹⁰¹

354. In its recent call for views in relation to Post Legislative Scrutiny both Fisheries Management Scotland (FMS) and the Salmon & Trout Conservation Society (S&TCS) raised concerns with the operation of the Aquaculture and Fisheries (Scotland) Act 2007, particularly on the relationship between farmed salmon and wild fisheries.

355. FMS and S&TSC raised issues such as the gap in the powers of the Fish Health Inspectorate being limited to the welfare of farmed salmon (not wild fish). It was also suggested that technical standards in relation to equipment and training should be put on a statutory footing. In addition, it was noted that the Scottish Government hasn't brought forward a statutory Code of Practice (although SEPA has done) on desirable practices, and there has been little use of enforcement notices with respect to sea lice. It was also noted that the Scottish Ministers power contained in the Act to require information in relation to prevention, control and reduction of parasites needs to be used.

356. The ECCLR Committee noted in its conclusions that it was concerned that the focus of Marine Scotland and the Fish Health Inspectorate was solely on the health of farmed salmon. It said—

” The Committee considers that an agency should be charged with the health and welfare of wild salmon and trout.¹⁸

357. **The Committee understands the concerns expressed by some in evidence that the presence of sea lice around salmon farms could be impacting on wild salmon migratory routes, in particular on smolts.**
358. **The Committee acknowledges that there are likely to be a range of factors that have contributed to the decline in wild salmon stocks over recent decades, and considers that it is possible sea lice attracted by the presence of salmon farms could be one. However, it also recognises that there is a lack of definitive scientific evidence on this issue.**
359. **The Committee welcomes the SG initiative to set up a working group to look at existing policy and advice governing these issues and to produce recommendations on how interaction between wild and farmed salmon can be taken forward in the future.**
360. **RECOMMENDATION 38**
- However, it suggests that there needs to be a recognition that any work taken forward on this issue in the short term may be hampered by a lack of scientific data. The Committee supports the proposal from the ECCLR committee for more research into the interactions between farmed and wild salmon, as a matter of priority, although it acknowledges the evidence heard which suggests that this may be difficult to deliver.**
361. **RECOMMENDATION 39**
- The Committee also encourages both the farmed salmon and wild salmon sectors to share information and data as transparently as possible in order to improve understanding as to why wild salmon stocks are decreasing.**
362. **RECOMMENDATION 40**
- Although there is a lack of definitive scientific evidence of the various factors that are contributing to the decline of wild salmon stocks, the Committee is nevertheless of the view that a precautionary approach should be taken which will seek to minimise the potential risk to wild salmon stocks wherever possible.**
363. **RECOMMENDATION 41**
- The Committee suggests that the siting of salmon farms is key to managing any potential risk to wild salmon stocks and ensuring that the sector is managed responsibly and sustainably. The Committee comments on this in issue in more detail in the next section of this report.**
364. **RECOMMENDATION 42**
- The Committee notes concerns expressed in evidence that none of the existing regulatory bodies currently has responsibility for the impact of salmon farms on wild salmon stocks. The Committee believes that clarity must be provided by the Scottish Government as to how this apparent**

regulatory gap will be filled and which agency will assume responsibility for its management.

Collaboration between farmed and wild fish sectors

365. The Committee has become aware during its inquiry of the friction which exists between certain wild fisheries interests and the salmon industry. It has also been aware of some good examples of cooperation and joint working which exist between the sectors which it viewed as very positive. The Committee is clear that if the challenges facing the salmon farming and wild salmon industries are to be resolved they need to work together to address them. It was therefore keen to explore what might be done to encourage greater collaboration between salmon farmers and wild fisheries interests.

366. The RSPCA noted that their assessment of the industry showed that stakeholders work hard to overcome the challenges that they encounter. “It seems very puzzling therefore, that stakeholders working together to try and find solutions to often unexpected problems, appear to attract a disproportionate level of negative scrutiny, misleading headlines and vilification in the press, compared to other farming sectors.”⁷⁰

367. Ben Hadfield from Marine Harvest said—

” ...by working together, the progressives on the wild fish side and the farmed side will create more solutions in future. If we have tensions, heat and argument, that will not work.

Source: Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 178¹²⁹

368. He acknowledged that it is the farmed salmon industry’s responsibility to work with the wild sector to make sure it is as healthy as possible and called for more projects on habitat enhancement and restoration. He continued—

” Our responsibility is to be transparent, to convey information honestly and—because it is technical—in a straightforward way, and to minimise risk and hazard. I would like there to be more collaborative working with the wild fish groups to address the issues there.

Source: Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 212¹³⁰

369. When asked whether the two sides could work together Guy Linley-Adams, Salmon & Trout Conservation Scotland said—

” ...the answer is definitely yes: it is perfectly possible for the two to co-exist. We are often labelled as an organisation that is against fish farming, but that is not correct.

Source: Rural Economy and Connectivity Committee 14 March 2018, Guy Linley-Adams (Salmon & Trout Conservation Scotland), contrib. 14¹³¹

370. Fisheries Management Scotland outlined the following four points which it considered would improve the situation—

” ...thriving salmon and sea trout populations and fisheries without negative impacts from salmon farming; harmonious local co-existence with an industry that understands the importance of being a good neighbour and which communicates openly and transparently with stakeholders; a world-leading regulatory and planning system that protects wild fish and proactively seeks to address negative local impacts; and investment of a proportion of the profits that are generated by the industry in protection and improvement of local salmon and sea trout populations and fisheries.

Source: Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 17¹³²

371. Alex Adrian advocated greater funding into piloting new management practices, innovative relationships and collaborations.

372. When the Committee questioned the Scottish Government on this point the Cabinet Secretary acknowledged that whilst bringing the two sectors together would be a challenge, it would be an extremely desirable thing to achieve. He commented—

” There is a cultural issue when it comes to all of us working together to support marine activity. That approach seems to exist in Norway, but it is perhaps not so evident in Scotland. There is a sense that the conflict between various groups is too tense and not really proportionate to the discussions that we should be having, in which everybody should be seeking to co-exist and to find and adopt best practice.

Source: Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 188¹³³

373. During the inquiry, members of the Committee visited Drimsallie Mill Salmon Hatchery in Lochaber, where they heard about a project which involved collaboration between the River Lochy Association and Marine Harvest. This attempts to circumvent the marine survival ‘bottle-neck’ facing wild salmon smolts. Wild smolts are trapped on their way to sea and grown on to adulthood at Drimsallie and the Marine Harvest sea site at Lochailort. These fully-grown salmon will then be stripped and their fertilised eggs placed in artificial redds (nests in the gravel) all around the underperforming parts of the River Lochy catchment. The trial on the Lochy is the first of its kind in Scotland and the River Lochy Association made clear that it would not have been possible without the support of Marine Harvest and other smaller aquaculture supply companies who also donate feed, equipment and expertise.

374. The Committee notes that significant friction exists between the farmed salmon and wild fisheries sectors in particular catchment areas close to wild salmon migratory routes, with disagreements focussing on the impact of salmon farms on wild fish health and stocks.

375. Whilst the Committee understands why such friction and mistrust develops, it recognises that the situation is not helped by the fact that there is a distinct lack of scientific evidence and data to support or dismiss claims. This further highlights the need for more research to be conducted

on the reasons behind the decline in wild salmon stocks and the potential contribution that salmon farming may have on these.

376. **RECOMMENDATION 43**

The Committee is of the view that there is a need for both sectors to co-exist and it considers it to be essential that there is greater collaboration to resolve local management issues and other areas of concern.

377. The Committee notes that there are examples of good relationships between the sectors in certain areas of Scotland. During its inquiry, the Committee was fortunate in being able to undertake a fact-finding visit to hear at first hand about innovative and collaborative working between a fisheries board and a farmed salmon operator on a project which aimed to boost wild salmon stocks. It is in no doubt that if issues of mutual interest to both sectors are to be properly managed, there needs to be close, constructive and effective engagement between representatives of both sectors on a widespread basis. This needs to occur at both a local level, between local fisheries boards and farmed salmon operators and at a national, strategic level between the relevant representative groups.

378. **RECOMMENDATION 44**

The Committee recommends that mechanisms to encourage such collaboration between the sectors should be further developed and introduced. It further recommends that the Scottish Government's wild salmon interactions group should, as part of its work, address this matter as a priority

Location of salmon farms

379. Several issues discussed in earlier sections of this report touch on the siting of existing and new salmon farms. Many of those who expressed concern about the potentially negative impact of salmon farming on wild salmon stocks and the marine environment viewed the location of salmon farms as a key consideration.

380. ECCLR Committee said —

” Scotland needs an ecosystems-based approach to planning the industry's growth and development in both the marine and freshwater environment, identifying where salmon farming can take place and what the carrying capacity of that environment is. A cohesive framework is needed. ¹⁸

381. The Committee heard that the identification of more suitable sites was key to addressing some of the fish health problems faced by the industry, such as sea lice infestation. Heather Jones said—

” Plenty of locations in Scotland do not suffer with any sea lice problems whatsoever, but individual sites are very prone to such pressures, so it is important to consider where farms are sited. We could think about expanding growth in Orkney, for example, where there are incredible tidal flow exchanges between the North Sea and the Atlantic and no problems with lice.

Source: Rural Economy and Connectivity Committee 25 April 2018, Heather Jones, contrib. 190¹³⁴

382. The Committee notes that the ECCLR Committee was of the view that “in order to mitigate the risk of transfer of sea lice, fish farms should be located away from salmonid migration routes”. That Committee also highlighted that the information on the migration routes of wild salmon in Scotland is limited and suggested that that further research may be needed to ensure migration routes are adequately mapped and understood.
383. The ECCLR Committee also expressed the view that the precautionary principle should be applied in terms of locating salmon farms near wild salmon migratory routes.
384. As mentioned earlier in this report, the Committee is aware that one of the largest farmed salmon operators in Scotland, Marine Harvest, has voluntarily taken the policy decision to locate new sites away from wild salmon rivers in order to minimise any impact from sea lice present in farms on migrating smolts.
385. The Committee notes that in Norway salmon farms are not permitted near wild salmon migratory routes and that some fjords are closed and environmentally protected.
386. In 2003 and 2007, 52 national salmon rivers and 29 salmon fjords in Norway were approved to give selected wild salmon stocks better protection from aquaculture and other activities such as water power interventions. The scheme comprises approximately 75 percent of the wild salmon resource and has been implemented across a range of different environmental, aquaculture and water resource management regulations.

387. **RECOMMENDATION 45**

The Committee shares the view of the ECCLR Committee that the siting of farms in the vicinity of known migratory routes for wild salmon must be avoided.

388. **The Committee understands that there is at present only limited empirical scientific evidence to suggest that wild salmon are infected by sea lice as they pass salmon farms. However, it is noted that the Norwegian Government has taken the decision to act decisively on this matter. It applies a strict precautionary approach and does not issue licences for salmon farms in the vicinity of wild salmon routes.**

389. **RECOMMENDATION 46**

The Committee is of the view that a similar precautionary approach must be taken in Scotland to assist in mitigating any potential impact of sea lice

infestation on wild salmon. It therefore recommends that there should be an immediate and proactive shift towards siting new farms in more suitable areas away from migratory routes and that this should be highlighted in the strategic guidance on the siting of salmon farms.

390. **RECOMMENDATION 47**

The Committee recognises that it will take time for the range of current activity by the Scottish Government (e.g. Fish Health Framework initiatives, consenting review) and regulatory bodies (e.g. SEPA finfish sector review) and action on the Committee's recommendations to be completed, with outcomes known, agreed and implemented.

391. Therefore, until this work is completed and the enhanced regulatory and enforcement regime is in place, the precautionary principle should be applied in a meaningful and effective manner in relation to applications for new sites and expansion of existing sites.

392. **RECOMMENDATION 48**

The Scottish Government should provide strong and clear leadership in ensuring that the precautionary principle is applied, producing appropriate policy and guidance documents as necessary. These should make clear that the potential impact on the environment, known wild salmon migratory routes and other species must be comprehensively and robustly assessed and fully taken into account as part of the consideration of salmon farm applications.

393. **RECOMMENDATION 49**

The Scottish Government should support and assist planning authorities by producing planning guidance which sets out clearly how the precautionary principle should be applied and managed.

394. **RECOMMENDATION 50**

Support should also be provided to local authorities to enable planning committees to have access to appropriate training resources so that decisions on applications for salmon farms can be better informed.

395. In terms of environmental impact, it was noted in the SRSL report to the ECCLR Committee that "in more energetic waters, the waste will be dispersed, so having less impact on the seabed, and enriching the supply of organic matter to the marine food web in a sea-loch." ⁸⁹

396. FIDRA said that a thorough investigation of new sites and reassessment of current sites is needed to ensure that is the case. It cautioned that possible inaccuracies in dispersion modelling make this highly pertinent, as there is a lack of knowledge of how increased nutrient concentrations impact the dispersal of treatment chemicals.

397. However, organisations such as the Friends of the Jura Sound questioned the assumption that sites with increased tidal capacity to disperse waste would be located further offshore. It was concerned that farms could still be sited in near-shore sites which are more exposed, such as less sheltered lochs. It was also concerned that larger farms in these locations would still be in the path of migrating salmon and impinges upon the habitat of sea trout. It stated—

” In choosing the sites and sizes of farms, more weight should be given to the opinions of those whose livelihoods depend on the health of their local environment. At present this is only done, in a very patchy way and with a strong bias in favour of development

Source: The Friends of the Sound of Jura, 2018¹³⁵

398. Many submissions received by the Committee discuss the potential impact of fish farms on Marine Protected Areas (MPAs) and Priority Marine Feature (PMFs) and the species that inhabit them. For example, the University of Plymouth Marine Institute highlights in a written submission that that “Locating fish farms above maerl habitats is not consistent with UK conservation targets and alternative sites should be sought when licensing new farms.”¹³⁶

399. Also in a written submission, [Dr Carol Hawley](#) expressed concern that although Scottish Natural Heritage is responsible for ensuring that PMFs are safeguarded, its own planning guidance only permits it to object to planning applications for fish farms if the national population of those PMFs is at risk. She argued that “SNH must be allowed to object to new applications where they threaten PMFs at a regional level, and not only when the development will threaten them at the national level.”¹³⁷

400. This was also an issue on which the ECCLR Committee took evidence and it stated that it “remains deeply concerned that it appears a precautionary approach has not been, and is not being, applied to the development of fish farms and in particular to farms in MPA’s or in the vicinity of a PMF”.¹⁸

401. The Committee notes that, in publishing its draft Finfish Aquaculture Sector Plan in November 2018, SEPA expressed the view that the package of proposals it contains would combine to encourage operators to site and operate their fish farms in environmentally less sensitive waters and use improved practices and technologies to reduce environmental impact. SEPA stated that it anticipated that, in practice, this would lead to fewer fish farms in shallower, slow-flowing waters and more fish farms in deeper and faster-flowing waters.

Strategic overview of salmon farm development

402. Concerns were expressed about the lack of a process of assessment of cumulative regional and national impact of salmon farms. In its written submission, the [Marine Conservation Society](#) suggests that such an assessment “is essential if we are to understand and mitigate for impacts on wild salmonids, benthic habitats, water quality, including nutrient loads and on the wider environment, including all Priority Marine Features.”¹³⁸

403. Some witnesses to the inquiry suggested that adopting a more strategic approach to the development of sites through the planning system would also be of benefit to

the industry as it sought to expand. James Withers of Scotland Food and Drink said—

” A more strategic overview and framework for how we grow the sector nationally would be helpful... If we had a planning system that demonstrated how it can support that development nationally, with all the checks and balances that such a planning system would need, that would make it easier for the industry to think about how it invests and grows.

Source: Rural Economy and Connectivity Committee 25 April 2018, James Withers, contrib. 132¹³⁹

404. Support for such an approach was also provided by a senior planning professional who is actively involved in processing planning applications for salmon farm developments. Mark Harvey of Highland Council’s Development & Infrastructure Service told the Committee—

” The need for a more strategic plan has come up a couple of times. I was quite struck by the Norwegian model, which consists of a traffic-light approach, with green, amber and red... That model strikes me as relevant to the Scottish experience, because I suspect that there are parts of the west coast of Scotland where we have too great a loading of fish farms already—we have red areas, as it were. We need to move that biomass to areas that we might categorise as green.

Source: Rural Economy and Connectivity Committee 18 April 2018, Mark Harvey, contrib. 65¹⁴⁰

405. The Committee notes that under the “traffic light” approach to strategic management of farmed salmon production in Norway, the coast has been divided into 13 production areas. Sea lice impact on wild salmon stocks is used as the indicator when determining whether a production area is ready for growth or not. If the indicator in a production area is green, it means capacity could be increased by up to 6 percent. A yellow indicator means capacity could be unchanged, whilst a red categorisation means capacity could be reduced. Capacity adjustments are considered every other year, and these started in 2017.

406. The Committee was advised that the traffic light was “turned on” for the first time in autumn 2017, resulting in 8 green production areas, 3 yellow and 2 red. Whilst the Norwegian Government will not reduce the production capacity in red areas immediately, it has stated that this will be done for the first time in 2019.

407. In a submission to the Committee, Norwegian Government officials indicated that the traffic light system is designed to give the industry “more predictability with regard to when and at what criteria the production capacity will be adjusted and how large the adjustment will be at each instance”. They also advised the Committee that, as a result of the traffic light system, the Norwegian Government is now in the process of allocating new production capacity for the sector, with those operating in “green” production areas being offered a 2% increase in production capacity in December 2017. ¹⁴¹

408. In its written submission, [SNH](#) advised the Committee that some work had been carried out by Marine Scotland in developing an aquaculture spatial planning tool. It suggested that when this work was finalised, it “should help to identify locations with fewest constraints for fish farm development, and might inform a strategic planning approach to better define the capacity for sustainable growth.” ¹⁰⁰

409. This was confirmed by Alastair Mitchell, Head of Aquaculture & Recreational Fisheries, Marine Scotland, who advised the Committee that Marine Scotland Science has been working on heat maps which would provide an indication of where opportunity for growth exists based on a range of criteria, including existing salmon farm activity. He said—

” It is absolutely the intention that that work helps to inform planning around the country. Indeed, it will form part of the consenting review, as part of which we will look at how all of that fits together as a jigsaw.

Source: Rural Economy and Connectivity Committee 09 May 2018, Alastair Mitchell, contrib. 234¹⁴²

410. **The Committee is in agreement with evidence which suggests that taking a more strategic approach to the siting of salmon farms in Scotland would be beneficial, not least in identifying the environmental suitability of both inshore and offshore locations for such developments.**

411. **RECOMMENDATION 51**

It is therefore of the view that the Scottish Government should, as a matter of priority, initiate a spatial planning exercise with a view to developing strategic guidance specifying those areas across Scotland that are suitable or unsuitable for siting of salmon farms. This work should take full account of existing strategic documents such as the Marine Plan, and incorporate an assessment of the potential impact of salmon farms on MPAs and PMFs and the species which inhabit them.

412. **The Committee recognises that such work will require input from the wide range of regulatory and advisory bodies which have responsibility for or engage with the sector and may therefore take some time to produce. However, it notes that Marine Scotland is already working to develop heat maps which would identify areas suitable for farmed salmon expansion and is of the view that this work might usefully inform a wider spatial planning exercise.**

413. **RECOMMENDATION 52**

The Committee acknowledges the role of planning authorities in considering and deciding on planning applications for salmon farms, taking into account a range of social, economic and environmental factors. However, it is of the view that strategic guidance on the siting of salmon farms should also be viewed as a material consideration in planning terms, which would help guide the industry in making applications and planning authorities in deciding on these. The Committee calls on the Scottish Government to consider how this might operate in practice and to consider whether any changes in planning guidance might be required.

Potential relocation of existing sites

414. In addition to receiving evidence on how new salmon farms might be better located, the Committee also heard how moving existing fish farms from poorly suited locations might deliver fish health and environmental benefits. In written evidence, SNH indicated that it would—

” ...welcome a mechanism to consider moving existing farms where environmental impacts are greatest and perhaps consolidation to larger farms in locations with lower environmental sensitivity and thus greater capacity for development.¹⁰⁰

415. Industry representatives made clear that they welcomed the opportunities that moving existing sites presented to address some of challenges facing the industry. [The Scottish Salmon Company](#) stated in its written submission that it “would welcome the opportunity to consider a process to review site locations and potentially move underperforming sites, releasing environmental headroom, to develop in more suitable alternative locations.”¹⁴³

416. Grant Cumming of Grieg Seafood also suggested that the relocation of existing sites should be encouraged. He told the Committee—

” The movement away from inshore sites should definitely be encouraged by regulation. That would free up those sites for other water users, and we would move offshore... A move to bigger, deeper sites would be beneficial, and it may be worth looking at how marine spatial planning can help us to identify areas that are more suitable for aquaculture and to specify where the industry should move to.

Source: Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 292¹⁴⁴

417. Ben Hadfield of Marine Harvest highlighted the benefits of consolidation of sites in less sensitive areas and suggested that this would allow production to be maintained or even increased. He also expressed the view that this approach might deliver environmental benefits, as well as having a positive impact on relationships between the industry and stakeholders, particularly those from the wild fish sector.

418. Other stakeholders suggested that the removal of production from sensitive sites should be a requirement if the industry wishes to expand. In a written submission, the [West Sutherland Fisheries Trust](#) stated—

” There is currently no mechanism to move production from sensitive inshore marine sites, to less sensitive locations. If the industry is seeking to move production to larger, higher energy sites, we believe that there should be a mechanism to require an associated reduction in production from sensitive inshore sites.

Source: West Sutherland Fisheries Trust, 2018¹⁴⁵

419. However, a lack of flexibility with the planning system to allow a relocation of sensitive inshore sites was highlighted by other witnesses. Jon Gibb of Lochaber District Salmon Fishery Board told the Committee—

- ” At the moment, the local authority has no power to say to an inshore site that already has full planning permission that it has to relocate biomass, so I suggest that we need a mechanism in the planning regulations to allow that.

Source: Rural Economy and Connectivity Committee 14 March 2018, Jon Gibb, contrib. 158¹²⁰

420. It was also suggested to the Committee that the provision of incentives to salmon farm operators, perhaps to make use of new and emerging technologies which would allow a move to high energy sites would be worth considering. Dr Alan Wells of Fisheries Management Scotland said—

- ” There are no incentives that I am aware of. I know that Norway incentivises some of the technologies, and we made the point to the Environment, Climate Change and Land Reform Committee that it would be good to see such incentives coming through in Scotland.

Source: Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 193¹⁴⁶

421. **The Committee notes that as the salmon industry in Scotland has evolved in recent decades, farms may have been located in areas which are now recognised as being environmentally sensitive (such as MPAs or PMFs) or are less well-suited to production for a variety of reasons. It welcomes the fact that some operators are already actively looking to relocate poorly sited farms or to consolidate farms in less sensitive areas.**

422. **RECOMMENDATION 53**

However, the Committee considers that there should be immediate dialogue with the industry to identify scope for moving existing poorly sited farms. It recommends that this should be led by Marine Scotland and encouraged with appropriate incentives for operators, such as giving favourable consideration towards allowing increased capacity at replacement sites that are known not to be environmentally sensitive. The Committee considers it to be important, however, that there is no deviation from due process in terms of granting approval for replacement sites.

Challenges of moving to more exposed sites

423. The Committee also heard that, whilst the siting of fish farms in more exposed, higher energy marine environments would most likely deliver some benefits, it would not resolve all of the issues faced by the industry. Indeed, such an approach would present the industry with a different set of challenges, as Stewart Graham of Gael Force Group explained—

” I encourage the committee not to consider that moving offshore to bigger sites is a panacea. That must be a progressive process—although nowadays we have much more robust equipment, the process must be one of feeling and moving our way slowly forward. It is not a case of unlocking and suddenly moving everything offshore; it is a difficult and challenging environment not just for people but for the fish and their containment and the environmental challenges that can come with that.

Source: Rural Economy and Connectivity Committee 02 May 2018, Stewart Graham, contrib. 297¹⁴⁷

424. RSPCA called for clearer definitions of what terms such as ‘exposed’ and ‘deep water’ mean in practice. It called on SEPA to provide guidelines to quantify these terms to allow a more informed debate and consistent approach to what would constitute off shore farming.
425. Alastair Mitchell of Marine Scotland acknowledged these challenges and also made the point that the fish that would go into pens in more exposed locations would need to be larger and more robust. However, he indicated that this could reduce the amount of time that farmed salmon would need to be in the marine environment which would be advantageous. He said—

” The shorter time in the marine environment grow-out phase means, in basic terms, less disease and fewer sea lice. The holy grail is to get to a year or less in the marine environment, because there is a moment in the second year in that environment when many of the issues accelerate. Therefore, if we can move to a shorter time, there will be commensurate benefits that will allow the sustained expansion that people have talked about.

Source: Rural Economy and Connectivity Committee 09 May 2018, Alastair Mitchell, contrib. 239¹⁴⁸

426. The Committee is aware that farmed salmon sites in Norway are increasingly being located further offshore in deeper water. The Norwegian Government is currently evaluating the current legal framework for offshore aquaculture to identify any regulatory issues that may arise. This exercise has input from nine ministries which may have regulatory or other interests and is expected to be completed by the end of 2018.
427. The Committee also heard that the industry in Norway, although also at an early stage in encouraging the move to higher energy sites, was making significant investment in research and development work to inform and support that process. It was suggested by Alastair Mitchell of Marine Scotland that the industry in Scotland is not of sufficient scale to support such high levels of investment.
428. The Committee again notes the relevance of SEPA’s draft Finfish Aquaculture Sector Plan proposals, which the regulatory body considers would lead to fewer fish farms in shallower, slow-flowing waters and more fish farms in deeper and faster-flowing waters.

429. **RECOMMENDATION 54**

The Committee recommends that work to examine the scope for siting salmon farms in suitable offshore and other locations where there are

higher energy water flows should also be treated as a high priority by the industry. It acknowledges that there are significant technological challenges associated with locating farms in these areas, as well as risks in terms of workforce health and safety. However, it also notes the benefits this could bring in terms of addressing fish health issues, reducing the environmental impact of waste and providing scope for the industry to develop higher capacity sites.

430. **RECOMMENDATION 55**

The Committee further recommends that the Scottish Government should consider how the regulatory framework which applies to the industry might need to be adapted to suit the particular circumstances of offshore aquaculture.

Closed containment

431. The Committee explored the topic of closed containment with witnesses. Closed containment attempts to restrict and control interactions between farmed fish and the rest of the marine environment. Recirculating Aquaculture Systems (RAS) are land-based recirculation systems which help to grow salmon in tanks. Some systems grow them to a certain size before they are transferred to the sea. A smaller number grow salmon to harvest weight. There is also development in other closed containment technologies at sea.

432. Professor Migaud explained —

” ...they are transferred to a recirculation system in seawater, where they will be on-grown for a longer period. That reduces the time that the fish spend in open cages, which also reduces the health challenges.

Source: Rural Economy and Connectivity Committee 07 March 2018, Professor Migaud, contrib. 172¹⁴⁹

433. A number of submissions, in particular those with wild salmon interests, strongly support a move to closed containment systems. For example, Alan MacDonald of Doonside Fishing expressed the view that “Closed Containment is the only solution to the problems caused by the currently unsustainable salmon farming.”¹⁵⁰

434. Others noted that it may be helpful in tackling the challenges of sea lice, climate change and be a more effective solution to protect salmon from seal predation at sea. For example, member of the public and retired business owner, Angus Meldrum said —

” Trying to grow the industry using outmoded open net farming will only make things worse. Using Closed Containment, the water will always be at the right temperature on land, and at sea using colder water from below.

Source: Angus A Meldrum, 2018¹⁵¹

435. A submission from Scottish Land and Estates suggested that Scotland should seek to become an international leader in the development of closed containment technology. It said —

” RAS systems are currently being developed by Norway and Canada. As the largest producer of farmed salmon in the EU and the third largest globally Scotland should be placing itself at the forefront in developing RAS technology.

Source: Scottish Land and Estates, 2018¹⁵²

436. However, others, although they are supportive of the technology caution that it is not yet a viable alternative. For example, Douglas Low, a retired industry specialist, said that if on land RAS would require the same amount of space as salmon farms take up at sea. He argued that given the distance to the main salmon markets and high logistical and energy costs, Scotland is unlikely to be a competitive location. Although it is an important technology for the industry he argued it wasn't currently viable to grow salmon to market size in sufficient volume

437. Marine Harvest Scotland Ltd and Biomar identified that the move to RAS systems may be premature with further testing and financial viability required. Marine Harvest Scotland Ltd stated that—

” A land-based tank system (Recirculating Aquaculture System) is often quoted as a possible replacement for farming fish in the sea but our extensive research, and the experience of companies who have carried out trials, has shown that much more work needs to be done before it could be considered a viable alternative.

Source: Marine Harvest Scotland Ltd, 2018¹⁵³

438. BioMar stated “It is suggested by many, that the future of the Scottish Aquaculture Industry is on shore in automated recirculation systems. Financially this is not realistic; no system to date has economically proven itself producing harvest sized fish, where the whole life cycle has been in a recirculation system.”¹⁵⁴

439. Richard Luxmoore from SE Link informed the Committee that one of the main arguments against technologies such as closed containment is that they are more expensive to operate at a profit. As such, a financial incentive would be useful. He noted that other farming industries e.g. cattle have to pay to dispose of their waste whereas the salmon industry externalises these costs by dispersing waste in the sea. He said —

” It is more expensive but, in effect, it brings in some of the costs to the economic envelope of the farm and gets them properly dealt with. The sooner we can move in that direction, the better.

Source: Rural Economy and Connectivity Committee 14 March 2018, Richard Luxmoore, contrib. 196¹⁵⁵

440. ECCLR Committee called for urgent research and incentives. It said—

” As a matter of urgency the Committee wishes to see independent research commissioned, including a full cost-benefit analysis of Recirculating Aquaculture Systems (RAS), and a comparative analysis with the sector as it currently operates in Scotland, alongside further development and implementation of alternative technical solutions, supported by the use of incentives.¹⁸

441. The Committee asked whether there are sufficient regulatory or economic incentives to bring about the adoption of such solutions in the fish farm industry. The Committee heard that there are no strong incentives currently available in Scotland. However, it notes that SEPA is of the view that the package of measures proposed in the its draft Finfish Aquaculture Sector “will encourage the adoption of new technologies such as partial and full containment to capture organic waste and any remaining medical residues.”¹¹³

442. Supporters of the move to closed containment strongly supported industry investment and increased support and incentivisation from authorities. Guy Linley Adams on behalf of Salmon and Trout Conservation Scotland said—

” You need as many incentives as you can possibly give to closed containment. An option that the Scottish Government has before it is sea-bed leases. Now that the Crown Estate is devolved here, there is no reason why a Crown Estate lease for a novel site should not be available for a peppercorn rent.

Source: Rural Economy and Connectivity Committee 14 March 2018, Guy Linley-Adams, contrib. 197¹⁵⁶

443. Andrew Bradford from Kincardine Estate said—

” Cost is not a defence for a system that so evidently is harmful through pollution, infestation etc. Energy issues can be addressed by using renewable energy.

Source: Andrew Bradford, 2018¹⁵⁷

444. Other organisations such as Compassion in World Farming raised concerns about the welfare of the salmon in RAS systems. It said—

” In order to run economically, RAS are likely to involve high stocking densities, well above those permitted by welfare schemes such as RSPCA Assured. This risks higher levels of stress, aggression, and injuries

Source: Compassion in World Farming, 2018⁹⁰

445. Other noted that the energy requirement for onshore facilities is likely to be high. SEPA noted that it will conduct further investigation into its potential carbon footprint.

446. The Committee also heard about the possible difference in productivity between fresh and salt water RAS facilities. Introduction of saltwater can change water chemistry and the range of bacteria present. Douglas Low noted that “seawater RAS science and technology lags behind freshwater. Dealing with effluent from seawater RAS is also more difficult given its salt content.”¹⁵⁸

447. The Scottish Government stated in a letter to the Committee that—

” Recirculation and closed containment is a fairly new concept to Scotland, at least in comparison to how the majority of the industry operates. New technologies and innovations may advance processes further and influence future development but their mainstream commercial application currently remains unviable.

In addition, it is argued by some that fish which are produced in an on-shore container system may not offer the same level of consumer appeal and flavour taste of those farmed salmon that have spent time in the sea

Source: Letter from the Cabinet Secretary for the Rural Economy to the Committee following his appearance on 9 May, regarding Closed Containment and the Implications for Waste., 2018¹⁵⁹

448. **The Committee recognises that the development of closed containment facilities could have a significant positive impact on the farmed salmon industry and has the potential to address many of the environmental challenges it faces. However, it also recognises that the development of this technology has its own challenges in terms of large scale roll out. These include its physical footprint whether on land or at sea; energy costs; carbon output; stock welfare issues; and the potentially negative impact on perceptions of provenance and quality.**

449. **RECOMMENDATION 56**

The Committee endorses the ECCLR Committee’s recommendation for urgent research on the subject and the consideration of ways to incentivise the industry to explore further use of the technology. However, it is aware that RAS is not the only closed containment option and would encourage wider research on alternative technologies.

Climate Change

450. The Committee is aware that the impact of climate change can create challenges for both the wild and farmed salmon sectors. The Committee heard that warmer seas can lead to increased numbers of sea lice as well as gill health issues and algae blooms which can negatively impact both types of fish. Dr Wells from Fisheries Management Scotland also said—

” Climate change almost certainly affects the ability of wild fish populations to find food in the marine environment. We know that there have been phase shifts of plankton and the things that fish eat—they have moved about 1,000km to the north, which has a big effect on wild fish.

Source: Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 30¹⁶⁰

451. The Committee also heard about the impact of El Niño conditions, which raised the Atlantic’s temperature contributing to warmer seas and coastal areas. Grant Cummings said—

” ...we have faced high water temperatures over the past few years, partly as a result of El Niño and possibly partly as a result of climate change. That has created a new environment in which we have to control fish health, which has been challenging for us.

Source: Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 180¹⁶¹

452. One of the workstreams in the Scottish Government’s Fish Health Framework is climate change and ocean acidification. The Scottish Government intends to monitor, review and assess this impact on Scottish waters and the aquaculture industry. This activity will help determine how to measure changing climatic conditions in Scotland particular to aquaculture, leading to an annual mapping exercise. This includes data already available from fish farms as well as real time temperature data and the creation of real time monitoring of plankton.

453. The Committee acknowledges the wider impact of climate change and the challenges it brings to both the wild and farmed salmon sectors. It welcomes the Scottish Government’s focus on climate change in its Fish Health Framework and looks forward to receiving early feedback on its progress.

Research on the impact of salmon farming

454. The Committee has been struck by the lack of knowledge, understanding and data availability in relation to the impact of salmon farms. The Committee agrees with the ECCLR committee that this research is fundamental to understand, manage and ameliorate the impacts of salmon farming on the environment, especially considering the planned expansion of the sector.
455. The Committee heard that it is very difficult to obtain robust data to accurately measure impact once wild salmon are out to sea. This is just one concern amongst many reported challenges which the Committee was made aware of around research and data collection. For example, in addition to the knowledge gaps considered throughout the report it is also aware of gaps in relation to likely migration routes and the number of smolts leaving individual sites, the impact of climate change and the diffuse far field effects of chemicals on the benthic and pelagic ecosystem components and cumulative impacts amongst others.
456. In order to try and establish a clearer picture the Scottish Aquaculture Research Forum (SARF) conducted a pilot study on adult salmon returning from sea. The approach involved treating groups of migrating Atlantic salmon smolts with an anti-lice compound and comparing the numbers of returning salmon with those in untreated control groups. However, it concluded that the numbers contained within the study were not large enough to derive any robust findings. This highlights the challenges in obtaining reliable data.
457. The SRSL report notes that “there are few data allowing the risk of disease transfer between wild and farmed populations to be reliably estimated.” Dr Wells from Fisheries Management Scotland said—
- ” It is incredibly difficult to try to assess disease in the wild population without massive sampling efforts. If fish are badly affected by disease, they die. The term “black box” was used last week—we simply cannot sample them.
- Source: Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 27¹⁶²
458. The ECCLR Committee stated that there are gaps in data, monitoring and research. It also noted that the data which is available often comes from in-house studies, carried out in sea lochs which may not translate to inshore areas or the open sea. It said —
- ” There are significant gaps in knowledge, data, monitoring and research around the adverse risk the sector poses to ecosystem functions, their resilience and the supply of ecosystem services. Further information is necessary in order to set realistic targets for the industry that fall within environmental limits. There should be a requirement for the industry to fund the independent and independently verified research and development needed. ¹⁸
459. It went on to identify a number of knowledge gaps, including—

- wild fish populations and likely migration routes and the number of smolts leaving individual sites
- population level effects of sea lice on wild salmonoids
- the risk of disease transfer between wild and farmed populations in Scotland
- impacts of sea lice treatments – long term and low level on the benthic diversity and vulnerable species such as cetaceans
- science based trigger levels for sea lice treatment
- diffuse far field effects of chemicals on the benthic and pelagic ecosystem components and cumulative impacts
- the environmental impacts on freshwater lochs
- monitoring of long term protected species
- the extent of genetic mixing between escaped farmed and wild salmonoids (including deliberate releases)
- the impact of wrasse fisheries on wild populations
- the application of new and emerging technological solutions including RAS
- the impact of climate change

460. The Committee notes that in a letter to the ECCLR Committee on 28 March 2018, SEPA made reference to a project which it said would help provide a stronger evidence base with regard to the potential risks to wild salmon and sea trout. The letter stated—

” We have committed to a large, jointly funded project with Marine Scotland and Scottish Natural Heritage to improve understanding of the current status of salmon in rivers across Scotland. This information will help us evaluate the results of the investigative surveys we have been carrying out into salmon stocks in rivers on the West Coast.

Source: Letter from the Scottish Environment Protection Agency to the Environment, Climate Change and Land Reform Committee, 2018¹⁶³

461. The Committee is also aware that there has been recent controversy in the [media](#) about SEPA and the Scottish Government failing to respond effectively to FOI requests to allow information to be released into the public domain. STC has won six cases after referring them to the Information Commissioner for review last year. This highlights the importance of the need for transparency within the sector.

462. There was support for increased research from the supermarket industry. For example, [Sainsbury's](#) stated—

” Research should be undertaken between government, industry and appropriate representative bodies representing wild fisheries interests in order to understand tolerable sea lice burden within individual farm areas based on hydrological characteristics and the potential for wild fish impacts.²⁵

463. [Prof Philip Thomas](#) states that there are large amounts of data already collected by the industry. He said—

” the scale of routine data collection by farming companies could provide the industry with a very powerful research tool, if the data were better harnessed for industry-wide benefit. For the avoidance of doubt, this is not a matter for the regulators or for further legislation, it is a matter for the industry itself.

Source: Professor Phillip Thomas, 2018³⁸

464. In addition to calls for greater research on environmental and sustainability issues, the RSPCA called for the objective measuring of animal welfare indicators. It stated that the production of up to date information, would remove the need to rely on “often outdated literature or subjective opinion, which in a fast-moving industry is very important”. It argued that this up to date information may also allow an evaluation of how issues such as climate change may be affecting the environment in which the fish are produced.

465. Heather Jones from the SAIC told the Committee that the industry is aware of the need for more research and has invested in 23 different research projects with the centre. Out of the £34 million worth of projects undertaken by the centre, £22 million has been contributed by the salmon industry.

466. Professor Bron from Stirling University told the Committee that—

” ...the subject needs a larger discussion with academia and industry and, indeed, Government and non-governmental organisations to identify the key gaps in knowledge that need to be filled. As the committee will see from the report, there are many such gaps—especially for Scotland.

Source: Rural Economy and Connectivity Committee 07 March 2018, Professor Bron, contrib. 205¹⁶⁴

467. Scottish Natural Heritage argued that resourcing for research (and ongoing monitoring to inform adaptive management) is always going to be a challenge, but a new collaborative focus (between industry, government and regulators) on agreeing key research priorities and commissioning work on an annual basis would be helpful. It stated that the imminent loss of the Scottish Aquaculture Research Forum (SARF) creates additional challenges in the coordination of such work. It voiced a hope that the Scottish Aquaculture Innovation Centre (SAIC) may in future perform a similar role, but this might require greater ability for government and regulatory bodies to influence research priorities alongside industry.

468. The Committee was advised during a meeting with the Norwegian Fisheries Minister that the Norwegian Government has increased funding for research related to the farmed salmon sector. In addition, salmon farm companies are encouraged to carry out their own research and are required to contribute 0.3% of all export profits to fund research nationally.



469. [Waitrose](#) stated “Per tonne, we believe the UK currently spends less on research than our Norwegian counterparts and this needs to change.”⁴⁸
470. The Norwegian Seafood Research Fund (FHF) is the Norwegian seafood industry’s tool in managing the industry’s investments into industry-based research and development (R&D). The FHF board is appointed by the Ministry of Trade, Industry and Fisheries, and comprised of representatives from the industry. The industry foundation is further strengthened through a series of advisory groups consisting of active players in the industry.
471. In addition to this, substantial amounts of R&D funding is allocated to aquaculture activities through funding schemes in the Research Council of Norway and the tax refund scheme Skattefunn (about 800 mill. NOK combined annually). The allocation of research licences and development licences also encourage the industry to conduct research. Research licences can be allocated to applicants that document the need for biomass to conduct research which will be used to develop knowledge that will benefit the aquaculture industry, e.g. farming systems, technology, biology, nourishment, fish health and fish welfare. The licences are allocated for a period of up to 15 years, dependent on the research project. Satisfactory research competence must be documented.

472. **RECOMMENDATION 57**

The Committee notes that the ECCLR Committee’s report identified a range of significant gaps in knowledge, data, analysis and monitoring around the adverse risk the sector poses to the environment (listed at paragraph 454 above). It strongly endorses the ECCLR Committee recommendation on the need for more research in these areas.

473. **RECOMMENDATION 58**

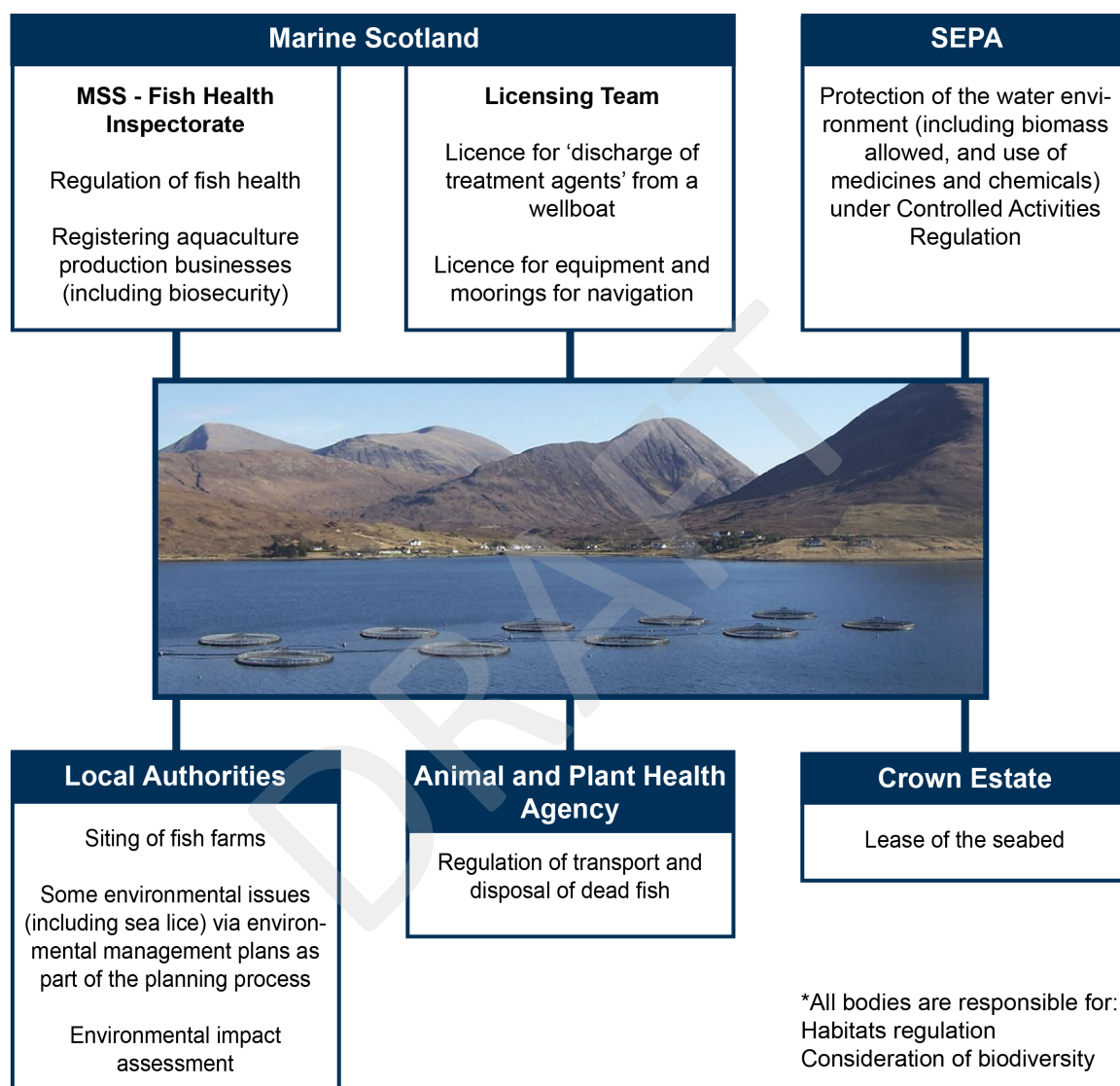
However, the Committee acknowledges the challenges inherent in the collection and processing of this data. It calls on the industry and all other relevant bodies and organisations to work together to overcome the barriers of the scale of the task and the challenge of securing appropriate funding for that research. In particular, it agrees that there should be a requirement for the industry to contribute finance, expertise and other relevant resources to independent research. The Committee calls on the Scottish Government to consider how an appropriate mechanism can be introduced.

DRAFT

Regulation and consent

474. There are a wide range of agencies involved in the current consenting and regulatory regime which applies to salmon farming in Scotland. These include
- Local authorities who give planning permission, conduct environmental impact assessments, and may require an environmental management plan
 - Marine Scotland Licensing Team who give a licence related to navigational considerations
 - The Crown Estate who provide a lease of the seabed
 - Marine Scotland Fish Health Inspectorate who provide authorisation to operate as an Aquaculture Production Business
 - SEPA who are responsible for the Controlled Activities Regulation
 - The Animal and Plant Health Agency who are responsible for animal by-product regulations and transportation of dead fish.
475. A detailed summary of the consenting process and the regulatory regime is provided in the [SPICe briefing on Salmon Farming in Scotland](#).

Organisations responsible for regulation and consent of Scottish Fish Farms



Effectiveness of the current regime

476. Several of the witnesses who appeared before the Committee and many of the written submissions received discussed the efficacy of the current consent and regulation regime under which the salmon industry operates.
477. The Committee notes that in its letter to the Committee, the ECCLR Committee called for a review of the roles and responsibilities of various bodies involved in regulation of the industry and was critical of the current framework. The letter stated—

” The current consenting and regulatory framework, including the approach to sanctions and enforcement, is inadequate to address the environmental issues. The Committee is not convinced the sector is being regulated sufficiently, or regulated sufficiently effectively. This needs to be addressed urgently because further expansion must be on an environmentally sustainable basis. ¹⁸

478. Several stakeholders also suggested in written submissions that the sector needs to be regulated more effectively. The [Scottish Inshore Fisheries Trust](#) stated that “the sector is inadequately regulated with regard to: site location; cumulative impact of multiple salmon farms; ecosystem impacts; impacts on other industries; transparency and reporting obligations.” [Skye Communities for Natural Heritage](#) expressed the view that the regulatory regime is “pathetically weak, disjointed, almost non-existent”. The [Scottish Wildlife Trust](#) asserted that “there should be a significant tightening of regulatory controls” and [Waitrose](#) stated that “we believe that regulatory bodies could provide more robust controls (possibly including financial ones) on breaches to licences or codes of practice”.

479. However, others who provided evidence were of the opinion that the regulatory framework in Scotland was of a high standard. Heather Jones of the Scottish Aquaculture Innovation Centre told the Committee—

” Scotland is widely regarded as one of the most tightly regulated places in the world for salmon production. In relation to other species, salmon is the king of fish in the way that it is monitored and researched, and the environmental impact is a recognised factor.

Source: Rural Economy and Connectivity Committee 25 April 2018, Heather Jones, contrib. 103¹⁶⁵

480. This view was echoed in a submission from the [NAFC Marine Centre](#) which said that—

” The sector adheres to a number of regulatory regimes, some self-imposed ...and some external and independent. We consider these to be sufficiently robust and involve all groups with an interest in salmon farming, including local communities and academia.

Source: NAFC Marine Centre, 2018¹⁶⁶

481. The Committee also heard that there was support from within the industry itself for an evolution and strengthening of the regulatory framework as the industry develops. For example, in its written submission, [Marine Harvest](#) stated—

” As the industry grows, the regulatory regime must also keep developing and be as robust as possible to maintain the high global reputation of farmed Scottish salmon for quality, food safety and the highest standards of husbandry.

482. James Withers of Scotland Food and Drink suggested that the proposed growth of the industry should occur only if it is accompanied by—

” ...not only bare-minimum standards but world-leading standards.

Source: Rural Economy and Connectivity Committee 25 April 2018, James Withers, contrib. 162¹⁶⁷

483. However, in a written submission, [Wester Ross Fisheries Ltd](#) cautioned against having a regulatory regime which placed a financial burden on operators. It stated—

” Salmon farming in Scotland is a relatively young industry, and it’s development must not be hindered by a costly regulatory framework which will adversely affect our competitive position in world markets.

Source: Wester Ross Fisheries Ltd, 2018⁴⁰

484. Marks and Spencer PLC sounded a similar note of caution —

” we need to ensure there is an appropriate balance found between maintaining strong regulation in Scotland whilst not stifling industry investment and innovation in the salmon aquaculture sector.

Source: Marks and Spencer's PLC, 2018⁴⁷

485. The Committee also heard suggestions that the current consenting and regulatory regime was complex, confusing and disjointed. For example, [Stewart Graham, Gael Force Group](#) stated that the “regulatory regime which applies to the farmed salmon industry in Scotland while robust is extremely complex, not joined up and demonstrates almost no innovation.” This view was shared by [Melville McDonald](#) who stated that “bodies such as Marine Scotland, SEPA, SNH and Local Authorities are working totally independently and not working well. There is a lack of guidance from Government as to their responsibilities. Presently they have no discernible accountability.”

486. Others suggested that the regulatory framework would be more effective if it was more streamlined and better coordinated. For example, Alex Adrian of the Crown Estate Scotland said—

” We have the right bits and pieces, but they have not been put together in the right order. We need an overarching framework that governs the relationship between the agencies, as well as one that acknowledges the uncertainties and unpredictability of the environment that we have and focuses on management, rather than development.

Source: Rural Economy and Connectivity Committee 18 April 2018, Alex Adrian (Crown Estate), contrib. 30¹⁶⁸

487. The Committee also heard that similar views were shared by those involved in the salmon farming industry. Ben Hadfield of Marine Harvest said—

” ...we should not downplay the strength of the regulation here in Scotland. It is good, and it is better than what exists in many other salmon farming regions. At points, however, it can be disjointed, and there is more work to be done to bring it together to get a strategy that is more like the one that Richard Lyle suggested, whereby someone can take a view of the whole industry and ask where we want to go.

Source: Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 189¹⁶⁹

488. Some practical suggestions of how better coordination might simplify the regulatory landscape and deliver improvements were provided by witnesses. Grant Cumming of Grieg Seafood said—

” To operate a fish farm, we require at least five licences, which are issued by different regulatory bodies. All our regulators are good and thorough, but there is the opportunity for things to fall between stools. A crucial point concerns sea lice and sea lice medicines. Sea lice numbers are regulated by one body, but sea lice medicines are regulated by another.

Source: Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 166¹⁷⁰

489. Dr Richard Luxmoore, representing Scottish Environment LINK, commented on the current requirement for fish farm operators to apply for both planning consent from a local authority and a CAR licence from SEPA. He suggested that—

” we need a single streamlined process in which a person submits a single application for a fish farm and all the impacts are considered together.

Source: Rural Economy and Connectivity Committee 14 March 2018, Richard Luxmoore, contrib. 136¹⁷¹

490. The Committee also heard from those who felt that the current regulatory landscape involving several different regulatory bodies was entirely appropriate. Heather Jones of the Scottish Aquaculture Innovation Centre said that—

” Each body has a specific role and, as long as it seeks to have opinions and evidence on its area of expertise, it is clear what that role is.

Source: Rural Economy and Connectivity Committee 25 April 2018, Heather Jones, contrib. 129¹⁷²

491. Suggestions were also made as to how the various regulatory and advisory bodies involved with the sector might work together more effectively. For example, Cathy Tillbrook of SNH said—

” ...it would be good to consider how we collaborate in relation to the area management of fish farms. That would involve thinking about what the monitoring was telling us about all the fish farms in an area—we could do that at sea-loch scale, for example—and what that meant for the management of the individual farms in the area. We might need to think about how, as a group of regulators and advisers, we can do that better.

Source: Rural Economy and Connectivity Committee 18 April 2018, Cathy Tillbrook, contrib. 176¹⁷³

492. In responding to questions on the whether the current regulatory framework was fit for purpose, the Cabinet Secretary for the Rural Economy and Connectivity suggested that introducing a simpler regime might not be straightforward and could be difficult to achieve. Whilst he indicated that he did not consider a streamlining of the process to be a priority at present, he was keen that the regime should operate efficiently and deliver positive outcomes. He said—

” The primary task at the moment is to focus resolutely and forensically on tackling the particular challenges that are rightly occupying our time, but I am also sympathetic to trying to have a consenting regime that gets the best results—which provides sustainable aquaculture and does not take forever to navigate or involve disproportionate expense or complexity.

Source: Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 246¹⁷⁴

493. The Committee also explored with the Cabinet Secretary whether a single regulatory body might be of benefit in simplifying the consenting and regulatory framework. He stated—

- ” Although I am attracted in principle to the idea of a one-stop shop, I think that in practice it would involve dismantling the whole framework of planning and regulation in the country. Rather than pursue such an approach immediately, we should focus on the task in hand of the consenting review, the wild fish interactions working group and the farmed fish health framework.

Source: Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 250¹⁷⁵

494. **The Committee notes the views provided by stakeholders on the efficacy of the current regulatory and consenting regime. Whilst some of those who have commented consider it to be adequate, the Committee shares the views of the majority of those who provided evidence who consider that a more robust and integrated regime is required.**

495. **From the evidence it has received, the Committee has gained the strong impression that the farmed salmon sector in Scotland has been subjected to what might be described as “light touch” regulation and enforcement to date as the relatively young industry has developed.**

496. **However, in recent years a range of fish health and environmental challenges have emerged and whilst it is clear that the industry is working hard to address these, the Committee is of the view that the regulatory regime has failed to keep pace with them.**

497. **RECOMMENDATION 59**

The Committee also notes and shares the concerns expressed in evidence that the current consenting and regulatory framework which is spread across several regulatory bodies is confusing and is poorly coordinated. It is of the view that the co-ordination of and interaction between the various elements of the regulatory regime needs to be significantly improved. The Committee recommends that Marine Scotland should be tasked with taking responsibility in delivering the necessary improvements and in taking on an overarching co-ordinating role.

498. **It is also clear to the Committee that the application of visible enforcement by regulatory bodies has been limited. It is of the view that robust enforcement of regulatory standards is absolutely essential if they are to meet their intended purpose.**

499. **The farmed salmon industry is of significant value to Scotland’s rural and wider economy. If this value is to be maintained and the industry is to grow, the Committee is in no doubt that it must be seen by consumers and markets to be meeting highest international production, fish health and environmental standards. It notes that should other producing nations operate under significantly more robust regulatory frameworks designed to raise standards, this could provide them with an advantage in terms of provenance.**

500. **RECOMMENDATION 60**

The Committee is therefore of the view that maintaining the status quo in terms of the regulatory regime in Scotland is not an option. It considers that there is a need to raise the bar in Scotland by setting enhanced and effective regulatory standards to ensure that fish health issues are properly managed and the impact on the environment is kept to an absolute minimum. The Committee therefore recommends that a comprehensively updated package of regulation should be developed by Marine Scotland and other regulatory bodies, both to ensure the sector will be managed effectively and to provide a strong foundation on which it can grow in a sustainable manner.

501. The Committee is firmly of the view that a stricter regulatory and consenting regime - that is also fair and proportionate - can only benefit the sector, helping to drive improvement and giving it confidence that it is meeting its environmental responsibilities.
502. The Committee is aware that some of the larger salmon farming companies in Scotland are already operating under a stricter regulatory regime in Norway and suggests that they would have little difficulty in making a transition should stricter regulations come into force in Scotland. Indeed, the Committee notes that some producers indicated in evidence that they recognise the benefits of enhanced regulation relevant to Scotland and would not be opposed to it.
503. The Committee recognises that there are a range of current exercises such as the Scottish Government's consenting review; the consultation by SEPA on the new regulatory proposals set out in its draft Finfish Aquaculture Sector Plan; and the Fish Health Framework workstreams which provide an opportunity to make tangible improvements to the way in which the sector is operated and managed. It welcomes this package of work and considers it essential that the outcomes from it result in proposals for change in certain elements of the regulatory framework.
504. **RECOMMENDATION 61**

However, the Committee calls on the Scottish Government to conduct a review of those other aspects of the regulatory framework that are not covered by these exercises.

The role of SEPA

505. The Water Environment (Controlled Activities) (Scotland) Regulations 2011 require any prospective fish farm operator to apply to SEPA for a licence. Conditions in the licence are set to protect the water environment by placing limits on the amount of fish that can be held in the cages and the type and amount of medicines and chemicals that can be used on a particular site.

506. CAR licence applications are supported by survey information undertaken by the aquaculture business on the physical, chemical and biological condition of the seabed and water column. The statutory timeline for consenting is 16 weeks from an application.
507. SEPA can take enforcement action if operators fail to comply with conditions of their CAR licence or if sites are not meeting SEPA standards on an ongoing basis. [SEPA state](#) that -
- ” Aquaculture is ... one of the least compliant sectors regulated by SEPA. Around 21% of marine finfish farms and 7% of freshwater finfish farms were not compliant in 2015. Non-compliance was mainly due to unsatisfactory seabed surveys, exceedance of biomass or discharge limits, and effluent quality failures. This poor compliance performance must change. ¹¹³
508. SEPA also has the power to vary or revoke an authorisation if compliance does not improve or if there is evidence that the water environment and its ecology have been harmed. In the [Environment Climate Change and Land Reform Committee](#) on 6 February, Anne Anderson from SEPA said that she was not aware of any authorisation ever being revoked.
509. In a written submission, [Friends of the Sound of Jura](#) noted that, despite many hundreds of breaches of licence terms, SEPA has never revoked any aquaculture licences, nor does it seem to have successfully prosecuted any persistent offenders. The group felt that it was therefore unsurprising “that public confidence in the independence of the industry’s regulator has been eroded”.
510. The Committee also heard in evidence that SEPA’s engagement with the industry had not been particularly effective. James Withers of Scotland Food and Drink said that “a good description of the relationship between SEPA and the industry in recent years would probably be that it has been sub-optimal”. He then went on to say that he felt there was now an opportunity for the agency to develop a strong partnership relationship with the industry as it had done previously with other food and drink sectors, most notably the whisky sector.
511. In its letter to the Committee, the ECCLR Committee also highlighted its concerns about the effectiveness of SEPA’s role. It stated—
- ” The Committee is not convinced SEPA (or any other agency) is effectively monitoring the environmental impact of salmon fisheries. The Committee is also not convinced that the regulations, protocols and options for enforcement and prosecution for the sector are appropriate, and being appropriately deployed. ¹⁸
512. In a subsequent [letter to the ECCLR committee](#), the Chief Executive of SEPA, Terry A’Hearn, accepted that, given the industry’s expansion proposals, current environmental protection measures were not appropriate. He indicated that SEPA’s sector plan will include changes to the regulatory regime in the following areas—
1. protecting the environment and biodiversity by ensuring fish production is matched to environmental capacity
 2. increasing the capture and beneficial use of waste

3. reducing medicine releases into the environment
4. supporting action to protect wild fish

513. SEPA also made clear that it would take into account the range of issues raised by the ECCLR Committee related to the environmental sustainability of the salmon industry as part of its sectoral review.
514. In giving evidence to the Committee on 18 April 2018, Anne Anderson indicated that the outcome of SEPA's sectoral review would be published in June 2018.
515. On 5 October 2018, SEPA published the results for 2017 of its Compliance Assessment Scheme (CAS) which rates an operator's environmental performance against their licence conditions. This highlighted the fact that "Scotland's aquaculture sector saw overall compliance levels drop during 2017 to 81.14%, against a relative peak of 85.75% in 2016." In a [press release](#) accompanying the publication of the data, SEPA stated that—
- ” Non-compliant fish farms rose from 50 to 56 failing sites in 2017 due to a lack of monitoring or abstraction data being submitted on time by fish farm operators and an increase in farms failing due to effluent treatment issues.

Source: The Scottish Environment Protection Agency, 2018¹⁷⁶

516. As mentioned earlier in this report, SEPA published a draft Finfish Aquaculture Sector Plan in November 2018 which set out a range of proposals designed to enhance the regulation of the sector. The package of measures includes enhanced environmental monitoring under which operators will be required to invest in more accurate monitoring, including of waste coming from fish farms. A new enforcement unit will also be created, the purpose of which will be to strengthen the checking and verifying of monitoring that fish farm operators are required to undertake. SEPA will also increase and strengthen monitoring of the impact of fish farms in surrounding areas.

517. **The Committee shares the view of the ECCLR Committee that the regulatory tools currently available to SEPA are neither adequate nor effective. It also endorses that Committee's concerns that SEPA has not been performing well in monitoring the environmental performance of the industry or in enforcing the regulations which relate to its responsibilities.**
518. **The Committee is concerned that the sector has shown very poor rates of compliance with SEPA's current standards. This is borne out by the results of its compliance assessment process for 2017 which showed an increase in the number of salmon farms had failed to meet the required standards.**
519. **The Committee welcomes SEPA's acceptance that a strengthening of environmental protection measures is necessary and that proposals for delivering this feature in its draft Sector Plan. However, the Committee again states its concern that the publication of the sector plan was delayed and that it has therefore been unable to comment in detail on these proposals in this report.**

520. **RECOMMENDATION 62**

The Committee considers it to be essential that SEPA introduces a significantly enhanced regulatory and monitoring regime under which it will robustly and effectively enforce compliance with environmental standards. It therefore welcomes the inclusion in SEPA's draft sector plan of consultation proposals to more effectively monitor the environmental performance of the industry and, improve compliance levels.

Information and transparency

521. A number of submissions highlighted concerns about the prevalence of self-reporting and self-assessment by the industry in relation to certain areas of regulatory compliance. The [Marine Conservation Society](#) said that the lack of independent monitoring and assessment meant that data being provided to SEPA could not be considered as robust. It said that "There needs to be confidence in the data provided to enable to plan and provide a basis for decisions." In a similar vein, [Gordon MacKay](#) states that the "system at present is often perceived as lacking impartiality and objectivity as it is scientifically informed and funded by the industry itself." [Ewan G Kennedy](#) points out that the current system of regulation and fines "relies entirely on self-reporting of breaches, which means that any prosecution would have to rely entirely on evidence supplied by the accused."
522. The ECCLR Committee also highlighted its concern that there is an over-reliance on data provided by the sector and insufficient independent monitoring and analysis by SEPA. [SLE](#) called for greater transparency in the availability of information with "full online public access, of farm-specific weekly data (sea lice, fish mortality) in a disaggregated form".¹⁵²
523. From an industry perspective, [Marine Harvest](#) indicated that it also shared a desire to be open and transparent relation to farmed salmon data saying that "we believe that openness and transparency is vital to public confidence in the industry and we would welcome a move to making public all the data provided to Marine Scotland."¹⁵³

524. **RECOMMENDATION 63**

The Committee is of the view that a key part of any improvement in the enforcement of regulation should be the introduction of mechanisms to provide more open and transparent reporting of regulatory breaches. It also strongly recommends that any changes to the enforcement regime should incorporate measures which will ensure that there is a move away from the self-assessment culture that appears to be prevalent at present.

Local authorities and the planning process

525. Fish farming developments (out to 12 nautical miles) are under the jurisdiction of the Town and Country Planning (Marine Fish Farming) (Scotland) Order 2007. Planning permission is obtained from the local authority.
526. [Scotland's National Marine Plan](#) (Chapter 8) introduced the issue of wild salmon into the Planning Permission decision making process, as well as within the EIA process.
527. As a result, local authorities may ask that Environmental Management Plans be developed and implemented as part of a condition of planning consent. Monitoring of farmed fish is essential and integral to an effective EMP. In addition to EMPs, the LAs may grant temporary planning permission (e.g. for 10 years). This may allow a mechanism for action if sea lice issues and/or unacceptable interactions with wild salmonids occur Scottish Government. (2016, March 12).
528. In relation to the interaction between farmed fish and conservation of wild fish, Fisheries Management Scotland have said that under the Nature Conservation (Scotland) Act (2004), all public bodies in Scotland are required to further the conservation of biodiversity when carrying out their responsibilities. In evidence to the [ECCLR committee on 6 February](#), Mark Harvey, Planning Team Leader, Highland Council, said that the biodiversity duty was very much in the planning authorities minds when considering planning permission.
529. However, some of those who provided evidence to the Committee asserted that the current process of obtaining planning permission for individual fish farms from planning authorities was not an effective consenting approach. For example, the Crown Estate stated—

” The marine environment is dynamic and ever-changing, and therefore the Town & Country (Scotland) legislation, with permanent planning permission predicated on terrestrial developments, is in our view unsuited to regulating the future development of this sector.

Source: Crown Estate Scotland, 2018¹⁷⁷

530. In a written submission, [Anne-Michelle Slater School of Law, University of Aberdeen](#) expressed the view that the marine planning system could not be effective “if there is a substantial element (i.e. aquaculture), which is regulated under a different regime (i.e. the land use planning system).”
531. Questioned on these concerns when giving evidence, the Cabinet Secretary indicated that the Scottish Government was actively considering the role of local authorities in approving salmon farms. He said—

” In the consenting review, we will consider the balance between local and national approaches. However, we also need to consider local democracy. We cannot dictate to local planning authorities what they do—I am not sure whether that is what is being suggested; I do not think that it is—but we also legislate, which is a top-down approach.

Source: Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 255¹⁷⁸

532. It is understood that a key part of the consenting review referred to by Scottish Government witnesses is a current project commissioned by the Scottish Aquaculture Research Forum (SARF) which is examining options for a more streamlined consenting process for aquaculture projects. As part of this work, SARF is looking at the feasibility of introducing a single Marine Licence development consent (excluding CAR). The report of that exercise will help inform the Scottish Government's future approach to the consenting process.

533. **RECOMMENDATION 64**

The Committee notes that the Scottish Government is currently undertaking a consenting review. It requests an update on this exercise, including details of whether the outcome is likely to impact on the role of planning authorities in considering applications for salmon farms.

Financing of regulation

534. Some respondents to the inquiry discussed issues related to the finances associated with regulation – such as the fact that salmon farms do not pay business rates; that revenue raised by the Crown Estate does not go towards managing the impacts of salmon farming; that there should be higher financial penalties for breaches of license conditions; and that SEPA does not fully recover the cost of its regulatory burden.

535. [Lochaber District Salmon Fishery Board](#) said—

” Currently SEPA and the Crown Estate raise over £4.5 million per annum from fish farm licences and sea bed leases. From what I can determine, none of that is returned into managing the impacts of salmon farming on wild fish stocks or protecting damaged stocks.

Source: Lochaber District Salmon Fishery Board, 2018¹⁷⁹

536. In a written submission, [Argyll District Salmon Fishery Board And Argyll Fisheries Trust](#) expressed the view that the regulatory system must be capable of applying penalties sufficient to ensure compliance and deter bad farming practice.

537. In response to these concerns, Anne Anderson of SEPA advised the Committee that the regulator is now commencing the use of new enforcement measures introduced under the Regulatory Reform (Scotland) Act 2014, two of which allow it to recover costs when it undertakes enforcement action. She said—

” We therefore have the ability to increase resource to manage any industry growth, because industry will pay for our ability to regulate and monitor it. In relation to enhanced monitoring, I am reasonably confident of our ability to get a response and to charge back on that basis.

Source: Rural Economy and Connectivity Committee 18 April 2018, Anne Anderson, contrib. 69¹⁸⁰

538. The Committee notes that in its recently published draft Sector Plan, SEPA stated that—

” 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 regulation 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.

Source: Scottish Environmental Protection Agency, 2018¹⁸¹

539. The Committee also heard that under the licensing system which is in place in Norway, licences are issued in tranches at a fixed price and via an auction process. This generates substantial amounts of revenue for the Norwegian Government, around 80% of which is paid to coastal communities. Members questioned the Cabinet Secretary on whether the Scottish Government had given any thought to introducing a similar form of auction process for licences. He indicated that this issue had been considered by the aquaculture industry leadership group and would be considered further as part of the consenting review.

540. The Cabinet Secretary also suggested that, as in Norway, reducing licence fees was a tool that could be used to incentivise companies to trial new technologies, such as closed containment, as a way of dealing with sea lice and environmental challenges. He said—

” A lower fee is one example of how we could incentivise innovative suggestions and models for best practice and the environment or the trialling of new methods and technologies. I am keen to adopt such levers in Government.

Source: Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 255¹⁷⁸

541. The Committee considers effective enforcement with appropriate penalties to be of significant importance in ensuring the industry complies with regulatory standards. It is also of the view that this is a necessary requirement should the industry wish to expand in a sustainable manner without causing damage to the environment. The Committee notes that SEPA now has additional tools at its disposal to raise revenue through enforcement action. However, it is concerned that it has taken four years since the relevant statutory powers were granted for these tools to be introduced.

542. The Committee welcomes SEPA's statement in its draft Finfish Aquaculture Sector Plan that it will apply monetary penalties to those who fail to comply with its proposed strengthened regulatory standards.

543. **RECOMMENDATION 65**

The Committee notes the indication that consideration of licence auctions for farmed salmon sites will be included as part of the Scottish Government's consenting review. It also notes the Cabinet Secretary's suggestion that licence fee structures could be used in Scotland to incentivise the use of new technologies. However, the Committee cautions that careful thought would have to be given as to how the implementation of any such measures would ensure a fair market and avoid smaller operators and local communities being marginalised or excluded. The

Committee calls on the Scottish Government to provide it with details of the outcomes of its consideration of these matters in due course.

DRAFT

Annex A - Extract from minutes

544. [25th Meeting, 2017 \(Session 5\), Wednesday 20 September](#)

3. Proposed Aquaculture Inquiry (in private): The Committee noted and supported a proposal for commissioning external research to support its proposed aquaculture inquiry.

Edward Mountain declared an interest as a partner in a wild salmon fishery.

[4th Meeting, 2018 \(Session 5\) , Wednesday 31 January 2018](#)

4. Aquaculture Inquiry (in private): The Committee agreed its approach to the inquiry.

Edward Mountain declared an interest as a partner in a wild salmon fishery.

[7th Meeting, 2018 \(Session 5\), Wednesday 7 March 2018](#)

4. Salmon Farming in Scotland: The Committee took evidence from—

Professor Paul Tett, Reader in Coastal Ecosystems, The Scottish Association for Marine Science; Professor James Bron, Professor in Aquaculture, and Professor Herve Migaud, Professor of Aquatic Breeding and Physiology, University of Stirling's Institute of Aquaculture; Steve Westbrook, Economist.

Edward Mountain declared an interest as a partner in a wild salmon fishery.

Donald Cameron declared an interest in fish farming and fishing.

[8th Meeting, 2018 \(Session 5\), Wednesday 14 March 2018](#)

1. Salmon Farming in Scotland: The Committee took evidence from— Jon Gibb, Clerk, Lochaber District Salmon Fishery Board; Dr Alan Wells, Chief Executive, Fisheries Management Scotland; Dr Richard Luxmoore, Senior Nature Conservation Adviser at The National Trust for Scotland, on behalf of Scottish Environment LINK; Guy Linley-Adams, Solicitor, on behalf of Salmon & Trout Conservation Scotland.

Edward Mountain declared an interest as a partner in a wild salmon fishery.

[11th Meeting, 2018 \(Session 5\), Wednesday 18 April 2018](#)

1. Salmon farming in Scotland: The Committee took evidence from— Anne Anderson, Chief Officer, Compliance and Beyond Portfolio, Scottish Environment Protection Agency; Mark Harvey, Team Leader, Development & Infrastructure Service, Highland Council; Alex Adrian, Aquaculture Operations Manager, Crown Estate Scotland; Cathy Tilbrook, Unit Manager, Coastal & Marine Ecosystems & Use, Scottish Natural Heritage.

Edward Mountain declared an interest as a partner in a wild salmon fishery.

Donald Cameron declared an interest in fish farming and fishing.

12th Meeting, 2018 (Session 5), Wednesday 25 April 2018

3. Salmon farming in Scotland: The Committee took evidence from— James Withers, Chief Executive, Scotland Food & Drink; Elaine Jamieson, Head of Food and Drink, Highlands and Islands Enterprise; Heather Jones, Chief Executive, Scottish Aquaculture Innovation Centre.

Edward Mountain declared interests as a partner in a wild salmon fishery and as a farmer.

Donald Cameron declared an interest in fish farming and fishing.

13th Meeting, 2018 (Session 5), Wednesday 2 May 2018

3. Salmon farming in Scotland: The Committee took evidence from— Scott Landsburgh, Former Chief Executive, Scottish Salmon Producers' Organisation; Ben Hadfield, Managing Director, Marine Harvest Scotland; Craig Anderson, Chief Executive, Scottish Salmon Company; Grant Cumming, Managing Director, Grieg Seafood Shetland, Grieg Seafood; Stewart Graham, Group Managing Director, Gael Force Group.

Edward Mountain declared an interest as a partner in a wild salmon fishery.

4. Salmon farming in Scotland (in private): The Committee reviewed the evidence it has heard to date on its inquiry on salmon farming in Scotland.

14th Meeting, 2018 (Session 5), Wednesday 9 May 2018

3. Salmon farming in Scotland: The Committee took evidence from— Fergus Ewing, Cabinet Secretary for the Rural Economy and Connectivity, Mike Palmer, Deputy Director, Aquaculture, Crown Estate, Recreational Fisheries, EMFF and Europe Division, Marine Scotland, Alastair Mitchell, Head of Aquaculture & Recreational Fisheries, Marine Scotland, and Charles Allan, Head of Fish Health Inspectorate, Marine Scotland, Scottish Government.

Edward Mountain declared an interest as a partner in a wild salmon fishery.

Donald Cameron declared an interest in fish farming and fishing.

5. Salmon farming in Scotland (in private): The Committee reviewed the evidence it has heard to date on its inquiry on salmon farming in Scotland.

Annex B - Written Submissions

[Acoura Ltd \(76KB pdf\)](#)

[Aileen Robertson \(213KB pdf\)](#)

[Alan MacDonald, Doonside Fishings \(142KB pdf\)](#)

[Alasdair Polson \(98KB pdf\)](#)

[ALDI \(155KB pdf\)](#)

[Alex Scott \(140KB pdf\)](#)

[Andrew Bradford \(122KB pdf\)](#)

[Angling Trust and Fish Legal \(211KB pdf\)](#)

[Angus A Meldrum \(155KB pdf\)](#)

[Anna Novak \(143KB pdf\)](#)

[Anne-Michelle Slater \(86KB pdf\)](#)

[Argyll and Bute Council \(212KB pdf\)](#)

[Argyll District Salmon Fishery Board and Argyll Fisheries Trust \(210KB pdf\)](#)

[Arnot J. McWhinnie \(68KB pdf\)](#)

[Atlantic Salmon Trust \(290KB pdf\)](#)

[Ayrshire Rivers Trust \(324KB pdf\)](#)

[Benchmark Holdings \(223KB pdf\)](#)

[BioMar Ltd \(135KB pdf\)](#)

[British Trout Association \(68KB pdf\)](#)

[C. G Withnell \(11,815KB pdf\)](#)

[Cargill Aqua Nutrition Scotland \(60KB pdf\)](#)

[Christopher Cox \(127KB pdf\)](#)

[Colin G Carnie \(205KB pdf\)](#)

[Community of Arran Seabed Trust \(187KB pdf\)](#)

[Compassion in World Farming \(170KB pdf\)](#)

[Cooke Aquaculture Scotland Ltd \(291KB pdf\)](#)

[Corin Smith \(334KB pdf\)](#)

[Craignish Restoration of Marine and Coastal Habitat \(74KB pdf\)](#)

[Crown Estate Scotland \(105KB pdf\)](#)

[David Ainsley \(1600KB pdf\)](#)

[David Cosh, Doonfoot Fishings \(142KB pdf\)](#)

[David Watson \(996KB pdf\)](#)

[Dive and Sea the Hebrides \(104KB pdf\)](#)

[Douglas Chirside \(393KB pdf\)](#)

[Douglas Low \(85KB pdf\)](#)

[Dr Carol Hawley \(145KB pdf\)](#)

[Dr Conor Ryan \(157KB pdf\)](#)

[Dr James Merryweather \(156KB pdf\)](#)

[Dr Jonathan and Mrs Susan Whittle \(129KB pdf\)](#)

[Dr Laura Dunn \(186KB pdf\)](#)

[Dr Martin Jaffa \(205KB pdf\)](#)

[Dr Sally Campbell \(173KB pdf\)](#)

[Ewan G Kennedy \(669KB pdf\)](#)

[Fauna and Flora International \(217KB pdf\)](#)

[Fidra \(177KB pdf\)](#)

[Finlay Oman, WJ Knox \(72KB pdf\)](#)

[Fisheries Management Scotland \(113KB pdf\)](#)

[FishFrom Ltd \(208KB pdf\)](#)

[Flow Country Rivers Trust \(62KB pdf\)](#)

[Forth District Salmon Fishery Board \(140KB pdf\)](#)

[Friends of the Sound of Jura \(284KB pdf\)](#)

[Game and Wildlife Conservation Trust Scotland \(66KB pdf\)](#)

[Gavin Pennycook \(87KB pdf\)](#)

[Gordon MacKay \(132KB pdf\)](#)

[Georgia Arnold \(102KB pdf\)](#)

[Grieg Seafood Shetland Ltd \(145KB pdf\)](#)

[Hebridean Whale and Dolphin Trust \(239KB pdf\)](#)

[Hector MacLennan \(66KB pdf\)](#)

[Highland and Islands Enterprise \(175KB pdf\)](#)

[Innes Weir, Steinsvik UK \(130KB pdf\)](#)

[Institute of Aquaculture, University of Stirling \(112KB pdf\)](#)

[Inverlussa Marine Services \(65KB pdf\)](#)

[James Harmer \(9KB pdf\)](#)

[James Mckendry \(81KB pdf\)](#)

[Jamie McAndrew \(151KB pdf\)](#)

[Jean Ainsley \(213KB pdf\)](#)

[Joe O'Donnell \(154KB pdf\)](#)

[John McIntyre \(87KB pdf\)](#)

[John Williamson, Skretting UK Ltd \(82KB pdf\)](#)

[Katrine Johnson \(75KB pdf\)](#)

[Keith Hawley \(116KB pdf\)](#)

[Kirriemuir Angling Club \(628KB pdf\)](#)

[Kyle of Sutherland District Salmon Fishery Board \(122KB pdf\)](#)

[Loch Sunart and the Sound Of Mull Community Association of Lochs and Sounds \(14KB pdf\)](#)

[Lochaber District Salmon Fishery Board \(215KB pdf\)](#)

[Lochaber Fisheries Trust \(112KB pdf\)](#)

[Lynn Schwisfurth \(142KB pdf\)](#)

[Marine Conservation Society \(159KB pdf\)](#)

[Marine Harvest Scotland Ltd \(247KB pdf\)](#)

[Mark Carter, Marine Concern \(105KB pdf\)](#)

[Mark North \(64KB pdf\)](#)

[Marks and Spencer's PLC \(175KB pdf\)](#)

[Melville McDonald \(73KB pdf\)](#)

[Michael Wigan \(78KB pdf\)](#)

[Mid Yell and Uyeasound Public Halls \(63KB pdf\)](#)

[Migdale Smolt Ltd and Migdale Transport Ltd \(21KB pdf\)](#)

[MSD Animal Health \(121KB pdf\)](#)

[NAFC Marine Centre \(139KB pdf\)](#)

[National Trust for Scotland \(267KB pdf\)](#)

[Ness District Salmon Fishery Board \(78KB pdf\)](#)

[Niall McKillop \(70KB pdf\)](#)

[Nick Joy \(138KB pdf\)](#)

[Nick Underdown \(364KB pdf\)](#)

[North Minch Shellfish Association \(99KB pdf\)](#)

[North West Angling Trust Fisheries Consultative Council \(1002KB pdf\)](#)

[North West District Salmon Fishery Board \(80KB pdf\)](#)

[Northmaven Community Council \(19KB pdf\)](#)

[Northwards Limited \(72KB pdf\)](#)

[Ocean Breeze Marine Services LLP \(136KB pdf\)](#)

[Ocean Kinetics \(67KB pdf\)](#)

[OneKind \(385KB pdf\)](#)

[Orkney Fisheries Association \(185KB pdf\)](#)

[Orkney Trout Fishing Association \(147KB pdf\)](#)

[Otter Ferry Seafish Ltd \(14KB pdf\)](#)

[Perth and District Anglers Association \(148KB pdf\)](#)

[Philip Walker \(142KB pdf\)](#)

[Professor James Bron \(251KB pdf\)](#)

[Professor Phillip Thomas \(131KB pdf\)](#)

[Professor Randolph Richards \(82KB pdf\)](#)

[Ridgeway Biologicals Ltd \(7KB pdf\)](#)

[River Cree District Salmon Fishery Board \(85KB pdf\)](#)

[River Deveron District Salmon Fishery Board \(138KB pdf\)](#)

[River Doon Fishery Board \(168KB pdf\)](#)

[River Girvan District Salmon Fishery Board \(198KB pdf\)](#)

[Roc Sandford \(88KB pdf\)](#)

[Roger Cottis \(130KB pdf\)](#)

[Roy Robinson \(144KB pdf\)](#)

[Royal Society for the Prevention of Cruelty to Animals \(RSPCA\) and RSPCA Assured \(236KB pdf\)](#)

[Sainsbury's Supermarkets Ltd \(86KB pdf\)](#)

[Salmon and Trout Conservation Scotland \(284KB pdf\)](#)

[Sara Nason \(226KB pdf\)](#)

[Saveseilsound \(139KB pdf\)](#)

[Scottish Anglers National Association \(SANA\) \(66KB pdf\)](#)

[Scottish Association for Country Sports WFEG \(130KB pdf\)](#)

[Scottish Environment LINK Marine Group \(83KB pdf\)](#)

[Scottish Gamekeepers Association Fishing Group \(96KB pdf\)](#)

[Scottish Land and Estates \(154KB pdf\)](#)

[Scottish Natural Heritage \(116KB pdf\)](#)

[Scottish Salmon Company \(92KB pdf\)](#)

[Scottish Salmon Producers Organisation \(243KB pdf\)](#)

[Scottish Salmon Watch \(703KB pdf\)](#)

[Scottish Sea Angling Conservation Network \(204KB pdf\)](#)

[Scottish Sea Farms \(719KB pdf\)](#)

[Scottish White Fish Producers Association Ltd and Mallaig & North-West Fishermen's Association \(151KB pdf\)](#)

[Scottish Wildlife Trust \(239KB pdf\)](#)

[Sea Change Wester Ross \(674KB pdf\)](#)

[Scottish Natural Heritage \(433KB pdf\)](#)

[Scottish Environment Protection Agency](#) did not submit written evidence to the REC Committee inquiry but instead wish to refer the Committee to the submission to ECCLR Committee (344KB pdf)

[Scottish Environment Protection Agency supplementary evidence to ECCLR Committee \(344KB pdf\)](#)

[Shetland Islands Council \(139KB pdf\)](#)

[Skye Communities for Natural Heritage \(127KB pdf\)](#)

[Spey Fishery Board \(69KB pdf\)](#)

[Stephen Cosh, Doonfoot Fishings \(73KB pdf\)](#)

[Stewart Graham, Gael Force Group \(98KB pdf\)](#)

[Stewart Rendall \(112KB pdf\)](#)

[Stuart Hunter \(112KB pdf\)](#)

[SumOfUs \(7KB pdf\)](#)

[Sustainable Inshore Fisheries Trust \(232KB pdf\)](#)

[Thomas G. Buchanan \(7KB pdf\)](#)

[Ugie Salmon \(915KB pdf\)](#)

[Uig and Hamanavay Estate \(UHE\) \(228KB pdf\)](#)

[University of Plymouth Marine Institute \(108KB pdf\)](#)

[Unst Community Council \(83KB pdf\)](#)

[Unst Partnership Ltd \(74KB pdf\)](#)

[Waitrose \(317KB pdf\)](#)

[West Sutherland Fisheries Trust \(89KB pdf\)](#)

[Wester Ross Area Salmon Fishery Board \(234KB pdf\)](#)

[Wester Ross Fisheries Ltd \(129KB pdf\)](#)

[Westray Community Council \(20KB pdf\)](#)

[Whale and Dolphin Conservation \(96KB pdf\)](#)

[Wild Trout Trust \(118KB pdf\)](#)

[Will Jewison \(77KB pdf\)](#)

- [1] Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 127, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11520&c=2091026>
- [2] Grieg Seafood Shetland Ltd. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Grieg_Seafood_Shetland_Ltd.pdf
- [3] Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield (Marine Harvest Scotland), contrib. 109, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088418>
- [4] Marine Harvest Scotland Ltd. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Marine_Harvest_Scotland_Ltd.pdf
- [5] Katrine Johnson. (2018, April). Written Submission to Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Katrine_Johnson.pdf
- [6] Rural Economy and Connectivity Committee 02 May 2018, Scott Landsburgh, contrib. 114, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088423>
- [7] Rural Economy and Connectivity Committee 02 May 2018, Stewart Graham, contrib. 140, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088449>
- [8] Cargill Aqua Nutrition Scotland. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Cargill_Aqua_Nutrition_Scotland.pdf
- [9] Inverlussa Marine Services. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Inverlussa_Marine_Services.pdf
- [10] Scottish White Fish Producers Association Ltd and Mallaig & North-West Fishermen's Association. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Scottish_White_Fish_Producers_Association_Ltd_and_Mallaig_and_North-West_Fishermens_Association.pdf
- [11] Dive & Sea The Hebrides. (n.d.) Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Dive_and_Sea_the_Hebrides.pdf
- [12] Michael Wigan. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Michael_Wigan.pdf
- [13] Marine Scotland Science. (2017). Scottish Fish Farm Production Survey 2016. Retrieved from <http://www.gov.scot/Resource/0052/00524803.pdf>
- [14] Gavin Pennycook. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Gavin_Pennycook.pdf
- [15] Corin Smith. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Corin_Smith.pdf

- [16] Scotland Food and Drink. (2016). Aquaculture Growth to 2030. Retrieved from <http://scottishsalmon.co.uk/wp-content/uploads/2016/10/aquaculture-growth-to-2030.pdf>
- [17] Marine Scotland Science. (2017). Scottish Fish Farm Production Survey 2016. Retrieved from <https://www2.gov.scot/Resource/0052/00524803.pdf>
- [18] Environment, Climate Change and Land Reform Committee (5 March 2018) Report to the Rural Economy and Connectivity Committee on the Environmental Impact of Salmon Farming. (2018, March 5). Retrieved from http://www.parliament.scot/S5_Environment/Inquiries/20180305_GD_to_Rec_salmon_farming.pdf
- [19] Letter from the Chief Executive Officer of the Scottish Environment Protection Agency to the Environment, Climate Change and Land Reform Committee in response to the letter the Committee sent on 3 March 2018. (2018, March 28). Retrieved from http://www.scottish.parliament.uk/S5_Environment/Inquiries/20180328_SEPA_response_to_GD.pdf
- [20] Scotland Food & Drink. (2016). Aquaculture Growth to 2030. Retrieved from <http://scottishsalmon.co.uk/wp-content/uploads/2016/10/aquaculture-growth-to-2030.pdf>
- [21] Scottish Salmon Producers Organisation. (2018, April). Written submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Scottish_Salmon_Producers_Organisation.pdf
- [22] Rural Economy and Connectivity Committee 02 May 2018, Stewart Graham, contrib. 179, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088488>
- [23] Rural Economy and Connectivity Committee 25 April 2018, James Withers, contrib. 122, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11488&c=2086038>
- [24] Royal Society for the Prevention of Cruelty to Animals (RSPCA) and RSPCA Assured. (2018, April). Written submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Royal_Society_for_the_Prevention_of_Cruelty_to_Animals_RSPCA_and_RSPCA_Assured.pdf
- [25] Sainsbury's Supermarkets Ltd. (2018, April). Written submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Sainsburys_Supermarkets_Ltd.pdf
- [26] Argyll and Bute Council. (2018, April). Written submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Argyll_and_Bute_Council_SF.pdf
- [27] The Scottish Salmon Company. (2018, April). Written submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Scottish_Salmon_Company.pdf
- [28] Waitrose. (2018, April). Written submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Waitrose.pdf

- [29] Craignish Restoration of Marine and Coastal Habitat. (2018, April). Written submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Craignish_Restoration_of_Marine_and_Coastal_Habitat.pdf
- [30] Fisheries Management Scotland. (2018, April). Written submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Fisheries_Management_Scotland.pdf
- [31] Scottish Salmon Watch. (2018, April). Written submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Scottish_Salmon_Watch.pdf
- [32] Scottish Environment LINK Marine Group. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Scottish_Environment_Link_Marine_Group.pdf
- [33] The National Trust for Scotland. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/National_Trust_for_Scotland.pdf
- [34] North Minch Shellfish Association. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/North_Minch_Shellfish_Association.pdf
- [35] Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 141, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11520&c=2091040>
- [36] Rural Economy and Connectivity Committee 09 May 2018, Mike Palmer, contrib. 147, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11520&c=2091046>
- [37] Scottish Government. (2018, June). Seafood Trade Modelling Research Project - Assessing the Impact of Alternative Fish Trade Agreements Post EU-Exit. Retrieved from <https://www.gov.scot/publications/seafood-trade-modelling-research-project-assessing-impact-alternative-fish-trade/>
- [38] Professor Phillip Thomas. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Professor_Phillip_Thomas.pdf
- [39] Scottish Government. (2018, June). Assessing the impact of alternative fish trade agreements post-Brexit: research. Retrieved from <https://www.gov.scot/publications/seafood-trade-modelling-research-project-assessing-impact-alternative-fish-trade/>
- [40] Wester Ross Fisheries Ltd. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Wester_Ross_Fisheries_Ltd.pdf
- [41] Shetland Islands Council. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Shetland_Islands_Council_SF.pdf

- [42] Rural Economy and Connectivity Committee 25 April 2018, James Withers (Scotland Food & Drink), contrib. 98, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11488&c=2086014>
- [43] Rural Economy and Connectivity Committee 07 March 2018, Steve Westbrook, contrib. 59, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11407&c=2071127>
- [44] Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 125, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088434>
- [45] Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 125, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11520&c=2091024>
- [46] Lynn Schweisfurth. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Lynn_Schweisfurth.pdf
- [47] Marks and Spencer's PLC. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Marks_and_Spencer_PLC.pdf
- [48] Waitrose. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Waitrose.pdf
- [49] Rural Economy and Connectivity Committee 25 April 2018, James Withers, contrib. 101, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11488&c=2086017>
- [50] Hebridean Whale and Dolphin Trust. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Hebridean_Whale_and_Dolphin_Trust.pdf
- [51] Rural Economy and Connectivity Committee 02 May 2018, Scott Landsburgh, contrib. 161, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088470>
- [52] ACOURA. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Acoura_Ltd.pdf
- [53] Northwards Limited. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Northwards_Limited_.pdf
- [54] Rural Economy and Connectivity Committee 07 March 2018, Professor Bron, contrib. 117, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11407&c=2071185>
- [55] Rural Economy and Connectivity Committee 25 April 2018, Heather Jones, contrib. 166, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11488&c=2086082>
- [56] Scottish Salmon Producers Organisation. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Scottish_Salmon_Producers_Organisation.pdf
- [57] Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 170, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088479>
- [58] Rural Economy and Connectivity Committee 02 May 2018, Craig Anderson, contrib. 197, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088506>

- [59] Rural Economy and Connectivity Committee 25 April 2018, James Withers, contrib. 151, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11488&c=2086067>
- [60] Rural Economy and Connectivity Committee 25 April 2018, Heather Jones, contrib. 173, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11488&c=2086089>
- [61] Rural Economy and Connectivity Committee 14 March 2018, Richard Luxmoore (Scottish Environment LINK), contrib. 44, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074763>
- [62] Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 150, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11520&c=2091049>
- [63] Scottish Government. (2018, May 23). Scotland's 10 Year Farmed Fish Health: strategic framework. Retrieved from <https://www.gov.scot/binaries/content/documents/govscot/publications/report/2018/05/scotlands-10-year-farmed-fish-health-framework/documents/00535697-pdf/00535697-pdf/govscot%3Adocument>
- [64] Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 218, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088527>
- [65] Rural Economy and Connectivity Committee 07 March 2018, Professor Migaud, contrib. 143, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11407&c=2071211>
- [66] Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 205, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088514>
- [67] Rural Economy and Connectivity Committee 07 March 2018, Professor Bron, contrib. 122, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11407&c=2071190>
- [68] Rural Economy and Connectivity Committee 25 April 2018, Heather Jones, contrib. 171, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11488&c=2086087>
- [69] Benchmark Holdings. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Benchmark_Holdings.pdf
- [70] The Royal Society for the Prevention of Cruelty to Animals (RSPCA) and RSPCA Assured. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Royal_Society_for_the_Prevention_of_Cruelty_to_Animals_RSPCA_and_RSPCA_Assured.pdf
- [71] Rural Economy and Connectivity Committee 07 March 2018, Professor Bron, contrib. 146, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11407&c=2071214>
- [72] Marine Harvest Group. (2018). 1st Quarter Report 2018. Retrieved from <http://hugin.info/209/R/2191367/848340.pdf>
- [73] Rural Economy and Connectivity Committee 09 May 2018, Charles Allan, contrib. 173, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11520&c=2091072>
- [74] Rural Economy and Connectivity Committee 09 May 2018, Charles Allan, contrib. 175, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11520&c=2091074>

- [75] Marine Scotland. (2018, April 17). Letter to the Environment, Climate Change and Land Reform Committee. Retrieved from http://www.scottish.parliament.uk/S5_Environment/Inquiries/20180417_Marine_Scotland_response.pdf
- [76] Rural Economy and Connectivity Committee 14 March 2018, Jon Gibb, contrib. 109, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074828>
- [77] Rural Economy and Connectivity Committee 14 March 2018, Guy Linley-Adams, contrib. 112, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074831>
- [78] Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 113, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074832>
- [79] Rural Economy and Connectivity Committee 07 March 2018, Professor Bron, contrib. 169, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11407&c=2071237>
- [80] Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 253, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088562>
- [81] Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 125, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074844>
- [82] Rural Economy and Connectivity Committee 14 March 2018, Guy Linley-Adams, contrib. 122, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074841>
- [83] Rural Economy and Connectivity Committee 02 May 2018, Scott Landsburgh, contrib. 223, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088532>
- [84] Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 233, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088542>
- [85] Rural Economy and Connectivity Committee 02 May 2018, Scott Landsburgh, contrib. 229, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088538>
- [86] Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 221, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088530>
- [87] Rural Economy and Connectivity Committee 02 May 2018, Stewart Graham, contrib. 236, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088545>
- [88] Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 237, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088546>
- [89] SAMS Research Services Ltd. (2018, January). Review of the Environmental Impacts of Salmon Farming in Scotland. Retrieved from http://www.parliament.scot/S5_Environment/General%20Documents/20180125_SAMS_Review_of_Environmental_Impact_of_Salmon_Farming_-_Report.pdf
- [90] Compassion in World Farming. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Compassion_in_World_Farming.pdf

- [91] OneKind. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/OneKind.pdf
- [92] Ayrshire Rivers Trust. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Ayrshire_Rivers_Trust.pdf
- [93] Aileen Robertson. (2018, April). Written submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Aileen_Robertson.pdf
- [94] Ocean Breeze Marine Services LLP. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Ocean_Breeze_Marine_Services_LLP.pdf
- [95] Open Seas. (2018, April). Cleaning up the "Cleaner Fish" - News Release. Retrieved from <https://www.openseas.org.uk/news/cleaning-up-the-cleaner-fish/>
- [96] Scottish Wildlife Trust. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Scottish_Wildlife_Trust_SF.pdf
- [97] Orkney Fisheries Association. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Orkney_Fisheries_Association.pdf
- [98] Rural Economy and Connectivity Committee 07 March 2018, Professor Migaud, contrib. 213, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11407&c=2071281>
- [99] Rural Economy and Connectivity Committee 07 March 2018, Professor Migaud, contrib. 217, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11407&c=2071285>
- [100] Scottish Natural Heritage. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Scottish_Natural_Heritage.pdf
- [101] The Angling Trust and Fish Legal. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Angling_Trust_and_Fish_Legal.pdf
- [102] Ayrshire Rivers Trust. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Ayrshire_Rivers_Trust.pdf
- [103] Dive & Sea The Hebrides. (2018, April). Written Submission, Rural Economy and Connectivity. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Dive_and_Sea_the_Hebrides.pdf
- [104] The Scottish Environmental Protection Agency. (2018, April). Letter to the Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/20180508_SEPA_-_follow_up_response_from_18_April.pdf

- [105] Rural Economy and Connectivity Committee, Richard Luxmoore, contrib. 157,. (2018, March 14). No title Retrieved from <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074876>
- [106] Rural Economy and Connectivity Committee 14 March 2018, Richard Luxmoore, contrib. 157, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074876>
- [107] Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 160, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074879>
- [108] Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 184, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088493>
- [109] Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 263, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088572>
- [110] Environment, Climate Change and Land Reform Committee 06 February 2018, John Aitchison, contrib. 57, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11359&c=2063596>
- [111] The Scottish Salmon Company. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Scottish_Salmon_Company.pdf
- [112] Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 251, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088560>
- [113] Scottish Environment Protection Agency. (2018, November). Finfish Aquaculture Sector Plan - Media Release. Retrieved from <http://media.sepa.org.uk/media-releases/2018/aquaculture-sector-plan/>
- [114] Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 272, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088581>
- [115] Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 276, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088585>
- [116] Rural Economy and Connectivity Committee 02 May 2018, Craig Anderson, contrib. 273, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088582>
- [117] FIDRA. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Fidra.pdf
- [118] Rural Economy and Connectivity Committee 25 April 2018, Heather Jones, contrib. 149, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11488&c=2086065>
- [119] Rural Economy and Connectivity Committee 14 March 2018, Guy Linley-Adams, contrib. 21, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074740>
- [120] Rural Economy and Connectivity Committee 14 March 2018, Jon Gibb, contrib. 158, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074877>

- [121] Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 244, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088553>
- [122] Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 67, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2080417>
- [123] Rural Economy and Connectivity Committee 14 March 2018, Jon Gibb, contrib. 68, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074787>
- [124] Rural Economy and Connectivity Committee 07 March 2018, Professor Tett, contrib. 148, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11407&c=2071216>
- [125] Rural Economy and Connectivity Committee 25 April 2018, Heather Jones, contrib. 188, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11488&c=2086104>
- [126] Uig and Hamanavay Estate. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from [http://www.parliament.scot/S5_Rural/Uig_and_Hamanavay_Estate_\(UHE\).pdf](http://www.parliament.scot/S5_Rural/Uig_and_Hamanavay_Estate_(UHE).pdf)
- [127] Rural Economy and Connectivity Committee 14 March 2018, Richard Luxmoore, contrib. 134, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2080419>
- [128] Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 131, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074850>
- [129] Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 178, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088487>
- [130] Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 212, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088521>
- [131] Rural Economy and Connectivity Committee 14 March 2018, Guy Linley-Adams (Salmon & Trout Conservation Scotland), contrib. 14, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074733>
- [132] Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 17, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2082061>
- [133] Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 188, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11520&c=2091087>
- [134] Rural Economy and Connectivity Committee 25 April 2018, Heather Jones, contrib. 190, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11488&c=2086106>
- [135] The Friends of the Sound of Jura. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Friends_of_the_Sound_of_Jura.pdf
- [136] The University of Plymouth's Marine Institute. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Inquiries/University_of_Plymouth_Marine_Institute.pdf

- [137] Dr Carol Hawley. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Dr_Carol_Hawley.pdf
- [138] Marine Conservation Society. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Marine_Conservation_Society.pdf
- [139] Rural Economy and Connectivity Committee 25 April 2018, James Withers, contrib. 132, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11488&c=2086048>
- [140] Rural Economy and Connectivity Committee 18 April 2018, Mark Harvey, contrib. 65, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11469&c=2082918>
- [141] Further information following a meeting with the Rural Economy and Connectivity Committee and the Norwegian Fisheries Minister. (2018, March). Retrieved from http://www.parliament.scot/S5_Rural/Meeting_with_Norwegian_Fisheries_Minister_follow_up_info.pdf
- [142] Rural Economy and Connectivity Committee 09 May 2018, Alastair Mitchell, contrib. 234, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11520&c=2091133>
- [143] The Scottish Salmon Company. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Scottish_Salmon_Company.pdf
- [144] Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 292, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088601>
- [145] West Sutherland Fisheries Trust. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/West_Sutherland_Fisheries_Trust.pdf
- [146] Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 193, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074912>
- [147] Rural Economy and Connectivity Committee 02 May 2018, Stewart Graham, contrib. 297, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088606>
- [148] Rural Economy and Connectivity Committee 09 May 2018, Alastair Mitchell, contrib. 239, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11520&c=2091138>
- [149] Rural Economy and Connectivity Committee 07 March 2018, Professor Migaud, contrib. 172, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11407&c=2071240>
- [150] Alan MacDonald, Doonside Fishings. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Alan_MacDonald_Doonside_Fishings.pdf
- [151] Angus A Meldrum. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Inquiries/Angus_A_Meldrum.pdf

- [152] Scottish Land and Estates. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Scottish_Land_and_Estates_SF.pdf
- [153] Marine Harvest Scotland Ltd. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Marine_Harvest_Scotland_Ltd.pdf
- [154] BioMar. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/BioMar_Ltd_.pdf
- [155] Rural Economy and Connectivity Committee 14 March 2018, Richard Luxmoore, contrib. 196, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074915>
- [156] Rural Economy and Connectivity Committee 14 March 2018, Guy Linley-Adams, contrib. 197, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074916>
- [157] Andrew Bradford. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Inquiries/Andrew_Bradford.pdf
- [158] Douglas Low. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Douglas_Low.pdf
- [159] Letter from the Cabinet Secretary for the Rural Economy to the Committee following his appearance on 9 May, regarding Closed Containment and the Implications for Waste,. (2018, June 5). Retrieved from http://www.parliament.scot/S5_Rural/20180605_Cab_Sec_REC_-_follow_up_from_9_May_mtg_-_closed_containment_and_the_implications_for_waste.pdf
- [160] Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 30, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074749>
- [161] Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 180, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088489>
- [162] Rural Economy and Connectivity Committee 14 March 2018, Dr Wells, contrib. 27, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074746>
- [163] Letter from the Scottish Environment Protection Agency to the Environment, Climate Change and Land Reform Committee. (2018, March 28). Retrieved from http://www.parliament.scot/S5_Environment/Inquiries/20180328_SEPA_response_to_GD.pdf
- [164] Rural Economy and Connectivity Committee 07 March 2018, Professor Bron, contrib. 205, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11407&c=2071273>
- [165] Rural Economy and Connectivity Committee 25 April 2018, Heather Jones, contrib. 103, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11488&c=2086019>

- [166] NAFC Marine Centre. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/NAFC_Marine_Centre.pdf
- [167] Rural Economy and Connectivity Committee 25 April 2018, James Withers, contrib. 162, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11488&c=2086078>
- [168] Rural Economy and Connectivity Committee 18 April 2018, Alex Adrian (Crown Estate), contrib. 30, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11469&c=2082883>
- [169] Rural Economy and Connectivity Committee 02 May 2018, Ben Hadfield, contrib. 189, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088498>
- [170] Rural Economy and Connectivity Committee 02 May 2018, Grant Cumming, contrib. 166, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11503&c=2088475>
- [171] Rural Economy and Connectivity Committee 14 March 2018, Richard Luxmoore, contrib. 136, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11424&c=2074855>
- [172] Rural Economy and Connectivity Committee 25 April 2018, Heather Jones, contrib. 129, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11488&c=2086045>
- [173] Rural Economy and Connectivity Committee 18 April 2018, Cathy Tilbrook, contrib. 176, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11469&c=2083029>
- [174] Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 246, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11520&c=2091145>
- [175] Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 250, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11520&c=2091149>
- [176] The Scottish Environment Protection Agency. (2018, October 05). Press Release - Environmental compliance of Scottish business exceeds 90% for third year in a row. Retrieved from <http://media.sepa.org.uk/media-releases/2018/environmental-compliance-of-scottish-business-exceeds-90-for-third-year-in-a-row/>
- [177] Crown Estate Scotland. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.parliament.scot/S5_Rural/Crown_Estate_Scotland.pdf
- [178] Rural Economy and Connectivity Committee 09 May 2018, Fergus Ewing, contrib. 255, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11520&c=2091154>
- [179] Lochaber District Salmon Fishery Board. (2018, April). Written Submission, Rural Economy and Connectivity Committee. Retrieved from http://www.scottish.parliament.uk/S5_Rural/Inquiries/Lochaber_District_Salmon_Fishery_Board.pdf
- [180] Rural Economy and Connectivity Committee 18 April 2018, Anne Anderson, contrib. 69, <http://www.scottish.parliament.uk/parliamentarybusiness/report.aspx?r=11469&c=2082922>
- [181] Scottish Environmental Protection Agency. (2018, November). Finfish Aquaculture Sector Plan. Retrieved from <https://consultation.sepa.org.uk/sector-plan/finfishaquaculture/>

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