Agenda item 5.1(a)
For decision

Council

CNL(11)11

Final Report of the Aquaculture, Introductions and Transfers and Transgenics Focus Area Review Group

CNL(11)11

Final Report of the Aquaculture, Introductions and Transfers and Transgenics Focus Area Review Group

1. The third and final focus area in the first cycle of reporting under the Implementation Plans is aquaculture, introductions and transfers and transgenics. The Review Group's draft report had been presented to the Council last year, CNL(10)12, following its earlier review by the NASCO/ISFA Liaison Group. It had not been necessary for the Review Group to develop recommendations on best practice because in 2009 a Task Force established by the Liaison Group had developed 'Guidance on Best Management Practices to Address Impacts of Sea Lice and Escaped Farmed Salmon on Wild Salmon Stocks', SLG(09)5.

2. In finalising its report, the Review Group was asked to take into account the comments on its draft report from the Parties, ISFA, and the NGOs and those made during the Special Session. The Review Group was also asked to review a new FAR that had been submitted by EU-Ireland and the relevant sections of a document provided by EU-Spain.

3. The final report is attached. It was considered by the Liaison Group at its meeting during 18-19 March 2011 (see CNL(11)14), which made the following comments:

   - The Liaison Group thanks the Review Group for its report, complete with its eight annexes, and encourages NASCO's Parties to make full use of the wealth of information provided;
   - Going forward, NASCO Parties should carefully consider the following in its 'Next Steps' process:
     - the extent of NASCO's role with respect to aquaculture, introductions and transfers and transgenics;
     - the roles and responsibilities of the Parties, industry and NGOs with respect to NASCO's role;
     - activities and studies that would best serve NASCO's role going forward.

4. This response was considered by the 'Next Steps' Review Group and its report is contained in document CNL(11)12. The Council is asked to consider the final report of the aquaculture FAR Review Group and decide on any action needed in the light of this report, and the recommendations from the Liaison Group and from the 'Next Steps' Review Group.

Secretary
Edinburgh
7 April 2011

IP(10)39

Report of the Meeting of the Ad Hoc Review Group on Aquaculture, Introductions and Transfers and Transgenics

1. Opening of the Meetings by the Coordinator

1.1 At the Review Group's first meeting, held in Washington DC from 22 – 25 February 2010, the Coordinator, Dr Malcolm Windsor, indicated that the task before the Group was to review the measures taken by the jurisdictions to protect the wild salmon stocks from the impacts of aquaculture, introductions and transfers and transgenics in order to assess their consistency with NASCO's agreements. He stressed that this is the first time that NASCO had attempted such a review of aquaculture and related activities and the outcome will set the scene for the future. He noted that there are serious concerns about the impacts of salmon aquaculture, introductions and transfers and transgenics. NASCO has gone to great lengths to ensure that it has the best available scientific advice on the threats to the wild stocks from these activities. It is clear from the findings of the 2005 Bergen Symposium that while the salmon farming industry has made progress, real concerns remain about the impacts of escapees and sea lice on the wild stocks, in part linked to continuing growth of the industry. However, he stressed that poorly planned introductions and transfers, including stocking practices, can also have impacts on the wild stocks. He noted that in carrying out its reviews, the Group should have only one question in its mind – 'Do the steps in the FARs fully comply with NASCO's agreements to protect the wild stocks from genetic, disease, parasite and other impacts?' While neither he nor the Assistant Secretary would be reviewers the Secretariat would support the work of the Review Group. The members of the Review Group were specifically not representing their Party or Organization but the interests of the wild Atlantic salmon. While the Group did not need to produce unanimously agreed assessments he indicated that it may be more powerful if it could.

1.2 At the Group's second meeting, held in Boston from 22 – 23 November 2010, the Coordinator indicated that the Group's Draft Report had been presented at the meeting of the ISFA/NASCO Liaison Group in April 2010 and then to the Council during a Special Session at its Annual Meeting in Quebec City in June 2010. Comments on this draft report had been received from ISFA and NASCO's accredited NGOs had responded to these comments. Feedback on the draft report had also been received during the Special Session in 2010. He indicated that the Council had agreed that the Parties should be given until 31 October 2010 to provide comments on the draft report and these had been received from Canada, Faroe Islands, Norway, UK – Scotland and the USA. In finalising its report, the Group had been asked to take into account the comments on its draft report from the Parties, ISFA and the NGOs during the Special Session and to review two new documents made available since the Group's first meeting. The task for the Review Group at its second meeting was, therefore, to consider an appropriate way to handle the feedback on its draft report, to review the two new documents (for Ireland and Spain) and to develop an overview of approaches and challenges in accordance with its Terms of Reference.

1.3 The members of the Review Group who participated in the meetings were: Torfinn Evensen, Heidi Hansen, Tim Sheehan, Bob Steinbock and Boyce Thorne Miller (second meeting by correspondence only). Ms Marita Rasmussen contributed to the work of the Review Group by correspondence. Brief biographies of the members of the Review Group are contained in Annex 1.

2. Adoption of the Agenda

2.1 The Group adopted the agendas for both of its meetings, IP(10)20 and IP(10)35.

3. Review of the Terms of Reference and consideration of working methods

3.1 The Group reviewed its Terms of Reference and agreed on its working methods. These were described fully in the Review Group's draft report, CNL(10)12, and are contained in Annex 2 together with other procedural information.

3.2 In finalising its report, the Group had been asked to take into account the comments on its draft report from the Parties, ISFA and the NGOs including those made during the Special Session and to review new documents made available since the first meeting for Ireland and Spain. The Review Group was asked to make its final report available to the Liaison Group in March 2011 and it would then be considered by the Council of NASCO at its Twenty-Eighth Annual Meeting.

3.3 The Review Group noted that the terms 'salmon farming' and 'salmon aquaculture' are sometimes used synonymously. Throughout this report and in its assessments the Review Group has used the terms as defined in the Williamsburg Resolution as follows:

Salmon aquaculture: The culture or husbandry of Atlantic salmon, including salmon farming, salmon ranching and salmon enhancement activities.
Salmon enhancement: The augmentation of wild stocks in individual river systems by the release of Atlantic salmon at different stages in their life-cycles.
Salmon farming: Production system which involves the rearing of Atlantic salmon in captivity for the duration of their life-cycle until harvested.
Salmon ranching: The release of reared Atlantic salmon smolts with the intention of harvesting all that return.

4. Consideration of the Guidance on Best Practice

4.1 At the Group's first meeting, the Assistant Secretary presented an overview of NASCO's agreements on aquaculture and related activities and the background to the development of the BMP Guidance, SLG(09)5, that had been adopted by both ISFA and NASCO in 2009. The basic principle of this guidance is that salmon stocks in areas with salmon farming should be in as healthy a state as those in areas without salmon farming. The international goal for sea lice is '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'. The international goal for containment is '100% farmed fish to be retained in all production facilities'. The Task Force had subsequently developed an explanation of the terms used in the BMP Guidance and considered the possible development of a Decision Tree to assist

jurisdictions in understanding the application of the BMP Guidance. The Task Force had also considered other issues such as the use of sterile salmon in farming and the consequences of hybridization between farmed and wild salmon. The Task Force had noted that while the Williamsburg Resolution remains valid it needed to be strengthened in its interpretation and application, particularly in terms of defined goals and assessment of outcomes. The BMP Guidance was intended to assist the NASCO Parties and jurisdictions in framing the management of salmon aquaculture, in cooperation with their industries, in developing future NASCO Implementation Plans and in preparing their Focus Area Reports for the 2010 review and subsequently. To this end, the BMP Guidance had, at the request of the Council, been incorporated into the guidance on preparing the aquaculture focus area reports (see document CNL40.970).

The international goal for sea lice is '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'. The international goal for containment is '100% farmed fish to be retained in all production facilities'.

4.2 The Review Group recognised that while its TORs included compiling best practice, this work had been completed by the ISFA/NASCO Task Force. The Review Group welcomed this BMP Guidance and the development of more quantitative international goals and the recommendations for reporting and tracking which include monitoring of: lice loads on wild salmonids in areas with and without farms; lice-induced mortality of wild salmonids; and the efficacy of lice treatments. For containment, the reporting and tracking focuses not only on information on the level and causes of escapes from farms but the incidence of farmed salmon in the wild.

The Review Group welcomed this BMP Guidance and the development of more quantitative international goals and the recommendations for reporting and tracking.

4.3 The Review Group notes with concern information presented in the FARs that indicates increased lice abundance on farmed salmon in some jurisdictions in 2009 and the detection of resistance to both Emamectin benzoate (SLICE®) and pyrethroids. This development may jeopardise the ability to achieve the international goal for sea lice. The Review Group notes that there is no reference to the use of sterile salmon under the best management practices and suggests that this issue be given further consideration by NASCO and the Liaison Group. The recognition of the value of marking to determine the origin of escaped farmed salmon is welcome (see paragraph 5.27 below). The Review Group also believes that development of Decision Trees relating to sea lice control and containment, as discussed by the Task Force, could be a useful tool in assisting jurisdictions in applying the BMP Guidance.

4.4 The Review Group recognised that while the BMP Guidance was only agreed in 2009, NASCO's agreements relating to aquaculture, introductions and transfers and transgenics date from the early 1990s and many elements were subsequently included in the Williamsburg Resolution together with the Liaison Group's 2001 Guidelines on

Containment of Farm Salmon. The BMP Guidance was developed to assist in strengthening the application and interpretation of the Williamsburg Resolution. The Review Group, therefore, felt that all jurisdictions with salmon farming should be able to demonstrate clear progress towards achieving the international goals but in most cases data to demonstrate progress was not provided.

5. **Review and analysis of FARs and identification of additional actions to ensure consistency with NASCO agreements relating to aquaculture, introductions and transfers and transgenics**

Jurisdictions not submitting a FAR

5.1 Before presenting its recommendations arising from the reviews of the FARs, the Group wishes to note that three jurisdictions (Greenland, EU-Portugal, and EU-Spain) have not presented FARs. In the case of Greenland, the lack of an aquaculture and related activities FAR is to be expected as it does not have any of these activities. The Implementation Plan for Greenland states that there are 'no marine salmon aquaculture facilities in Greenland and, therefore, there are no environmentally threatening factors associated with this form of production originating from Greenland that could be detrimental to the stocks at West Greenland. The international sampling programme checks salmon for fish diseases, in particular the virus ISAv, of which all samples, as of now, have been negative'. There is only one small salmon river in Greenland and no stocking occurs. FARs were, however, expected for EU (Portugal and Spain) and the Review Group reiterates the views of previous Review Groups that if there is to be a complete assessment of whether the management actions being taken around the North Atlantic are in accordance with NASCO's agreements the Council needs to have information from all jurisdictions. A document entitled 'Information for the Compilation of a NASCO Implementation Plan and NASCO Focus Area Reports for Spain', CNL(10)36 was provided by Spain. The latter document was not a FAR but the Group did review the document and offers comments on it in paragraphs 5.4 – 5.6 below.

EU – Portugal

5.2 The Group noted the following specific points in relation to minimising impacts of aquaculture and related activities in EU – Portugal:

The Group is aware of the very small wild salmon stocks and their tenuous state in Portugal which, however, being at the southern limit of the range, are very important for genetic diversity. While the Group is unaware of any salmon farming in Portugal it is aware that hatchery programmes have been conducted in support of stock rebuilding efforts.

5.3 The Review Group recommends that the Council urges Portugal to contribute to this important aspect of NASCO's work at the earliest opportunity.

EU – Spain

5.4 The Group reviewed a document made available at NASCO's 2010 Annual Meeting entitled 'Information for the Compilation of a NASCO Implementation Plan and

NASCO Focus Area Reports for Spain', CNL(10)36. This document provides information for the Autonomous Regions in Spain with salmon rivers and includes brief descriptions of: the objectives of the salmon management strategy and the entities involved; the nature and extent of the resource; the measures in place for the management of salmon fisheries, for the protection and restoration of salmon habitat and to minimise impacts of aquaculture and related activities; and the on-going monitoring activities. However, the Group notes that information is lacking for some of the Autonomous Regions and little detail of the management measures is provided for those where information has been presented, so further input will be required before an Implementation Plan and FARs can be developed.

5.5 This is particularly the case for the sections of the document dealing with aquaculture and related activities. The document indicates that there has been no commercial salmon farming other than in Galicia, where production ceased 15 years ago. However, it is stated that a new Norwegian project has started in the Arosa Ria but no information is provided on the scale of the venture or the measures being applied to protect the wild stocks from adverse impacts. There is also some rainbow trout farming and stocking is carried out in several of the Autonomous Regions. Some information is provided on the hatchery programmes and it appears that the source of the material for these programmes is adult salmon returning to the rivers. For Asturias, it is stated that fish health and genetic screening are undertaken. Some information is also presented on monitoring programmes although these appear to be related mainly to monitoring of stock status.

5.6 Given the very limited information provided relating to aquaculture, introductions and transfers and transgenics and the fact that this document represents a first step in developing an Implementation Plan and FARs, the Group concluded that it was not appropriate to assess the document against the detailed criteria developed for evaluating the aquaculture and related activities FARs. However, the Group welcomes the progress made towards meeting NASCO's reporting requirements and encourages Spain to complete this process before the next reporting cycle commences.

Jurisdictions submitting a FAR

5.7 The Review Group welcomed the submission of the following fourteen FARs which it reviewed:

- Canada, IP(10)16;
- Denmark in respect of the Faroe Islands, IP(10)14;
- EU – Denmark, IP(10)11;
- EU – Finland, IP(10)5;
- EU – France, IP(10)9;
- EU – Germany, IP(10)6;
- EU – Ireland, IP(10)23;
- EU – Sweden, IP(10)8;
- EU – UK (England and Wales), IP(10)3;
- EU – UK (Northern Ireland), IP(10)10;
- EU – UK (Scotland), IP(10)15;

- Norway, IP(10)13;
- Russian Federation, IP(10)4;
- USA, IP(10)7.

5.8 While the Council had asked that the FARs be made available for review no later than 31 December 2009, only five jurisdictions were able to meet this deadline. Many of the FARs, including some of the longer documents, were not received until early or mid-February 2010 leaving limited time for the review (and one FAR was not received until May after the Group's first meeting). As noted by previous Review Groups the review process will only work effectively if the timetable set by the Council is adhered to.

General comments on the FARs

Structure and content

5.9 The earliest NASCO agreements were developed almost twenty years ago. The Williamsburg Resolution, to minimise adverse impacts on the wild salmon stocks from aquaculture, introductions and transfers and transgenics, was adopted by NASCO in 2003 (and amended in 2004 and 2006). It consolidated NASCO's previous agreements into one Resolution and incorporated elements intended to ensure consistency with the Precautionary Approach (e.g. burden of proof, corrective measures, risk assessments). The Williamsburg Resolution provides guidance to NASCO's jurisdictions on a diverse array of aquaculture activities including salmon farming, ranching and stocking that is conducted for a variety of purposes. There is variety in the type and magnitude of aquaculture related activities in which NASCO's jurisdictions are engaged. In some jurisdictions, the salmon populations are dependent on stocking programmes while in others there may be no stocking of salmon at all. Some jurisdictions have an enormous production of farmed Atlantic salmon whereas other jurisdictions have none. The size and status of the wild salmon populations across the jurisdictions also varies with some jurisdictions working to restore extinct populations or to prevent the extinctions of populations (including those designated to receive special government protection) whereas others have populations that still support significant, albeit reduced, recreational and commercial fisheries. In carrying out its work, the Review Group assessed each activity against the relevant guidance in the Williamsburg Resolution and, in the case of salmon farming, the BMP Guidance which was developed to strengthen the interpretation and application of the Williamsburg Resolution in relation to sea lice and containment.

5.10 The Group noted that some jurisdictions (Canada, EU – Finland, EU – France, EU – Ireland, EU – UK (England and Wales), EU – UK (Northern Ireland), EU – UK (Scotland), Norway, USA) had adhered to the guidance from the Council on the structure of their FARs. This had facilitated the Review Group's work and the Group urges all jurisdictions to adhere to the agreed format in future reporting. The Group also recommends that the Council considers providing further guidance to the jurisdictions concerning the amount of detail to be included in the FARs. It had previously been suggested that a limit of no more than 20 pages be applied with the option to provide more detailed information in annexes. While many FARs had kept to this guidance some FARs contained an enormous amount of detailed information in the annexes which was impossible for the Group to review. In future, where a

jurisdiction wishes to provide supplementary information in annexes it would assist the reviewers if this could be summarised because there is very limited time to conduct the reviews. Some FARs presented a large amount of information describing the activities, policies and management structures in place rather than focusing on the outcomes of measures taken to implement the Williamsburg Resolution and to demonstrate progress towards achieving the international goals to safeguard the wild stocks. Conversely, several of the FARs comprised only the briefest of overviews that made it difficult to fully understand and, therefore, assess the measures in place.

It would be desirable that future FARs focus on outcomes and progress towards achieving the international goals so as to properly demonstrate whether or not salmon stocks in areas with salmon farming are in as healthy a state as those in areas without salmon farming.

5.11 Some of the FARs lacked transparency with regard to the nature of the challenges that exist in minimising impacts on the wild stocks from aquaculture and stated their own judgements about consistency of the measures in place with NASCO's agreements. It would be desirable that future FARs focus on outcomes and progress towards achieving the international goals so as to properly demonstrate whether or not salmon stocks in areas with salmon farming are in as healthy a state as those in areas without salmon farming. Some FARs referred to duplication in the reporting format. This was, perhaps, inevitable given the inclusion of the BMP Guidance elements in an existing reporting format. However, it should be noted that there were some elements that few or none of the FARs provided any information on. The comments below apply to many of the FARs reviewed so, rather than repeat them in each assessment, the Review Group has described them in paragraphs 5.12 – 5.23 below.

Action Plans on Containment

5.12 Under the Guidelines on Containment of Farm Salmon (Annex 3 of the Williamsburg Resolution) each jurisdiction should draw up a national action plan, or regional plans. The action plan is described as the process through which internationally agreed guidelines on containment would be implemented at the national or regional level through existing or new voluntary codes of practice, regulations, or a combination of both. The Group discussed whether an action plan would be a single document detailing all the measures in place on containment in a particular jurisdiction or region but felt that, while such documentation was desirable, this would not be necessary to be consistent with the guidelines. Each jurisdiction is, however, required to have in place measures for minimising escapes; mechanisms for reporting information on the level and causes of escapes; and mechanisms for reporting and monitoring in order to assess compliance and to verify the efficacy of the measures taken. Taken together these elements would comprise an action plan.

International cooperation to minimize adverse impacts on wild stocks

5.13 The Williamsburg Resolution calls for cooperation to minimise impacts of aquaculture and related activities on the wild salmon stocks. For example, salmon farming in one jurisdiction clearly has the capacity to impact both farming activities and the wild stocks in another jurisdiction. It is essential that all marine and

freshwater salmon farms meet the highest possible standards and that there is international cooperation to exchange information on best practice and agree on actions to eliminate impacts on wild salmon populations. The Review Group noted that few FARs presented information relating to international cooperation between the jurisdictions on matters relating to minimising impacts of aquaculture and related activities on the wild stocks and the outcomes of such cooperation. The Group is aware of international (e.g. the ISFA/NASCO Liaison Group and the WWF Salmon Aquaculture Dialogue) and bilateral (e.g. on border rivers) initiatives that were not referenced in the FARs. Participation in these might be more clearly reported in subsequent FARs. The ISFA/NASCO Liaison Group provides an international forum for developing recommendations for action on wild salmon conservation and sustainable salmon farming practices and the Group urges all jurisdictions with salmon farming to participate in the work of that Group.

Salmon ranching

5.14 The Williamsburg Resolution defines salmon ranching as 'the release of reared Atlantic salmon smolts with the intention of harvesting all that return'. Article 5 of the Resolution states that measures should be taken to minimise impacts of ranched salmon by utilizing local stocks and developing and applying appropriate release and harvest strategies. The FARs indicate that there is no ranching presently being undertaken in the North Atlantic other than on an experimental scale. There has, in the recent past, been large-scale ranching of salmon in Iceland and there is increasing 'ranching to the rod' in that country although how this activity would be categorised under the Williamsburg Resolution is unclear. The Review Group notes that this issue might need further consideration as it is possible that this activity could increase in future if marine survival rates improve.

Risk Assessments

5.15 Article 4 of the Williamsburg Resolution indicates that the Parties should develop and apply appropriate risk assessment methodologies in considering the measures to be taken to minimise the impacts on wild salmon of aquaculture and related activities. In Annex 7 of the Resolution it is indicated that there is a need to identify the appropriate factors to be included in a risk assessment in order to evaluate the potential impacts of aquaculture and related activities on wild salmon stocks. Such assessments should be an essential part of the approval process both for new farming sites or re-licensing or expansion of existing sites. The Review Group notes that while there is often a requirement to consider the impacts on the marine environment (particularly benthic impacts) or exposure of the site, little consideration appears to be given to the risks to the health, genetic diversity and status of wild salmonid stocks in the decision-making process. Thus, while the potential carrying capacity of the environment may be considered, the effects that the proposed increase in biomass would have on the wild salmon stocks in terms of the prevalence of sea lice, increased disease risk or increased threats from escapees may not be taken into account. The outcome of all risk assessments should be reviewed in the light of changes in the status of the wild stocks and any increase in production of farmed salmon. The Review Group highlights the frequent absence of wild salmon stock considerations in risk assessments and strongly encourages all jurisdictions to incorporate these considerations into decision-making processes in future.

5.16 A number of the FARs refer to risk-based approaches to monitoring and inspections in which farming sites that are considered to be at lower risk of non-compliance would receive less or no monitoring. The Review Group recognises that, consistent with the Precautionary Approach, where high risk sites are identified measures should be taken to eliminate the risks posed to the wild stocks and its environment. Where low risk sites are identified, appropriate monitoring would help to confirm, or reveal changes in, their low risk status.

Transgenic salmonids

5.17 The NASCO Guidelines for Action on Transgenic Salmonids (Annex 5 of the Williamsburg Resolution) state *inter alia* that Parties should: take all possible steps to ensure that the use of transgenic salmonids is confined to secure, self-contained, land-based facilities; inform salmon producers of the risks to wild stocks; and take steps to improve knowledge of the potential impacts of transgenic salmonids on wild stocks and their habitat. Most FARs indicate that there is no rearing of transgenic salmonids. However, the FAR for Canada indicates that while no transgenic salmonids have been approved for commercial aquaculture, release, or consumption, research has been approved to rear transgenic salmonids in contained facilities to assess the environmental and human health risks, and the performance characteristics of the fish. The US FAR indicates that an application has been made to the Food and Drug Administration (FDA) for approval to sell transgenic salmon in the US. While most jurisdictions with salmon farming have indicated that the industry is not in favour of rearing transgenics (and at the Liaison Group meeting ISFA has confirmed that it rejects the use of transgenic salmon) few FARs described clearly if the controls exist to ensure any use in the future is consistent with the NASCO Guidelines i.e. in secure, self-contained, land-based facilities.

5.18 At its second meeting the Group received additional information that indicated that the FDA's assessment related to whether or not transgenic salmon are safe for human consumption. It is understood that the company making the application proposes to produce transgenic salmon eggs at its facility in eastern Canada and transport these to Panama for rearing to market size. The Review Group believes that the issues raised by the likelihood that transgenic salmon may be available for commercial production in the near future should be thoroughly discussed by the Council and, in particular, the Group believes that it will be important that the clear guidance in the 'Williamsburg Resolution' is applied throughout the North Atlantic area.

River Classification

5.19 Article 8 of the Williamsburg Resolution states that for the purpose of developing management measures concerning aquaculture and introductions and transfers, river classification and zoning systems should be developed, as appropriate. Both the Guidelines for Stocking Atlantic Salmon (Annex 4 of the Resolution) and the North American Commission Protocols for the Introduction and Transfer of Salmonids (Appendix 1 of the Resolution) refer to river classification or zoning. While it is clear that many jurisdictions are developing river classification, e.g. under the EU Water Framework and Habitats Directive, few FARs referred to how river classification was used for developing management measures in relation to aquaculture and related

activities. This element might be more clearly reported in subsequent FARs. The Group notes that while wild salmon 'protection areas' and 'aquaculture exclusion zones' have been established in some jurisdictions there is a need to assess their effectiveness in protecting the wild stocks.

Corrective measures

5.20 The Williamsburg Resolution states that where significant adverse impacts on wild stocks are identified, the Parties should initiate corrective measures without delay and these should be designed and implemented to achieve their purpose promptly. This is an important aspect of the Precautionary Approach. The Guidelines on Containment of Farm Salmon refer to the need for escape contingency plans, Annex 2 of the Williamsburg Resolution refers to the establishment of gene banks to protect against loss of genetic diversity, and the 'Road Map' for *G.salaris,* developed by the North-East Atlantic Commission refers to the need for contingency plans to be developed. Many FARs did not report clearly on this aspect and in others little information was presented on the nature of the measures to be taken to protect the wild stocks when unforeseen impacts are detected. For future reporting, this important aspect of the Precautionary Approach should be addressed.

Socio-economic information

5.21 NASCO's Guidelines for Incorporating Social and Economic Factors in Decisions under the Precautionary Approach, CNL(04)57, provide a framework for incorporating social and economic factors into decisions which may affect the wild Atlantic salmon and the environments in which it lives. Previous Review Groups have noted that most FARs did not provide a clear indication of how socio-economic factors are incorporated into management decisions. This was also the case for the aquaculture and related activities reports. While some FARs did refer to the social and economic values associated with the salmon farming industry, they did not refer to the economic values associated with the wild stocks which also need to be taken into account in management decisions. There are also instances where the value of the wild stocks has been adversely affected by impacts from aquaculture and related activities. For future reporting, it would be essential that this aspect is addressed. In the interim, the Review Group notes the Council's intention to hold a Special Session in either 2011 or 2012 on how socio-economic factors are incorporated into management decisions and believes that it would be valuable to have examples relating to aquaculture, introductions and transfers and transgenics.

Evaluation of the effectiveness of measures taken

5.22 A central theme of the Precautionary Approach is the assessment of the effectiveness of management measures taken and, where necessary, adaptation of these measures so as to safeguard the wild stocks. Adaptive management is also highlighted in the BMP Guidance. Many of the FARs did not describe programmes to assess the effectiveness of their management measures. In this regard, the Review Group wishes to stress that while it may have indicated in the assessments that the measures taken are consistent with NASCO's agreements, it cannot assess if the measures are effective in safeguarding the wild stocks and achieving the international goals contained in the BMP Guidance. This BMP Guidance contains clear recommendations for reporting

and tracking to support assessment of the progress made towards achievement of the international goals. For future reporting, it will be essential that there is clear presentation of the outcomes of the monitoring in support of the BMP Guidance in order to assess progress towards the international goals.

Research, Development and Data Collection

5.23 Consistent with the Precautionary Approach a lack of scientific information should not be used as a reason for failing to take conservation measures. The Review Group notes that the jurisdictions have, to varying degrees, developed programmes of research in support of the Williamsburg Resolution. The Group notes that the Liaison Group intends to review this information with a view to identifying research gaps and data deficiencies and wishes to highlight that the BMP Guidance makes specific recommendations on reporting and tracking. In particular, the Review Group notes that while a very low percentage of farm fish escapes, 100% containment may never be achievable and the number of escaped farmed salmon remains large relative to wild fish abundance. Further research and development on improved containment technologies, alternative approaches to the production of sterile salmon and commercial-scale trials with sterile salmon are urgently required. Similarly, in relation to sea lice there is a need for further research and development of vaccines and effective therapeutants, particularly given the evidence of resistance to existing treatments.

General Comments Relating to the Assessments

Introduction

The Review Group recognises that progress has been made by the salmon farming industry in introducing measures intended to minimise 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, many FARs failed to provide information to demonstrate progress towards achieving the international goals for sea lice and containment.

5.24 The Review Group's final assessments are contained in Annex 3. The Review Group recognises that progress has been made by the salmon farming industry in introducing measures intended to minimise impacts on wild salmon stocks. It concluded, however, that in spite of the wealth of regulations and measures described in the FARs relating to salmon farming, many FARs failed to provide information to demonstrate progress towards achieving the international goals for sea lice and containment. The salmon farming industry is very successful but it is its scale and continuing growth that poses real challenges to addressing impacts on the wild stocks. 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. Often the monitoring described is related to the situation at the farms rather than focusing on the wild fish. However, the Review Group welcomes the establishment of more

quantitative international goals and the reporting and tracking that includes monitoring of wild fish as recommended in the BMP Guidance.

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.

Scale of Activities

Jurisdictions with a large production of farmed salmon bear a particular responsibility to minimize the threats that their activities pose to the wild stocks domestically and internationally.

5.25 Over the last twenty years or so, there has been a dramatic growth of salmon farming in the North Atlantic (see Figure 1 below). There can be little doubt that the scale of the salmon farming industry (production in the North Atlantic is now around 600 times the harvest of the wild fish) means that it has the potential to do more damage than other aquaculture practices and, therefore, has a responsibility to eliminate impacts. The findings of the 2005 ICES/NASCO Bergen Symposium highlight that the major challenges in managing impacts of aquaculture on the wild stocks relate to containment and sea lice in salmon farming. It was in recognition of these threats that the Liaison Group recently agreed on the BMP Guidance to strengthen the interpretation and application of the Williamsburg Resolution. Jurisdictions with a large production of farmed salmon bear a particular responsibility to minimize the threats that their activities pose to the wild stocks domestically and internationally. These jurisdictions may wish to consider whether national and regional limits on total salmon farming production as well as on densities of facilities would be appropriate. That said, however, it should also be noted that 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 guidance in the Williamsburg Resolution and the BMP Guidance needs to be fully implemented by all jurisdictions with stronger measures where local conditions dictate.

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.

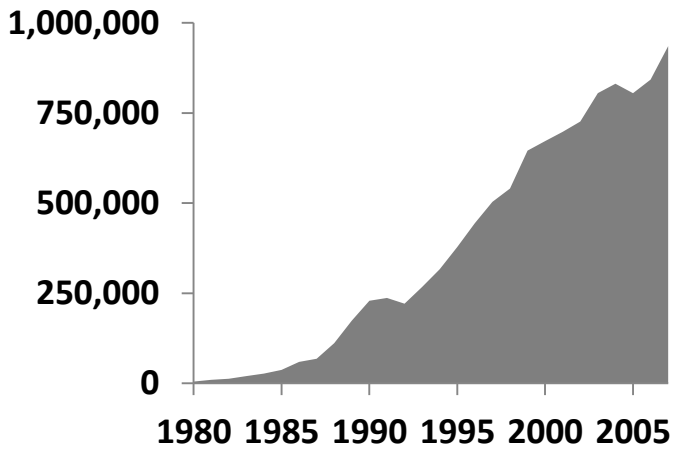

Figure 1: Production of farmed Atlantic salmon in the North Atlantic (Source: ICES)

Responsibility for setting standards

5.26 The Review Group considers that there is a need for caution in assigning responsibility for setting standards for containment, disease prevention and control and for compliance monitoring. In some jurisdictions, both are the responsibility of the salmon farming industry and, in the some cases, compliance is voluntary. The Review Group notes that there is an evolution from voluntary measures to legislation in a number of jurisdictions and believes that better protection of the wild stocks from adverse impacts may be achieved when government authorities set technical and environmental standards, oversee monitoring and impose strict monitoring requirements and schedules. There should also be monitoring programmes of wild salmon populations to determine impacts from salmon farming as recommended in the BMP Guidance. The Review Group believes that it is essential that measures designed to safeguard the wild salmon stocks are enforced and that any non-compliance is addressed.

Containment

5.27 The Review Group notes the recommendations in the BMP Guidance concerning reporting and tracking in support of the international goal on containment and wishes to stress that escaped farmed salmon should always be reported as numbers of escaped fish from farms (both marine and freshwater facilities) with the total number of farms together with monitoring for escapees in wild salmon populations (e.g. numbers and percentages in fisheries and spawning stocks). This information will enable a clearer assessment of the impacts on the wild stocks and the effects of salmon farming development. Often, contingency plans for escapes include only efforts to recapture escaped farmed salmon in the vicinity of the cages, but consideration could also be given to the opportunities to recapture escaped farmed salmon migrating into rivers where this can be achieved without damaging the wild stocks. Evidence suggests that escaped farmed salmon disperse rapidly from the site so recapture efforts immediately following an escape event may not be successful. These recapture efforts should not be seen as an alternative to stringent measures to improve containment. The Review Group notes that the BMP Guidance identifies methods to track the origin of escaped farmed salmon as a factor that would facilitate implementation of the guidance. This is an international issue because escaped

farmed salmon can, and do, migrate between jurisdictions. 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 (e.g. a visual mark or tag) and that would allow identification of the facility from which the fish originated (e.g. genetic marking).

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.

Sea lice

Resistance to sea lice treatments is a worrying development.

5.28 Sea lice larvae can survive independently in coastal waters for 20-50 days during which time they may be dispersed along the coast (as far as 180km during a 15 day period). Consequently any treatment zone for this parasite must be large in order to be effective. Other salmonids, such as sea trout, may suffer infestation rates higher than those on wild Atlantic salmon. The Review Group notes the recommendation in the BMP Guidance on reporting and tracking and wishes to stress that, from the perspective of minimizing impacts on the wild stocks, lice monitoring programmes are required not just on the farmed fish in the cages but also on wild salmonids if there is to be an assessment of progress towards the international goal. Monitoring, at appropriate times of year, of lice loads on wild salmonids in areas with and without farms as well as of lice-induced mortality of wild salmonids, that have been treated or that are held as sentinel fish in cages, are needed to better assess sea lice impacts on the wild stocks. At present this monitoring is not commonly conducted. Monitoring for the efficacy of sea lice treatments is also essential and is commonly done. Ideally monitoring would be undertaken by governments with industry support. Resistance to sea lice treatments is a worrying development. One important control mechanism is coordinated fallowing over large geographical areas along with single year-class stocking. In a defined region all farmed fish should be the same age and the focus should be on the numbers of fish (hosts) rather than biomass, which changes over time. Where possible, several treatment methods should be used to prevent resistance developing. Vaccination, if developed, against sea lice is unlikely to be 100% effective. There should be contingency plans that would apply in the event of a serious outbreak so that there is a rapid and effective response to prevent the transmission to the wild stocks and spread of the disease and parasite (including treatment methods, restrictions on movements, mass harvesting, disposal arrangements etc.).

NGO Statements

5.29 All of the statements in this report were unanimously agreed by the Review Group. A number of other statements were made by the NGOs which did not find unanimous support from the rest of the Review Group. These are contained in document IP(10)32 (Annex 4).

Feedback on the Group's Draft Report

5.30 At NASCO's 2010 Annual Meeting, the Council agreed that each jurisdiction should be given the opportunity to provide feedback to the Review Group on the assessments contained in its draft report, CNL(10)12. Feedback had been received from Canada, the Faroe Islands, UK - Scotland, Norway and the USA and is contained in document IP(10)34 (Annex 5). Feedback had also been received from ISFA, CNL(10)33 (Annex 6) and the NGOs had provided a response to the comments from ISFA, CNL(10)37 (Annex 7). Feedback had also been provided during the 2010 Special Session, IP(10)30. The Review Group was asked to take this feedback into account in finalising its report. It has done so where it felt that this was appropriate and its final assessments are contained in Annex 3. The Review Group has responded to this feedback in paragraphs 5.33 – 5.41 below.

5.31 The Review Group notes that a number of comments in the feedback related to the nature of the template developed to assist jurisdictions in preparing their FARs. This template was developed by the Council, not the Review Group, and combined the elements in the Williamsburg Resolution with those in the BMP Guidance. Opinions expressed suggested that the template both led to duplication of reporting and was restrictive. It was also suggested that the reporting measures for the FAR were not understood. As the template was based exactly on the elements in the NASCO agreements, the Review Group found this concern surprising.

5.32 The Group also noted that there were also criticisms in the feedback from ISFA that the NGOs had been able to circulate the FARs widely before the industry had seen the reports (and presumably other jurisdictions). The Group is aware that the 'Next Steps' Review Group will be considering future reporting arrangements prior to NASCO's Twenty-Eighth Annual Meeting. The Group recommends that in the interests of transparency, consideration might be given to making all FARs available on the NASCO website prior to their review.

Response to feedback from the jurisdictions

5.33 The Review Group welcomed the feedback from the jurisdictions which was carefully reviewed by the Group at its second meeting. Some of this feedback indicated that new initiatives were underway to, for example, improve containment and enhance monitoring for sea lice. In the interests of fairness to other jurisdictions that had decided not to provide feedback, any new information that related to measures that had been introduced subsequent to the submission of the FARs i.e. during 2010, was not taken into account by the Group in reviewing its assessments. This information might be expected to feed into the next round of FARs. While the Group welcomes these initiatives, some of which were still under development, they did not result in a change to the assessment unless they had resulted in the implementation of new

measures or actions consistent with the agreements. Some jurisdictions provided additional information but it was not in enough detail to allow the Group to assess it.

5.34 In the case of the information provided by Canada and Norway, the additional information resulted in the Review Group making some changes to the assessments in its draft report.

Response to feedback from ISFA

5.35 The Review Group considered carefully the comments on its draft report from ISFA, CNL(10)33. The Group is aware that NASCO's accredited NGOs had also responded to these comments in document CNL(10)37. The comments from ISFA include information relating to aquaculture, introductions and transfers and transgenics that was not included in the FARs for four jurisdictions (Canada, Norway, Scotland and the USA). The FARs were submitted to the Review Group by the jurisdictions and not by the industry. Therefore, it was felt more appropriate for the jurisdictions to consider the comments from the industry about a specific FAR rather than the Review Group. ISFA also heavily criticised the process used to conduct the review, the clarity of goal statements, and what it claimed was the inclusion of opinions rather than evidence and science-based comments, and it criticised the role of the NGOs.

5.36 The Review Group does not accept the ISFA comment that the review was 'fundamentally flawed' or those criticisms concerning its composition, Chairman or the status of the NGOs. The process used by the Review Group was set by the Council and was the same as for all the three previous reviews. These were all internal reviews intended to assess progress in implementing NASCO's agreements and did not include industry representatives.

5.37 However, the Council did go to great lengths to ensure that ISFA was kept informed of the work of the Review Group and to allow it to comment on its findings (both the draft and final reports are presented to the Liaison Group before consideration by the Council. ISFA representatives also attended the 2010 Special Session when NASCO discussed the draft report). The Review Group can accept some of ISFA's suggestions regarding the format of its report and has made a number of changes to address these (including annexing the NGO statements and including brief biographical notes on the reviewers).

5.38 The Group also rejects the criticism that its assessments were not based on evidence but only opinions. In fact, the Review Group had an unprecedented and enormous amount of factual information before it in the FARs and it was this information that formed the basis of its assessments. The Group did, however, re-examine its report to ensure that the opinions expressed were justified.

5.39 The Group was disappointed by the adversarial tone of the response from ISFA. ISFA states that an environmentally sustainable industry 'should not be impeded, but rather complemented by the work undertaken by NASCO'. In fact, the Council's intention in conducting the review was to assess progress in implementing its agreements to conserve the wild salmon stocks and encourage sustainable salmon farming practices. The Review Group notes that ISFA states that its objectives include 'conserving and enhancing wild salmon stocks' and it had, therefore, been hoped that the issues raised would be taken in the spirit of genuine feedback from a

Review Group only concerned to see significant progress in implementing the NASCO agreements.

5.40 Of great concern to the Group are the statements in the ISFA document that the international goals in the BMP Guidance adopted in 2009 by both NASCO and ISFA are 'inherently unachievable and unrealistic' and that ISFA agreed to these goals with 'serious concerns'. The Review Group believes that this statement calls into question ISFA's commitment to cooperation with NASCO to make progress towards the international goals and to ensure that wild salmon stocks are as healthy in areas with salmon farms as in areas without farms.

5.41 The Review Group recognises the progress made by the Liaison Group in developing the Guidelines on Containment of Farmed Salmon (Annex 3 of the Williamsburg Resolution) and more recently the BMP Guidance, and in particular it welcomes the development through this cooperation with the industry of the international goals for sea lice and containment. However, it believes that future cooperation between NASCO and ISFA can only have meaning if there is commitment to the international goals and the agreed principle that wild salmon stocks should be as healthy in areas with farms as in areas without farms. The Review Group recommends, therefore, that the Council seek an appropriate assurance from ISFA about its commitment to this principle and the international goals.

6. Identification of common challenges and common management and scientific approaches to address them

6.1 The Council asked that the Review Group identify common management and scientific approaches to challenges as reported in the FARs. This overview is intended to facilitate an exchange of information among the Parties and is contained in Annex 8. It includes some recommendations on future reporting through aquaculture, introductions and transfers and transgenics FARs and other approaches for further improving the exchange of information.

7. Arrangements for the 2010 and 2011 Special Sessions

7.1 The Group discussed arrangements for presentation of both its draft and final reports both to the Liaison Group meetings and to the Council at the Special Sessions during the 2010 and 2011 Annual Meetings. For the Liaison Group meetings, the report would ideally be presented by members of the Review Group and this was the case for the 2010 meeting. However, if none are able to participate in the 2011 Liaison Group meeting, the Coordinator agreed to present the report.

7.2 For the Special Sessions, it was agreed that following a general introduction from the Coordinator describing the way the Group had approached its work, there would be a presentation of the assessments by at least one Group member from the Parties and one from the NGOs.

8. Report of the meeting

8.1 The Group agreed its final report.

9. **Any other business**

9.1 There was no other business.

10. **Close of the meeting**

10.1 The Coordinator thanked the members of the Review Group for their valuable contributions, very hard work on the reviews and their effort to ensure fairness, balance and consistency.

Annex 1

Biographies of the Members of the Review Group

Mr Torfinn Evensen

Torfinn Evensen is Managing Director of Norwegian Salmon Rivers, based in Oslo, Norway. He holds a Cand. Agric degree in natural resource management from the Norwegian University of Life Sciences. He has experience as a professional natural resource manager in the Norwegian Touring Association where he served as specialist in monitoring the effects of human activity on nature and the environment. He has led a number of programs for developing sustainable tourism. He also served as a member of a Governmental Committee with responsibility for developing the new planning act in Norway, including interaction with other acts e.g. those concerning aquaculture. In recent years, he has concentrated on the impacts of the Atlantic salmon farming industry on wild salmonids.

He is a member of the national advisory board on salmon management in Norway. He is coordinator of the NGO-group of ten Norwegian organizations, dealing with conservation and management of wild salmon.

Norwegian Salmon River is an organization for holders of fishing rights in salmon rivers. Its objectives are: 1) conservation and enhancement of salmon stocks, 2) local management by river associations and 3) development of fishing tourism, based on local ownership and sustainable fishing activities. Each river association is responsible for management of the local fishery in accordance with the Salmonid Fisheries Act including the development of management plans, adoption of fishing rules (bag limit, length of fishing season, allowed lures, etc.), catch reporting, establishing and operating stations for disinfection of fishing gear, supervision – warden/ bailiff, enhancement activities to improve the fishing (fish ladder construction, stocking programs, habitat improvements etc) and improving access.

Ms Heidi Hansen

Heidi Hansen is senior advisor in the fish management division of the Directorate for Nature Management in Norway. She is coordinating the Directorate's work in protecting wild Atlantic salmon from negative effects from salmon aquaculture. She has a Cand. scient degree in freshwater fish biology from the University of Oslo with special focus on the effects of alien invasive species/organisms. For several years, she was a fishery officer at the County Governor's office in Oestfold County with responsibility for managing wild anadromous fish and fisheries. In this period, she was responsible for coordinating the processing of applications for aquaculture licenses in freshwaters. For a period of time she served as manager and biologist at Lafjord Aqua Products (fishfarm). During 2010, she has participated in an expert committee, appointed by the Norwegian government, for effective and environmental sustainable use of the coastline for aquaculture. The committee has suggested a new geographical structure to ensure effective use of area and minimize negative impacts on the environment. This work will be important for the future development of the aquaculture industry in Norway.

Mr Tim Sheehan

Timothy Sheehan is a Research Fishery Biologist with NOAA Fisheries Services' Atlantic Salmon Research & Conservation Task based out of Woods Hole, Massachusetts USA. He has been studying Atlantic salmon since 1995. Since that time he has worked cooperatively with a variety of International, Federal and State agencies, Federal fish hatcheries and the Atlantic salmon farming industry in Maine on a number of research and restoration oriented projects. Starting in 2002, his focus shifted towards marine and international science and management issues. He has been a member of the International Council for the Exploration of the Seas' Working Group on North Atlantic Salmon since 2003, serving as its Chairman from 2006-2008. He served as the Program Coordinator for the international sampling effort at Greenland since 2002 and also serves as the Principle Investigator on a number of other marine research projects investigating Atlantic salmon marine survival issues. He is an active participant at NASCO and serves as the Scientific Advisor to the United States Delegation. He also serves on NASCO's Standing Scientific Committee and Scientific Advisory Group, serving as the Scientific Advisory Group's Chairman starting in 2010.

Mr Robert Steinbock

Robert Steinbock is the Assistant Director, Straddling and Salmon Stocks Division, International Affairs Directorate of the Department of Fisheries and Oceans in Ottawa, Canada. With the Department since 1981, he has developed extensive experience in bilateral and multilateral fisheries negotiations as well as in international market access issues and international trade development. He is currently responsible for developing Canada's policy positions to the Northwest Atlantic Fisheries Organization (NAFO), the North Pacific Anadromous Fish Commission (NPAFC) and the North Atlantic Salmon Conservation Organization (NASCO). In recent years, he has participated in negotiations aimed at reforming key regional fisheries management organizations consistent with the United Nations Fish Stocks Agreement and other recent international instruments. This work led to NAFO's adoption of amendments to its Convention, revisions to the NAFO Conservation and Enforcement Measures and the development of the terms of reference and assessment criteria for the NAFO performance review to begin in early 2011.

Ms Boyce Thorne Miller

Boyce Thorne Miller is Science and Policy Coordinator for the Northwest Atlantic Marine Alliance and is the North American NGO representative to the aquaculture review group. She has worked since 1988 as a science advisor/director for several US and international environmental NGOs, covering marine environmental issues including pollution, biodiversity and fisheries. She has represented NGOs in several international forums, including the London Convention, 1972 on the Prevention of Marine Pollution by Dumping of Wastes and Other Matters from 1990-5; the UNEP Intergovernmental Conferences resulting in the Global Programme of Action for the Protection of the Marine Environment from Land Based Activities from 1994-5; and GESAMP subgroup on the sea-surface microlayer, 1995. She has participated in NASCO since 1999. She was a member of working advisory committee, *US Framework for Offshore Aquaculture Development*, Chm. Biliana Cicin-Sain, University of Delaware Marine Policy Center, 2004-5. She is author of two books on marine biodiversity, peer reviewed scientific papers on marine ecology and pollution, and reports on marine environmental issues. She received her MS in Oceanography from the University of Rhode Island.

Dr Malcolm Windsor (Coordinator)

Malcolm Windsor is the Secretary of NASCO based in Edinburgh. He started NASCO from the beginning in 1984 after the NASCO Convention came into force and has served as Secretary ever since. The work involves fostering cooperation by the Parties and their jurisdictions on management of fisheries, salmon habitat and aquaculture and related activities as well as agreeing certain management measures in Greenland and the Faroe Islands all in order to conserve wild salmon stocks. He has worked to develop the cooperation with the salmon farming industry through the Liaison Group since its inception. Before that he was the Fisheries Adviser to the Chief Scientist at the, then, Ministry of Agriculture and Fisheries in London. Prior to that, he worked as a researcher at a government laboratory in Hull, Yorkshire. He has a PhD in Physical Chemistry and worked on thermodynamics of inter-molecular forces at the University of California for 2 years. Prior to that he had experience in the food industry working on product development at Cadbury Ltd. He was awarded the Order of the British Empire in 2005 for Services to International Salmon Conservation.

Note: No biography was available for Ms Marita Rasmussen

Annex 2

Terms of Reference and Working Methods

Terms of Reference

1. At its Twenty-Sixth Annual Meeting, the Council of NASCO had agreed on a format for the aquaculture and related activities Focus Area Reports (FARs), the composition of the Review Group, its Terms of Reference (ToRs) and a work schedule**,** CNL(09)15. The ToRs for the Review Group are as follows:

    1. Review and analyse the FARs on Aquaculture, Introductions and Transfers, and Transgenics.

    2. Prepare a report which includes the following:

        a. Identification of common challenges in the FARs;
        b. Identification of common management and scientific approaches to challenges, as reported in the FARs;
        c. Compilation of recommended best practice with the intention of increasing the collaborative learning aspect of the Next Steps Process; and
        d. Recommendations and/or feedback on each FAR where additional actions may be helpful to ensure implementation of the 12 commitments within the Williamsburg Resolution.

2. In 2009, the Council had considered an interim report from a Task Force established by the ISFA/NASCO Liaison Group to develop a series of best practice recommendations to address the continuing impacts of salmon farming on wild salmon stocks, CNL(09)17. The Task Force had developed 'Guidance on Best Management Practices to Address Impacts of Sea Lice and Escaped Farmed Salmon on Wild Salmon Stocks', SLG(09)5, hereinafter referred to as 'BMP Guidance' intended to assist NASCO's jurisdictions in framing the management of salmon aquaculture, in cooperation with their industries, in developing future NASCO Implementation Plans and in preparing their Focus Area Reports for the 2010 review and subsequently. The Council had adopted this BMP Guidance and agreed with the recommendation of the Task Force to incorporate this BMP Guidance in the format for the FARs. The recommended revised format for the FARs based on CNL(09)15 and including the elements from the BMP Guidance is contained in document CNL40.970 which had been circulated to the Parties to assist them in completing their FARs. The Group noted that the Council of NASCO had not amended the Group's Terms of Reference in the light of adoption of the BMP Guidance which had been adopted by both the International Salmon Farmers Association (ISFA) and NASCO. These TORs still requested the Group to compile recommended best practice although this work had been undertaken by the Task Force and used as a basis for the information to be provided in the FARs. The Group decided, therefore, that it would review the BMP Guidance and provide feedback to the Council.

3. The procedure the *Ad Hoc* Review Group was asked to use to accomplish its work is as follows:

1. Meet in February 2010 to review the FARs submitted, collaborate to highlight questions and/or issues to be sent back to the Parties/jurisdictions by March 1, 2010. These answers should assist the *Ad Hoc* Review Group in preparing their report as outlined in item 2 above. Responses would be due from the Parties/jurisdictions by 1 April 2010.

2. Provide a draft report, as described in item 2 (in paragraph 1 above), by 15 May 2010 for circulation to Parties prior to the annual meeting.

3. Present an overview of the draft report at the Special Session at the 2010 Annual Meeting, and facilitate a discussion on the four areas identified above in item 2 (in paragraph 1 above). Parties and jurisdictions will not be expected to present their FAR during the Special Session, but may be asked to present information at the request of the *Ad Hoc* Review Group.

4. Following the Special Session, prepare a final report for submission to the President by 31 August 2010.

4. The Review Group discussed its working methods. Prior to the first meeting a format for assessing the FARs had been developed based closely on the elements contained in document CNL40.970 (see paragraph 8 below). An initial reviewer was assigned to each FAR from among the NASCO representatives and the NGOs also undertook initial reviews of all the FARs. These initial reviews from the NASCO representatives and the NGOs formed the basis for deliberations by the whole Group.

5. The Review Group noted that in addition to the presentation at the Special Session, the Council had agreed that the draft report of the Review Group should be made available for consideration at the Liaison Group meeting in late April 2010, before the report is considered by NASCO. The Review Group agreed that it should, therefore, aim to complete its draft report for circulation to the Parties and the Liaison Group by the end of March 2010 at the latest.

Methodology

6. The Group agreed on a number of 'ground rules', based on those used by the previous three *Ad Hoc* Review Groups to guide its work in undertaking the reviews. These were as follows:

   (a) An initial reviewer was appointed for each FAR who was asked to lead the discussion within the Group and to develop an assessment of consistency of the actions documented in the FAR with the Williamsburg Resolution and BMP Guidance;

   (b) The initial reviewers would remain anonymous in the report and in the event that one or more members of the Review Group did not agree with a particular aspect or aspects of the review then the report would indicate that there were dissenting views but not disclose which members of the Review Group expressed the dissenting views unless they wished to be identified;

(c) The Review Group would base its reviews only on the information presented in the FARs and the final Implementation Plans;

(d) Because not all jurisdictions were represented on the Review Group, it was agreed that the NASCO representative on the Group from a jurisdiction whose FAR was being reviewed would not be present during the review of that report;

(e) Following the completion of the reviews all assessments were re-examined to ensure consistency.

7. The Review Group's TORs allowed for questions and issues to be raised with the jurisdictions before the Group completed its assessments. At its first meeting, the Review Group decided that in view of the limited time available before its draft report was to be made available to the Liaison Group, it would not seek further clarification from the jurisdictions but would base its assessments on the FARs as submitted. This would also be more transparent as any issues that either the Review Group or the jurisdictions wished to raise would be done so during the 2010 Special Session. While not required under its TORs, the Review Group decided to ask the Secretary to send the draft assessments completed at the first meeting to the jurisdictions indicating that it did not seek any feedback until the Special Session at the Twenty-Seventh Annual Meeting. Following that Special Session, the Group would carefully consider all feedback on its findings when finalising its assessments.

8. The Group developed a format to facilitate an assessment of the consistency of measures detailed in the FARs with the guidance from the Council. This 'check list', based closely on the elements in document CNL40.970, comprised the following:

- There is an overview of activities, policy and management structures;
- Initiatives for international cooperation to minimize adverse impacts on wild stocks are described;
- Progress towards achieving the international goals for sea lice and containment is described;
- There is a process to demonstrate prior to approval that proposed activities will not have a significant impact on wild salmon stocks;
- Appropriate risk assessment methodologies are being applied including in relation to site selection;
- An Action Plan has been developed and implemented to minimise escapes including: a Code of Containment and system for verifying compliance; technical standards for equipment; and procedures for reporting losses and their causes;
- Measures to minimise the impacts of ranched salmon have been implemented;
- Measures to minimise interactions from salmon enhancement activities, including introductions and transfers, have been implemented;
- Measures to minimise the risk of diseases and parasite transmission to wild stocks have been implemented e.g. area management, integrated pest management, single year class stocking and fallowing;
- Measures to control movements into a Commission area of reproductively viable Atlantic salmon or their gametes and introductions of reproductively viable non-indigenous anadromous salmonids or their gametes exist;

- Procedures exist to ensure no introductions of non-indigenous fish into a salmon river occur that would have unacceptable risks of adverse impacts;
- The NASCO Guidelines for Action on Transgenic salmon are being applied e.g. rearing of transgenic salmonids is confined to secure, self-contained land-based facilities;
- River classification and zoning systems have been developed where appropriate;
- Procedures are in place to initiate without delay corrective measures where adverse impacts are identified. There is a description of any factors impeding implementation of the BMP Guidance;
- Research and data collection are undertaken in support of the Williamsburg Resolution including monitoring programmes related to sea lice, containment and escapes;
- Educational materials have been developed to increase awareness of the risks of introductions and transfers;
- The effectiveness of measures taken is evaluated both in terms of the extent of and timescale of the effects;
- There is a clear explanation of how socio-economic factors are applied and how this affects attainment of NASCO's objectives.

9. For each of these elements the Review Group assessed if the approach was well developed and generally in accordance with NASCO's agreements. In presenting its assessments, the Group first described the elements that it felt required additional actions to ensure implementation of the NASCO agreements and then used standard text in a series of bullets to highlight these. However, as with previous Review Groups, it did not suggest the nature of the actions as this would be a matter for the jurisdiction concerned. The elements listed in paragraph 8 above are not all of equal importance in terms of minimising impacts of aquaculture and related activities on the wild stocks.

Annex 3

IP(10)33

Assessments of the FARs

The Review Group's assessments of the fourteen FARs follow. They should be read in conjunction with the general comments that apply to all of the FARs in paragraphs 5.9 to 5.23 of the Group's final report.

Canada

The Review Group is aware that the salmon farming industry in Atlantic Canada is concentrated in the province of New Brunswick, with significant activities also in Nova Scotia and Newfoundland and Labrador. Production in 2008 was 35,000 tonnes, the fourth highest production in the North Atlantic. There is also significant production of farmed Atlantic salmon on the West Coast of Canada. The FAR indicates that in order to achieve single-year class farming, six major aquaculture Bay Management Areas were established in the Bay of Fundy in 2006. Each year, one-third of all sites is left fallow while another third is receiving smolts and the remaining third is harvesting product. The fallowing practice is designed to break the cycle of sea lice before an outbreak can occur. SLICE has recently been approved for use in Canada, and is the only authorised treatment. Introductions and transfers are governed by the 2002 National Code on Introductions and Transfers of Aquatic Organisms and related regulatory procedures. The majority of the introductions and transfers are for salmon farming but there are also significant movements for wild stock enhancement purposes. Under the Code, a licence will only be issued for the release or transfer of fish if it will not adversely affect the stock size or genetic characteristics of fish stocks. Since the introduction of the Code, Canada has not approved any new introductions or transfers of non-indigenous fish into rivers containing Atlantic salmon. Initiatives are underway to address unlawful introductions. A new National Aquatic Animal Health Program has been developed and the Health of Animal Act is being amended to provide protection for farmed and wild aquatic animals against infectious diseases. Canada is the only jurisdiction to report rearing of transgenic salmon. This is for research purposes in land-based closed containment systems.

Both Federal and Provincial governments are involved in the management of aquaculture and related activities in Canada. Different regulatory approaches are being used in different provinces and in some cases only examples from specific provinces were provided in the FAR. This made it difficult to assess the FAR as a whole, although more complete information was provided in the feedback received from Canada in relation to containment and sea lice management measures.

No data were presented to describe progress towards achievement of the international goals for sea lice and containment. The FAR states that the incidence and number of escapes are declining in all provinces as a result of the measures introduced even though farmed production is increasing. However, it is also stated that the records are not yet maintained by the Provinces in a format that allows easy analysis. The Review Group notes that while Codes of Containment have been developed and implemented consistent approaches are not used across the Provinces. For example, immediate reporting of escapes is not required in

Nova Scotia (where it is, however, common practice). In New Brunswick, where the industry is located close to endangered wild salmon populations listed under the Species at Risk Act, the code is voluntary but in Newfoundland it is mandatory. There is not yet an integrated pest management system although this is being developed and the issue of inconsistent approaches across Provinces referred to above applies to measures to minimise disease and parasite transmission. Contrary to the Williamsburg Resolution and the NAC Protocols there is no general prohibition on importation of reproductively viable Atlantic salmon from outside the Commission area, although such imports are rare. There was a lack of a clear description of the procedures involved in corrective measures where adverse impacts are identified.

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;
- procedures in place to initiate corrective measures are not adequately described.

Denmark - Faroe Islands

Atlantic salmon are not native to the Faroe Islands. However, stocking of salmon of Icelandic and Norwegian origin has resulted in the establishment of salmon runs maintained by stocking in four small rivers and an annual catch of 400 – 600 fish. Stocking of sea trout is also undertaken. It is not clear whether there is natural production of salmon in the rivers that are enhanced by stocking or if the salmon runs are entirely hatchery maintained. The Faroe Islands is the third largest producer of farmed salmon in the North Atlantic. Production has increased to approximately 50,000 tonnes in 2009 following reduction in the incidence of diseases (mainly ISA) which had resulted in a sharp fall from the peak production of 60,000 tonnes in 2003. The FAR states that NASCO's agreements are largely not relevant in the context of the Faroe Islands because there are no self-sustaining wild salmon stocks. While the Review Group recognises that the salmon populations in Faroes were introduced, it remains unclear if these should be considered wild given the length of time they have been established. Furthermore, escaped farmed salmon are an international issue so the measures taken to minimise escapes and prevent disease outbreaks are important in that context, particularly given the close proximity to marine feeding grounds for wild salmon.

Containment measures include a requirement that equipment is built and installed to an 'adequate' strength, monthly inspections of nets by certified divers and mandatory reporting of escapes. The FAR indicates that there have been few reported significant escape incidents in recent years. Fish health is monitored monthly through all stages of production, imports to the Faroe Islands are regulated in accordance with EU fish health regulations, and fallowing and single-year class stocking are used. Regulations intended to reduce the occurrence of sea lice in farmed fish and to impair the development of resistance to preventative treatment have

been developed that require regular sampling for, and reporting of, sea lice on farmed fish and sets out the required procedures for treatment, which can also require coordinated efforts between fish farming facilities. Medical treatment of sea lice is registered by date of treatment, medicine and dosages.

While there is international cooperation with other research institutes, no cooperation is described in relation to minimising impacts on the wild salmon stocks. The FAR indicates that sea lice caused serious problems for the industry in 2009 resulting in new measures to improve treatment methods and their coordination and lice monitoring. However, no data is provided to allow assessment of progress towards achieving the international goals for either sea lice or containment. While there is a requirement to report losses and there are inspections of the nets, there is no overall Code of Containment, no detailed technical standards for equipment and no system for verifying compliance with standards. The procedures to control movements into the Commission area are based solely on health status of the exporting country. There is a procedure in place for implementing corrective measures in the event of heavy metal or organic matter build-up in the sediments around farms and contingency plans are in place in the event of a large scale escape or disease outbreak, but no details on these plans were provided.

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

- initiatives for international cooperation to minimise adverse impacts on wild stocks were not adequately described;
- 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 control movements into a Commission area of reproductively viable Atlantic salmon and non-indigenous anadromous salmonids or their gametes have not been implemented;
- procedures in place to initiate corrective measures are not adequately described.

EU – Denmark

There is no salmon farming in Denmark. There are five salmon rivers, four of which have wild stocks and valuable efforts are being made to rebuild these stocks through stocking and habitat restoration work. Broodstocks for stocking are obtained from each river and the resulting progeny are only released back into that river (except in the case of rivers that have lost their salmon population). Crossing between the wild strains is not permitted and they are held separately in the hatcheries. Genetic guidance has been developed and applied regarding optimal numbers of spawners and breeding protocols. A proportion of the released hatchery fish are marked to allow evaluation of the stocking programme. The FAR indicates that the two hatcheries both use re-circulated water and high health status is maintained. Stocking is mainly of fed fry but smolts are also released particularly in the river with no wild stocks.

The FAR indicates that containment in the hatcheries is 100% but no information is presented on the containment measures in support of this statement. No information was presented concerning controls on movements of non-indigenous anadromous salmonids originating outside the Commission area. While the FAR indicates that the introduction of foreign

strains of Atlantic salmon is not allowed, no information was presented in relation to introductions of non-indigenous species or on the procedures for implementing corrective measures where adverse impacts are identified.

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

- inadequate development and implementation of an Action Plan to minimise escapes;
- 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 procedures to ensure that no non-indigenous fish species are introduced into a salmon river that would have unacceptable risks of adverse impacts to the wild stocks are not adequately described;
- procedures in place to initiate corrective measures are not adequately described.

EU – Finland

There are only two Atlantic salmon rivers in Finland, the rivers Teno and Naatamo, both border rivers with Norway. There is no coastline and, therefore, no marine salmon farming in Finland although there is on the Norwegian coastline. In the River Teno, fish farming is not allowed, no releases of fish of any kind are permitted within the salmon migration area and transfers from other watersheds into the Teno of live fish or eggs that have not been disinfected are prohibited. In practice, the only aquaculture activity permitted is small-scale transfers of indigenous fish between lakes or tributaries within the Teno catchment outside the salmon migration area and only under licence. In the Naatamo, transfers from other watersheds into the catchment of live fish or eggs that have not been disinfected are prohibited but there is no general prohibition on fish farming and stocking. However, in practice there is only one small hatchery that releases newly hatched fry of char, whitefish and grayling derived from eggs collected from wild broodfish in lakes outside the salmon migration area. This hatchery is subject to annual health inspections.

A monitoring programme is in place for the parasite *G.salaris*, a contingency plan is being developed, new legislation intended to prevent the possible spread of the parasite has been introduced and educational materials (roadside signs, leaflets, video tapes) to increase public awareness of the parasite, its effects on wild salmon and the measures required to prevent its spread have been developed in cooperation with Norway. The Review Group believes that such cooperation between Sweden, Norway, Finland and Russia on *G.salaris* is very important. There is monitoring to identify the origin of salmon (wild or escaped farmed) covering all fishing methods and seasons in both rivers.

These procedures are consistent with the NASCO agreements and guidelines.

EU – France

The Review Group is aware that France has some major salmon rivers but that the presence of numerous dams has resulted in the loss of habitat resulting in the loss of some stocks and severe declines in others. Restoration and rebuilding efforts are being undertaken and ten rivers have stocking programmes to restore lost wild stocks, sustain remaining stocks and maintain fisheries. The hatcheries mainly produce eggs, unfed and fed fry but smolts are also

stocked. Rearing at freshwater hatcheries is in tanks and the outlets are fitted with screens to prevent escapes. The stocking policy has evolved from being based on imported eggs to the use of native strains. Fish are now stocked at earlier life-history stages and progress is being made in developing genetic guidance for hatchery programmes. However, the limited numbers of available wild spawners and their sex ratios is a concern since the need to protect the wild stocks from which the hatchery material is sourced is recognised. There are two marine sites for commercial salmon farming located in sheltered locations with a production of 1,500 tonnes; one of these farms utilises local French stocks while the other uses Scottish strains. There are inspections of nets and all escapes must be reported and there are risk-based site inspections.

The FAR indicates that while there is some international cooperation through the Federation of European Aquaculture Producers, collaboration on the restocking programme is rare within France and internationally. No information was presented to allow assessment of progress towards the international goals for sea lice and containment and reference is made to a number of 'black spots' relating to aquaculture that need to be addressed. Although the FAR indicates that a comprehensive dossier of information must be provided before a licence for salmon farming is issued, it is not clear if this is the responsibility of the proponent of the activity or the authority. Freshwater hatcheries are required to screen outflows and marine sites must report escapes, but there are no technical standards for marine farms. The FAR recognises that further progress in implementing genetic protocols and in assessing the health status of spawners is required in the stocking programme. There is no reference to measures for the control of sea lice such as single year-class stocking or fallowing. While no non-native salmon stocks have been used for many years in France, there is no law prohibiting movements that originate from outside the Commission area. No procedures for initiating corrective measures have been described in relation to salmon farming although areas for improvements to hatchery practices for the stocking programmes have been identified.

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

- initiatives for international cooperation to minimise adverse impacts on wild stocks were not adequately described;
- no information is presented to allow assessment of progress towards the international goals for sea lice and containment;
- the process to demonstrate prior to approval that proposed activities will not have a significant impact on wild salmon stocks is not adequately described;
- inadequate development and implementation of an Action Plan to minimise escapes;
- adequate measures to minimise interactions from salmon enhancement activities are not adequately described;
- 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;
- procedures in place to initiate corrective measures are not adequately described.

EU – Germany

The Review Group notes that there is no salmon farming in Germany. All wild salmon stocks were extinct in Germany by the middle of the nineteenth century and valuable efforts are now being made to restore them. Restoration stocking uses eggs imported from other European countries (i.e. from within the North-East Atlantic Commission area) or increasingly derived from adults returning to the rivers or their progeny. The aim is to become independent of foreign origin ova and some material is already obtained from returning spawners, some kelts are reconditioned and there is some captive breeding. The habitats chosen for stocking are those known to have been occupied by salmon historically or that have suitable habitat today. All salmon hatcheries require authorisation and are subject to health inspections. All ova imported from abroad require a health certificate and all material is subject to a health check before stocking.

No information has been provided in the FAR in relation to initiatives for international cooperation, burden of proof, classification and zoning, policies concerning the introduction of non-indigenous fish into salmon rivers, and procedures to initiate corrective measures. While the FAR indicates that only stocks originating from countries within the North-East Atlantic Commission area have been used in the stocking programmes no information is presented on the existence of controls on movements from outside the Commission area. No information is presented relating to introductions of non-indigenous fish and there is no information on ongoing research and data collection in support of the restoration programme.

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

- initiatives for international cooperation to minimise adverse impacts on wild stocks were not adequately described;
- the process to demonstrate prior to approval that proposed activities will not have a significant impact on wild salmon stocks is not adequately described;
- 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 procedures to ensure that no non-indigenous fish species are introduced into a salmon river that would have unacceptable risks of adverse impacts to the wild stocks are not adequately described;
- classification and zoning systems have not been developed;
- procedures in place to initiate corrective measures are not adequately described;
- research and development and data collection are not adequately described.

EU – Ireland

Ireland is the fifth largest producer of farmed salmon in the North Atlantic with a production in 2009 of approximately 10,000 tonnes. All aquaculture facilities must be licensed and all marine farms with a production >100 tonnes are required to produce an Environmental Impact Statement that includes potential impacts on the wild stocks. Target lice levels have been set (0.3-0.5 mature female lice per salmon) above which an increase in production would not be allowed and there is a national sea lice monitoring programme with inspection

and sampling of each year class of fish at all farm sites. In 2008, a new pest Management Strategy was developed that introduced detailed fallowing requirements and a new approach to monitoring to deal with situations where target lice levels were not being achieved. This approach will identify 'breakout' site options for sites with persistent sea lice problems. An on-going project funded under the EU Seventh Framework Programme entitled 'Project Escape' is developing an audit of escapes from fish farms but it is stated that there have been no major escapes in the last three years although small-scale losses may go undetected.

There is no commercial ranching but 'experimental' ranching is carried out in two rivers (Burrishoole and Screebe) with adult returns harvested by rod and line and by in-river traps. Clear guidance has been developed on the measures required to minimise interactions between ranched fish and wild stocks. Stocking has been carried out in Irish rivers for over a century, with the largest programmes being on rivers harnessed for hydro-power and where large-scale arterial drainage required mitigation stocking. The FAR indicates that there are twelve salmon hatcheries predominantly for enhancement on a single river using indigenous stocks. Recently, there has been a move towards stocking with later life stages rather than ova and unfed fry. For stocking purposes, the classification in the NASCO guidelines is applied. The ESOPS (Enhancement Stocks – Origin, Progress and Status) Programme has monitored all stocking activities from capture of broodstock through to release of progeny to the wild. Important research into the relative fitness of wild, farmed and ranched salmon was conducted in Ireland and recent experiments suggest that more caution is required before releasing hatchery-reared progeny to the wild. Educational material is available on websites including information on *G.salaris*.

While reporting of escapes is required, little information was presented on the technical standards or on containment measures in freshwater facilities. There is no systematic monitoring for escaped farmed salmon in rivers although the proportion in fisheries is considered low. While there is a national sea lice monitoring programme on the farms and monitoring of lice on sea trout in estuaries these data are not presented in a manner that allows progress towards the international goals to be assessed. There is no information on initiatives for international cooperation other than to refer to involvement in the NASCO process. The FAR indicates that imports of salmonids have been permitted for aquaculture purposes under strict controls, including material originating from outside the North-East Atlantic Commission area.

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

- initiatives for international cooperation to minimise adverse impacts on wild stocks were not adequately described;
- 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;
- procedures in place to initiate corrective measures are not adequately described.

EU – Sweden

There are major habitat issues in Swedish West Coast rivers associated with acidification and hydro-electric power (HEP) schemes but significant stock rebuilding efforts are underway including liming programmes and large-scale stocking of smolts in three rivers affected by HEP. There is no marine salmon farming although escapees originating in other countries have been detected in rivers and caused problems for the compensatory stocking programme. The parasite *G.salaris* was first detected in 1989 and now occurs in most rivers. The parasite has significant effects on the growth and condition of parr in infected rivers. There are cooperative programmes with Norway and Finland relating to this parasite and with Norway on stocking border rivers. This cooperation includes scientific cooperation related to identification of the parasite. There is only one salmon hatchery on a salmon river and ten rainbow trout farms. Stocking with salmon is restricted to local stocks from the river concerned and before any release of hatchery-reared fish a risk-benefit analysis is required. Permission for stocking with salmon is normally restricted to the ongoing national re-stocking programme, designed to compensate for lost production due to HEP generation. Any new aquaculture facilities on salmon rivers are prohibited and under a new strategy on introductions and transfers, it is recommended that h**a**bitat improvement to enhance natural regeneration of stocks should be prioritised over re-stocking.

It is not clear what protective measures relating to introductions and transfers of non-indigenous species apply in these rivers. There is no marine salmon farming in Sweden but there is no description of the containment measures employed at freshwater facilities for rearing salmon and rainbow trout. While the FAR indicates that stocking can only use material obtained from the river being stocked, no information has been provided to show that controls exist concerning the movement of salmon and non-indigenous salmonids that have originated outside the Commission area. While it is indicated that stocking with any species of salmonid is normally prohibited if the parasite *G.salaris* does not already exist in the river system, the FAR indicates that most rivers now have the parasite present. There is no description of procedures relating to the introduction of non-indigenous fish into a salmon river. The FAR indicates that the strategy to prevent the further spread of *G. salaris* is to prevent stocking of uninfected rivers and to disseminate information about the risks from the parasite but no initiatives for eradicating the parasite in infected rivers are described. Such initiatives are recommended in Annex 2 of the Williamsburg Resolution.

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

- inadequate development and implementation of an Action Plan to minimise escapes;
- 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 procedures to ensure that no non-indigenous fish species are introduced into a salmon river that would have unacceptable risks of adverse impacts to the wild stocks are not adequately described;
- procedures in place to initiate corrective measures are not adequately described.

EU – UK (England & Wales)

The FAR indicates that there is no saltwater farming of salmon but approximately 1.9 million salmon parr/smolts are reared annually in fresh water for on-growing in marine cages in Scotland. Rearing of juvenile salmon (~1.3 million) and small numbers of sea trout is undertaken to supply a range of mitigation, restoration and enhancement stocking programmes**.** There is also rearing of brown and rainbow trout, small numbers of non-indigenous species and coarse fish.

Consent is required to release fish and as part of the consenting procedure, the effects on the fisheries and the general ecology of the receiving and connected waters are considered including, fish health, fish ecology and the ecology of plants and other wildlife. Separate regulations apply if the fish are not native to the British Isles. There is a risk-based approach to authorising fish farms. All fish farm operators are required to ensure that screens are in place to prevent the entrainment of salmon or migratory trout into the farm and to prevent the egress of farmed fish from the fish farm. Compliance is assessed by regular inspections. There is a clear policy for stocking that incorporates the elements in NASCO's guidelines. Stocking of non-native species or 'kinds' of fish would very rarely be permitted in waters containing salmon and then only subject to a risk assessment demonstrating that the expected effects on the salmon stocks would be minimal. A policy of only stocking triploid (sterile) brown trout is being introduced. There are no imports of live salmon or salmon ova from other NASCO Commission areas, there is a presumption against issuing any licences to keep or release non-indigenous anadromous salmonids or to release any non-native fish in a salmon river. Research is being conducted into the impacts of intensive in-river aquaculture on wild salmonids and in developing risk assessment frameworks for non-native species. Educational materials have been developed including material related to *G. salaris* for which a contingency plan has been developed.

These procedures are consistent with the NASCO agreements and guidelines.

EU – UK (Northern Ireland)

The FAR indicates that there is only one marine salmon farm in Northern Ireland which has two sites that are ten miles apart and are stocked and harvested alternately. Production is low (138t in 2008) and because of the lack of suitable sites, it is considered unlikely that additional licences will be issued for marine salmon farms. Any new applications would be subject to an Environmental Impact Assessment and consultations. Because of the hydrodynamics of the two sites currently operated, there has been no need to carry out any treatment for sea lice. Each site is stocked with a single year-class alternately allowing a 6-week fallowing of each site. Procedures and measures have been adopted in relation to both marine sites and freshwater facilities with regard to site selection, equipment and structures, management systems and operations, and verification. With regard to introductions and transfers, movements of Atlantic salmon and non-indigenous anadromous salmonids from outside the North-East Atlantic Commission area are not permitted and stocking of salmon rivers with non-indigenous fish are prohibited. Stocking to the wild requires the use of salmon sourced from the river to be stocked except where the salmon population has been extirpated. Contingency plans have been developed for *G. salaries,* escapes and jelly fish swarms around the farms.

No initiatives for international cooperation were reported although the Review Group is aware that such initiatives exist with the Republic of Ireland and the UK. A genetic study showed that interbreeding between escaped farmed salmon and wild fish had occurred in the Glenarm River following an escape event. Changes in gene frequencies in the wild population were documented and have persisted. Data were provided on the number and percentage of farmed origin salmon in coastal fisheries (11 - 18% or 500 – 900 salmon in recent years) and in the River Bush (zero or close to zero in recent years) and lice loads on commercially caught adult salmon. However, these data are not adequate to fully evaluate progress towards the international goals. The Review Group notes the absence of information on the licensing process and that the burden of proof appears to be on the regulatory authority, not the proponent of the activity.

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

- initiatives for international cooperation to minimise adverse impacts on wild stocks were not adequately described;
- progress towards achieving the international goals for sea lice and containment was not demonstrated;
- the process to demonstrate prior to approval that proposed activities will not have a significant impact on wild salmon stocks is not adequately described.

EU – UK (Scotland)

Scotland is the second largest producer of farmed salmon in the North Atlantic with a production of approximately 130,000 tonnes in 2008 from 257 active marine sites. There is also farming of rainbow trout and small scale farming of other species (char, brown/sea trout, halibut and cod). There is a presumption against any further finfish aquaculture development covering the north and east coasts of Scotland. The FAR indicates that the salmon producers' organization has developed a Code of Good Practice which is currently being reviewed and updated. All salmon farmers are required to comply with this Code. Third party non-statutory audits of compliance with the Code are undertaken. Reporting of escapes is mandatory and sharing the information with wild fish interests is advised. New legislation will establish a risk-based approach to aquatic animal health surveillance. The FAR indicates that a number of controls are in place and these controls are being updated to ensure effective sea lice management, there is a process for sharing information on sea lice prevalence between fish farming companies and wild fish interests and monitoring of wild smolts is carried out by sweep netting to assess lice burdens. The Review Group welcomed the summary table indicating how each measure in the BMP Guidance is being addressed. It is an offence to introduce salmon or sea trout into waters without consent. Policy guidance has been developed to promote best practice for stocking that advocates a risk-based approach. It is an offence to introduce non-native species into the wild without a licence and there is a strong presumption against releasing non-indigenous fish into rivers containing salmon. Scotland has Additional Guarantees in relation to *G.salaris* (and BKD) and a contingency plan has been developed. Considerable efforts are being made to highlight the risks posed to the wild stocks by this parasite.

'A Fresh Start: the Renewed Strategic Framework for Scottish Aquaculture' includes six themes including healthier farmed fish and improved containment. A Containment Working Group is working to strengthen the approach to escape avoidance and it intends *inter alia* to

develop a technical standard covering production in both freshwater and marine environments and an accredited training scheme for fish farm workers. Research is ongoing into seal deterrent devices. Similarly, a Healthier Fish and Shellfish Working Group will update the current sea lice control regime by introducing a national system for publishing sea lice data, introducing threshold levels, ensuring single year-class stocking, fallowing and synchronous lice treatments and introducing statutory reporting on suspicion of sea lice resistance to therapeutants. The Review Group notes that the FAR refers to an evolution in the approach to address the impacts of salmon farming from voluntary approaches, through accredited schemes such as the Code of Good Practice to legislation and enforceable regulation.

However, the FAR does not present any data to assess if progress has been made towards achieving the international goals; this is especially true for sea lice. The current Code of Good Practice is described in the FAR as being outdated with regard to containment and it is currently being reviewed. Similarly, the Group notes that new initiatives for improved disease and parasite control are being developed but are not yet in place. The Review Group notes that imports of salmon ova from outside the Commission area occurred as recently as 2006.

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.

Norway

Norway is the largest producer of farmed Atlantic salmon in the world, with production in 2009 of approximately 846,000 tonnes and between 600 - 700 sites holding fish at any one time (~1,038 licensed sites in total in 2009). Production has quadrupled over a fifteen year period. The FAR indicates that the major concerns relate to escapees and sea lice. The Group notes some major initiatives concerning measures to minimise impacts of aquaculture, introductions and transfers. For example, 52 national salmon rivers and 29 national salmon fjords have been designated in which the establishment of new salmon farms is prohibited and existing farms have been subject to stricter regulations since 2009. In 14 fjords the existing salmon farms will be prohibited from 2011. An Action Plan on Containment, 'Vision zero escapes' was developed in 2006 with the aim of achieving its goals in two years and an extension of this plan is now being considered. The plan includes technical standards, a permanent Commission of enquiry into escape events, and education and motivation efforts. Efforts are made to recapture escapees, a method of tracing escapes to the farm of origin has been developed for use in the case of non-reporting of losses and monitoring for escapees occurs in 39 rivers. Since 2007, there has been a coast-wide (except Troms and Finnmark counties) synchronised delousing programme which becomes mandatory in 2010 and which

is intended to protect out-migrating smolts. Memoranda of Understanding concerning cooperation on sustainable aquaculture have been developed with Scotland, Canada and the US.

Norwegian wild salmon populations in 46 rivers have been severely damaged by the introduction of the parasite *G.salaris*. Treatment of *G.salaris* has been successful in 21 rivers and in 2009 an updated Action Plan was developed dealing with surveillance, prevention of spread into uninfected rivers and measures to eradicate the parasite. Gene banks (both living and cryopreserved) have been established. Stocking to the wild is restricted to the local stock and is kept to a minimum with greater emphasis on habitat protection and restoration. Salmon originating from outside the Commission area have not been introduced and it is prohibited to import and release anadromous freshwater fish.

Data were presented on the reported escapes of farmed salmon as both numbers and as a proportion of the farmed stock. Information presented in the FAR indicates that the reported number of escapees has declined, but the number remains high (175,000 in 2009). Monitoring in rivers indicates that the proportion of escaped farmed salmon in spawning populations has also declined but since 2000 it has been between 11 – 18% and shows a slightly increasing trend between 2003 - 2008. Appropriate thresholds have not been determined. A modelling study presented in the FAR predicts major changes in the composition (percentage wild origin) of the spawning run in all but two regions of Norway by 2100. Among the salmon that hatched in 1995 an estimated 75% or more came from wild parents in all regions while a century later it is predicted that < 75% will come from wild parents in all but two regions. Sea lice levels per fish were found to be three times higher in Autumn 2009 than in 2008. The data on sea lice are not adequate to assess progress towards the international goals. However, it is noted in the FAR that lice levels monitored annually on wild fish indicate that levels are significantly higher in areas with fish farms than in areas without. In response to the increased lice levels in 2009, compulsory synchronised delousing treatments are now required at new lower thresholds but a major challenge in achieving these targets to protect wild fish is the evidence of resistance to both emamectin benzoate and pyrethroid treatments, which was perhaps inevitable given the frequency of treatments.

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;
- adequate measures to minimise the risk of disease and parasite transmission have not been implemented.

Russian Federation

The FAR indicates that there are two salmon farms in the Murmansk region close to the border with Norway that use Norwegian or Scottish origin fish which are quarantined until health testing has confirmed that the material is disease-free. While production is presently a few hundred tonnes, projected production is around 23,000 tonnes. Stocking occurs in the Murmansk, Karelia and Archangelsk regions using indigenous salmon and fin clipping is used to allow evaluation of the effectiveness of the hatchery releases. There are plans to review the hatchery protocols since the effectiveness of stocking appears to be low. It is stated that there are presently no activities related to introductions and transfers and that no

non-indigenous fish are released into salmon rivers and none are planned. The hatchery releases of pink salmon, a species native to the Pacific Ocean, that started in the 1930s ceased in 2000. The parasite *G.salaris* occurs in one river in Karelia.

The FAR did not follow the format provided by the Council and the information provided was unclear in a number of places. This made it difficult for the Group to assess the FAR. No information was presented on initiatives for international cooperation, to allow progress towards achieving the international goals to be assessed, on the burden of proof or on river classification and zoning. There are no technical standards for equipment and no requirement to report escapes although farms must have a contingency plan in the event of an escape event. While interim veterinary and sanitary rules for marine farms have been developed, they have not been approved. There do not appear to be requirements for single year-class stocking or fallowing and there is no IPM. The FAR indicates that although the introductions of pink salmon have now ceased, it is not clear if controls exist to prevent future introductions. Pink salmon spawn in all rivers in the Murmansk region (supporting a fishery twice the harvest of Atlantic salmon) and the Review Group is aware the species also spawns in some Norwegian salmon rivers. The FAR does not describe any corrective measures intended to address this situation or to eradicate the parasite *G.salaris* in the infected river in Karelia.

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

- initiatives for international cooperation to minimise adverse impacts on wild stocks were not adequately described;
- no information is presented to allow assessment of progress towards the international goals for sea lice and containment;
- 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;
- procedures in place to initiate corrective measures are not adequately described;
- classification and zoning systems have not been developed.

USA

The remaining wild populations of Atlantic salmon in Maine have been listed under the Endangered Species Act (ESA), while rivers in which the salmon populations have been extirpated are under restoration. The salmon farming industry is located in Maine and production has increased in recent years reaching 9,500 tonnes in 2008 following a major outbreak of ISA. Management actions have been implemented through Federal, State and local measures with the most significant federal measures implemented through the ESA consultation process which has regulatory enforcement power. The FAR describes a federal agency determination that salmon farming poses the risk of adverse effects on endangered salmon populations although it is not considered likely that these will drive the species to extinction. The FAR indicates that the option to relocate the farms away from the wild

salmon rivers was considered but alternative suitable sites could not be identified. Rather the measures implemented include the use of only local North American stocks, containment measures to reduce escapes, audits and reporting requirements, prohibitions on stocking transgenic salmon and marking all salmon in marine pens. The salmon farming industry has employed a Containment Management System (CMS) at all production facilities including those in fresh water (e.g. three barrier screening at outflows). Site specific plans were developed following hazard analysis and include standard operating procedures covering, stocking and harvesting, net changes, predator control, managing unique events, record keeping, reporting of escapes and training. Monitoring of rivers for escapees is undertaken. An industry initiative, the Finfish Bay Management Agreement applies to all US companies in Cobscook Bay and certain Canadian companies and has led to better coordination of site fallowing, fewer overlapping year classes in production and reduced disease transmission between year classes. In addition an Integrated Pest Management Programme is a requirement of the ISA programme and includes monitoring of sea lice levels and evaluating treatment efficiency. Thresholds for lice treatment have been established.

With regard to stocking, in Maine only local river specific stocks are used and standard mating protocols including screening for farmed salmon are applied. A gene bank has been established but is not described.

Data is presented on the occurrence of escaped farmed salmon in five rivers which shows that few escapees have been detected in recent years. However, the data presented is not adequate to allow an assessment of progress towards achieving the international goal for containment and no information is presented in relation to assessing progress in relation to the goal for sea lice. The FAR indicates that deliberate, authorized introductions of non-indigenous anadromous salmonids into the US North American Commission area do not occur but introductions of non-indigenous salmonids with the potential to become anadromous do occur. While imports of all salmonids into the US are controlled by federal salmonid importation regulations, these seek to minimize the spread of diseases and do not address ecological interactions. The FAR indicates that prohibitions on stocking non-indigenous fish into rivers containing Atlantic salmon are not in place and procedures for evaluating the impacts on wild salmon only exist in the case of federally supported programmes. The Group recognises that a requirement to mark all farmed salmon was introduced in 2009 which will allow identification of the source of escapes so corrective measures can be taken. A permanent weir is in place on one river but it is not clear how the temporary weirs would be used to initiate corrective measures on the other rivers.

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

- no information is presented to allow assessment of progress towards the international goals for sea lice and containment;
- 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 procedures to ensure that no non-indigenous fish species are introduced into a salmon river that would have unacceptable risks of adverse impacts to the wild stocks are not adequately described;
- procedures in place to initiate corrective measures are not adequately described.

Annex 4

IP(10)32

NGO Statements to the Review Group

The following statements were made by the NGO Group but did not find unanimous support from the rest of the Review Group.

Application of NASCO's principles

- The NASCO Convention applies to the North Atlantic but not to other areas where Atlantic salmon are farmed in marine and freshwater habitats where they are non-native. However, when a country has agreed to the principles of NASCO, including the principles of the Williamsburg Resolution, it would be consistent and strongly advisable that they apply these principles to other areas of their respective countries that are not in the NASCO Convention Area and are not native habitat for Atlantic salmon. In particular, they should adhere to the principle discouraging the introduction of non-native salmon or salmonid species that might interfere with native salmon or salmonid species. For example, escapes from Atlantic salmon aquaculture along the Pacific coast of North America have led to such introductions.

- Companies from one NASCO country operating in another country should meet the national standards for salmon aquaculture operations in their home country as well as the country in which they are operating.

- The NGOs note that in some jurisdictions management and regulation of both salmon farming and the wild stocks are the responsibility of different government departments while in others they are the responsibility of the same department. The NGOs consider that separating the management and regulation of salmon farming from that for wild salmon could help avoid any conflicts of interest that may occur when the two sectors are managed within the same department. While this is a matter for individual jurisdictions, the NGOs observed that at NASCO the primary responsibility of the jurisdictions is the conservation of wild salmon through adherence to the Williamsburg Resolution and implementation of the BMP Guidance, rather than placing wild stocks at risk by accommodating the commercial demands of the salmon farming industry.

Need for enforcement

- The NGOs recognise the need for rigorous enforcement linked to failures highlighted by monitoring and the need for legislation to enable closure or relocation of farms failing to achieve satisfactory sea lice levels or experiencing escape events or other significant losses. Strong and enforceable standards for lice levels and escapes/losses are essential and should be established on the basis of effects on wild salmon and should be consistent with best available independent scientific advice and rapidly adaptive to changes in that advice.

Presumption against farming

- NASCO's agreements aim to minimize the possible threats from adverse impacts of salmon aquaculture, introductions and transfers and transgenics on the wild stocks. As noted by the Task Force, the general principle should be that wild salmon stocks in areas with fish farming should be as healthy as those in areas without fish farms. Salmon farming is certainly not the only threat to wild salmon stocks, but the NGOs believe the impact is threatening enough that salmon farming and wild stocks are best kept well separated if the wild stocks are to flourish. In addition, there should not be a presumption that aquaculture is compatible with healthy wild salmon populations, as there seems to be in most jurisdictions. It is, instead, recommended that there be a presumption against salmon farming in all coastal waters in the vicinity of salmon rivers, particularly where a jurisdiction has populations of salmon and specific rivers designated under conservation legislation. Exclusion zones should be established based on best available independent scientific advice (i.e. not in-house studies by paid consultants). Furthermore, the NGOs consider that there should be a presumption against any freshwater salmonid aquaculture in river catchments (including lakes) containing a wild population of migratory salmonids.

Issues not addressed in the Williamsburg Resolution

- The NGOs consider that there are issues, particularly concerning salmon farming activities that are not adequately addressed in the Williamsburg Resolution or the BMP Guidance. For example, there should be a clear recognition that assessment of the impacts of salmon farms on the wild stocks should be an essential component of the pre-approval process and for determining the continuing existence or expansion of sites. In this process, risk assessment has been identified as a key tool, but it should be clear that it is no more than that. Risk assessment, in itself, is not precautionary but it can organize information in a way that assists in making precautionary decisions. Other information is often appropriate as well. A better definition of risk assessment would provide guidance on how to apply it (e.g. using it to decide which farms don't have to be monitored is far from precautionary and far from useful in protecting wild salmon). The option of down-sizing, relocating or eliminating salmon farms should also be considered as a possible corrective measure where problems are identified or in response to changes in wild stock abundance. In general, it is important to identify in advance possible threats that may occur to the wild stocks from salmon farming and how best to avoid them or respond to them when they arise. Moving salmon farms offshore should not be viewed as a means of avoiding the need for limiting development. The need for assessment of impacts on wild stocks is just as important for offshore farms as it is for coastal farms. The increasing ratio of farmed salmon to wild salmon populations is a growing concern and must be considered in the pre-approval assessment.

- The scale and rate of growth of salmon farming development are not, but should be, addressed in the Williamsburg Resolution, with guidelines for setting limits to growth ahead of time. More emphasis is needed on the importance of monitoring that can accurately assess the impact on populations of wild salmon in both the marine and freshwater environments. Apparently guidance is needed as most jurisdictions have not succeeded in establishing reliable and thorough monitoring programmes. International guidance is also needed on what conditions should trigger decisions to

relocate, limit growth or reduce density and capacity of salmon farms in a region. This is not just an issue within national boundaries. Salmon in distant ocean waters can and may already be severely impacted by salmon farming in coastal waters. It is also essential that the potential impact of large-scale offshore farming, which looms in the future and could impact wild salmon stocks, be assessed before it is permitted to proceed. Marine spatial planning is being explored or undertaken by many jurisdictions. Mariculture, including salmon farming, should figure prominently in these deliberations, including if and where it is an appropriate activity and its compatibility or incompatibility with other maritime activities. Overall, it is essential that in applying the Precautionary Approach to aquaculture and introductions and transfers, the population status, genetic diversity, and health of the wild salmon are taken into full account. This applies whenever jurisdictions are making decisions about permitting and location of facilities.

- The NGOs, therefore, recommend that NASCO considers developing a more detailed protocol for Atlantic salmon farming to augment (not replace) the Williamsburg Resolution and provide standards for achieving the goal of negligible harm to wild salmon populations.

Issues not addressed in the FARs

- The NGOs note that several of the FARs from jurisdictions with salmon farming omitted some information or procedural knowledge that is publicly available and is known to the NGOs in those jurisdictions. With those omissions the FARs appeared to present a more favourable picture than the actual situation with regard to the impacts of salmon farming on the wild salmon stocks or on efforts to avoid such impacts.

Annex 5

IP(10)34

Responses from Parties to the Review Group's Draft Report

Canada

- Canada's Focus Area Report (FAR) on Aquaculture, Introductions and Transfers, and Transgenics provided a summary of the regulatory and management processes of Canadian aquaculture, introductions and transfers (I&T), and transgenics, and of the measures taken to minimize their impacts on wild salmon stocks. The information in the FAR clearly demonstrated a strong legislative, regulatory, and policy environment, as well as effective collaboration between government, industry, and nongovernmental groups, for conservation and management of wild Atlantic salmon.

- Canada has made clear and demonstrable progress on pest management, containment, fish health and introductions and transfers through the development and implementation of various programs, policies, regulations, and practices that are consistent with NASCO guidelines. Canada is committed to continuous improvement and to working towards international goals on issues such as sea lice management and containment.

- Canada (both the federal and provincial governments and industry) is very active internationally and works both bilaterally and as a member of various international bodies to ensure the sustainability of the aquaculture sector. This clearly shows Canada's commitment to international cooperation to minimise adverse impacts on wild stocks.

- Canada has made significant progress towards achieving the international goals for sea lice and containment as defined by the *Guidance on Best Management Practices to Address Impacts of Sea Lice and Escaped Farmed Salmon on Wild Salmon Stocks* by taking an integrated pest management approach and ensuring that all aquaculture sites in Canada have sea lice monitoring and management plans and containment protocols in place.

- While at times dealing with diseased animals, Canada's fish health management system is predicated on a proactive approach to husbandry that prevents the manifestation of disease. Extensive clinical support, on-farm visitation and local knowledge support their efforts to maintain the health of farmed salmon, as well as to preclude ecological impacts.

- Canada is currently undertaking legislative change to implement its responsibilities for aquatic animal health with the development of the National Aquatic Animal Health Program (NAAHP), which is similar to Canada's established and internationally recognized terrestrial animal health program.

- Canada has been at the forefront of developing and implementing the Bay Management Approach, which has been proven around the world to be an effective tool for fish health and parasite management by interrupt pathogen cycles through regular fallowing measures, ensuring that the risk of disease and parasite transmission is minimized. A Bay

Management Approach is currently used in New Brunswick and Newfoundland, while Nova Scotia is currently looking into its viability.

- Breaches in containment are uncommon in Canada despite increasing numbers of salmon being farmed in Eastern Canada. All provinces which have net-pen farming of Atlantic salmon have Standard Operating Procedures for containment on salmon farms that specify's cage system design standards and mandatory reporting of escapes. This is consistent with NASCO's Guidelines on Containment of Farm Salmon (Annex 3 of the Williamsburg Resolution).

- Potential breaches in containment are also preemptively addressed within Canada's National Code on Introductions and Transfers from an ecological impact perspective and form part of the risk assessment based decision making process before any stock is moved to a particular site.

- Canada proactively controls movements of Atlantic Salmon and non-indigenous salmonids into Canada through its National Code on Introductions and Transfers, which was endorsed by the federal and provincial governments and implemented in 2003.

- As outlined in Canada's FAR, the Code allows us to proactively determine the potential disease, ecological and genetic risks associated with all introductions and transfers and to mitigate risks where appropriate. This internationally recognized approach ensures that the risk of disease and parasite transmission is minimized and that movements of reproductively viable Atlantic salmon and non-indigenous anadromous salmonids or their gametes are strictly controlled.

- Canada does not prescriptively classify salmon rivers as to their potential sensitivity to aquaculture escapement and introductions and transfers. Rather, every introduction and transfer is assessed within the Code's risk assessment process relative to the ecological impact of potential escapement before an introduction or transfer is permitted (whether for aquaculture purposes or other). Permits are only issued when risks are deemed acceptable [i.e., low risk] to the recipient jurisdiction.

Draft Response Document on the NASCO FAR Review Group Draft Report

List of Appendices:

1. National Aquaculture Sea Lice Pest Management Framework
2. Bay Management Plan Overview Document
3. National Aquatic Animal Health Program (NAAHP) Overview
4. Southwestern New Brunswick Code of Containment for Atlantic Salmon (separate pdf)
5. The New Brunswick Breach of Containment Governance Framework for Marine Salmon Farm Operations (separate pdf)
6. Newfoundland Salmonid Code of Containment (separate pdf)
7. National Code on Introductions and Transfers of Aquatic Organisms
8. Canada-U.S. MOU on Introductions and Transfers

Introduction

Canada's Focus Area Report (FAR) on Aquaculture, Introductions and Transfers, and Transgenics provided a summary of the regulatory and management processes of Canadian aquaculture, introductions and transfers (I&T), and transgenics, and of the measures taken to minimize their impacts on wild salmon stocks. The information in the FAR clearly demonstrated a strong legislative, regulatory, and policy environment, as well as effective collaboration between government, industry, and nongovernmental groups, for conservation and management of wild Atlantic salmon. However, in response to the FAR Review Groups Draft Report, Canada has prepared this supplemental report to respond directly to the seven comments made on Canada's FAR. This report aims to more adequately describe how Canada meets each of the elements of the Williamsburg Resolution and to demonstrate the progress made towards the international goals for sea lice management and containment. Canada welcomes this opportunity to contribute to Council's Focus Area Review on Aquaculture, Introductions and Transfers, and Transgenics and is hopeful that this report is useful for clarification on issues that were raised. Canada has made clear and demonstrable progress on pest management, containment, fish health and introductions and transfers as shown by the descriptions of various programs, policies, regulations, and practices provided in our FAR and herein. Canada is committed to continuous improvement and to working towards international goals on issues such as sea lice management and containment. It is important to note that in Canada aquaculture is an area of shared jurisdiction between the federal, provincial and territorial governments. The federal, provincial and territorial governments work collaboratively with the Canadian aquaculture industry to ensure the sustainable development of the aquaculture sector in Canada.

1. **Initiatives for international cooperation to minimize adverse impacts on wild stocks were not adequately described.**

Canada (both the federal and provincial governments, and industry) is very active internationally and works both bilaterally and as a member of various international bodies to ensure the sustainability of the aquaculture sector. Specific examples of direct engagement include:

- Ongoing and direct participation in the ISFA/NASCO Liaison Group and the North American Commission (NAC) of NASCO;
- Active participation in ISO TC234 Fisheries and Aquaculture and its associated working groups;
- Ongoing and direct participation in the WWF Salmon Aquaculture Dialogues;
- Active participation in the FAO-COFI Subcommittee on Aquaculture;
- Participation in the international sea lice research workshop hosted by Norway in February 2010;
- Hosting of two international workshops on sea lice in New Brunswick in the fall and winter of 2009-2010 that brought together researchers, industry and fish health experts from around the world and helped develop the framework for an Integrated Pest Management Plan and a supporting research program; and
- Hosting of an international sea lice conference in British Columbia in May: Sea Lice 2010 that brought together experts from industry, government and science from around the world;

Bilaterally, Canada has regular dialogues with other salmon producing countries, particularly Scotland and Norway, on areas of common interest such as certification, fish health

management and regulatory initiatives. These discussions, and the resulting relationships, allow for information and knowledge to be shared and joint initiatives to be undertaken to ensure continued improvement of the aquaculture sector around the world.

With respect to Introductions and Transfers (I&T), at the Council's 22nd Annual Meeting in Vichy, France, North American Commission [NAC] member nations signed a **Memorandum of Understanding on Introductions and Transfers [NAC (05)7]**. This document outlines Canada's commitment to using its **National Code on Introductions and Transfers (The Code)**. The Code requires notification between jurisdictions in the same watershed that may be affected by a proposed introduction or transfer. Through the NAC, Canada and the U.S. are currently developing a new reporting protocol to ensure that information sharing occurs in an appropriate manner. This protocol should be formally implemented in 2011, though many of the elements are already in place through other mechanisms. In addition to NASCO reporting measures, Canada also utilizes the reporting measures specified in the Code, which includes a commitment to notify neighbouring jurisdictions of any I&T occurring in shared watersheds. These initiatives are clear examples of Canada's commitment to international cooperation to minimise adverse impacts on wild stocks.

2. **Progress towards achieving the international goals for sea lice and containment was not demonstrated.**

As described below, and in Canada's FAR, Canada has made significant progress towards achieving the international goals for sea lice and containment as defined by the *Guidance on Best Management Practices to Address Impacts of Sea Lice and Escaped Farmed Salmon on Wild Salmon Stocks*.

Canada takes an integrated pest management approach and all aquaculture sites in Canada have sea lice monitoring and management plans in place. Until recently, significant sea lice loads were the exception versus the rule industry-wide in Canada; management of the industry is continuously evolving to address new developments and challenges. Currently, provincial and federal governments and industry are working collaboratively to refine the **Integrated Pest Management Plans (IPMPs)** developed for salmon farms. These Plans are site specific and can incorporate site fallowing, bay management, therapeutants, and/or other measures. This proactive refinement is consistent with good farm husbandry practices while remaining sensitive to the ecology of the local area. In addition, DFO, in collaboration with the provincial governments and the aquaculture industry have developed a **"National Aquaculture Sea Lice Integrated Pest Management Framework"** which outlines the key components to be considered when developing or refining regional (provincial) Sea lice IPMPs. These advancements show obvious progress towards achieving the international goal of "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."

Fish health management on salmon farms in Eastern Canada is under the authority of both government (federal and provincial) and industry veterinarians. While at times dealing with diseased animals, the fish health management system is predicated on a proactive approach to husbandry that prevents the manifestation of disease. Extensive clinical support, on-farm visitation and local knowledge support their efforts to maintain the health of farmed salmon, as well as to preclude ecological impacts. Examples of this approach include a spectrum of activities ranging from recommendations on rearing density to the full scale imposition of

Bay Management Plans, which interrupt pathogen cycles through regular fallowing measures. These measures help to ensure that the risk of disease and parasite transmission is minimized. Bay Management has been proven around the world to be an effective tool for fish health and parasite management; Canada has been at the forefront of developing and implementing these systems. The box below describes the Bay Management Areas Programs currently in place in New Brunswick and Newfoundland and Labrador.

Box 1: *Summary of the Bay Management Area Programs in New Brunswick and Newfoundland and Labrador.*

New Brunswick

The Bay Management framework in Southwest New Brunswick was developed in cooperation with industry and governments to facilitate fish health management in the region. The main components of the framework include a reduction of the management areas from 21 to 8 and extension of the production cycle at each farm from 2 to 3 years, including a mandatory fallow period.

Farms in each Aquaculture Bay Management Area are now stocked every third year which allows for true single year class farming and fallow periods. Each site has a minimum four month fallow, while the whole Aquaculture Bay Management Area has a concurrent two month fallow period before restocking occurs.

The designation of these areas was based on a three-year production cycle on the principle that, to ensure the sustainability of the industry, the marine site production system framework must provide an operational environment which enables industry to service markets on a year round basis without compromising fish health management, biosecurity requirements, or the environmental integrity of coastal waters. In addition, the number of farms active at any given time in an area is lower.

Single year class farming and fallowing breaks the pathogen-host cycle and the life-cycle of pests such as sea lice. Since the implementation of Bay Management Area Program, there have been no instances of Infectious Salmon Anemia (ISA), and the management and treatment of sea lice infestations have been greatly facilitated.

Newfoundland and Labrador

Newfoundland currently has a 3-site system with a minimum of 1 km site separation in place. This system requires that each operator have at least three sites to allow for true year class separation and a 12 month fallow period between production periods. However, due to the development of the industry in Newfoundland in recent years, the province is proactively developing a new integrated aquaculture management regime that will encompass fish health, environmental management and production management. Implementation of a Bay Management Program, similar to that in Southwest New Brunswick, is anticipated.

Nova Scotia

Nova Scotia is currently considering the development of a bay management program.

Breaches in containment are uncommon despite increasing numbers of salmon being farmed in Eastern Canada. Through regulation, condition of licence, or operating agreement, regulatory agencies are notified of a breach in containment and, dependent upon the circumstance, the application of recapture procedures may also apply. Atlantic salmon are farmed in three of five provinces in Eastern Canada - New Brunswick, Nova Scotia, and

Newfoundland and Labrador – all of which have developed **Standard Operating Practices** on containment on salmon farms, including the establishment of cage system design standards that ensure containment and mandatory reporting. This is consistent with the Guidelines on Containment of Farm Salmon (Annex 3 of the Williamsburg Resolution) and the conclusion by the FAR review group that while a single document would be desirable, that would not be necessary to be consistent with the guidelines (s. 5.13). The box below describes the approach taken by each province with respect to containment:

Box 2: *Summary of the containment approaches in New Brunswick, Nova Scotia and Newfoundland and Labrador.*

New Brunswick - The New Brunswick Salmon Growers Association has developed the *Code of Containment for the Culture of Atlantic Salmon in Marine Net Pens in New Brunswick,* and with the federal and provincial governments, have endorsed the *Southwest New Brunswick Breach of Containment Governance Document* which details responsibilities and reporting requirements in the event of a containment breach. The Code includes a set of Standard Operating Practices (SOPs), provisions specific to the marine site location and infrastructure, and requires a documented maintenance, inspection, and auditing processes. The Code and Governance Document outlines the requirements and process for establishing a contingency plan, the process for reporting escapes and the reporting requirements which include mandatory investigation and mitigation responses. The Code of Containment and Governance Document will be supported by changes to current regulations under the New Brunswick Aquaculture Act. Prior to these documents being developed, companies complied on a voluntary basis and this will continue until the changes to regulation occur. Through the NAC, both Canada (New Brunswick) and the U.S. have agreed to inform the other when breaches of containment occur in their respective jurisdictions.

Nova Scotia - Immediate reporting of all breaches to net pens and appropriate efforts to recapture all escaped stock are requirements of licence under the Nova Scotia Fisheries and Coastal Resources Act, Aquaculture Regulation. Salmon net pen companies operating in Nova Scotia have adopted the standards and practices specified in the NBSGA Code of Containment.

Newfoundland and Labrador - Newfoundland and Labrador's Code of Containment for the Culture of Salmonids (1999) is a condition of the finfish aquaculture license. The Code describes equipment and fish handling standards, contingency measures for predator management and recapture, auditing and inspection provisions, and industry reporting requirements. The provincial government conducts bi-annual inspections of all net-cage and surface mooring components and periodic audits of cage systems. A fundamental component of the Code is an annual reporting and review process. The Code requires regulatory notification in the event of breaches, as well as contingency plans for recapture and mitigation.

Potential breaches in containment are also preemptively addressed within Canada's **Code** from an ecological impact perspective and form part of the risk assessment based decision making process **before** any stock is moved to a particular site. Biological risk from potential escapement is reviewed and must be deemed acceptable [i.e., low risk] for the introduction and transfer activity to be permitted. These examples show clear progress towards the international goal of "100% farmed fish to be retained in all production facilities".

3. **Inadequate development and implementation of an action plan to minimize escapes.**

Canada has made clear progress on the development and implementation of Action Plans to minimize escapes and to meet international goals for containment. Atlantic salmon are farmed in three of five provinces in Eastern Canada - New Brunswick, Nova Scotia, and Newfoundland and Labrador – all of which have developed **Standard Operating Practices** on containment on salmon farms, including the establishment of cage system design standards that seek to eliminate potential breaches of containment and mandatory reporting.

Breaches in containment are uncommon despite increasing numbers of salmon being farmed in Eastern Canada. Through regulation, condition of licence, or operating agreement, regulatory agencies are notified of a breach in containment and, dependent upon the circumstance, the application of recapture procedures may also apply. This is consistent with the Guidelines on Containment of Farm Salmon (Annex 3 of the Williamsburg Resolution) and the conclusion by the FAR review group that while a single document would be desirable, that would not be necessary to be consistent with the guidelines (s. 5.13). Please refer to **Box 2,** above, which describes the approach taken by each province with respect to containment.

Potential breaches in containment are also preemptively addressed within Canada's **Code** from an ecological impact perspective and form part of the risk assessment based decision making process **before** any stock is moved to a particular site. Biological risk from potential escapement is reviewed and must be deemed acceptable [i.e., low risk] for the introduction and transfer activity to be permitted.

4. **Adequate measures to minimize the risk of disease and parasite transmission have not been implemented.**

Canada has been a leader in emerging aquatic animal health issues having federal regulations enacted since 1978 to minimize the risk of disease and parasite transmission. Today, Canada uses an **Integrated Pest Management** approach to dealing with parasites common to coastal fishes, especially sea lice affecting salmon farms in Atlantic Canada.

Until recently, significant sea lice loads were the exception versus the rule industry-wide in Canada; management of the industry is continuously evolving to address new developments and challenges. Currently, provincial and federal governments and industry are working collaboratively to refine the **Integrated Pest Management Plans (IPMPs)** developed for salmon farms. These Plans are site specific and can incorporate site fallowing, bay management, therapeutants, and/or other measures. This proactive refinement is consistent with good farm husbandry practices while remaining sensitive to the ecology of the local area. In addition, DFO, in collaboration with the provinces and the aquaculture industry have developed a **"National Aquaculture Sea Lice Integrated Pest Management Framework"** which aims to outline the key components that should be considered when developing or refining regional (provincial) sea lice IPMPs. In addition, all salmon farming activity meets the stringent requirements of Canadian federal and provincial legislation (over 73 pieces of legislation, most of which is environmental protection oriented).

Fish health and pest management also form an integral part of the risk assessment decision making mechanism in the Code.

Canada is currently undertaking legislative change to implement its responsibilities for aquatic animal health with the development of the National Aquatic Animal Health Program (NAAHP), which is similar to Canada's established and internationally recognized terrestrial animal health program. That this innovation has occurred within a multiplicity of jurisdictions and interests supports the notion of common interest among all parties in Canada.

Fish health management on salmon farms in Eastern Canada is under the authority of both government (federal and provincial) and industry veterinarians. While at times dealing with diseased animals, the fish health management system is predicated on a proactive approach to husbandry that prevents the manifestation of disease. Extensive clinical support, on-farm visitation and local knowledge support their efforts to maintain the health of farmed salmon, as well as to preclude ecological impacts. Examples of this approach include a spectrum of activities ranging from recommendations on rearing density to the full scale imposition of Bay Management Plans, which interrupt pathogen cycles through regular fallowing measures. These measures help to ensure that the risk of disease and parasite transmission is minimized. Bay Management has been proven around the world to be an effective tool for fish health and parasite management; Canada has been at the forefront of developing and implementing these systems. Please refer to **Box 1** which describes the Bay Management Areas Programs currently in place in New Brunswick and Newfoundland and Labrador.

5. **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.**

Canada proactively controls movements of Atlantic Salmon and non-indigenous salmonids into Canada through its National Code on Introductions and Transfers, which was endorsed by the federal and provincial governments and implemented in 2003.

The purpose of the Code is to provide uniform guidelines for reviewing applications for licences to introduce or transfer live aquatic organisms into or within Canada and for assessing associated disease, ecological or genetic risks. The Code incorporates sophisticated risk assessment tools and codified procedures which have been recognized internationally [e.g., International Council for the Exploration of the Sea] as being best practice.

As outlined in Canada's FAR, the Code allows us to proactively determine the potential disease, ecological and genetic risks associated with all introductions and transfers and to mitigate risks where appropriate. The Code provides a consistent approach to ensuring that only I&Ts deemed as low risk are permitted to occur. This internationally recognized approach ensures that the risk of disease and parasite transmission is minimized and that movements of reproductively viable Atlantic salmon and non-indigenous anadromous salmonids or their gametes are strictly controlled.

At the Council's 22nd Annual Meeting in Vichy, France, North American Commission [NAC] member nations signed a Memorandum of Understanding on introductions and transfers [NAC (05)7]. That document outlines Canada's commitment to using The Code. Decisions associated with the importation of "*reproductively viable Atlantic salmon and non-indigenous anadromous salmonids or their gametes*" from outside the North American Commission area are very rare. They would involve the imposition of special containment requirements to meet the Risk Assessment mitigation requirements of the Code to reduce risk

to a level acceptable to the recipient jurisdiction. Absence of recent reports may be an indication of the rarity of the action.

6. **Classification and zoning systems have not been developed.**

Canada does not prescriptively classify salmon rivers as to their potential sensitivity to aquaculture escapement and introductions and transfers. Rather, **every** introduction and transfer is assessed within the Code's risk assessment process relative to the ecological impact of potential escapement **before** an introduction or transfer is permitted (whether for aquaculture purposes or other). Permits are only issued when risks are deemed acceptable [i.e., low risk] to the recipient jurisdiction.

Procedures in place to initiate corrective measures are not adequately described.

Consistent with the management of most of its fisheries, jurisdictional mandate dictates the manner in which local situations are addressed in Canada. The nature of our governance system sometimes manifests itself in jurisdictions undertaking a variety of approaches to achieve the same goal. While that diversity [i.e., the absence of a consistent approach] does create variations in methodology, it does not necessarily suggest inadequacy in dealing with the situation locally.

Experience has shown this local adaptive management has generated a more effective approach than the initially envisioned prescriptive "consistent approach".

Canada continues to work with all parties to insure the intent of the measures is met and that we protect the ecological integrity of our aquatic environments.

Conclusion

Aquaculture, like any other industry, is constantly evolving over time. The development of new technologies, policies, regulations, procedures, etc. will all have an impact on how the industry develops. In Canada, we are working on a multitude of programs that feed into this, such as the development of sector strategies, certification programs, regulatory renewal, fish health management, and alternative technologies. Each of these, and others not mentioned, contribute to the continuing sustainable development of the aquaculture sector. From a practical perspective, work priorities are based upon the immediate needs of the sector and in the near term this requires a clear focus on the sustainability of ocean net-pen culture of Atlantic salmon.

Canada notes that the objective of NASCO is to conserve, restore, enhance and rationally manage Atlantic salmon through international cooperation taking account of the best available scientific information, and continues to be committed to the spirit of that intent. Canada applies ecologically, precautionary, and risk-based management approaches to all fishery management sectors, including aquaculture. This approach best meets our needs in the sustainable management of our fisheries resources, and although it may not seem as prescriptive as the Williamsburg Resolution, it is in-line with the spirit of Williamsburg and achieves the same objectives as demonstrated in Canada's FAR and this supplemental report.

Faroe Islands

The Faroe Islands thanks the review group for their comprehensive work in preparing the Draft Report on Aquaculture, Introductions and Transfers and Transgenics Focus Area Review issued by NASCO April 9, 2010.

Since the salmon aquaculture industry can be one of the major challenges in the protection of the wild salmon this work has generally been a fruitful process in order to ensure transparency in the Contracting Parties´ fulfilment of the NASCO aquaculture measures.

However the process could have been simplified and streamlined if the Contracting Parties had been provided with a form which listed the areas that were expected to be included in the FARs.

This would have helped both the Contracting Parties as well as the Review Group.

In the assessment of the Focus Area Reports the process would have benefitted from a better understanding in the review group of the very different situation in the member countries regarding the distribution and condition of wild salmon as well as the size and importance of the aquaculture industry.

More specifically the Faroe Islands have the following comments regarding the assessment of the Faroese Focus Area Report:

Protection of the wild salmon is an international responsibility. Since the salmon aquaculture industry is seen as one of the major challenges to the wild salmon stocks it is the responsibility of all nations with an aquaculture industry to minimize the negative impacts of the aquaculture industry on the wild salmon stocks.

Due to the fact that there are no self-supporting wild salmon stocks in Faroese rivers, incorporating the elements in the Guidance on Best Management Practices and the Williamsburg Resolution in many cases is not relevant in the context of Faroese aquaculture control, monitoring and risk management.

However the Faroese waters are important feeding grounds for wild salmon. Therefore, the most important measure in the Faroese aquaculture industry in the protection of the wild salmon is to prevent disease outbreaks and minimise escapes. The international goal in the Best Management Practices states that 100% of the farmed fish should be retained in all production facilities. This is an unrealistic goal, since accidents will inevitably occur to some extent.

The Faroe Islands is the third largest producer of farmed salmon in the North Atlantic. The value of farmed fish exports corresponds to around 35% of the total value of Faroese exports. Therefore it is of immense importance to the Faroese government that the regulation and control of fish farming ensures a healthy and competitive aquaculture industry in the Faroe Islands. In addition, it is central to have in mind that it is very much in the interest of the aquaculture industry to minimize the amount of escapes as well as preventing outbreak of diseases since these are risks that threaten the revenue base of the companies.

The following areas, highlighted in the assessment of the Faroese FAR, need further elaboration:

Equipment:
All fish farming equipment and facilities must be built and installed with the adequate strength and other properties necessary to ensure responsible operations in accordance with the legislation and they should be used with the necessary care and precaution. (Act of Parliament No. 83 from 2009 on fish farming)

All fish farming facilities must be approved by the Food and Veterinary Agency (Executive order no. 134 from 2009 on disease prevention procedures in fish farms).

Contingency Plans:
All fish farms must have a contingency plan which describes potential risks and preparedness e.g. escapes and outbreak of diseases. The contingency plans must be approved by the Food and Veterinary Agency (Executive order no. 134 from 2009).

Monitoring:
The Fish and Animal Disease Department in the Food and Veterinary Agency monitors health status through all stages of production, from broodstock, egg, fry, smolt to the ready-to-harvest fish, based both on monthly health status and biomass reports, as well as on-site inspections.

Every month all fish farmers must register a range of information in a common governmental electronic system e.g. number of sea lice and number and reasons for escapes (Executive order no. 134 from 2009).

Corrective measures:
A licence issued by the Food and Veterinary Agency is required in order to build, prepare, restructure, expand, buy or operate a farm intended for the rearing of fish. An overview of fish farming sites can be seen here.

The consequence of repeated or grave violations of the provisions in the regulatory framework may lead to withdrawal of the licence, a fine or imprisonment (Act of Parliament No. 83 from 2009 on fish farming).

EU - UK(Scotland)

Thank you for the opportunity to comment on the draft report of the Focus Area Review Group on Aquaculture, Introductions and Transfers and Transgenics. This letter represents the Scottish Government's consolidated response.

Taking in turn the issues raised by the group:

Progress towards achieving the international goals for (i) sea-lice and (ii) containment was not demonstrated

(i) The FAR explained that Scotland is moving toward a national system for the publication of sea-lice data (aggregated over 6 areas), providing publicly available information on prevalence for the first time. Site specific data will continue to be

available locally, and the aquaculture industry has established a sophisticated system for the sharing of sea-lice and treatment data amongst the industry in order to improve coordination area-wide treatments. We expect that will support better control and so even lower levels of sea-lice than have been seen hitherto.

The Scottish Government also intends to introduce a system of reporting to Marine Scotland of sea-lice resistance to treatments, and of mortality events above defined thresholds.

(ii) The aquaculture industry in Scotland is on course to achieving the lowest levels of escapes since public reporting began in 2002, with a precipitous decline in salmon escapes. This will be a great achievement assuming no significant escapes in the next two months, reflecting well on the efforts of the industry, and of our Containment Working Group, established in 2009. See the table below for the relevant statistics.

Inadequate development and implementation of an Action Plan to minimise escapes

This is perhaps the most difficult of the group's comments for us to understand. The Scottish Government's Containment Working Group is:

- Developing a statutory engineering standard for fish-farms, covering marine and freshwater;

- Developing accredited training for fish-farm workers to minimise human error, for example covering net handling;

- Supporting a "road-show" involving the relevant Scottish equipment suppliers (nets, cages, moorings) to better explain to farmers in the main production areas how to use kit in the correct combinations;

- Commissioning an assessment of freshwater smolt production and its impacts; and

- Investing in research into deterrent devices for seals and into seal behaviour in the vicinity of fish farms.

The escapes statistics for 2010 appear to show that this concerted effort is now paying dividends.

Adequate measures to minimise the risk of disease and parasite transmission have not been implemented

This comment suggests that the group has taken no account of the Healthier Fish Working Group and its request to Scottish Ministers that the current regulatory system be strengthened through the creation of a statutory obligation to enter into Farm Management Agreements (FMAs) to ensure synchronised approaches to farming across marine areas. We believe that this major development should be recognised by the group in light of the benefits it will certainly bring.

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.

All imports must meet the minimum health certification requirements as laid out in the legislation. In 2006 third country imports were not harmonised within the EU and to import into the UK a health certificate and licence was required. Now that 2006/88/EC has been fully implemented a licence is no longer required, but the consignment must be accompanied by a health certificate as per Annex IV of regulation 1251/2008 and from a country listed in Annex III of that legislation. We do not believe we have the right to refuse entry to consignments that have been appropriately health certified unless we have reason to believe that there may be an undeclared disease issue.

I trust that this response will be of use to you and the group. We believe that it is important to the credibility of this process that progress be recognised where it has occurred or where government commitment to specific changes has been made.

SCOTLAND CONFIRMED FARMED FISH ESCAPES
2002-2010
Number of Fish/ Number of Incidents
NOT INCLUDING ESCAPE INCIDENTS WHERE NO FISH WERE LOST

	TOTAL	TOTAL	TOTAL	TOTAL
Year	Atlantic salmon	Rainbow trout	Other **	All Species
2002	309,996 (8)	80,000 (1)	0 (0)	389,996 (9)
2003	151,853 (13)	1,560 (1)	8,025 (2)	161,438 (16)
2004	90,593 (10)	0 (0)	10,000 (1)	100,593 (11)
2005	877,883 (19)	7,970 (3)	15,800 (1)	901,653 (23)
2006	155,653 (20)	36,866 (4)	12,230 (1)	204,749 (25)
2007	154,466 (12)	56,151 (7)	26 (2)	210,643 (21)
2008	58,641(8)	10,690 (7)	3,700 (1)	73,031 (16)
2009	131,971(9)	8,591 (6)	0(0)	140,562 (15)
2010*	11,185(4)	19,976(3)	0(0)	31,161(7)

Points to note:

1 Statutory reporting introduced May 2002
2 Major winter storm in January 2005.
3 Code of Good Practice operational from January 2006.
4 **Other inclusive of Brown/Sea trout, Cod, Arctic char and Halibut
*5** *as at 29 October 2010*

Norway

Background

During the annual meeting of NASCO, held in June 2010 in Quebec City, Canada the Draft Report of the Aquaculture, Introductions and Transfers and Transgenics Focus Area Review Group was examined.

NASCO Guidance on Best Practice has the following aim for sea lice management and escapees:

The international goal for sea lice is '*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*'. The international goal for containment is '*100% farmed fish to be retained in all production facilities'*.

As an attachment to the draft report there is a review of the performance of each country done by the Focus Area Review Group.

The conclusions of the Focus Area Review Group on issues towards Norway's performance are:

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

1. *Initiatives for international cooperation to minimise adverse impacts on wild stocks were not adequately described;*
2. *Progress towards achieving the international goals for sea lice and containment was not demonstrated;*
3. *Adequate measures to minimise the risk of disease and parasite transmission have not been implemented.*

Introduction

In Norway six potentially existential threats towards the wild salmon stocks are identified: acidification, hydropower regulation, other habitat alterations, the introduced parasite *Gyrodactylus salaris*, salmon lice and escaped farmed salmon. Acidification, hydropower regulation and habitat alterations appear as stabilized and the probability of further losses is regarded as low. The threat caused by *G. salaris* is currently regarded as relatively stabilized. However, the negative effect of these four factors on production makes the populations vulnerable to other threats. Sea lice and interbreeding between wild and escaped farmed salmon are categorized as the only threats to wild salmon populations in Norway that are clearly not stabilized. As a consequence Norway over the years significantly has increased its efforts to reduce impacts of salmon aquaculture on wild stocks.

Norway wants to give the following comments to the draft report from the Focus Area Review group.

Remarks from Norway

Issue 1

Norway has implemented several actions to preserve the Atlantic salmon, both in an environmental and fisheries perspective, and therefore find the work consistent with the

agreement. In our view, the report seems not to have taken this sufficiently into account and consequently some of the conclusions should be amended.

In the following, references are made to the report sent to NASCO in connection with the annual meeting this year.

First, we would like to draw the attention to Annex 5 in the Norwegian report, part 7 of the "Vision zero escapes" (Standardize), Norway participate (and chair) the international standardization work under the ISO – the International Standardization Organisation – in the ISO/TC 234. One of the main achievements will hopefully be to develop a common international technical standard for floating aquaculture installations, based on the content of and experience with the national Norwegian standard which have been in force since 2003 and was revised last year. Norway encourages all parties to support the ISO process.

Furthermore, in 2009 The Ministry of Fisheries and Coastal Affairs signed a memorandum of understanding (MOU) with Scotland concerning an environmentally sustainable aquaculture industry. An environmentally sustainable aquaculture industry is also a subject covered by the MOUs signed between our Ministry of Fisheries and Coastal Affairs, Canada and US. Norway hosts roughly one third of the remaining Atlantic salmon stocks and is farming more Atlantic salmon than any other country. Naturally our main focus is to deal with our own challenges in these areas, but international cooperation is important in order to learn from each other and gain experience.

Issue 2

Sea lice

One of the goals in the Norwegian Government's Strategy for an environmentally sustainable aquaculture industry goal is: *"Disease in fish farming will not have a regulating effect on stocks of wild fish, and as many farmed fish as possible will grow to slaughter age with minimal use of medicines."*. We believe this corresponds well to the NASCO's aim, "*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*",

Due to the serious sea-lice situation during autumn 2009, the Government placed on hold, the further expansion of Norwegian salmon farming. In November 2010 the Government allowed 5% increase in the production capacity in Troms and Finnmark counties.

Measures in accordance with NASCO's Guidance on Best Practice have been taken. These measures include implementation of a new regulation handling sea lice in all fish farms.

Systems for monitoring sea lice in fish farms have been implemented. The number of sea lice per fish is reported to the Norwegian Food Safety Authority every month.
Sea lice on wild salmonids have been monitored since the 1990's. Due to the serious situation last year, the Norwegian Food Safety Authority (Mattilsynet) allocated more resources, and increased the sea-lice surveillance programme on wild salmonids. In 2010 the both the Ministry of Fisheries and Costal Affairs and Ministry of Environment provided extra budgetary funding for sea-lice research and monitoring, to the Directorate of nature conservation, Institute of Marine Research and National Veterinary institute. Similar funding – provided approval from the Parliament – be available also for the fiscal year 2011.

The Ministry of Fisheries and Costal Affaires has also made a Strategy for an environmentally sustainable aquaculture industry. The challenges in the area of fish health and sea lice have been particularly described in this strategy.

The Norwegian Food Safety Authority (NFSA) describes its work against sea lice in three steps:

- The first aim was to implement a new national legislation and to increase the supervision from the NFSA (completed). Legislation is dynamic in order to meet any change in the sea lice situation.

- The second aim is to develop and implement regional legislation. This legislation makes it possible to coordinate and synchronize both preventive measures and treatment in larger areas, in contrast to one farm. A typical preventive measure is coordinated fallowing. Regional legislation is completed in the Hardanger area and public hearing is finalized for the counties of Trøndelag. Further areas are under consideration.

- The third aim is to contribute to a Committee on Area utilisation in the coastal zone, set up by The Ministry of Fisheries and Costal Affairs. More on this topic below.

For the last two years, before the smolt migrates out to sea, the NFSA has organized a coordinated winter and spring sea lice delousing scheme, where delousing was compulsory is sea-lice infestations exceeding a treatment threshold of 0,1 sea-lice pr fish. This campaign will be repeated in winter/spring 2011. Preliminary results from the annual surveillance program on sea lice on out-migrating smolt indicates that the 2010 year class – as the 2009 year class –migrated out to the sea without negative impact on the stocks due to sea lice infections. Consequently, the conclusions of the report should be amended.

Containment

In the Norwegian Government's Strategy for an environmentally sustainable aquaculture industry the following aim has been described: "*Aquaculture will not contribute to permanent changes in the genetic characteristics of wild fish stocks."*

We believe this corresponds well with the NASCO goals of "*100 % of farmed fish is to be retained in all production facilities*". ,

Compared to the situation 20 years ago, Norway has demonstrated significant progress towards these highly desired goals.

In order to achieve NASCO's international goals for containment, Norwegian fisheries authorities have implemented new regulations in order to reduce the risk of smolt escaping from production plants. The regulation demands a double set of independent devices hindering fish to escape from land based operations.

Norway has also launched an exercise for developing a new national technical standard for all land based fish farming, including smolt production units.

The numbers of escaped Atlantic salmon from Norwegian fish farms, reported by fish farmers, have decreased since "the top year" 2006 and is now on the low end of the numbers from the last 15 years - despite a significant increase in production. However, the number of reported escaped fish is not an optimum metric for escapees and since escaped farmed fish do not have identical behavioral patterns, and escape figures are probably inaccurate. Accordingly, the most adequate indicator of potential harmful effect is the number of farmed fish found in salmon watercourses. The various stocks may have different levels of tolerance and robustness, and work is done to find suitable indicators/parameters to measure the influence of escaped salmon. Registrations of farmed salmon in numerous salmon watercourses since the 1980's, have documented that the number of escapees have been high in many watercourses. The number of farmed fish in salmon water courses decreased rapidly during the late 1990's, and has since continued to decrease – all though at much slower rate. The total reduction over the past 20 years is approximately 60%. Despite this reduction the levels of farmed salmon in several wild spawning populations remained above what is regarded as sustainable levels.

We anticipate therefore a further reduction in the percentage of farmed salmon observed on natural salmon spawning grounds in the following years as a result of increased effort in the last and coming years.

Consequently, the conclusions of the report should be amended.

Issue 3
In respect that Norway has extensive regulation in the fish health area, and the inspection performed by EFTA's Surveillance Authority during spring 2010 showed few derogations regarding Norway's management and implementation of EU's fish health directive; EC 2006/88, the claims stated in this report is consequently questionable.

USA

The United States (U.S.) would like to take this opportunity to thank the members of the Focus Area Review (FAR) Group for Aquaculture and related activities. The review group and the NASCO secretariat have clearly put forward considerable effort in conducting the reviews of each of the countries' FAR reports. These efforts have yielded considerable benefits as evidenced by the Review Group's draft report issued in advance of the ISFA/NASCO Liaison Group meeting and this year's special session at the annual NASCO meeting. The work of the review group has greatly increased NASCO's effectiveness and efficiency through increased transparency, a primary goal of NASCO's Next Steps process. While we believe the Review Group's report was quite thorough, we would like to offer the following information and points of clarification for the Review Group to consider as it develops its final report.

The Review Group stated that it would be desirable for future FARs to focus on outcomes and progress towards achieving the international goals so as to properly demonstrate whether or not salmon stocks in areas with salmon farming are in as healthy a state as those in areas without salmon farming. We agree that the first round of FARs focused more on what Parties are doing to implement the NASCO agreements and that perhaps future rounds of reporting could focus on outcomes. We suggest that the Next Steps review process, as agreed at the 2010 Annual NASCO Meeting, evaluate the FAR process and consider if it achieved what

was intended and if it should be continued or altered in future years to focus more on outcomes and deliverables.

The Review Group highlighted the frequent absence of wild salmon stock considerations in risk assessments and strongly encouraged all jurisdictions to incorporate these considerations into decision-making processes in the future. Permitting programs within the U.S. place the burden on the applicant to demonstrate that what they propose will not have adverse effects on the environment and the highest priority for protection is placed on endangered species, including the Gulf of Maine Distinct Population Segment of Atlantic salmon.

The Review Group recognized that progress has been made by the salmon farming industry in addressing impacts on wild salmons stocks but concluded that no jurisdiction was able to show that it had reached a situation where it had achieved the international goal. This is very unfortunate. In the coming years, the U.S. will be working to ensure that subsequent Aquaculture FARs will be able to clearly show that the goal has been met. Further, we support the work of the Liaison Group to identify an appropriate reporting format to ensure that there is a clear and transparent way to track progress toward the international goal and to facilitate information exchange among parties to facilitate achievement of the goal.

We acknowledge that there was limited information presented in the U.S. FAR to allow assessment of progress towards the international goals for sea lice and containment. As noted previously, our report focused more on identification and description of the programs and processes within the U.S. to implement the Williamsburg Resolution and less on the outcome of those programs. We have experienced a significant reduction in reported losses from commercial aquaculture facilities and detection of escapees in the wild in recent years which we believe can be attributed in part to the implementation of improved inventory tracking and containment management systems (including audits). We expect that future reporting through the Liaison Group will more directly address tracking progress toward achievement of the international sea lice and containment goals.
The Review Group stated that 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 Review Group also stated that the procedures to ensure that no non-indigenous fish species are introduced into a salmon river that would have unacceptable risks of adverse impacts to the wild stocks are not adequately described. The Review Group appropriately highlighted these issues. In the U.S., legal and illegal stocking of non-indigenous anadromous salmonids and other non-indigenous fish species does occasionally occur, although less frequently than in the past. As such, the U.S. will take the Review Group's report into consideration as we develop the Recovery Plan for the GOM DPS. We believe this is the appropriate venue to address these outstanding issues raised by the Review Group.

The Review Group stated that the US FAR did not adequately describe the procedures in place to initiate corrective measures. We agree this could have been clearer. We do, however, believe the procedures in place are consistent with the Williamsburg Resolution. Subsequent Aquaculture FARs will be clearer on this point.

Finally The Review Group stated that the ESA consultation process does not have regulatory enforcement power. We wish to clarify that the ESA consultation does, in fact, have regulatory enforcement power and that regulatory power can and has been used for the conservation of endangered salmon in Maine.

The US notes that there were comments from the NGOs that were not unanimously agreed to by all members of the Review Group. The NGOs expressed concern that the principles of NASCO Conventions, such as the Williamsburg Resolution, should apply throughout a jurisdiction as well as several other issues such as the need for enforcement, a presumption against farming, issues not addressed in the Williamsburg Resolution, and issues not addressed in the FARs. The U.S. thanks the NGOs for their thoughtful and thorough critique.

Annex 6

CNL(10)33

ISFA Comments on the Draft Report of Aquaculture, Introductions and Transfers and Transgenics Focus Area Review Group

May 15, 2010

Malcolm Windsor, Secretary
NASCO
11 Rutland Square
Edinburgh EH1 2AS UK

Dear Malcom:

As promised at the April 29 and 30, 2010 Liaison meeting in London, we have compiled industry comments on the *Draft Report of Aquaculture, Introductions and Transfers and Transgenics Focus Area Review Group Report issued by the North Atlantic Salmon Conservation Organization on April 9, 2010*. After the London meeting, each of the industry associations, which are all members of ISFA, provided me with their country's comments on the Report. I have structured this response to reflect the diversity of our industry and the different perspectives and experiences of the North Atlantic countries but it still a response on ISFA's behalf. As I hope you can appreciate, we all share a common goal of conserving wild salmon, but we also have jurisdictional and operational differences that inform this collective response to the FAR.

Our general comments were provided by ISFA to the Liaison Group in the April 30 document: "ISFA Comments on the "Draft Report of the Aquaculture, Introductions and Transfers and Transgenics Focus Area Review Group" which has been revised slightly and is attached. The following document contains comments specific to each region.

We trust these will be taken with the seriousness and care with which they have been prepared and look forward to further discussions.

Yours truly,
by email correspondence
Nell Halse, President
International Salmon Farmers Association

EAST COAST CANADA

(prepared by the New Brunswick Salmon Growers Association / NBSGA on behalf of theindustry in the east coast of Canada)

Canada has a very extensive eastern region that is governed by both the federal government and four provincial governments. In fact, this region includes three zones that are designated for implementation of the protocols within the Williamsburg Resolution. All regulators and the industry in these areas are committed to protecting wild salmon and to supporting a sustainable aquaculture sector. Regulations are risk-based and are based on each unique ecosystem.

The reporting measures for the FAR report were not well understood and the reporting template proved to be restrictive and did not allow for enough information to be presented in a way that could demonstrate how progress was being made or to reflect the differences among the various jurisdictions in Canada. Because this was also the first report of its kind, the information should form the basis from which progress can be measured in the future.

There were several issues that were raised by the Review Committee about Canada's report that require further clarification. Initiatives for international cooperation not adequately described Because this area was not specifically identified in the template and because space was restricted, this area was not fully explored in the Canadian FAR submission. Canada has many agreements and initiatives in place that support international and interprovincial cooperation to minimize adverse impacts on wild salmon. These activities address the following areas:

- Introductions and transfers of aquatic organisms
- Incorporation of sophisticated risk assessments tools and codified procedures
- Fish health and sea lice management

Examples of direct engagement by industry include:

- Ongoing and direct participation in the ISFA/NASCO Liaison Group
- Ongoing and direct participation in the WWF Salmon Aquaculture Dialogue
- Participation in an international sea lice research workshop hosted by Norway in February 2010.
- Hosting of two international workshops on sea lice in New Brunswick in the fall and winter of 2009-2010 that brought together researchers, industry and fish health experts from around the world and helped develop the framework for an Integrated Pest Management Plan and a supporting research program.
- Canada hosted and provided industry, government and science leadership at an international sea lice conference in British Columbia in May: Sea Lice 2010 In addition several east coast salmon farming companies are certified to internationally accredited third party quality and eco label programs.

Progress toward international goals for sea lice

Canada has implemented most of the best management practices and reporting and tracking mechanisms that are recommended within the Guidance On Best Management Practices SLG(09)5. Heavy sea lice loads have been the exception rather than the rule in Canada's salmon farming industry. The absence of a formal sea lice reporting program does not equate to an unaddressed problem; rather, it is indicative of the infrequency of the issue, the success of fish health management programs in the past and the affects of severe winters.

In addition, the east coast salmon farming industry, independent of regulators, is implementing an integrated pest management strategy for sea lice that involves the reporting of sea lice numbers to a third party data system with every company and farm following a standardized monitoring program. The industry is also supporting the development of a third party monitoring system that will ensure that sea lice reporting by companies is independently verified.

Monitoring sea lice numbers on wild salmon should not be the responsibility of salmon farms but rather the responsibility of federal and/or provincial authorities in some index rivers.

Action plan to minimize escapes

The potential for farm escapes is addressed within Canada's Code on Introductions and Transfers whereby a risk assessment forms part of the decision making process *before* smolts are moved from hatcheries to ocean farms. Biological risk from potential escapement is reviewed and must be deemed an acceptable risk before the introductions and transfers activity will be permitted [i.e., the salmon moved to the farm].

Escapement events are rare and fall within provincial jurisdiction. Each authority's approach may be different; however, they remain consistent with the intent of the Code and the Williamsburg Resolution. Most provinces have a Code of Containment under which salmon farms operate. Even before governance systems were implemented in regulation, the industry has followed a voluntary reporting practice. Examples of voluntary reports can be provided.

Measures to minimize the risk of disease and parasite transmission

Minimizing the risk of disease and parasite transmission begins with the *Code on the Introduction and Transfer of Aquatic Organisms* where fish health and pest management form an integral part of the risk assessment decision-making process. In addition, Canada is in the midst of legislative change that amalgamates this aquatic responsibility into its established terrestrial animal health agencies and provincial veterinarian systems. Canada looks forward to reporting on this progressive initiative once completed.

That this legacy of innovation has occurred within a multiplicity of jurisdictions and interests supports the notion of common interest among all parties to implement a Canadian approach to a Best Practice.

In Canada, fish health is generally under the jurisdiction of provincial governments who may take a somewhat different approach unique to each region. However, they achieve the same goal. Experience has shown that local adaptive management has generated more effective results than the initially envisioned consistent "one size fits all" approach.

Control reproductively viable Atlantic salmon and non-indigenous anadromous Salmonids

Canada's Code has been ratified by the federal government, the governments of its ten provinces and two territories and it incorporates sophisticated risk assessment tools and codified procedures, which have been recognized internationally [e.g. ICES] as being a Best

Practice. NAC(05)7 does not specify what decision making tool is used by the United States.

Canada continues to use its Code to assess introductions and transfers applications. Decisions associated with the importation of "*reproductively viable Atlantic salmon and non-indigenous anadromous salmonids or their gametes*" from outside the Commission area are very rare. They would likely involve the imposition of special containment requirements to meet the risk assessment mitigation requirements of the Code to reduce risk to a level acceptable to the recipient jurisdiction. Such decisions are reported annually as required under NAC (05) 7 and are thus in compliance with established NASCO procedures. Absence of recent reports only indicates the rarity of the action.

Classification/zoning system development

Canada does not classify its rivers with respect to introductions and transfers nor aquaculture activity. However, Canada's Code assesses every introduction and transfer within its risk assessment process for the ecological impact of potential escapement.

Permits are issued when risks are deemed acceptable [i.e., low risk] to the recipient jurisdiction.

As well, all Canadian jurisdictions undertake extensive cross-agency consultation in regards to the licensing of aquaculture activities. These reviews include the risks associated with this concern. While Canada protects its salmon resources in the area of introductions and transfers and the licensing of salmon aquaculture activity, the remaining 95% of Canadian rivers and 98% of Canada's salmon resource are remote from either activity and are thus not impacted [i.e., low risk].

Procedures to initiate corrective measures not adequately described

In Canada, jurisdictional mandates dictate the manner in which local situations are addressed. This often results in a variety of approaches being taken to achieve the same goal. While that diversity [i.e., the absence of a consistent approach] does create variations in methodologies, it does not necessarily mean that we are not dealing with the local situation. Experience shows that local adaptive management will generate a more effective approach than the initially envisioned prescriptive "consistent approach".

Canada continues to work with all parties to ensure the intent of the measures is met and that we protect the ecological integrity of our aquatic environments. Although Canada's diverse geography and systems can create problems for reporting, it will continue to report in as complete and comprehensive manner as resources permit. In addition, all Provincial and Federal Acts and Regulations noted in the FAR enable the Minister to take various forms of action if operators fail to comply with regulations, terms and conditions of license etc., which can include the revoking of licenses.

The NBSGA had the opportunity to participate in the 29-30 April 2010 meeting of the ISFA-NASCO Liaison Group and contributed to general comments in that report. However we feel the following points should be reinforced:

Process – the process for the development of any FAR report should allow time for all countries to have the opportunity to respond and for that response to be considered prior to the release and circulation of any draft report. We also note that it was inappropriate for NGOs to circulate the country reports among their members when the Parties and the Industry did not have the same opportunity.

Report Structure – the Draft Report was full of opinions by reviewers that were not grounded in either science or in material submitted for review – these opinions went beyond providing recommendations and/or feedback on where additional actions may be helpful and have no place in this report. Examples include: "resistance to sea lice treatment is a worrying development" statement on page 16; section 5.26 regarding responsibility for setting standards; section 5.28 "sea lice larvae can survive independently for 20-50 days" and page 14 Box entitled "Scale of Activities." We ask that such unsubstantiated comments be removed from subsequent reports.

Reviewers – It would be beneficial to include biographies of the reviewers of the various country reports. There also needs to be a clear recognition that the NGOs were not engaged as reviewers and that they are, in fact, a special interest group, albeit recognized by NASCO. The NBSGSA is by definition a non-government organization and yet we were not part of this body. The NGO statements (page 17) should be included only as an appended Minority Report.

In closing the Canadian east coast salmon farming sector is committed to environmentally sustainable and economically viable operations that are focused on continuous improvement, innovation and collaboration. Our products help to eliminate pressure on wild Atlantic salmon stocks and our companies work with local salmon conservation organizations to help to rehabilitate and preserve wild salmon.

Indeed, NASCO's role is not to regulate industries but to provide a forum where all parties can work together to ensure wild salmon stocks are protected.

NORWAY
(prepared by the Norwegian Seafood Federation / FHL)

a) The international goals for sea lice and containment written as: *100% of farms to have effective sea lice management such that there is no increase in sea lice loads or liceinduced mortality of wild salmonids attributable to the farm and 100% farmed fish to be retained in all production facilities* are to be looked upon as visions that we as industry are striving to reach more than exact goals. Based on this, NASCO should focus on the parties' progress.

b) The NASCO Council Report of 2009 reads: *He (the president of NASCO) noted that there had been some discussions about the involvement of the salmon farming industry, but noted that they have already been involved in the work of the Task Force and he anticipated that they would be appropriately involved in the preparation of the FARs within each jurisdiction.* This has been poorly followed up by most of the parties in the preparation of the FARs.

c) In point 5 the Review Group underlines that some jurisdictions have not submitted FARs to NASCO. It should be mentioned in the report that NASCO has no mandatory role and it is up to each jurisdiction if and how it wants to respond. In this process, NASCO's main role is to facilitate and encourage international cooperation.

d) Under Methodology, point d) it should be pointed out that this did not apply to the NGO-members of the review group.

e) In point 5.16 the review group says that: *"little consideration appears to be given to the risks to the health, genetic diversity and status of wild salmonids"* when sites are applied for. This opinion of the Review Group cannot be substantiated as many, if not all, jurisdictions in NASCO have regulations and site approval processes that do take these risks into account.

f) In point 5.25 the Review Group expresses opinions on the size of the salmon aquaculture industry and makes direct links between industry size to risks on wild populations. There is no automatic linkage between the two. Rather, it is more important to consider the regulations and enforcement of the industry and the industry's efforts towards sustainability.

g) It is not always clear why some of the text in the Report is highlighted in bold and placed in separate text boxes.

h) Point 5.38 is an assumption made by the NGO members of the Review Committee that is not substantiated and should either be taken out or made part of an NGO-appendix.

i) There is a question about the time-consuming work that is required by the jurisdictions to report to NASCO. Is this the right use of resources? The main thing is the national regulations and policies and the manner in which the authorities and the industry are striving to meet common goals. There are probably better ways for the Parties to report to NASCO as part of a process for NASCO to better reach their objectives, but that is for the Parties to decide.

When it comes to the summing up on each FAR, the following comments are relevant to Norway:

1) There is a lack of connection between the comments and the three bullet points

2) More than one third of the comments deal about *G.salaris.* There is no connection between salmon farming and the spread of *G.salaris*. The risk of spreading *G.salaris* is mainly connected to sports fishing and enhancement activities.

3) Of all the papers that have been published on salmon biology, possible interaction between salmon farming and wild salmon and related topics, the Review Group mentions only one model study, a model that, to our knowledge, has never been verified. This brings into question the validity of these comments made by the Review Group.

UNITED STATES
(Prepared by the Maine Aquaculture Association / MAA)

The MAA supports the initial comments provided by ISFA to the Liaison Group on the 30 April but would like to make the following points.

Jurisdictions' ability to demonstrate progress.

Throughout the document the Review Group repeatedly refers to the various jurisdictions' inability to demonstrate progress towards achievement of the Williamsburg Resolution and the subsequent guidance on BMPs. We would like to highlight two concerns.

1) Over the years ISFA has often indicated that the establishment of absolute measures, goals or action levels that may not be achievable in the real world will lead to false expectations, frustration and disappointment in both the parties and stakeholder groups associated with the NASCO treaty. Most recently, during the formation of the Guidance on BMPs ISFA members repeatedly expressed concerns about establishing goals on containment and sea lice management that were inherently unachievable and unrealistic. While ISFA agreed to those goals it did so with serious concerns that they would result in, and indeed guarantee, the continual criticism of the parties even if they were making determined efforts to achieve the goals. The FAR Review Group report appears to justify this concern. We respectfully suggest that the Parties re-examine what they have agreed to and determine whether they are prepared to be eternally criticised for falling short of these goals.

2) Aside from an inherent inability to achieve absolute goals, we are additionally concerned that two factors are inhibiting the Parties' ability to demonstrate progress towards those goals: first, the timing of implementation of management measures relative to when an assessment of progress is being made and second, the lack of data with respect to wild salmon populations.

In regards to the first factor, the Review Group acknowledges in several instances that the parties and the industry have enacted significant measures that are designed to address impacts on wild salmon stocks. The report references the "wealth of regulations and measures" but notes the FARs do not contain data adequate to assess a jurisdiction's "progress." The term "progress" denotes a change in position over time. Indeed the draft review directly acknowledges this change over time concept in its report.

> *"4.4 The Review Group recognised that while the BMP Guidance was only agreed in 2009, NASCO's agreements relating to aquaculture, introductions and transfers and transgenics date from the early 1990s and many elements were subsequently included (my emphasis) in the Williamsburg Resolution together with the Liaison Group's 2001 Guidelines on Containment of Farm Salmon. The BMP Guidance was developed to assist in strengthening the application and interpretation of the Williamsburg Resolution. The Review Group, therefore, felt that all jurisdictions with salmon farming should be able to demonstrate clear progress towards achieving the international goals but in most cases data to demonstrate progress was not provided."*

Given the FAR reporting format that focuses on reporting of the current state of affairs and

the fact that many of the measures designed to address potential aquaculture impacts on wild salmon stocks have been in place for some time it is inherently difficult for the parties to demonstrate "progress." We respectfully suggest that future FAR reporting requirements include a historical summary of the regulations and measures that have already been enacted along with the time they were first put into place. We believe that this will assist the Parties in documenting the extent and speed of their progress towards achieving the international goals. ISFA believes that significant progress has been made and that the Parties and the industry are not being given credit for this because of the current reporting format and focus on achievement of absolute goals.

In regards to the second factor that the lack of data on levels of hybridisation between farmed and wild stocks and levels of sea lice in wild stocks makes any assessment of the efficacy of management measures virtually impossible, ISFA concurs with this finding and commends the Review Group for recognising that the lack of historical data makes it virtually impossible for the parties to demonstrate progress. Indeed the Review Group acknowledges this in section 5.22. of their report. Within the last twenty years significant measures that were designed to address potential impacts on wild salmon stocks have been enacted. Many of these actions were enacted some time ago and the lack of data on wild stocks before their enactment makes it virtually impossible to determine the efficacy of these measures. The industry has spent millions of dollars in complying with regulations, improving operations and developing new techniques that were designed to address the potential impacts on wild stocks. The parties have spent millions of dollars in developing and enforcing regulations and coordinating these efforts through NASCO.

To have imposed these costs on endangered working waterfronts in coastal communities and to have spent large amounts of public funds without any ability or effort to assess the efficacy of these investments is not responsible or effective management. Indeed the lack of retrospective data makes any Review Group's ability to assess the party's progress virtually null and void. Until NASCO and its parties address this issue, further reviews will result in the same findings as the current one and will serve no purpose except to engender further criticism of the parties and a clear documentation of NASCOs ineffectiveness. This will serve neither NASCO, the Parties nor the salmon well.

5.14 International cooperation to minimize adverse impacts on wild stocks.

The Review Group acknowledges the existence of a number of forums for international cooperation and the coordination of efforts to minimise potential adverse impacts on wild stocks but misses several important ones.

For example the Review Group's report does not reference a number of important and well developed third party certification programs such as Global Gap, the Aquaculture Certification Council, Seafood Trust, Friends of the Sea, and a number of organic certification programs. The Report does not reference the overarching initiative undertaken by the United Nations Food and Agriculture (FAO) on Guidelines for certification programs. Additionally the Report does not reference the International Standards Organisation's (ISO) aquaculture initiatives on the development of technical standards for equipment that is designed to reduce the risk of equipment failures. All of these initiatives are ongoing and will result in significant standards, certification programs and BMPs that will directly address many of the concerns expressed by the NASCO Parties.

ISFA has repeatedly expressed its concern that NASCO's focus on the development of BMPs and regulations intended to reduce potential adverse impacts on wild stocks simply duplicates these other initiatives. The fact that these efforts are not acknowledged in the FARs or in the Review Group's report heightens our concern that NASCO may be disconnected from these other important initiatives. ISFA respectfully suggests that NASCO invest the time and effort required to familiarize itself with these initiatives to make sure that its efforts are not duplicative and create unnecessary costs to the Parties.

This effort would be consistent with the Terms of Reference for the FAR Review Group and should be included as part of the final version of the FAR Review group report.

Risk Assessments

The draft Review Group report suggests that existing risk assessment methods employed by the parties in the various NASCO jurisdictions are inadequate. Specifically in Section 5.16 of the report the review committee states:

> *"The Review Group notes that while there is often a requirement to consider the impacts on the marine environment (particularly benthic impacts) or exposure of the site, little consideration appears to be given to the risks to the health, genetic diversity and status of wild salmonid stocks in the decision-making process."*

We disagree strongly with this statement and are astounded that either the Parties have not more effectively communicated their risk assessment methodologies to NASCO as part of their FAR responses or that the Review Group has not understood those methodologies that were communicated by the Parties.

ISFA members must apply, through a number of methods, for the license to operate a farm in public waters in all NASCO party jurisdictions. As applicants who go through these comprehensive, extensive, costly and complicated processes, it is our experience that the potential risks to the health, genetic diversity and status of wild stocks are routinely considered during the decision making process. Indeed these standards and their consideration are explicitly articulated in all NASCO Parties' statutes and regulations in one form or another.

ISFA respectfully suggests that it is in the Parties' best interest to require the Review Group to specifically review each Party's statutes and regulations and document how they do not meet the risk management goal. If this statement cannot be substantiated, the Review Group should strike it from the record.

SCOTLAND
(prepared by the Scottish Salmon Producers Organization / SSPO)

The SSPO supports the initial comments provided by ISFA to the Liaison Group on the 30 April. Additionally we would make the following points.

General Comments
The SSPO has been generally supportive of the NASCO Focus Area Review (FAR) initiative. It has believed that the FAR process might serve to facilitate progress towards the strategic objectives of the NASCO Parties and the Atlantic salmon 'community of interest',

of which SSPO members are a significant part.

On the basis of the *Aquaculture, Introductions and Transfer and Transgenics* FAR, SSPO continues to feel that the sharing of information contained in the FAR submissions across jurisdictional areas, national farming industries and fisheries could have benefits in promoting greater mutual understanding. However, the NASCO Reporting process on the FAR has not been a useful or forward looking exercise and we find it difficult to identify where it has added value to the information provided in the FAR reports.

The Scottish Salmon industry has a range of clearly identifiable sectors: sports and leisure angling; net-fisheries; and Salmon aquaculture for food production (farming) and river stocking. Each of these sectors ultimately relies on the 'king of fish', but only aquaculture is not directly dependent on the harvesting of wild fish.

It is important to state that:

- SSPO shares NASCO's objectives *to manage salmon fisheries to promote and protect the diversity and abundance of salmon stocks*; these stocks are not only important as a basis for maintaining natural fisheries they represent the ultimate genetic resource on which the aquaculture industry is based;
- SSPO members have played a major role in the conservation of Scottish wild salmon; without the development of salmon farming the demand on Scotland's natural fisheries may well have led to their terminal decline.
- SSPO members grow salmon in some of Scotland's most remote, economically fragile and environmentally-valued areas of the country; they are a key part of local communities and are focused on sustainable aquaculture, supported by continuous improvement and technological innovation.

Comments on Review and Draft Report Process

Our expectation was that the NASCO review process would potentially add value to the FAR reports, possibly bringing new insights or drawing attention to features that would have benefits to the whole process. However, this has not been the case. Rather, we have an underlying concern that the investment in time and resources represented by the review was disproportionate to any discernable benefits we can identify. We believe this reflects an underlying problem in the NASCO processes. As specific points we have concluded:

The review process would have been more effective and would have commanded a greater respect if it had been specified more in accord with a conventional international scientific or project evaluation. A better and more uniform engagement of all sides of the Atlantic salmon community, including aquaculture producers, in the Review Group would have resulted in a more insightful and productive process.

- The review report fell short of the standards and a level of detail that would normally be expected of an international evaluation. It lacked any indication of the background or basis of selection of the review team, and the way in which the review process was undertaken was not specified.
- Whilst it is a reasoable assumption that NASCO will provide the Secretariat for the review process, the Review Group should have been led by an independent Chairman, who was not associated with any of the relevant governmental bodies or agencies or

non-governmental bodies aligned with NASCO. If the review reports are to be transparent and command confidence we believe this is an essential requirement.

- The review process was fundamentally flawed in that there was no in-jurisdiction visits, to allow review members to clarify points or ask question or understand the different approaches that are adopted. As a consequent, the review report suffers from misundertandings and misinterpretations, which do little to commend it to those who had contibuted to the FAR.

Points on EU-UK (Scotland)

The pen-picture summary (page 29 *et seq* of the Review Groups draft report) indicates that the Review Group has substantially failed to understand either the underlying philosophy or the pratical details of the approach that has been adopted in Scotland. As a small country with a history of working collaboratively, we are proud to say there is a considerable record of a coordinated collaborative approach between the Scottish Government and its agencies and the finfish farming industries (including salmon and other species).

This approach has led to the publication of two Strategic Framework documents for Scottish Aquaculture, the first published in 2003 and the second in 2009. As a strategic action arising from the first of these documents, a comprehensive Code of Good Practice for Scottish Finfish Aquaculture was developed involving wide consultation, not only with the Aquaculture industry but with a very wide range of stakeholders.

This process is now being repeated not because the present Code is 'outdated in regard to containment' (as stated in the review) but because the proposals of the second Strategic Framework, and the recommendations of Working Groups and Sub-groups, which have been established to take forward its implementation, need to be incorporated in the Code.

Likewise the report states that 'new initiatives for improved disease and parasite control are being developed but are not yet in place' as if this were a criticism. However, to the contrary, this situation will, and should always be the case because the situation reflects the constant introduction of new developments and innovations. As with the repeated revision of the Code of Good Practice, it reflects the commitment of the Scottish salmon industry to continuous technological and profesional development – something of which the industry is justifiably proud.

The ISFA comments on 30 April have highlighted the fact that the Review Group has in places expressed opinións rather than evidence-based comments, including paragraph 5.26 on standard setting. Reflecting this we would similarly draw attention to the statement forming the last sentence of the penultimate paragraph on page 29. This suggests that in Scotland there has been an 'evolution in approach' --- 'from voluntary approaches, through accreditation schemes, such as the Code of Good Practice, to legislation and enforceable regulation'. This is simply an incorrect understanding and is misleading in its implications. Moreover, it seems to reflect the same lack of evidence-based analysis highlighted elsewhere and the Review Group's unsupported opinión. Finally, since the 'conclusions' of the review at the end of the Scotland section are not referenced to the supporting evidence, it is difficult to make comment on them. However, we particularly reject the statement that 'adequate measures to minimise the risk of disease and parasite transmission have not been implemented'.

ISFA Comments on the "Draft Report of the Aquaculture, Introductions and Transfers and Transgenics Focus Area Review Group"

April30, 2010

London

These comments represent ISFA's initial feedback to the Report. It is ISFA's intent to submit a more detailed report in time for NASCO's next mailing.

General Comments:

The International Salmon Farming Industry shares the objective of conserving and enhancing wild salmon stocks.

- ISFA members help to preserve wild salmon by filling the consumer demand for high quality, nutritious salmon thereby reducing pressure on wild Atlantic Salmon.

- ISFA promotes an environmentally sustainable and economically viable salmon farming sector that is focused on continuous improvement, innovation and collaboration.

- Significant milestones have been reached in the areas of containment and fish health and the industry welcomes NASCO's support for access to a full suite of tools for fish health management.

An environmentally sustainable, socially responsible and economically viable international salmon farming industry should not be impeded, but rather complemented by the work undertaken by NASCO.

Specific Comments on the Draft Report and Review Process

1. Process

A better engagement of ISFA members within the review process, both in the drafting of the FAR reports and in the Review Group itself would have led to a more effective, constructive and productive process.
The Review Process and the Report submission process is not clearly defined. The Report would be more complete if accurate assessment of the cost were included. ISFA requests that the Liaison Group be given the opportunity for comment and input into the final report of the Review Group after the Special Session in 2010 and before NASCO 2011.

2. Clarity on Goal statements

While the Task Force affirmed the common goals of 100% of farms having effective sea lice management and the containment of 100% farmed fish in all production facilities, the Review Committee should have looked for progress towards these goals, rather than achievement. (see page 14 – box under Introduction: "…*no jurisdiction was able to show that it had reached a situation where it had achieved the international goals*.") If the Review Committee only looks for achievement of the international goal, the report will always be negative and progress will not be recognized.

3. Opinions rather than evidence and science--based comments

The Draft Report contains a number of opinions and beliefs that are not evidence---based. Such comments should be referenced to link them to the appropriate scientific background. Some examples are:

- "resistance to sea lice treatment is a worrying development" statement on page 16
- section 5.26 regarding responsibility for setting standards
- section 5.28 "sea lice larvae can survive independently for 20---50 days"
- page 14 Box entitled "Scale of Activities"
- section 5.21 "There are also instances where the value of the wild stocks has been adversely affected by impacts from aquaculture and related activities."

4. Role of Special Interest Groups on the Review Group

There needs to be a clear recognition that the NGOs are special interest groups, albeit recognized by NASCO, not independent reviewers. The NGO statements (page 17) should be included only as an appended Minority Report.

Our understanding was that this was to be focused, tightly controlled professional Review undertaken by selected members of the review committee. However, the NGO / special interest group members of the Review Committee treated it as a public consultation and circulated the documents widely.

Unlike the NGO community, ISFA was not only excluded from the Review committee; its members were not given access to other countries' reports.

It is our understanding that members of the Review Committee did not review their own country's reports. (page 7 – 5.6 d) However, this apparently did not apply to the NGO / Special Interest representatives. ISFA views this as a clear conflict of interest.

We are very concerned with the tone and implication of Section 5.38 in the report which states:

> *"The NGOs note that several of the FARs from jurisdictions with salmon farming omitted some information or procedural knowledge that is publicly available and is known to the NGOs in those jurisdictions.* ***With those omissions the FARs appeared to present a more favourable picture than the actual situation*** *(ISFA emphasis) with regard to the impacts of salmon farming on the wild salmon stocks or on efforts to avoid such impacts."*

Is it the report's intention to suggest that some of the parties intentionally misreported and mislead the Review Group? This would seem speculative at best and inflammatory at worst. ISFA believes that the parties responded to the FAR requests with all sincerity and request that this statement be stricken from the report.

5. Annex 1 – CV of Reviewers should be attached

It is normal practice for a Report of this nature to include an Annex with the CV of each of the reviewers and an identified Chairman. In keeping with NASCO's commitment to transparency, this should be added to the Report.

In summary, the science for management practices is changing quickly and we need to be able to bring new science to the table at all times. The reporting measures were not well understood and the reporting template proved to be restrictive and did not allow for enough information in a way that demonstrates how progress has been made.

Annex 7

CNL(10)37

NGO Response to ISFA Comments on the NASCO Draft Aquaculture Focus Area Review Report

The NASCO process

1. The ISFA response demonstrates a complete lack of understanding of the role of NASCO as an organisation, the Next Steps process and the role of the NGOs accredited to NASCO in that process.

2. The objectives of NASCO are the conservation, restoration and rational management of wild Atlantic salmon. The NGOs accredited to NASCO have to demonstrate that their objectives are consistent with those of NASCO.

3. While ISFA maintains that they support those objectives, ISFA is essentially a trade association and the principal objective of a trade association is to protect and promote the interests of its members whose activity is the commercial farming of Atlantic salmon. This activity has been found to be in conflict with the management and survival of wild salmon wherever the two resources co-exist.

4. NASCO is an inter-governmental treaty organisation to which there are currently six signatories (Iceland having resigned). NASCO operates on the basis of consensus, so no agreement can be reached without the full agreement of all the Parties.

5. In 1994, NASCO agreed the Oslo Resolution, with the aim of minimising the impacts of salmon aquaculture on wild salmon; this was superseded in 2003 by the Williamsburg resolution, with the same over-arching objectives.

6. In 2004, as part of a 20 year Review, NASCO agreed to introduce its "Next Steps" process. This process included the production, by each jurisdiction within the Parties, of an Implementation Plan, describing in detail how they were managing, and planned to manage, their wild Atlantic salmon stocks in line with and to implement NASCO agreements on habitat, fisheries management and impacts of aquaculture. As part of this process, the Parties agreed a three year cycle to examine in detail the implementation of NASCO agreements on fisheries management (year one) habitat (year two) and aquaculture and introductions (year three). This is the Focus area Review process in which we are currently engaged.

7. A further agreement by the Parties enabled full participation by the NGOs accredited to NASCO, not just in The Next Steps process, but in the annual meeting and any intercessional meetings that take place. The aim of all this is to make NASCO a fully transparent organisation, and through its accredited NGOs, more publicly accountable.

8. **So, in the context of the Aquaculture FAR, NGOs are not "special interest groups" as has been alleged; they are an integral part of the NASCO process, a process which has been fully ratified by the Parties at NASCO.**

9. The NGOs at NASCO (34) represent more than 5 million members across the North Atlantic dedicated to the objectives of the organisation. It is worth reinforcing here, that like salmon farming, wild fish represent a hugely valuable resource, both in terms of their sporting and commercial exploitation, often benefiting remote rural communities.

Response to ISFA comments

10. The Aquaculture FAR is not an independent report; that was not the objective. The FAR is an internal report for NASCO, examining how jurisdictions are implementing the Williamsburg resolution and managing the impacts of aquaculture on wild Atlantic salmon.

    The draft report will be discussed at NASCO Council in June 2010. The fact that ISFA has been given an opportunity to comment on the draft report, ahead of the Parties, is of some concern to NGOs as it perhaps indicates undue influence by the Industry on the NASCO process. This could be regarded as a testament to the transparency of the organisation, **but the NGOs remind the Parties at NASCO that in this forum they are representing wild Atlantic salmon, and not the salmon farming industry.**

11. **The idea that the process would have been more effective if IFSA had been part of the Review group is rejected.**
    The whole point of this exercise is that it is a review of how jurisdictions are implementing (or not) the Williamsburg Resolution, and this review had to be carried out by individuals, nominated by the Parties and the accredited NGO Group, on behalf of wild salmon interests, independent of the aquaculture industry. **Self-assessment, like self- regulation, clearly does not work.**

12. **Criticism of the competence of the reviewers is unacceptable.**
    The representatives of the Parties and NGOs were selected by the Parties (Canada, USA, Norway and Faroes) and NGOs (US and Norway) for their knowledge and experience of impacts of aquaculture on wild salmon. The addition of cvs might be helpful when the report is finally published.

13. **Criticism of the science involved in these assessments is also unhelpful.**
    The scientific advisor to the Review Group is a former Chairman of the ICES Advisory Group to NASCO, and an eminent wild salmon scientist. Moreover, there is a wealth of scientific evidence to demonstrate the various impacts of salmonid aquaculture on wild stocks, much of it summarised in the NASCO/ICES Bergen symposium of 2005. A more recent summary of this research across the N. Atlantic has been compiled and published by the UK Salmon & Trout Association.

14. **While it would be premature to claim that all this research was definitive, there is certainly more than enough evidence to justify taking action to protect wild fish on the basis of the precautionary approach**, an approach to which all the NASCO Parties have agreed.

15. ISFA challenges many statements of the Review Group as "opinions", yet their own document is full of their own opinions, such as:
    "*ISFA promote an environmentally sustainable salmon farming sector…"*
    "*ISFA help to preserve wild salmon by filling the consumer demand etc.*"
    The country comments are also littered with criticism of these "opinions" which are actually based on the science referred to in para 13.

16. Acceptance by ISFA that salmonid aquaculture can and does impact wild salmon is an essential precursor to taking action to minimise those impacts.
    The targets set out in the Best Management Practice recently agreed by the Task Force were a good step forward. C**hallenging peer- reviewed science on the subject now, is not helpful.**

17. ISFA has also challenged the phraseology of the Review Group conclusions. Broadly, these were that no jurisdiction had demonstrated full compliance with NASCO guidelines on minimising the impacts of aquaculture on wild Atlantic salmon. ISFA suggested that this approach did not allow for measurement of progress towards those objectives.

18. **The NGOs have some sympathy with this complaint, and suggest that a "scorecard" approach would enable comparison both within and between individual jurisdictions.**

NGO Conclusions

19. The NASCO/ISFA Task Force has produced appropriate goals on escapes and sea lice control which the Industry, Parties and NGOs have all endorsed as Best Management Practice (BMP).

    NGOs were extremely concerned to read the statement from ISFA that these BMP goals were "unachievable" and "unrealistic". **Backsliding on only recently agreed goals by the Industry makes the value of dialogue with the Industry questionable, and reinforces NGO concerns that dialogue is being used as a cloak of respectability and a vehicle for postponing the firm regulatory action that is required from governments to protect wild Atlantic salmon from the impacts of salmonid aquaculture.**

    The NGO conclusion is that the salmon aquaculture industry should concentrate on delivering real, measurable and visible progress towards those targets, which is an essential step by NASCO governments in measuring that progress, **rather than attempt to undermine and discredit the Focus Aquaculture Review,**

20. **The accredited NGOs at NASCO fully support the Aquaculture FAR Group report, and call on the Parties at NASCO to endorse it**, with minor modifications as suggested.

21. **Anything less than full endorsement will expose the organisation and its governments to public ridicule in the wider community of wild Atlantic salmon conservation interests.**

Annex 8

IP(10)36

Comparative overview of approaches used to address challenges in minimising the adverse impacts of salmon aquaculture, introductions and transfers and transgenics on wild salmon stocks

1. Introduction

Salmon aquaculture is defined as the culture or husbandry of Atlantic salmon, including salmon farming, salmon ranching and salmon enhancement activities. Since the early 1980s, farming of Atlantic salmon has become a major industry in the North Atlantic and other parts of the world. Production of farmed salmon in the North Atlantic has increased from around 5,000 tonnes in 1980 to more than 1,000,000 tonnes in 2009. The 2009 production is approximately 1,000 times the declared harvest of salmon in fisheries in the North Atlantic region. The Review Group believes that the scale of the salmon farming industry means that it has the potential to be more damaging than other aquaculture practices although poorly planned stocking practices and other forms of introductions and transfers also pose significant genetic and other risks to the wild stocks, as highlighted by recent research. The damage caused by the introduction of the parasite *Gyrodactylus salaris* to Norway highlights these risks.

There is variety in the type and magnitude of aquaculture related activities in which NASCO's jurisdictions are engaged. In some jurisdictions, the salmon populations are dependent on stocking programmes while in others there may be no stocking of salmon at all. Some jurisdictions have an enormous production of farmed Atlantic salmon whereas other jurisdictions have none. The size and status of the wild salmon populations across the jurisdictions also varies with some jurisdictions working to restore extinct populations or to prevent the extinctions of populations (including those designated to receive special government protection) whereas others have populations that still support significant, albeit reduced, fisheries.

Since 1990, NASCO has co-convened three major international symposia to ensure that it had the best available information on interactions between wild and reared salmon to guide its decisions. The most recent NASCO/ICES symposium held in Bergen in 2005 highlighted that while much progress had been made in addressing impacts of aquaculture and in better understanding the nature of these impacts, sea lice and escaped farmed salmon were identified as continuing challenges both for the salmon farming industry and the wild stocks and on which further progress was urgently needed. In response to these concerns, NASCO adopted the Resolution by the Parties to the Convention for the Conservation of Salmon in the North Atlantic Ocean to Minimise Impacts from Aquaculture, Introductions and Transfers, and Transgenics on the Wild Salmon Stocks, CNL(06)48, (hereinafter referred to as the 'Williamsburg Resolution'). This Resolution consolidated NASCO's previous agreements, that dated back to 1991, and included new elements (e.g. on the burden of proof, mitigation and corrective measures, and risk assessment) to ensure consistency with the Precautionary Approach. More recently, the Liaison Group established by NASCO and the International Salmon Farmers' Association (ISFA) has developed Guidance on Best Management Practices to Address Impacts of Sea Lice and Escaped Farmed Salmon on Wild

Salmon Stocks, SLG(09)5, (hereinafter referred to as the 'BMP Guidance'). This Guidance, which was adopted by both NASCO and ISFA in 2009, is intended to supplement the Williamsburg Resolution. It sets new international goals in relation to sea lice and escaped farmed salmon with the basic principle that 'salmon stocks in areas with salmon farming should be in as healthy a state as those in areas without salmon farming' (see document ATF(09)8).

The *Ad Hoc* Review Group (hereinafter referred to as 'the Review Group') has reviewed the aquaculture, introductions and transfers and transgenics FARs submitted to NASCO and has commented on the progress made by each jurisdiction in implementing the Williamsburg Resolution and the BMP Guidance. As part of its review, the Council also asked the Review Group to undertake a comparative overview of these FARs, highlighting common challenges and common management and scientific approaches to minimising adverse impacts on the wild salmon stocks so as to facilitate the exchange of information and transfer of knowledge on aquaculture issues envisaged in the Strategic Approach. This overview follows the format for the development of the aquaculture FARs agreed by the Council, CNL40.970. As this format combines reporting on both the Williamsburg Resolution, which deals with aquaculture, introductions and transfers and transgenics, and the BMP Guidance, which deals only with salmon farming, there is inevitably greater focus on salmon farming. However, as indicated above the scale of the salmon farming industry and the most recent scientific advice presented at the Bergen Symposium suggest that it poses a significant threat to the viability of wild salmon populations.

2. Overview of activities, policy and management structures

Generally, most FARs provided a good overview of the activities, policy and management structures in place. However, in some FARs while a large amount of this information was presented there was little focus on the outcomes of measures taken to implement the Williamsburg Resolution and to demonstrate progress towards achieving the international goals to safeguard the wild stocks. While many FARs provided details of the legislation in place, few provided a clear evaluation of the effectiveness of the measures actually implemented. Conversely, several of the FARs comprised only the briefest of overviews that made it difficult to fully understand and, therefore, assess the measures in place.

The Review Group believes that it would be desirable that future FARs focus on outcomes and progress towards achieving the international goals so as to properly demonstrate whether or not salmon stocks in areas with salmon farming are in as healthy a state as those in areas without salmon farming.

3. Initiatives for international cooperation

The Williamsburg Resolution calls for cooperation among NASCO Parties in order to minimise the adverse effects to the wild salmon stocks from aquaculture, introductions and transfers and transgenics. Some FARs provided no information on these initiatives while others referred only to examples of cooperation within the jurisdiction. However, there are also some examples of both bilateral and multilateral international cooperation.

- The Scottish and Norwegian FARs indicate that a Memorandum of Understanding on Aquaculture Cooperation has been agreed that includes commitments to cooperate on

fish health and welfare issues and on containment. There is also close cooperation in relation to the parasite *G.salaris*.

- The FAR for Sweden refers to cooperation with Norway and Finland in relation to *G.salaris* and on stocking of border rivers.
- The US FAR refers to close cooperation with Canada in developing the 1992 NAC Protocols for the Introduction and Transfer of Salmonids. Subsequently, in 2008, escape notification procedures were developed jointly. More generally, the US cooperates internationally through participation in scientific symposia, including the ICES/NASCO Bergen Symposium, and involvement in the NASCO/ISFA Liaison Group and its Task Force.

The Review Group noted that few FARs presented information relating to international cooperation between the jurisdictions on matters relating to minimising the impacts of aquaculture and related activities on the wild stocks and the outcomes of such cooperation. This aspect might be more clearly reported in subsequent FARs. The Review Group urges all jurisdictions with salmon farming to participate in the work of the NASCO/ISFA Liaison Group. It considers it vital that this Group has representation not only of the salmon farming industry and administrators and managers involved with salmon aquaculture but also of those responsible for the management and conservation of the wild salmon stocks.

4. Progress towards achieving the international goals for sea lice and containment

The BMP Guidance was developed to assist in strengthening the application and interpretation of the Williamsburg Resolution. The BMP measures in this guidance reflect those contained in the Williamsburg Resolution, and its predecessor the Oslo Resolution which was adopted in 1994. However, the BMP Guidance contains new international goals and sections on reporting and tracking and factors facilitating implementation as well as the BMPs. Under this Guidance the internationally agreed goals are: 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; and 100% farmed fish to be retained in all production facilities. For sea lice, the recommendations on reporting and tracking include the use of monitoring programmes to characterise the lice loads in the farms and wild salmonid populations; monitoring of lice loads on wild salmonids in areas with salmon farms compared to areas with no salmon farms; assessment of lice-induced mortality of wild salmonids (e.g. as monitored using sentinel fish, fish-lift trawling, using batches of treated smolts); and monitoring to check the efficacy of lice treatments. In relation to containment, the Guidance recommends reporting of the number of incidents of escape events and standardised descriptions of the factors giving rise to escape events; reporting of the number and life-stage of escaped salmon; and monitoring for the number of escaped salmon in both rivers and fisheries and the relationship to reported incidents.

The Review Group recognises that, as noted at the NASCO/ICES Bergen Symposium, progress has clearly been made in addressing the impacts of aquaculture on the wild stocks. However, the continuing growth of the industry poses significant challenges in protecting the wild stocks and a number of FARs recognise the need for further progress to address the impacts from sea lice and escapees. For example, under the Norwegian policy for the preservation of wild salmon, despite the progress made, sea lice and escapees from farms are still considered to be serious threats to wild salmon stocks. In most cases, data to demonstrate progress towards achievement of the international goals was not presented in the

FARs. While many FARs provided information derived from monitoring programmes for sea lice on farms and on reported numbers of escapees, little information was presented from monitoring of wild salmon stocks that would enable the effectiveness of measures designed to protect them to be properly assessed.

- The FAR for Ireland indicates that the current national sea lice monitoring programme involves the inspection and sampling of each year class of fish at all fish farm sites fourteen times a year and target lice levels have been set for farms. These data are made available to all stakeholders. A number of approaches have been used to monitor lice levels on wild salmonids (see section 18 below). A new pest management strategy was introduced in 2008 to deal with incidences where target lice levels were not being met at farms. This strategy recognises that recently it has been more difficult to achieve the very low levels of infestation required by the national control programme, *inter alia*, because of a succession of warm winter sea temperatures, resistance of sea lice to treatments, limited access to 'fallowing sites' for temporal and spatial separation of stocks and other complicating fish health problems.
- The FAR for Northern Ireland indicates that there has been no necessity for treatment of lice at either of the two farmed sites over the last 20 years, as the sites have strong currents with consequent strong flushing of the cages. However, no information is presented on lice levels on wild smolts (only on returning adult fish).
- The Norwegian FAR indicates that while the reported number of escaped farmed salmon has decreased in recent years to approximately 175,000, in 2009 monitoring of spawning populations in 39 salmon rivers indicates that proportions of escaped farmed salmon remain high (around 15% in autumn samples with a slight increasing trend in recent years). The sea lice infestation levels in the industry were three times higher in September 2009 compared to the same period in 2008. During the winter of 2010, compulsory synchronised de-lousing was enforced at a threshold of 0.5 adult female lice per fish in January and of 0.1 for all stages in March/April, in order to ensure the lowest possible lice levels on farms when wild salmon smolts leave the rivers. However, resistance to emamectin benzoate and pyrethroids has been discovered along the Norwegian coast. It is also stated that the move to larger cage units, some capable of holding up to 500,000 farmed salmon poses challenges in controlling sea lice and preventing escapes. With regard to progress in eliminating the parasite *G.salaris*, a total of 35 rivers have been treated; in 21 the parasite has been successfully eradicated, five rivers are being monitored and in 9 rivers the treatments have been unsuccessful.
- The US FAR presents information from in-river traps showing that the number of farmed origin salmon entering US salmon rivers has decreased significantly since the implementation of containment management systems in farms.

The Review Group recognises that progress has been made by the salmon farming industry in introducing measures intended to minimise the 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, many FARs failed to provide information to demonstrate progress towards achieving the international goals for sea lice and escapees.

5. Process to demonstrate prior to approval that proposed activities will not have a significant impact on wild salmon stocks

With regard to the burden of proof, the Williamsburg Resolution states that each Party, in accordance with the Precautionary Approach, should require the proponent of a proposed activity to provide all the information necessary to demonstrate that it will not have a significant adverse impact on wild salmon stocks or lead to irreversible change. In all jurisdictions, an application to conduct salmon farming (or to expand production) is required and a range of information is required to support these applications. (It should be noted that any new aquaculture facilities are prohibited in salmon rivers in Sweden and in National Salmon Fjords in Norway). The following are examples of the information required to support applications to conduct aquaculture and introductions and transfers in various jurisdictions:

- The Irish FAR indicates that applicants for a salmon farming license are required to provide sufficient information to demonstrate that the proposed activity will not have a significant adverse impact on wild salmonid stocks. In practice all offshore finfish farming operations over 100 tonnes capacity are required to submit a comprehensive Environmental Impact Statement. Similarly, proponents wishing to release hatchery-reared salmon must also provide relevant information to facilitate a full evaluation of the impacts of stocking on the wild salmon stocks.
- The Norwegian FAR states that information is required, *inter alia,* on: the distance to other aquaculture facilities and rivers; the maximum standing biomass to be reared; arrangements for treatment of sea lice; contingency plans for handling high mortality and serious diseases; the disease situation in the area around the site; and the risk of spreading disease to wild fish.
- The FAR for Scotland indicates that applicants are required to submit sufficient information to allow consultees to advise on whether the proposed development is likely to have a significant effect on the environment including wild salmonids. Authorisation is granted where the operation of the farm is not considered to pose an unacceptable risk of spreading disease to other farms or to wild fish stocks.
- The US FAR indicates that proponents are required to identify the work they propose to conduct, describe how it is to be carried out, and to follow the sequence of identifying impacts, avoiding impacts, minimizing unavoidable impacts, and mitigating any remaining impact. For activities occurring in the GOM DPS, there is an even higher burden on project proponents to avoid impacts to the ESA listed species and/or designated critical habitat. Monitoring is required to ensure the level of the effects is not greater than anticipated at the outset of the project.

The Review Group has highlighted the frequent absence of wild salmon stock considerations in risk assessments (see section 6 below). This appears to be particularly the case with regard to the impacts of escapees on the wild stocks. Furthermore, risks assessments based on the ability to control lice levels on farmed fish may under-estimate the risks to the wild stocks.

6. Application of appropriate risk assessment methodologies including in relation to site selection

Risk assessment is integral to the implementation of the Precautionary Approach and serves to promote transparency in the decision-making process. The Williamsburg Resolution states

that risk assessment should include identification of options and consideration of mitigation measures and that the Parties should develop and apply appropriate risk assessment methodologies in considering the measures to be taken in accordance with the Resolution. It is clear from many of the FARs that jurisdictions are applying risk-based assessment methodologies although the extent to which wild salmon stock considerations are included in these assessments varies. A number of the FARs also refer to risk-based approaches to monitoring and inspections in which farm sites that are considered to be at lower risk of non-compliance would receive less or no monitoring.

- Several FARs indicate that risk assessments are required prior to stocking hatchery fish. In England and Wales, both ecological and genetic risks must be assessed and considered acceptable before stocking with salmon will be permitted. The FAR for Ireland indicates that in assessing applications the licensing authority must consider, *inter alia*, the ecological impacts on wild fisheries, natural habitats, flora and fauna. This FAR also refers to recent experiments indicating that hatchery releases are likely to depress rather than enhance the productivity of natural populations suggesting that more caution and planning is required before hatchery reared progeny are released into the wild. The current supportive breeding programmes in Ireland are to be reviewed in the light of this scientific information.
- The FAR for Canada indicates that any proposed intentional introduction would require a risk assessment to evaluate the ecological and other impacts of introductions and transfers.
- The FAR for Scotland indicates that a series of computer modelling packages driven by local tidal, bathymetric and meteorological data are used in assessing risks from a proposed farm site. This modelling allows site-specific limiting conditions to be specified in authorisations to ensure that the impacts arising are within the carrying capacity of the local environment.
- The US FAR indicates that at the time of the ESA consultation, the option to relocate farm sites away from wild salmon rivers was considered, but alternative suitable sites could not be identified. Therefore, other risk reduction measures including compatibility of the equipment to the site conditions, a containment management system (using a Hazard Analysis Critical Control Point approach), audits, inventory control, a prohibition on the use of non-North American strain salmon and marking were all required.
- The Norwegian FAR indicates that the farm monitoring program is risk based (AkvaRisk) with all marine aquaculture sites categorized in three groups (low, medium and high risk). The control focus has been on the high-risk group except that all farms in National Salmon Fjords are monitored annually. Similarly, risk-based approaches to monitoring are referred to in the FARs for Scotland and Northern Ireland.

The Review Group highlights the frequent absence of wild salmon stock considerations, in risk assessments and strongly encourages all jurisdictions to incorporate these considerations into decision-making processes in future. Furthermore, the outcome of all risk assessments should be reviewed in the light of changes in the status of the wild stocks and any increase in production of farmed salmon. With regard to risk-based monitoring, the Review Group recognises that consistent with the Precautionary Approach, where high risk sites are identified measures should be taken to eliminate the risks posed to the wild stocks and their environment. Where low risk sites are identified, appropriate monitoring would help to confirm, or reveal changes in, their low risk status.

7. Development and Implementation of Action Plans to minimise escapes

Under the Williamsburg Resolution it is stated that each Party shall take measures to minimise escapes of farmed salmon to a level that is as close as practicable to zero through the development and implementation of Action Plans as envisaged under the Guidelines on Containment of Farm Salmon (Annex 3 of the Resolution). These Guidelines recommend that each jurisdiction has in place measures for minimising escapes; mechanisms for reporting information on the level and causes of escapes; and mechanisms for reporting and monitoring in order to assess compliance and to verify the efficacy of the measures taken. The Review Group considers that together these elements comprise an Action Plan. The guidelines are intended to prevent escapes of farmed salmon in both the freshwater and marine environments. They include elements on site selection, design of equipment and structures, management systems operation, verification, and development of action plans and reporting. Under the BMP Guidance, the international goal is that 100% of farmed fish are to be retained in all production facilities.

- A number of FARs refer to measures to prevent escapes from freshwater hatcheries. In Denmark the two hatcheries used in the stock rebuilding programme use recirculating water and it is stated that no escapes occur from these facilities. Several FARs refer to the use of grills on the outlets to prevent escapes. In the US commercial freshwater hatchery facilities located on rivers with endangered salmon populations are required to eliminate losses of juvenile salmon by screening discharges from the hatchery using a three barrier system. In Norway, commercial smolt hatcheries are not permitted in salmon rivers.
- The FAR for Northern Ireland indicates that sites are selected following a hydrodynamic study, the equipment deployed is designed to withstand the conditions at the sites, which are appropriately marked and depicted on Admiralty charts. Each net and cage has an identification number and maintenance records are compiled and inspected each month together with a physical inspection of the structures by remotely operated underwater vehicles. Predator deterrence equipment is required. Staff are trained, training records are maintained and containment measures are adopted during stocking, counting, grading, transport and harvesting of fish, net changes and cleaning. There is regular preventative maintenance including cleaning of cages and inspection by divers. No cages are towed with the nets assembled or containing fish. Records exist for each cage detailing all handling of fish and there is a requirement to report escapes and their causes. A contingency plan exists to permit the deployment of drift nets in the immediate vicinity and removal of farmed salmon from adjacent rivers by electrofishing.
- The FAR for Norway indicates that an Action Plan 'Vision Zero Escapes' was developed in 2006 with the aim of achieving its goal in two years but the timescale has been extended. Among the most important measures it contains are: strict technical requirements for equipment (NYTEK) which have been recently revised; a permanent commission of enquiry to investigate all escape episodes and give advice on prevention of further escapes; and verification by public inspectors and heavy fines for violation of regulations including failure to report escapes. Education and motivation are also elements. There is mandatory reporting of escapes and investigation of causes of loss. In 2009 a process to develop a new standard for land-based aquaculture installations, including commercial hatcheries, was initiated.
- The Review Group noted that while reporting of escape events appears to be a mandatory requirement in all jurisdictions, it is not clear if the small-scale 'trickle

losses' are included in such reporting or if efforts are made to assess them at the end of the production cycle. It is also clear from the Norwegian FAR that there may be unreported escape events and obtaining complete data on escapes is a challenge.

8. Implementation of measures to minimise the impacts of ranched salmon

Salmon ranching is defined in the Williamsburg Resolution as the release of reared Atlantic salmon smolts with the intention of harvesting all that return. The Resolution states that the impacts of ranched salmon should be minimised by utilizing local stocks and developing and applying appropriate release and harvest strategies. Currently, there is no ranching being undertaken in the North Atlantic other than on an experimental scale. There has, in the recent past, been commercial ranching of salmon in Iceland; production peaked at approximately 500 tonnes in 1993 but commercial production has since ceased although there is increasing 'ranching to the rod', in which hatchery-reared smolts are released in rivers, e.g. the Ranga, to enhance angling. In 2009 the harvest by rods in Iceland of 'ranched' salmon was 42 tonnes. It is not clear how this activity would be categorised under the Williamsburg Resolution.

- The FAR for Ireland indicates that there has been experimental ranching in the Burrishoole system since the mid 1970's in which returns have been captured either by rod and line or by an in-river trap. A similar operation has taken place on the River Screebe since the 1990s with returns intercepted by rods or by an in-stream trap. The Precautionary Approach is applied to ranching specifically to increase angling returns with, *inter alia,* the following recommendations applying: site location distant from rivers with wild populations; no harvests permitted outside of the river; location of the harvest station in the lower reaches of the river to give better access to fish during the season; in-river trap to remove all returning hatchery fish; all fish to be tagged and genetically typed; all stock to be disease free on transfer and release; and all stock to be vaccinated.

The Review Group notes that the issue of how 'ranching to the rod' would be categorised under the Williamsburg Resolution might need further consideration as it is possible that this activity could increase in future if marine survival rates improve.

9. Measures to minimise interactions from salmon enhancement activities

The Williamsburg Resolution states that each Party shall take measures to minimise the adverse genetic and other biological interactions from salmon enhancement activities, including introductions and transfers. Salmon enhancement is defined in the Resolution as the augmentation of wild stocks in individual river systems by the release of Atlantic salmon at different stages in their lifecycles. Under the Guidelines for Stocking Atlantic Salmon (Annex 4 of the Williamsburg Resolution), three types of river (Classes I, II and III) are defined on the basis of the extent to which salmon and their habitats have been affected by human activities. In addition to general guidelines applying to all classes of river, there are specific recommendations relating to stocking, ranching and other forms of aquaculture for each class.

- The FARs for several jurisdictions indicate that stocking of salmon rivers must use material sourced from the same river, although there may be exceptions where the salmon population has been lost. In England and Wales, as salmon brood stock are

usually obtained from the wild, the impacts on the donor stock must also be considered. In France, the stocking policy has evolved from originally being based on imported eggs to using native strains but a significant challenge is the low number of returning spawners and their sex ratio. In Swedish West Coast rivers that are free of the parasite *G.salaris,* stocking of any salmonid is not normally permitted to reduce the risk of spreading the parasite. Similarly, stocking of salmonids in the River Teno in Finland is not permitted. In Norway, when stocking is conducted local stocks are used but, additionally, a plan is drawn up in each case to minimize possible adverse genetic and other biological effects.

- The FARs for Norway and Sweden indicate that salmon stocking is being replaced by habitat protection and restoration for stock rebuilding purposes.
- The US FAR states that standard mating protocols have been established using genetic information and evaluation for each individual brood fish collected from the wild. The protocols also include screening for aquaculture origin salmon prior to spawning. In addition, gene banking is employed at one federal hatchery for rivers in danger of extinction or at risk of genetic introgression from aquaculture origin escapes.

10. Implementation of measures to minimise the risk of diseases and parasite transmission to wild stocks e.g. area management, integrated pest management, single year class stocking and fallowing

Under the Williamsburg Resolution it is stated that measures should be taken to minimise the risk of disease and parasite transmission between all aquaculture activities, introductions and transfers, and wild salmon stocks. The BMP Guidance indicates that with regard to sea lice, best management practices should include: area management, risk-based, integrated pest management (IPM) programmes that meet jurisdictional targets for lice loads at the most vulnerable life-history stage of wild salmonids; single year-class stocking; fallowing; risk-based site selection; trigger levels appropriate to effective sea lice control; and strategic timing, methods and levels of treatment to achieve the international goal and avoid lice resistance to treatment.

- The Canadian FAR refers to the establishment of six major aquaculture Bay Management Areas in the Bay of Fundy in 2006. Under this 3-year site rotational system, each year one-third of all sites are left fallow while another third is receiving smolts and the remaining third is harvesting fish. Within each area, salmon farmers coordinate health management activities of all farms. For example, only farmed salmon born in the same year may be raised within the same management area with the aim of preventing parasites or pathogens from being transmitted to disease-free incoming smolts.
- The FAR for Northern Ireland indicates that the two salmon farming sites are approximately ten miles apart and are operated independently and stocked and harvested on an alternate basis allowing a six week fallow period of each site between final harvesting and restocking.
- The Norwegian FAR reports that a synchronized winter delousing treatment program has been in place since 2007 (see section 4 above). While this had been deemed successful, as assessed by lice levels on out-migrating smolts, resistance to treatments has developed and less efficacious compounds are now being used. There is increasing interest in the use of wrasse but current knowledge suggests that use of these cleaner fish alone will not be adequate to protect wild fish. Wild stocks of wrasse are not adequate to supply the industry but commercial rearing is showing

promising results although it will not be able to meet demand until 2013. There is mandatory reporting of all suspected or confirmed cases of reduced sensitivity or resistance of sea lice to any of the available treatment drugs.

- The US FAR states that integrated pest management protocols include monitoring of sea lice levels and evaluating treatment efficacy. The guidelines include BMPs that seek to reduce the need for use of chemicals or medications. Routine monitoring of sea lice populations occur at least bi-weekly when water temperatures are greater than 8ºC, and monthly when water temperatures are between 6ºC and 8ºC. A maximum treatment threshold for sea lice counts is presently 1 gravid female and 5 pre-adult, on average, with a minimum of two samples. At the discretion of the licensed veterinarian, treatment may be initiated before such a count is reached. If appropriate, coordinated bay-wide therapeutic treatments are used to reduce initial infection.

11. Control of movements into a Commission area of reproductively viable Atlantic salmon or their gametes and of introductions into a Commission area of reproductively viable non-indigenous anadromous salmonids or their gametes

The Williamsburg Resolution states that movements into a Commission area of reproductively viable Atlantic salmon or their gametes and of introductions into a Commission area of reproductively viable non-indigenous anadromous salmonids or their gametes should not be permitted. It should be noted that in the case of the Faroe Islands and Germany there were either no native salmon stocks or the native salmon stocks have been lost, so the establishment or re-establishment of stocks required the use of non-indigenous salmon. In both cases, the material used had originated in the North-East Atlantic Commission area.

- A number of FARs confirm that these movements and introductions are either not permitted or do not occur. However, in some jurisdictions these movements and introductions into a Commission area have occurred under licence (e.g. Scotland, and Ireland). Some FARs refer to reproductively viable non-indigenous salmon, particularly rainbow trout, that were introduced historically for aquaculture purposes and that are now considered indigenous (e.g. in Canada) or where there is concern about escapes from farming but uncertainty about whether self-sustaining stocks have been established (e.g. Norway). In Canada, the current rainbow trout policies authorize the use of rainbow trout only within the historical range of introductions and a similar situation exists for brown trout, though the geographic range of introduction and establishment is much less.
- The FAR for the Russian Federation indicates that the introductions of pink salmon from the Russian Far East during the 1930s and 1960-1990s have now ceased, although self-sustaining populations are present in all rivers in the Murmansk region. Furthermore, pink salmon adult fish are regularly observed in northern Norwegian rivers and spawning fish and fry have been observed in one Norwegian river.

12. Procedures to prevent introductions of non-indigenous fish into salmon rivers

The Williamsburg Resolution recommends that no non-indigenous fish should be introduced into a river containing Atlantic salmon without a thorough evaluation of the potential adverse impacts on the Atlantic salmon population(s) which indicates that there is no unacceptable risk of adverse ecological interactions. Non-indigenous is defined in the Resolution as not originating or occurring naturally in a particular environment; introduced outside its native or natural range. The information provided in the FARs refers to measures relating to both salmon and other species.

- Several FARs confirm that introductions of non-indigenous fish species into rivers containing salmon are not permitted while others indicate that there would be a strong presumption against releasing any non-native fish into rivers containing salmon.
- The FAR for Canada states that no new introductions or transfers of non-indigenous fish into the rivers in Atlantic Canada or Quebec containing Atlantic salmon have been approved since 2002. However, unlawful introductions have occurred e.g. of smallmouth bass, largemouth bass, chain pickerel and brown bullhead, and it is thought that these illegal introductions have negatively impacted a number of freshwater ecosystems in the region. Detection of such activities relies to a large degree on information from the public but actions have been taken in relation to violations (see also section 16 below).
- The FAR for France indicates that while an authorisation is required to introduce any fish not present in French watercourses, the list of species that do not need authorisation is based on fish present in France in 1985 and includes alien species including rainbow trout.
- The US FAR indicates that stocking of non-indigenous species into waters containing anadromous Atlantic salmon are widespread and authorized by the appropriate state agency having jurisdiction over these actions. Prohibitions on introducing non-indigenous fish (e.g. smallmouth bass, brown and rainbow trout) into rivers containing wild Atlantic salmon are not in place. In the case of ESA listed salmon populations, state managed programs receiving federal support would require a thorough analysis of any proposed introductions including identifying, evaluating and mitigating potential adverse impacts to the salmon population.

13. Application of the NASCO Guidelines for Action on Transgenic salmon

The NASCO Guidelines for Action on Transgenic Salmonids (Annex 5 of the Williamsburg Resolution) state, *inter alia,* that Parties should: take all possible steps to ensure that the use of transgenic salmonids is confined to secure, self-contained, land-based facilities; inform salmon producers of the risks to wild stocks; and take steps to improve knowledge of the potential impacts of transgenic salmonids on wild stocks and their habitat. Most FARs indicate that there is no rearing of transgenic salmonids. While most jurisdictions with salmon farming have indicated that the industry is not in favour of rearing transgenics, and at the Liaison Group meeting ISFA has confirmed that it rejects the use of transgenic salmon, few FARs described clearly if the controls exist to ensure that use in the future is consistent with the NASCO Guidelines i.e. in secure, self-contained, land-based facilities.

- The FAR for Canada indicates that while no transgenic salmonids have been approved for commercial aquaculture, release, or consumption, research has been approved to

rear transgenic salmonids in contained facilities to assess the environmental and human health risks, and the performance characteristics of the fish.

- The US FAR indicates that permits for the commercial culture of Atlantic salmon in net pens and freshwater hatcheries in the US prohibit the use of transgenic salmon. However, an application has been made to the Food and Drug Administration (FDA) for approval to sell transgenic salmon in the US. As part of the review process an Environmental Assessment will be required and a consultation is required under the Endangered Species Act to determine the potential impacts on endangered Atlantic salmon. The scope and complexity of the analyses will depend on the type of approval ultimately sought from the FDA – rearing in freshwater facilities in the US, rearing in marine waters in the US, or only sale of the fillets and whole fish in the US.

While the Review Group recognises that rearing of sterile, transgenic salmon in land-based facilities might reduce the risks of adverse impacts from sea lice and escapes compared to current practice, the availability of these fish raises issues that the Group believes should be thoroughly discussed by the Council. The Review Group is concerned about the additional risks that transgenic salmon could pose to the wild stocks if reared in sea cages. There will, therefore, be a need to ensure, as the Council intended, that any rearing in the North Atlantic area is restricted to secure, self-contained land-based facilities. However, it is not clear from the FARs if each jurisdiction has the legislation in place to require this. The Review Group considers that this element should be more clearly reported in subsequent FARs, particularly as approval may be given by the US FDA to market transgenic salmon. It might also be further discussed at the Special Session scheduled for the 2011 Annual Meeting. The Group understands that the consultations referred to in the US FAR have not yet taken place and the Group is aware of concerns that have been expressed that the FDA environmental assessment would not adequately address impacts on wild salmon stocks.

14. Development of river classification and zoning systems

Article 8 of the Williamsburg Resolution states that for the purpose of developing management measures concerning aquaculture and introductions and transfers, river classification and zoning systems should be developed as appropriate. Both the Guidelines for Stocking Atlantic Salmon (Annex 4 of the Resolution) and the North American Commission Protocols for the Introduction and Transfer of Salmonids (Appendix 1 of the Williamsburg Resolution) refer to river classification or zoning.

- The FAR for Northern Ireland states that all 27 salmon rivers have been designated as 'salmonid' rivers under the EU Freshwater Fish Directive and activities likely to have an impact on their native salmon populations would be restricted.
- The Irish FAR indicates that all rivers have been classified in accordance with the NASCO Guidelines for Stocking Salmon and that given the poor returns from extensive restocking programmes over the past decades and new evidence of the potential negative effects of using hatchery progeny for some restocking programmes, all restocking programmes are being reviewed.
- The Norwegian FAR indicates that all salmon rivers are classified on the basis of the extent to which they have been impacted by human activities, ranging from rivers that have lost their salmon stock to those that are only moderately or lightly affected by human activities and which do not require special attention. Norway has also designated 52 National Salmon Rivers and 29 National Salmon Fjords in which the salmon stocks are given special protection including a prohibition on the

establishment of new aquaculture facilities or increase in the production of farmed anadromous or marine fish in existing facilities.

- The US FAR states that all salmon rivers have been classified in accordance with the NAC Protocols i.e. into three types: Class 1 (Pristine), Class II (Habitat alterations, non-indigenous wild or hatchery-reared Atlantic salmon populations), and Class III (Habitat alterations, non-indigenous fish species). In Maine both Class II and III rivers occur, but only Class III rivers occur elsewhere in New England.

The Review Group notes that while it is clear that many jurisdictions are developing river classification, e.g. under the EU Water Framework and Habitats Directives, few FARs referred to how river classification was used for developing management measures in relation to aquaculture and related activities. This element might be more clearly reported in subsequent FARs. The Group notes that where wild salmon 'protection areas' and 'aquaculture exclusion zones' have been established, there is a need to assess their effectiveness in protecting the wild stocks.

15. Procedures to initiate corrective measures where adverse impacts are identified and description of factors impeding implementation of the BMP Guidance

Where significant adverse impacts on wild salmon stocks are identified, the Williamsburg Resolution states that Parties should initiate corrective measures without delay and that these should be designed to achieve their purpose promptly. Mitigation measures can include activities to safeguard against potential future impacts (e.g. contingency planning, gene banks). For example, the Guidelines on Containment of Farm Salmon refer to the need for escape contingency plans, Annex 2 of the Williamsburg Resolution refers to the establishment of gene banks to protect against loss of genetic diversity and the 'Road Map' for *G.salaris* developed by the North-East Atlantic Commission refers to the need for contingency plans to be developed.

- The Canadian FAR indicates that a gene-banking program for Inner Bay of Fundy salmon populations was established in 1998 and a program has been developed to maximize the genetic diversity of the populations held. Several key populations are also being harboured and protected in DFO Biodiversity Centres in New Brunswick and Nova Scotia.
- The FAR for the Faroe Islands states that when heavy metal concentrations or organic matter in the sediments below salmon farms exceed prescribed levels operations may continue only when the seabed has recovered.
- Several FARs refer to the development of contingency plans in relation to *G.salaris* and escapes from salmon farms, including recapture efforts.
- The Norwegian FAR states that reporting of any reduced sensitivity to sea lice treatments is required and there are powers for the authorities to require reduction in biomass or slaughtering if the lice cannot be controlled; to extend fallowing; to prevent new smolt stocking; to ban the use of substances if resistance is detected; and ultimately to withdraw the licence to farm.
- The US FAR indicates that salmon farming facilities failing to meet permit conditions are required to initiate corrective measures to bring the facility into compliance before smolts can be transferred.

The Review Group considered that many FARs did not report clearly on this aspect and in others little information was presented on the nature of the measures to be taken to protect the wild stocks when unforeseen impacts are detected. It was also unclear if contingency plans had been tested in practice or their efficacy assessed. For future reporting, this important aspect of the Precautionary Approach should be addressed.

16. Research and data collection including monitoring programmes

The Williamsburg Resolution states that each Party should encourage research and data collection in support of the Resolution and take steps to improve the effectiveness of the measures contained in the Resolution. Annex 7 of the Resolution details the areas for research and pilot testing.

Sterile fish:

- The FARs for Norway and Scotland indicate that research is being undertaken into the development of triploid strains. The Liaison Group has been made aware of the *Salmotrip* project, a three year (2008 – 2010) feasibility study into triploid Atlantic salmon production. The project is funded through the EU Seventh Framework Programme and will provide new knowledge to support decisions on the potential implementation of triploid salmon within the salmon industry as a measure to minimise genetic impacts while improving fish welfare and food standards by maintaining a year-round high quality product that is acceptable to the consumer (see SLG(10)4).

Genetic methods:

- The FAR for Northern Ireland refers to an earlier study which showed that inter-breeding between wild and farmed salmon following an escape event had resulted in persistent genetic changes in the wild stocks although the significance of the changes was unknown.
- The FARs for Scotland and Norway state that studies are underway to better understand genetic structuring of wild stocks. In Norway, research is ongoing into the development of genetic markers to distinguish farm and wild salmon and to assess how much the genetic composition of wild salmon has been changed by escapees.

Intermingling:

- The FARs for several jurisdictions refer to monitoring programmes in fisheries, rivers or both to detect the occurrence of fish farm escapees. In the US, temporary weirs can be installed within 24 hours of any reported aquaculture escape.
- The Irish FAR indicates that investigations and industry surveys are being undertaken as part of an EU funded (FP7) project, 'Prevent Escape', which is examining the extent and causes of potential and actual failures in containment at marine finfish farming operations in Ireland and the results will be used to advise on improvements.

Risk assessment:

- The FAR for England and Wales states that risk assessment protocols and management practices for the introduction of non-native fish species are under development.

Diseases and parasites:

- The FAR for Scotland states that a biophysical model of planktonic sea lice dispersal has been developed and is being validated. Geographical variations in sea lice burden on sea trout and the link to production on farms are being investigated.

Biological interactions:

- The FAR for England and Wales indicates that research into the impacts of intensive in-river aquaculture on wild salmonids is being conducted. An initial study, completed in 2007, investigated the effects of trout farms on both reproduction and smoltification in Atlantic salmon. A further study will be completed in 2014.

Production methods:

- The Canadian FAR refers to an industry-driven program funds research into best performance in fish production, optimal fish health, and industry environmental performance. The US FAR states that the efficacy of using Emamectin Benzoate (Slice®) for treating sea lice infestations has been evaluated. Additional new animal drug studies for alternative treatments are ongoing. Since 2006, the State of Maine DMR has been collecting data on the source and causes of losses from marine net pens and freshwater hatcheries.

Tagging and marking:

- The US FAR indicates that, since 2009, all farmed fish have required to be genetically marked.
- The Norwegian FAR states that DNA profiles are used to identify sources of unreported escapes (TRACES)
- The FAR for Scotland states that a tagging study was conducted to assess dispersal of escaped farmed salmon that showed a net easterly long-range dispersal.

The Review Group believes that further research and development on improved containment technologies (particularly closed containment systems), alternative approaches to the production of sterile salmon and commercial-scale trials with sterile salmon are urgently required. Similarly, in relation to sea lice there is a need for further research and development of vaccines and effective therapeutants, particularly given the evidence of resistance to existing treatments.

17. Development of educational materials to increase awareness of the risks of introductions and transfers

Article 12 of the Williamsburg Resolution recommends that educational materials should be developed and distributed to increase awareness of the risks that introductions and transfers of aquatic species may pose to wild salmon stocks and the need for measures that control these activities.

- The FAR for Canada indicates that programmes are run to educate anglers of the dangers of introducing non-native aquatic animals and plants. Materials have been developed to assist the public in identifying aquatic invasive species and warning of the dangers they pose to aquatic habitats and native species.
- The FARs for a number of EU jurisdictions refer to initiatives to increase awareness of the threats posed by the parasite *G.salaris* and the need to prevent its further spread. These include the use of roadside signs, videos/DVDs, webinars, press releases, establishment of disinfection stations, presentations at meetings and leaflets. In England and Wales, a website 'efishbusiness' has been established providing information on the regulations, guidance, news and the mechanism for applications to move fish.
- The Norwegian FAR refers to training courses that have been developed for fish farm personnel on escape prevention, and to guidelines that have been disseminated on effective sea lice treatment on farms and on the spread of *G.salaris*.

18. Evaluation of the effectiveness of the measures taken

A central theme of the Precautionary Approach is the assessment of the effectiveness of management measures taken and, where necessary, adaptation of these measures so as to safeguard the wild stocks. The need for adaptive management is also highlighted in the BMP Guidance in relation to salmon farming. While it is clear that various monitoring programmes are in place e.g. in relation to the distribution of *G.salaris* most FARs failed to describe programmes to assess the effectiveness of management measures and how the information derived is used in the management process. In this regard, the Review Group wishes to stress that while it may have indicated in the assessments that the measures taken are consistent with NASCO's agreements, it cannot assess if the measures are effective in safeguarding the wild stocks. The BMP Guidance contains recommendations for reporting and tracking to support assessment of the progress made towards achievement of the international goals for salmon farming. The Review Group welcomes these recommendations which include monitoring of lice loads on wild salmonids in areas with and without farms; lice-induced mortality of wild salmonids and the efficacy of lice treatments, and the incidence of farmed salmon in the wild.

- The FARs for Denmark and the Russian Federation indicate that all or a proportion of stocked hatchery reared salmon are marked or tagged before release in order to assess return rate, mortality and contribution of stocked fish to the spawning stock. The FARs for England and Wales and the US indicate that monitoring is an integral part of stocking programmes.
- The FAR for Ireland indicates that in addition to monitoring for sea lice on farms, there is netting in estuaries to determine the sea lice infestation on prematurely returning sea trout and both live fish-lift trawling and surface gill-netting have been used to investigate sea lice levels on migrating post-smolts. Mortality of wild smolts due to sea lice has been investigated through releases of batches of fish treated with SLICE® and untreated controls.
- The Norwegian FAR refers to monitoring programmes for escaped farmed salmon in 39 watercourses. There is mandatory counting and reporting on a regular basis of sea lice burdens on farmed salmon, monitoring of lice levels on migrating smolts, and in 2010 a programme to monitor for resistance to sea lice treatment was scheduled to commence. A surveillance programme is in place to confirm the absence of *G.salaris* from areas with parasite-free status. The effectiveness of the National Salmon Rivers and Salmon Fjords will be assessed ten years after their establishment.

The Review Group believes that for future reporting, it will be essential that there is clear presentation of the outcomes of the monitoring in support of the BMP Guidance in order to assess progress towards the international goals.

19. Application of socio-economic factors in relation to attainment of NASCO's objectives

NASCO's Guidelines for Incorporating Social and Economic Factors in Decisions under the Precautionary Approach, CNL(04)57, provide a framework for incorporating social and economic factors into decisions which may affect the wild Atlantic salmon and the environments in which it lives. They state that the means by which social and economic factors may be incorporated in decisions under the Precautionary Approach is through socio-economic impact assessments, and that in the guidelines, the purpose of such assessments is

to support and inform decision-making, rather than providing a mechanism for making the decision. The objective of the Williamsburg Resolution is to minimise the possible adverse impacts of aquaculture, introductions and transfers and transgenics on the wild stocks, while recognising the benefits, including the socio-economic benefits, which have resulted from the development of salmon aquaculture. Thus, the NASCO Resolution and Guidelines do not make it clear how decisions relating to aquaculture, introductions and transfers, and transgenics are to be taken when there are conflicting socio-economic and conservation issues to be considered. While some FARs referred to the social and economic values associated with the salmon farming industry, they did not refer to the economic values associated with the wild stocks which also need to be taken into account in management decisions and most FARs failed to indicate how socio-economic factors are incorporated into management decisions.

- The FAR for England and Wales indicates that the majority of stocking of either native or non-native species is to maintain, improve or create fisheries, which will have both social and economic values. However, regardless of the purpose, stocking and transfers will only be permitted if the ecological and fish health conditions are met, and there is a presumption that requirements for stocking should not override the maintenance of good ecological conditions.
- The FAR for Scotland indicates that stocking of non-natives can support the maintenance and development of fisheries for socio-economic purposes. However, to balance these needs against the risks, nearly all stocking of non-native species is normally restricted to enclosed, artificial or highly managed fisheries, and there is a presumption against permitting any stocking that would compromise the maintenance of good ecological conditions in natural waters.
- The US FAR states that when determining whether or not a species qualifies for protection under the Endangered Species Act, the Services are to make their determinations based solely on the best scientific and commercial data available; consideration of economic impacts is not permitted. Further, if a project is determined to jeopardize the continued existence of a species listed under the ESA, the Services cannot authorize any take and instead must identify an alternative project that would not result in jeopardy.

The Review Group noted that most FARs did not provide a clear indication of how socio-economic factors are incorporated into management decisions (this was also noted by earlier Review Groups in relation to the management of salmon fisheries and habitat protection and restoration). For future reporting this aspect should be addressed.

20. Conclusions

This overview highlights the wide range of approaches that are being used by jurisdictions in attempting to minimise impacts of aquaculture, introductions and transfers and transgenics on the wild salmon stocks. In its report, the Review Group recognises the progress that has been made in this regard. However, it is clear that significant challenges remain not least given the statements made in the FARs about the detection of resistance of sea lice to SLICE® and pyrethroids, the apparent increased abundance of lice related to warmer water temperatures, the increasing size of cage units etc., and the continuing high levels of escaped farmed salmon in rivers and fisheries in some jurisdictions The possible approval of transgenic salmon in the US may pose new challenges and possibly opportunities to address impacts of salmon farming. There are also significant challenges related to stocking and introductions

and transfers, not least those in ensuring that *G.salaris* is not spread to areas currently free of the parasite.

One of the purposes of the 'Next Steps' process is to facilitate information exchange among the jurisdictions. The Review Group has made recommendations that should facilitate improved information exchange the next time the Council focuses on aquaculture and related issues. In this regard, the Group believes that it would be desirable that future FARs focus on outcomes and progress towards achieving the international goals.