Association of Salmon Fishery Boards

RAFTS

Policy Paper: Aquaculture

February 2012

Summary

- ASFB and RAFTS recognise the permanence and economic importance of the aquaculture industry to Scotland and the West Coast of Scotland in particular. However, there have been, and continue to be, impacts upon wild fish stocks in the areas where the aquaculture industry is most active.
- The most significant concerns for wild fish interests are the potential negative effects of sea lice and escapes.
- ASFB and RAFTS will seek the publication of a public register, with full online access, of farm specific weekly counts of sea lice in a non-aggregated form.
- ASFB and RAFTS will seek to ensure that the industry Code of Good Practice targets are changed in order to minimise the risks to both Atlantic salmon and sea trout, by taking into account farm biomass and the cumulative biomass in the local area.
- ASFB and RAFTS will seek to ensure that Scottish Government instigate the phased withdrawal of smolt production in freshwater cages, with an initial focus on cages sited in systems containing migratory salmonids.
- ASFB and RAFTS will seek the relocation and/or reallocation of sites/biomass, where sites are so sensitive, and the potential impact is so great, that available mitigation, management and best practice cannot reduce the risks and impacts to acceptable levels in terms of wild fish and fisheries.
- ASFB and RAFTS will attempt to influence the forthcoming Aquaculture and Fisheries Bill in order to ensure that a power for Scottish Ministers to take genetic samples from fish farm sites is included.
- ASFB and RAFTS believe that the target of the aquaculture industry and Scottish Government must be for the statutory use of enclosed systems for rearing fish, whether on land or at sea, therefore cutting out any interaction between farmed and wild salmon and sea trout. This should be within a timescale agreed between Government, industry and wild fish organisations.

Introduction

The Association of Salmon Fishery Boards is the representative body for Scotland's 41 District Salmon Fishery Boards (DSFBs) including the River Tweed Commission (RTC), which have a statutory responsibility to protect and improve salmon and sea trout fisheries. The Association and Boards work to create the environment in which sustainable fisheries for salmon and sea trout can be enjoyed. Conservation of fish stocks, and the habitats on which they depend, is essential and many DSFB's operate riparian habitat enhancement schemes and have voluntarily adopted 'catch and release' practices, which in some cases are made mandatory by the introduction of salmon conservation regulations. ASFB creates policies that seek where possible to protect wider biodiversity and our environment as well as enhancing the economic benefits for our rural economy that result from angling. An analysis completed in 2004 demonstrated that freshwater angling in Scotland results in the Scottish economy producing over £100 million worth of annual output, which supports around 2,800 jobs and generates nearly £50million in wages and self-employment into Scottish households, most of which are in rural areas.

Formed in 2005, Rivers and Fisheries Trusts of Scotland (RAFTS) is an independent freshwater conservation charity representing Scotland's national network of 25 rivers and fisheries Trusts and Foundations. Our members work across over 90% of Scotland's freshwaters to protect and develop our native fish stocks and populations by undertaking a range of activities including freshwater, river habitat restoration, fish and fisheries monitoring, research and education programmes. RAFTS is the membership organisation of the fisheries and rivers trusts operating in Scotland and is, itself, a charity and company limited by guarantee.

Background

ASFB and RAFTS support the shared vision expressed in 'A Fresh Start: The renewed Strategic Framework for Scottish Aquaculture':

> *"Scotland should have sustainable, growing, diverse, market-led and profitable farmed fish and shellfish industries, which promote best practice and provide significant economic and social benefits for their people, while respecting the marine and freshwater environment. The industries will contribute to the overall vision for Scotland's marine environment of "clean, healthy, safe, productive and biologically diverse seas managed to meet the long-term needs of nature and people".*

In realising this vision, we believe that a successful and sustainable salmon aquaculture industry should be defined as:

- An industry that operates alongside wild salmon and sea trout populations and other species, without negatively impacting them.
- An industry that has negligible environmental impact through pollution, degradation of habitats or disease/parasite transfer.
- An industry that inspires confidence and loyalty by communicating openly and transparently with stakeholders and the public.

ASFB and RAFTS recognise the permanence and economic importance of the aquaculture industry to Scotland and the West Coast of Scotland in particular. However, there have been, and continue to be, impacts upon wild fish stocks in the areas where the aquaculture industry is most active. We have identified below a number of key areas in which we believe real progress can be made in resolving and mitigating impacts. We are keen to work with the Scottish Government, and the industry, to maximise the benefits to Scotland from the contributions of wild fish and the aquaculture industry.

Environmental effects of aquaculture

A number of significant concerns with regard to the sustainability of the salmon aquaculture industry in Scotland, including the release of harmful chemicals, disease impacts on wild fish, benthic impacts due to organic enrichment from waste food and faeces and the sustainability of food sources. However, the most significant concerns for wild fish interests are the potential negative effects of sea lice and escapes. There is a large body of peer-reviewed scientific literature relating to the effects of sea lice and escapes on wild fish

and we do not intend to reproduce the evidence here. We would highlight two recent independent reviews conducted as part of the Salmon Aquaculture Dialogue process (which ultimately will lead to an accreditation system for aquaculture under the Aquaculture Stewardship Council)[1]. We would note in particular that over the last 20 years there has been no substantive evidence to counter the hypothesis that sea lice and escapes from aquaculture cages may harm wild salmonids.

National Policy Drivers

In her 2010 response to the Petitions Committee, Roseanna Cunningham (then Minster for Environment) made the following comments. '*Analysis of the catch data suggests contrasting trends on the east and west coasts. Taken as a whole, east coast rod catches have shown no clear trend, suggesting no clear long term trend in the numbers of fish entering fresh water and escaping to spawn. In contrast, sea trout catches in west coast fisheries have declined markedly over the same period, suggesting declining spawning escapement. The reasons for this decline are not clear. It should be noted that sea trout, when they migrate to sea, generally remain in coastal and inshore areas, whereas salmon are known to migrate longer distances, in some cases as far as West Greenland.*' Similar analyses, undertaken by Marine Scotland Science[2] and RAFTS[3] demonstrated that Atlantic salmon catches in the 'aquaculture zone' of the West Highlands and islands followed a similar pattern of decline, as compared to the East coast rivers. Indeed, Vollestad *et al.* stated "*Although other explanations are possible, some of the differences between the Atlantic sector and the other Scottish sectors might be due to local effects of intensive salmon aquaculture on affected rivers*". We are not aware of any alternative hypotheses, other than the effects of sea lice, which would adequately explain the discrepancy in catches between the East and West coasts.

A Fresh Start - The renewed Strategic Framework for Scottish Aquaculture was launched at a Scottish Parliamentary Debate on 21 May 2009. The Framework is based around 5 key themes: healthier fish and shellfish; Improved systems for licensing aquaculture development; Improved containment; Better marketing and improved image; Improved access to finance. These themes are also incorporated into the Ministerial Working Group on Aquaculture as specific working groups. The Ministerial forward recognised that '*Development must be sustainable – economically, socially, culturally and environmentally – minimising risks to biodiversity. The aquaculture industry must act as a good neighbour to those who share the aquatic environment.'* and *'Control of sea lice continues to be a serious concern. The consultation indicated an urgent need for effective sea lice control measures to protect the health and welfare of both farmed and wild salmonids and is viewed as crucial for the long-term future of both sectors.'*

The Industry Code of Good Practice – of particular relevance to wild fisheries are the inclusion of the concept of Integrated Sea Lice Management and a number of recommendations regarding escapes from farm cages. Section 7 of the Aquaculture and Fisheries (Scotland) Act 2007 (the 2007 Act) gives Scottish Ministers powers to approve, by order, any code of practice issued for the purposes of fish farming with respect to (a) the prevention, control and reduction of parasites, (b) the containment of fish on fish farms, (c) the prevention of escape of fish from fish farms, and (d) the recovery of escaped fish. The 2007 Act also allows Scottish Ministers to monitor compliance with any approved code and may serve a notice requiring the execution of some works and taking of such other steps as Scottish Ministers consider necessary for securing compliance with the approved code.

Marine Scotland has recently funded RAFTS to undertake a project entitled, '*Aquaculture: Managing Interactions*'. This project will help to identify optimal and sub-optimal locations of aquaculture operations where these activities can best proceed with reduced or acceptable risks to wild fish populations and fisheries; support the sustainable growth of the aquaculture industry by providing information that will

[1] Revie, C., Dill, L., Finstad, B., and C.D. Todd. 2009. "Salmon Aquaculture Dialogue Working Group Report on Sea Lice"
Thorstad, E.B., Fleming, I.A., McGinnity, P., Soto, D., Wennevik, V. & Whoriskey, F. 2009. "Incidence and impacts of escaped farmed Atlantic salmon *Salmo salar* in nature."

[2] Vollestad, LA; Hirst, D; L'Abee-Lund, JH; Armstrong, JD; MacLean, JC; Yougson, AF & Stenseth NC (2009). Divergent trends in anadromous salmonid populations in Norwegian and Scottish rivers. *Proc Royal Soc London. B* ***276*** 1021-1027.

[3] RAFTS: Comparison of the decline of Scottish East and West Coast Salmon Fisheries.

support and direct growth to appropriate locations via the provision of locational guidance in terms of wild fish and fisheries; support the reduction of risk to the environment via lice monitoring and dialogue with the sector to negotiate local accommodations; by use of applied genetics tools and a strategic sampling programme to identify when or if genetic material of aquaculture origin is present in sampled wild fish populations to inform the need for further improved stock retention measures and demonstrate conclusively when such genetic ingress takes place.

The Scottish Government consulted on the Aquaculture and Fisheries Bill in December 2011[4], with specific sections dealing with *the sustainable development of aquaculture* and *fish farming and wild salmonid interactions*. Of particular note are the following proposals: A legal requirement to participate in farm management agreements; Powers to revoke consents/Powers to require SEPA to reduce biomass consents; Powers to determine a lower threshold for sea lice levels above which remedial action needs to be taken; A Scottish technical standard for finfish farm equipment; Powers to take or require samples of fish from fish farms, for tracing purposes. The Scottish Government also sought views on the most appropriate approach to be taken to the collection and publication of sea lice data – a key issue for wild fishery interests.

Following the Marine (Scotland) Act 2010, the Scottish Government developed a Marine Nature Conservation Strategy. Under this process, the marine phases of both Atlantic salmon and sea trout are included on the list of Priority Marine Features - the habitats and species of *greatest conservation importance* in inshore waters.

International Policy Drivers

NASCO is an international organisation established under the Convention for the Conservation of Salmon in the North Atlantic Ocean in October 1983 (established under the United Nations Convention on the Law of the Sea 1982). The objective of the organisation is to contribute through consultation and co-operation to the conservation, restoration, enhancement and rational management of salmon stocks. All EU Member states are signatories to the NASCO Convention (including Denmark in respect of the Faroe Islands and Greenland) which sets out general provisions for conserving salmon stocks. NASCO and its Contracting Parties agree to adopt and apply a Precautionary Approach to the conservation, management and exploitation of salmon in order to protect the resource and preserve the environments in which it lives.

In 1994, in response to the information presented at three major international symposia, NASCO adopted the 'Oslo Resolution' designed to minimise impacts of aquaculture on the wild salmon stocks. This was developed in consultation with the salmon farming industry and an industry Liaison Group was established in 2000. The objective of this Group is to establish mutually beneficial working arrangements in order to make recommendations on wild salmon conservation and sustainable salmon farming practices, to maximise potential benefits and to minimise potential risks to both. Through the Liaison Group guidelines on containment of farmed salmon were developed and reports on progress with developing and implementing containment action plans are made to the Liaison Group. These guidelines, together with Guidelines on Stocking and elements to ensure consistency with the Precautionary Approach, were incorporated into a new Resolution, the Williamsburg Resolution, CNL(06)48, adopted in 2003 and amended in 2004 and 2006.

The NASCO/ICES symposium held in Bergen in 2005, whilst recognising that much progress had been made in addressing and better understanding the impacts of aquaculture, identified sea lice and escaped salmon as continuing challenges both for the industry and the wild stocks. NASCO, therefore, established a Task Force comprising representatives of the Parties, the salmon farming industry and NASCO's accredited NGOs with the aim of developing guidance on best management practices[5], designed to achieve international goals to address the impacts of sea lice and escaped salmon on wild Atlantic salmon. The international goals are as follows:

[4] http://www.scotland.gov.uk/Publications/2011/12/06081229/0
[5] Available at: http://www.nasco.int/pdf/aquaculture/BMP%20Guidance.pdf

- ***100% of farms to have effective sea lice management such that there is no increase in sea lice loads or lice-induced mortality of wild salmonids attributable to the farms.***
- ***100% farmed fish to be retained in all production facilities***

Focus Area Reports (FARs) on the measures being taken by each jurisdiction to implement NASCO's agreements have now been completed. The FARs have been reviewed and the review group's findings included the following statements[6].

General Comments:

- *The Review Group recognises that progress has been made by the salmon farming industry in addressing impacts on wild salmon stocks. It concluded, however, that in spite of the wealth of regulations and measures demonstrated in the FARs relating to salmon farming no jurisdiction was able to show that it had reached a situation where it had achieved the international goals.*
- *The level of escapes may now be an extremely small percentage of the farmed salmon production but remains high relative to the numbers of wild salmon. Similarly, the number of sea lice may be less than one per farmed fish but that may still translate to large numbers of lice in the environment because of the scale of production.*
- *Even low levels of salmon farming and poorly planned introductions and transfers still have the potential to adversely affect wild salmon populations on a local scale.*
- *The Review Group considers that there should be an effective tagging or marking system that enables escaped farmed salmon from both freshwater and marine farms to be identified in the wild and that would allow identification of the facility from which the fish originated.*
- *Resistance to sea lice treatments is a worrying development.*

Comments specific to Scotland:
The following issues are not consistent with NASCO's agreements and need additional actions:

- *Progress towards achieving the international goals for sea lice and containment was not demonstrated;*
- *Inadequate development and implementation of an Action Plan to minimise escapes;*
- *Adequate measures to minimise the risk of disease and parasite transmission have not been implemented;*
- *Adequate measures to control movements into a Commission area of reproductively viable Atlantic salmon and non-indigenous anadromous salmonids or their gametes have not been implemented.*

The main European Directive which affects the regulation of salmon fisheries is 92/43/EEC on the conservation of natural habitats and of wild fauna and flora (the Habitats Directive). The aim of the Habitats Directive is to "*contribute towards ensuring bio-diversity through the conservation of natural habitats and of wild fauna and flora*", and "*measures taken pursuant to this Directive shall be designed to maintain or restore, at favourable conservation status, natural habitats and species of wild fauna and flora of Community interest*." The Habitats Directive lists Atlantic salmon as a "*species of community interest whose conservation requires the designation of Special Areas of Conservation*" (SAC). In an SAC, member states have to take measures to maintain or restore the listed species and such measures may need to be implemented outside the SAC. This may include statutory changes to protect the species, or protect against deterioration of the species' habitat. There are 17 Scottish rivers designated as SACs for Atlantic salmon and in 11 of which, Atlantic salmon are listed as a primary interest. Three of these SACs are located in areas where the aquaculture industry operates. There are also 11 SACs designated for freshwater pearl mussels (for which salmon and sea trout act as parasitic hosts at the larval stage) in areas where the aquaculture industry operates. SNH recommend that juvenile densities of 0.2 juvenile salmonids/m^2 are the critical density for the health of pearl mussels. However, a number of west coast SACs have been categorised as being at unfavourable condition due to low salmonid numbers.

[6] *NASCO Council document CNL(10)12 (2010).*

WWF, through a series of roundtable discussions, called Aquaculture Dialogues, is working with farmers, retailers, NGOs, scientists and other aquaculture industry stakeholders worldwide to develop standards for responsible aquaculture. The goal of the Dialogues is to create draft standards for 12 aquaculture species (including salmon and freshwater trout). Final standards will be given to a new organization, the Aquaculture Stewardship Council, which will be responsible for working with independent, third party entities to certify farms that are in compliance with the standards. This certification, which is similar to the Marine Stewardship Council and the Forestry Stewardship Council, will be reviewed regularly with a view to achieving continual environmental improvement.

ASFB-RAFTS Policy Position

As we stated earlier, ASFB and RAFTS recognise the permanence and economic importance of the aquaculture industry to Scotland and the West Coast of Scotland in particular. However, there have been, and continue to be, impacts upon wild fish stocks in the areas where the aquaculture industry is most active.

It is important to clarify at this stage that declines in Atlantic salmon and sea trout may have been influenced by a number of contributory factors and it is not, and has never been, the policy position of ASFB or RAFTS that aquaculture is the *sole* reason for declines in salmonids in the West Highlands of Scotland. It is accepted that survival of salmon and sea trout during their marine migration phase has fallen over the last 40 years. Some of this reduced survival can be explained by changes in sea surface temperature and subsequent contraction of feeding grounds. However, these issues can only be addressed at an international level and a key strategy for managing adaptation of species sensitive to climate change (such as Atlantic salmon and sea trout) is to minimise *additional* pressures such as those which are man- induced[7]. This would include increased protection from the effects of sea lice (in some locations in certain circumstances), reducing exploitation (including in mixed stock fisheries where reduction in exploitation is recommended) and from the potential effects of marine renewables.

The District Salmon Fishery Boards and Fisheries Trusts on the West of Scotland routinely work closely with the industry, particularly where Area Management Agreements are in place. The risk of impacts from aquaculture is accepted in these fora. These effects are also recognised at international level through the Best Management Practice jointly agreed by NASCO and the International Salmon Farmers' Association. As indicated above, our primary concerns are the impacts of sea lice on post smolt salmonids and competition and genetic introgression resulting from escapes. However, on-going denial that a problem exists remains a significant impediment to the development of constructive solutions between both sectors.

We have identified below a number of key areas in which we believe real progress can be made in resolving and mitigating impacts. We are keen to work with the Scottish Government, and the industry, to maximise the benefits to Scotland from the contributions of wild fish and the aquaculture industry.

Policy Priorities

1. **Full public access to farm lice data in a disaggregated form**
   Lice levels on farms are only accessible under the existing Area Management Agreements. However, such information is bound by confidentiality agreements and is not publically available. A major concern for wild fisheries interests is the potential for cumulative impacts on fish which often have to negotiate large numbers of farms on their migration to the open ocean. Such cumulative impacts cannot currently be adequately assessed as part of the planning process, as planners do not have access to lice levels on existing farms in the area. There is a clear trend for fish farm applicants to state that they will adhere to the Code of Good Practice with regard to lice levels and the routine response to this by Marine Scotland Science is to state that if the target is met then the impact will

[7] See for example: Folke C., Carpenter, S., Walker, B., Scheffer, M., Elmqvist, T., Gunderson, L. & Holling, C.S. (2004) Regime shifts, resilience, and biodiversity in ecosystem management. *Annu. Rev. Ecol. Evol. Syst.***35**: 557-581.

be minimal. We do not believe that operators are able to meet these targets (in some areas at certain times) and this is backed up by the aggregated industry figures provided by the SSPO which show that lice numbers were 9% above the suggested threshold (0.5 lice per fish) on the North Mainland, and 14% above the suggested threshold on the South Mainland, during February 2011. Since sea lice levels on farms are not uniformly distributed, these data suggest that in some cases lice levels will be very considerably higher than the suggested thresholds, but it is impossible to examine this further in the absence of access to the raw data. The most recent figures available at the time of writing demonstrate that during June 2011 lice numbers across the North Mainland region, on average, were 138% above the suggested lice treatment threshold (0.5 adult female lice per fish). During July and August, lice numbers were, on average, 149% above the suggested lice treatment threshold (1.0 adult female lice per fish). Full access to fish farm lice data is available in Norway (where companies such as Marine Harvest operate). Access to such data in Scotland would allow assessments to be made of the success or otherwise of lice control strategies and subsequent impacts on wild fisheries. In addition, full access to lice data would allow the Fish Health Inspectorate to prioritise limited resources on 'problem' sites as part of the on-going farm inspection process. We welcome Scottish Government seeking views on the most appropriate approach to be taken to the collection and publication of sea lice data via the consultation on the Aquaculture and Fisheries Bill.

ASFB and RAFTS believe that the optimum solution is a public register, with full online access, of farm-specific weekly counts of sea lice in a non-aggregated form.

2. Appropriate targets for sea lice levels on farms

We do not believe that the current industry practice as laid out in the Code of Good Practice is sufficient to protect wild fisheries. Indeed, Marine Scotland Science, in responding to fish farm applications, routinely states:

> "*However, it should be noted that adherence to Integrated Sea Lice Management (ISLM) as described in the industry Code of Good Practice may not necessarily prevent release of substantial numbers of lice from aquaculture installations. The CoGP takes no account of farm size, or number of farms in an area, in setting threshold levels for sea lice treatments. This may be appropriate when the aim is to protect the welfare of farmed fish but it will not necessarily prevent significant numbers of larval lice being shed into the environment, and posing a risk for wild fish particularly in the case of larger farms or management areas holding a large biomass of farmed fish.*"

We welcome the proposal in the consultation on the Aquaculture and Fisheries Bill that Scottish Ministers might take powers to determine a lower threshold for sea lice levels above which remedial action needs to be taken.

ASFB and RAFTS believe that targets must be changed in order to take into account farm biomass and the cumulative biomass in the local area in order to minimise the risks to wild fish. In addition, the current targets are directed solely at protecting salmon. It is important that targets are also appropriate to the inshore habitats of sea trout.

3. Phased withdrawal from smolt production in freshwater cages

We are particularly concerned about the risks associated with smolt production in open freshwater cages. Large escape events or 'drip' escapes through the use of nets with inappropriate mesh sizes, will result in an increased potential for introgression with wild fish. We now have evidence of drip smolt escapes from several parts of Scotland which are not being caught by the reporting process. Even where introgression does not occur, such escapees will compete with and may displace resident wild fish. We would note that the Salmon Aquaculture Dialogue, which will lead to an accreditation system for aquaculture under the Aquaculture Stewardship Council will not allow '*producing or holding smolts in net pens in water bodies with native salmonids*.' Given the Scottish Government's support for the MSC accreditation of Scottish sea fisheries we would encourage the Scottish Government to support the Scottish Industry in achieving these sustainability standards.

ASFB and RAFTS believe that the practice of smolt production in freshwater cages is unsuitable in Scotland and therefore we believe that Scottish Government should instigate the phased withdrawal of smolt production in freshwater cages, with an initial focus on cages sited in systems containing migratory salmonids.

4. Relocation of farms from sensitive sites

We recognise the desire of Government and the industry to increase Scottish production. We believe that increased production should be linked to a process of targeted re-allocation of biomass and location of production. This would allow production to be focused in premium sites whereas marginal sites (e.g. for environmental impact, production or other reasons) currently in production could be removed from the system. We would support the implementation of a pilot relocation where an associated socio-economic benefit study could be linked to the exercise.

RAFTS is currently undertaking a Government-funded project aimed at managing interactions between wild fisheries and aquaculture. A major aspect of this project is a sensitivity analysis which will result in the production of locational guidance for planning marine aquaculture developments. This tool will be important in helping to prioritise where new aquaculture developments can be taken forward with reduced and manageable risks to wild fish interests. Although not the purpose of this tool it is clearly possible that it could be applied to help identify potential relocation sites if this was to be taken forward.

We welcome the proposal in the consultation on the Aquaculture and Fisheries Bill that Scottish Ministers should be given powers, ultimately, to revoke, or to require or request others to revoke consents, *as a helpful and necessary option as our understanding of the impacts, interactions and management of aquaculture improve*.

ASFB and RAFTS believe that some sites are so sensitive, and the potential impact is so great, that available mitigation, management and best practice cannot reduce the risks and impacts to acceptable levels in terms of wild fish and fisheries. In such instances these sites should be relocated and/or have biomass and production reallocated elsewhere.

5. Identification of escaped fish via full access to genetic material on farms or by mandatory tagging of fish

We recognise and support the progress that the industry has made to reduce the number of escapes in Scotland. However, escapes do still occur, and will continue to be an inevitable consequence of fish farming in cages in both seawater and freshwater systems. In addition, the frequency and intensity of storm events are forecast to increase as a consequence of climate change. We believe that all companies in the Scottish Industry should provide access to genetic samples to enable escapee fish to be identified, and to allow the full assessment of the extent of introgression between farmed and wild fish. Novel genetic techniques based on single nucleotide polymorphism technology currently allow escaped salmon to be identified to the farm of origin. We are aware that some Scottish companies are content to provide this information and we believe that such a scheme should be mandatory across Scotland. In addition, we believe that there is also a move in Norway to ensure that all farmed fish are marked with a uniquely numbered tag, again with the purpose of identifying the source of escapes. We understand that Marine Scotland Science are currently undertaking a scoping study to assess the technical feasibility of identifying escapes and quantifying introgression using genetic methods.

We welcome the proposal in the consultation on the Aquaculture and Fisheries Bill that Scottish Ministers should have additional powers to take or require samples of fish from fish farms, for tracing purposes.

ASFB and RAFTS believe that a power for Scottish Ministers to take samples from fish farm sites for tracing purposes should be delivered through the forthcoming Aquaculture and Fisheries Act. This

power could then be deployed in future, depending on the results of the MSS scoping study and other methods as they become feasible and/or available.

6. Synchronised Treatment/Fallowing

Good practice and cooperation between producers working in the same geographical area is important for good husbandry and can be beneficial to wild fish and fisheries. Farm Management Agreements are recognised in the industry code and should cover: stocking; fallowing; husbandry and biosecurity; management practices, including for the control of sea lice; and information sharing.

We welcome the proposal in the consultation on the Aquaculture and Fisheries Bill that there should be a legal requirement to participate in a farm management agreement. We are concerned however, that the existing farm management agreements are extremely variable in size. Whilst we recognise that there remains incomplete information and understanding about connectivity between farms and FMAs, it would appear that in some instances, the current FMA boundaries are not primarily based on reasons of good husbandry, biosecurity and control of sea lice. In addition, FMAs do not have any input from wild fisheries interests. One of the identified failings of Area Management Agreements was the requirement for all discussions to take place under a confidentiality agreement. This lack of transparency led to suspicion about the process and ultimately resulted in a lack of wider support for the TWG process. It is therefore important, at the very least, that the proceedings of FMAs, and any data held within that agreement are open and accessible.

ASFB and RAFTS believe that there should be a legal requirement for all finfish operators in the marine environment to participate in a Farm Management Agreement. The boundaries of such management areas should be appropriate to all environmental considerations (including the control of sea lice) and the detail of such agreements should be open and accessible.

7. Closed containment

We maintain that the ultimate solution should be for all installations to consist of totally enclosed systems, either land or sea based. Such installations would minimise escapes, prevent the transfer of parasites and the spread of disease, and allow waste effluents to be collected and treated in order to avoid pollution. The aquaculture industry must research new technology as a matter of urgency, and within time scales set by the Scottish Government after consultation with aquaculture and wild fish interests. Such systems are currently under development by Preline (Norway) and Agrimarine (Canada) and Scotland risks being left behind.

ASFB and RAFTS believe that the target of the aquaculture industry and Scottish Government must be for the statutory use of enclosed systems for rearing fish, whether on land or at sea, therefore cutting out any interaction between farmed and wild salmon and sea trout. This should be within a timescale agreed between Government, industry and wild fish organisations.

Research Priorities

We believe that the policy priorities outlined above can and should proceed immediately and the research priorities listed below ***should not*** be viewed as a reason for any further delay in making progress with the policy priorities stated above. However, there are a number of key information gaps which may inform future management of interactions and decisions relating to the planning process.

8. Understanding of coastal migration routes for Atlantic salmon and inshore habitats for sea trout

Without a far better understanding of the coastal migration routes and habitats of wild salmonids it is impossible to plan aquaculture developments in a fully informed manner. Of particular strategic concern are the Sounds on the West coast, which have the potential to act as bottle necks in which migrating smolts are unable to avoid sea lice infestation. Equally, these areas are likely to be strategically important for marine renewable developments and therefore an understanding of fish migration routes would be likely to have multiple benefits for Scotland.

ASFB and RAFTS believe that an understanding of coastal migration routes/habitats would be a useful tool for the strategic planning of aquaculture and marine renewable developments.

9. Sea lice dispersal models

Sea lice dispersal models have been developed for Loch Torridon and are under development in Loch Linnhe and Loch Fyne. Early results from these models show that tidal currents are capable of dispersing lice over large areas, but that these currents are insufficient to explain the high concentrations of lice found in shallow waters. Wind-generated currents may have an important role to play in this. We understand that the models are not yet at a stage to be routinely used in the planning process or as a management tool.

ASFB and RAFTS believe that further research into (and funding for) sea lice dispersal models is important, as they may have the potential to be utilised in the appropriate siting of new farms and for the relocation of inappropriately sited farms.

10. Understanding of cumulative effects

The potential for detrimental cumulative effects on wild salmonids arising from sea lice released from multiple farms in an enclosed has been identified by Marine Scotland Science: '*…consideration should be given to the potential cumulative effect that may lead to a detrimental impact upon wild salmonids in the area. However, the current state of knowledge does not allow us to quantify the severity of that impact if any*.' If the cumulative effects of numerous sites within an area are to be considered as part of the planning process it is important that the knowledge base around this issue is developed further.

ASFB and RAFTS believe that research into the potential for cumulative impacts from aquaculture developments would be helpful in order that such information can be used in the strategic planning of aquaculture developments

11. Sensible assessment of production limits for defined geographical areas

'A Fresh Start: The renewed Strategic Framework for Scottish Aquaculture' clearly states that '*Growth should be within the carrying capacity of the environment*[8].' We support this aspiration. However, it is not currently clear how such a carrying capacity should be determined, particularly in relation to wild fisheries.

ASFB and RAFTS believe that such information should determine whether the aspiration for expansion of the industry can be met in a sustainable manner.

12. Assessing the effect of sea lice on sea trout and salmon at a population level

Marine Scotland's current position on the current state of scientific knowledge relating to sea lice is as follows: salmon farms have been shown to be a more important contributor than wild fish to the total lice in the environment; there is a strong correlation between levels of lice on fish farms and in the local environment; the stage of farm cycle relates to level of lice infestation on sea trout with higher levels of infestation during the second year of production; infestation levels on wild trout associated with years of high lice on farms are predicted to be sufficient to kill a proportion of individual fish sampled; however, the scale of any impact on sea trout at a population level cannot be determined from existing published information; although an association between levels of lice on salmon farms and on wild salmon has been shown in Norway no information is available for Scotland; there is no information on the effect of sea lice on salmon at the individual level available for Scotland; although there is evidence that declines in catches of wild salmon have been steeper on the Scottish west coast than elsewhere in Scotland there is no clear evidence of an effect of sea lice on wild salmon at the population level.

On assessing the current evidence Revie et al. stated, "*Nevertheless, we believe that the weight of evidence is that sea lice of farm origin can present, in some locations and for some host species populations, a significant threat. Hence, a concerted precautionary approach both to sea lice control throughout the aquaculture industry and to the management of farm interactions with wild*

[8] The Environmental Principle – Page 4.

salmonids is expedient." Despite this, planning consents continue to be granted in Scotland on the basis that there is currently no evidence to quantify the effects of sea lice on juvenile salmonids at a population level. One means of filling this data gap is the prophylactic treatment of wild salmon and sea trout smolts prior to their migration to seawater. Similar work has been undertaken in Norway, Ireland and Scotland in the past and significant effects, either in differential survivorship or in the enhanced condition of treated fish, have been demonstrated in all three countries. In Scotland, the only currently licensed treatment agent available for this work is Slice (Emmamectin Benzoate). As Slice is an in-feed treatment, such research can only practically be carried out on hatchery reared smolts (although wild smolts have been intercepted and treated with Slice in Ireland). This work should be carried out, in a properly controlled experiment with suitable controls with some urgency. Lochaber DSFB has an existing hatchery operation on the River Lochy, would be an ideal location for this work, in an area with significant marine aquaculture production.

ASFB and RAFTS believe that funding and scientific support should be directed towards assessing the population level effect of sea lice on wild salmonids.

Conclusions

The following policy objectives will be pursued with the industry and Scottish Government, in partnership with the Salmon and Trout Association, Fish Legal and the Atlantic Salmon Trust.

- ASFB and RAFTS will seek the publication of a public register, with full online access, of farm specific weekly counts of sea lice in a non-aggregated form.
- ASFB and RAFTS will seek to ensure that the industry Code of Good Practice targets are changed in order to minimise the risks to both Atlantic salmon and sea trout, by taking into account farm biomass and the cumulative biomass in the local area.
- ASFB and RAFTS will seek to ensure that Scottish Government instigate the phased withdrawal of smolt production in freshwater cages, with an initial focus on cages sited in systems containing migratory salmonids.
- ASFB and RAFTS will seek the relocation and/or reallocation of sites/biomass, where sites are so sensitive, and the potential impact is so great, that available mitigation, management and best practice cannot reduce the risks and impacts to acceptable levels in terms of wild fish and fisheries.
- ASFB and RAFTS will attempt to influence the forthcoming Aquaculture and Fisheries Bill in order to ensure that a power for Scottish Ministers to take genetic samples from fish farm sites is included.
- ASFB and RAFTS believe that there should be a legal requirement for all finfish operators in the marine environment to participate in a Farm Management Agreement. The boundaries of such management areas should be appropriate to all environmental considerations (including the control of sea lice) and the detail of such agreements should be open and accessible.
- ASFB and RAFTS believe that the target of the aquaculture industry and Scottish Government must be for the statutory use of enclosed systems for rearing fish, whether on land or at sea, therefore cutting out any interaction between farmed and wild salmon and sea trout. This should be within a timescale agreed between Government, industry and wild fish organisations.

For further information please contact:

Dr Alan Wells | ASFB Policy and Planning Director
Tel: 0131 272 2797 | Email: alan@asfb.org.uk

Callum Sinclair | RAFTS Director
Tel: 0131 272 2797 | Email: callum@rafts.org.uk

This document is supported by the following organisations:
Angling Trust
Atlantic Salmon Trust
Fish Legal
Salmon & Trout Association