CNL(07)18

Council

Report of the Meeting of the Liaison Group with the North Atlantic Salmon Farming Industry

1. The Liaison Group met in Boston, USA, on 9 and 10 March under the Chairmanship of Ms Mary Colligan (USA). The report of the meeting is attached. A welcome development was that for the first time NASCO's accredited NGOs participated in the meeting.

2. The Group agreed that it should:

   - share information on area management initiatives (local cooperation between wild and farmed salmon interests to address impacts of aquaculture on wild stocks, e.g. from sea lice) and promote area management to NASCO's Parties;
   - continue to explore opportunities for cooperation between wild and farmed salmon interests and that reports of such initiatives should be made available to the Group;
   - hold a one-day session at its next meeting focusing solely on the level and causes of escapes and opportunities to minimise them;
   - encourage research into alternative treatments for sea lice and make representations to the authorities urging that they make effective sea lice treatments available as quickly as possible where these are environmentally acceptable.

3. The industry representatives agreed to explore how they might support the SALSEA programme and to develop a discussion document on how NASCO could further support the salmon farming industry.

4. The Council is asked to consider the Liaison Group's report and decide on appropriate action.

Secretary
Edinburgh
11 April 2007

SLG(07)14

Report of the Meeting of the North Atlantic Salmon Farming Industry and NASCO Liaison Group

Hyatt Regency Boston Hotel, Boston, USA 9 and 10 March, 2007

Prior to the opening of the meeting, the Liaison Group agreed conditions for attendance by observers representing NASCO's accredited NGOs at its meetings, SLG(07)12 (Annex 1). Under condition 1 it is stated that the NGOs will advise the NASCO Secretariat of their representative(s) at least one month before the Liaison Group meeting and in the event of any change in the NGO representation this would provide for an exchange among the Parties well in advance of the meeting.

1. Opening of the Meeting

1.1 The Chair, Ms Mary Colligan (USA), opened the meeting and welcomed participants to Boston. She indicated that while the full Liaison Group had not met for two years, its 2005 meeting had been productive with a useful exchange of information and there was a need to build on that progress. She referred to the Liaison Group's Trondheim Workshop and the ICES/NASCO Bergen Symposium that had been held in 2005. The findings from the ICES/NASCO Symposium, in particular, had placed increased urgency on the work of the Liaison Group since the information presented had indicated that there is a legitimate reason to be concerned about the impacts of aquaculture, although progress in managing these interactions is being made. Furthermore, the industry now accepts that its activities can have impacts on the wild stocks, a prerequisite to moving forward cooperatively to address the remaining challenges related to the impacts of escapees and sea lice. She hoped that during the meeting it would be possible to make further progress in finding solutions to these issues and in charting a course for future Liaison Group meetings.

1.2 Ms Nell Halse indicated that it was a pleasure for the industry representatives to participate in the meeting. She referred to the Liaison Group's Guiding Principles that recognise the importance of conserving and enhancing wild salmon stocks and of supporting a sustainable salmon farming industry. She noted that over the years considerable trust had been developed between wild and farmed salmon interests through the Liaison Group and that amongst other things this had resulted in the development of the Guidelines on Containment of Farm Salmon. The differences of opinion that had arisen following development of the Williamsburg Resolution had been resolved and the Trondheim Workshop had been a very successful initiative. She indicated that the Liaison Group can provide a valuable forum for exchange of information on best practice and she suggested that in future, consistent with its Guiding Principles, the Group should focus more on how NASCO can support the industry and how the industry can assist NASCO with its work in conserving the wild salmon.

1.3 Dr Malcolm Windsor, Secretary of NASCO, added his welcome and stressed that neither NASCO nor its Parties oppose salmon farming but they seek solutions in which a sustainable salmon farming industry can prosper while safeguarding the wild salmon stocks. He stressed that there are many threats to the wild stocks and NASCO is taking action on a broad front to address these but the abundance of the wild stocks is presently low and the ICES/NASCO Symposium in 2005 had highlighted the need for further progress in addressing the challenges posed by sea lice and escapees. He indicated that the Liaison Group could provide a valuable forum for identifying best practice to help address these challenges. He thanked the industry for agreeing to the participation by a representative of NASCO's NGOs, which he thought would bring benefits to the Group and improve the transparency of its deliberations. He added that the Norwegian government representatives had sent apologies that they were not able to be represented at the meeting.

1.4 The Chair welcomed Mr Poupard, the Chairman of NASCO's accredited NGOs, who indicated that it was a pleasure to participate in the work of the Liaison Group and stressed that all of NASCO's NGOs recognise the value and contribution the industry makes in terms of food production and employment in rural communities. These NGOs range from large conservation organizations, such as WWF, to angling, netting and riparian owner groups and even a small educational trust. Details of these organizations are available on NASCO's website (www.nasco.int). He indicated that they all share a desire to conserve Atlantic salmon. He noted that it is NASCO's role to set the international framework of best practice, a level playing-field, for minimising the impacts of aquaculture on the wild stocks, for NASCO's Parties to regulate the industry in line with NASCO's agreements and enforce those regulations, and for the NGOs to offer constructive comments on progress with implementation. In response to a question and a concern raised by the industry representatives, Mr Poupard indicated that he would be communicating the outcome of the meeting to the NGOs together with the official report of the meeting but he stressed that he had no control over whether these organizations would circulate the reports to their members, although he would encourage them to do so.

1.5 Under the Liaison Group's Constitution, the posts of Chairman and of Rapporteur are held alternatively by representatives of NASCO and the salmon farming industry. Mr Sebastian Belle was appointed Rapporteur for the meeting.

1.6 A list of participants is contained in Annex 2.

2. Adoption of the Agenda

2.1 The Liaison Group adopted its agenda, SLG(07)13 (Annex 3) but agreed to delete item 8, 'NGO Participation in the Liaison Group', which had been dealt with prior to the opening of the meeting.

3. Reports on the Trondheim Workshop and Bergen Symposium

3.1 A report on the Trondheim Workshop 'Wild and Farmed Salmon – Working Together' was presented by the Assistant Secretary of NASCO, Dr Peter Hutchinson. This Workshop was held in August 2005, and had been organised by the Liaison Group in conjunction with the European Aquaculture Society. It had allowed for a

thorough discussion on three themes involving cooperation between wild and farmed salmon interests identified in the SALCOOP report:

- area management initiatives (local cooperation between wild and farmed salmon interests);
- use of sterile salmon in farming and the opportunities for comparative trials;
- restoration programmes (cooperative ventures in restoring wild Atlantic salmon).

3.2 He reported that the Workshop had been attended by 84 participants from 13 countries, and a number of important areas where cooperation exists between wild and farmed salmon interests had been identified, including successful area management initiatives. A report of the Workshop had been produced and the aim would be to ensure that this was circulated widely to both wild and farmed salmon interests. The valuable exchange of information at the Workshop would provide a basis for further discussions by the Liaison Group under agenda item 4. The Liaison Group thanked the Steering Group (Mr Kjell Maroni, Mr James Ryan, Dr Peter Hutchinson and Dr Ken Whelan) for their efforts in organising this successful event.

3.3 A report was presented on the ICES/NASCO Symposium entitled 'Interactions between Aquaculture and Wild Stocks of Atlantic Salmon and Other Diadromous Fish Species: Science and Management, Challenges and Solutions'. The symposium had been attended by 110 participants from 15 countries. While recognising that progress had been made in managing interactions between wild and farmed salmon, the continued growth of the industry meant that significant challenges remain in terms of reducing the level of escapes and in managing sea lice so as to safeguard the wild stocks. The scientific papers from the symposium had been published in the ICES Journal of Marine Science (Edited by Dr Peter Hutchinson) and a separate report by the Co-Conveners (Dr Lars Petter Hansen and Dr Malcolm Windsor) addressed the management implications. The Conveners had concluded that, in their opinion, if no action is taken, and if the views of the many scientists and experts at the symposium are correct, there is a risk that the diversity of local adaptations in the wild stocks of salmon will be lost. However, he indicated that a major change at the Bergen Symposium had been the acceptance by the industry that its activities could be damaging to the wild stocks. He concluded that the goodwill and frankness that characterised the Trondheim Workshop and the Bergen Symposium should encourage enhanced cooperation in addressing the remaining challenges.

3.4 During the discussions it was noted that there had been benefits to the wild stocks from salmon farming through economic forces that had resulted in a reduction in exploitation but there were still concerns about the potentially damaging impacts of escapees and sea lice. It was noted that while scientific understanding of the interactions between cultured and wild salmon had increased considerably since the first NASCO symposium on this topic in 1990, the science was still developing. However, modelling studies suggested that at high levels of intrusions of farmed fish (>20%) there could be substantial changes in wild populations within ten generations. Such models would need to be validated. Potentially irreversible genetic changes in wild salmon populations had been noted in some rivers, according to one study in Norway. The need for further progress on containment either through physical means or biological means (use of sterile salmon) had been stressed at the symposium. The industry representatives indicated that they had serious concerns about the use of

sterile salmon. There was further discussion on the use of sterile salmon under agenda item 4(c).

4. Follow-up Actions emerging from the Trondheim Workshop and Bergen Symposium

(a) Area management initiatives

4.1 Dr Stuart Baxter, project manager for the Scottish Tripartite Working Group (TWG), made a presentation on the work of this group. The TWG had been established by the Scottish Executive in 1999 to consider how farmed and wild salmon interests could share common waters in a way which ensures maintenance of healthy wild fish stocks and a sustainable aquaculture industry and to build trust and consensus. The TWG comprises representatives of the salmon farming industry, wild fish interests and the authorities and is funded by the Scottish Executive. Successes to date include the development of working partnerships between the group members and the delivery of Area Management Agreements (AMAs). Where problems arise the existence of Area Management Groups provides a forum for addressing them. The programme has made good progress in coverage of a significant proportion of the west, north-west and Western Isles of Scotland. This has been made possible largely by the work of Regional Development Officers to drive and deliver AMAs at a local level. Difficulties had been encountered, including achieving synchronised treatments in some areas, particularly where farms have all their sites within the same Management Area, and there had been some issues on both sides relating to transparency and publication of information. However, these are being addressed. In response to a question concerning assessment of the effectiveness of AMAs in terms of recovery of wild salmonid stocks, it was stated that, at present, data is insufficient to draw conclusions although there are positive signs. The TWG is now entering the next phase of the programme which is beginning to establish project work, at the regional level, on restoration, genetic diversity and alternative treatments for lice control. It was noted that in Newfoundland it is a new requirement that farms within a production area apply for three sites so as to allow for rotation and fallowing. The New Brunswick industry is being restructured into a three-bay system.

4.2 The Liaison Group discussed whether it might develop guiding principles on area management initiatives. It was recognised that these initiatives are taking very different forms in different countries and that the role of the Liaison Group should be to share information on these initiatives and promote area management to NASCO's Parties.

(b) Salmon restoration programmes

4.3 The Liaison Group reviewed document SLG(07)4 which considered the opportunities for cooperation between wild and farmed salmon interests on wild salmon stock rebuilding programmes. This paper proposed that the principal area for cooperation between wild and farmed salmon interests in rebuilding wild salmon stocks is in addressing the challenges identified at the Bergen Symposium, through the development of effective strategies to minimise impacts of sea lice on wild stocks and to reduce escapes to as close as practicable to zero. The Williamsburg Resolution provides guidance on measures to minimise these impacts. Area management initiatives are an important tool in reducing impacts on wild stocks and, as was

reported at the Trondheim Workshop, there have been significant benefits in some areas although challenges remain. It also noted that the industry has enormous expertise in producing large volumes of hatchery-reared salmon in a cost-efficient manner. This expertise could assist wild fish rebuilding programmes and there are already examples of cooperative projects of this nature. However, the use of hatchery programmes is a contentious issue with somewhat polarised views, and in many situations habitat protection and restoration, rather than stocking, may be the most appropriate approach. It is known that while stocking can be successful, it can also have negative impacts on the wild stocks being conserved. NASCO has developed Guidelines for Stocking Atlantic Salmon (contained in the Williamsburg Resolution).

4.4 The Liaison Group agreed that opportunities for collaboration between wild and farmed salmon interests should be explored in each jurisdiction and that reports of these initiatives should continue to be made to the Liaison Group. There is a role for the Liaison Group in promoting cooperation between wild and farmed salmon interests. The industry representatives indicated that it would be interested in having a more detailed report on the various issues being addressed by NASCO in its work to conserve and restore wild salmon. Reference was made to a recent NASCO report that summarised the Organization's activities over the last twenty years, copies of which would be sent to the industry representatives. Furthermore, NASCO's Parties are developing Implementation Plans in relation to NASCO's agreements on management of fisheries, habitat protection and restoration and aquaculture, introductions and transfers and transgenics. Once finalised, these reports would be publicly available and would detail the measures already taken and those planned for the next five years. Through its International Atlantic Salmon Research Board (IASRB), in response to concerns about the marine mortality of salmon, NASCO has developed an innovative programme of research on salmon at sea, the SALSEA programme, a report on which is given under agenda item 8. An update on the estimates of by-catch in pelagic fisheries would be presented under agenda item 6.

(c) Minimising genetic impacts of farmed fish on wild stocks and research on sterile salmon

4.5 The Chair referred to document SLG(07)5 which contained information extracted from the Norwegian Implementation Plan to NASCO. This paper had been submitted to the Liaison Group for information by the Directorate for Nature Management. Document SLG(07)9 indicated that, in Norway, a process will be initiated to examine the possibility of sterilizing aquaculture fish. It was noted that as escapes could not be eliminated altogether, despite the best efforts of the industry, sterile salmon might be a solution to eliminating genetic impacts on wild stocks but there might be significant costs to the industry and technical challenges remain. Furthermore, it would take approximately ten years before sterile salmon would be available on a commercial scale, and longer if selective breeding programmes were required. The industry representatives indicated that while it may be possible to address consumer concerns about sterile salmon, they simply are not economical and their production would require special broodstock facilities. Furthermore, identifying stocks that might perform well as triploids would be a major research undertaking that would require substantial funding. The industry representatives suggested that a more appropriate approach to minimising genetic impacts would be to focus on improving physical containment. The reports presented in section 5 below indicated that the main sources of escapes are storms, predators and human error and progress is being made in

addressing all of these, not least through improved staff training and deployment of improved technology. In this regard it was noted that the consolidation of the industry had been beneficial, particularly in terms of investment in equipment and infrastructure and consistent management practices. It was suggested that the cost of keeping in the last few percent of fish may be high and may not be cost-effective, whereas that small percentage was very significant to the wild stocks. This continuing level of escapes could threaten the diversity of stocks and lead to declines in fitness. The industry responded that it was committed to 100% containment due to the costs of escapes and the public impression of its activities. The Group recognised that containment is a major issue and that the topic of developments in improving containment might form a topic for a future Workshop or Liaison Group meeting.

4.6 In the Bay of Fundy, Canada, genetic screening of wild and farmed salmon is being undertaken with a view to identifying strains for use in farming that would minimise impacts on the wild stocks in the event of escapes.

(d) Sea lice control

4.7 The Chair referred to the limited number of available therapeutants for controlling sea lice and the concern that resistance to these treatments could develop. Reference was made to the use of wrasse in salmon farms in Norway. Approximately 2.5 –4 million wrasse are used to control sea lice in Norwegian salmon farms located within the wrasse's distribution range and progress is being made in developing breeding programmes for wrasse that should be supplying farms in 3-4 years' time. The Liaison Group noted that it should encourage research into alternative treatments for sea lice and make representations to the authorities urging that they make effective sea lice treatments available as quickly as possible where these are environmentally acceptable.

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(e) Follow-up workshop in 2009

4.8 The Liaison Group agreed to consider this issue under agenda item 9.

5. Reports on Progress in Developing and Implementing Action Plans on Containment

5.1 At its 2001 meeting, the Liaison Group had adopted Guidelines on Containment of Farm Salmon that were incorporated, unchanged, into the Williamsburg Resolution. To assist the Liaison Group to monitor the development and implementation of the Action Plans envisaged under the guidelines, a format had been agreed for reporting on progress. This format seeks the following information:

- progress on developing Action Plans on Containment;
- the level and causes of escapes;
- progress with implementation of, and compliance with, the Action Plan;
- the effectiveness of the Action Plan in minimising escapes;
- identification of areas for research and development in support of the Action Plan.

Information was provided, according to the format by Iceland, SLG(07)7 (Annex 4), Scotland, SLG(07)8 (Annex 5), Norway, SLG(07)9 (Annex 6), the Russian

Federation, SLG(07)10 (Annex 7) and the USA, SLG(07)11 (Annex 8). Canada reported that in Newfoundland and British Columbia, Codes of Containment have been developed that are incorporated in regulations that require mandatory reporting of escapes. In New Brunswick there is a Code of Containment with voluntary reporting, but by April 2007 the Code will be incorporated in regulations that will require mandatory reporting of escapes. Research and development programmes are being undertaken to develop methods for transferring smolts and removing harvest-size fish from cages without handling, to design more stable mooring systems and to develop technology for more exposed sites.

5.2 The Group recognised that under most climate change forecasts the frequency of storm events is predicted to increase and this would pose challenges for containment. If sterile salmon are not an option for the industry then there would need to be greater focus on containment if the frequency and intensity of storms increases. The industry representatives indicated that climate change is being factored into their planning. Reference was made to extreme storms in Scotland in 2005 during which almost 900,000 salmon had escaped. However, these escapes were from a small number of sites and most farms had not had escapes during these storms The industry reaffirmed that there are economic costs associated with escapes and it is investing in new technology and training in order to minimise escapes. Predation is also a cause of escapes and the industry would welcome support from NASCO on this issue.

5.3 The Liaison Group discussed the need for regulation by government compared to self-regulation by the industry with regard to containment. It was suggested that enforcement effort was unlikely to achieve 100% compliance and that there are benefits from a cooperative approach aimed at changing attitudes. Nonetheless there was a need to underpin voluntary initiatives with regulatory provisions and in this regard the industry's containment codes in Canada, US, Norway and Scotland are backed by regulation.

6. The Williamsburg Resolution

6.1 In 2003, the Council of 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, the "Williamsburg Resolution". In adopting this Resolution the Council of NASCO had recognised that it was a "living document" that would evolve in future in the light of experience with its implementation, consultations, improved scientific understanding of impacts and developments to minimise them. A number of revisions had been made to the Resolution, including changes proposed by ISFA. In 2006, following agreement of the changes with ISFA, the Council requested that the Williamsburg Resolution be produced in brochure format and widely distributed Copies of this brochure were made available to the Liaison Group.

7. Report on the Status of Wild Salmon Stocks

7.1 A brief report on the status of wild salmon stocks was presented based on the advice provided to NASCO by ICES in 2006. The advice indicates that abundance remains low as a result of increased mortality at sea. Major reductions in fishing effort all around the North Atlantic have, however, reduced the impact of this low abundance on spawning stocks. There is particular concern about the abundance of multi-sea-

winter stocks in the southern part of the species' range in both Europe and North America. In the US and Southern Canada some salmon populations have been listed under the Endangered Species Act and Species at Risk Act, respectively. A brief outline of the restrictive management measures for commercial and recreational fisheries that have been introduced by NASCO and its Parties was presented. In 2006 there had been no re-assessment of the level of by-catch in pelagic trawls. Two estimates had previously been provided based on Russian research surveys and screening of commercial catches. The higher of these two estimates, derived from the research surveys, suggested maximum by-catch of around 5% of the combined European pre-fishery abundance.

8. Progress Report on the SALSEA Programme

8.1 In response to concerns about the increased mortality of salmon at sea, NASCO had established an International Atlantic Salmon Research Board (IASRB). Information from monitored rivers indicates that mortality of salmon at sea has doubled over the last thirty years. The objective of the IASRB is to promote collaboration and cooperation on research into the causes of marine mortality of Atlantic salmon and the opportunities to counteract this mortality. The Board had established an inventory of research into the marine mortality of salmon so as to identify gaps in the ongoing research programme and facilitate the development of research priorities. Ongoing expenditure by NASCO's Parties and their partners on research relevant to mortality of salmon at sea is in the region of £5- £6 million annually but despite this significant level of expenditure there is a lack of understanding of the distribution and migration of salmon at sea and the factors influencing them. The Board had, therefore, developed a comprehensive innovative programme of research, the SALSEA programme, involving studies in fresh water, estuaries, coastal areas and in the open ocean. The funding required for the programme of marine surveys of about £9 million is being sought through a public-private partnership. At the meeting between representatives of the ISFA and NASCO Secretariats in 2006, the industry representatives had indicated that they may be able to assist by identifying potential supporters of the programme in the salmon farming industry and some meetings are being arranged with salmon farming countries to discuss possible industry support for the project.

8.2 The industry representatives indicated that in addition to assisting the SALSEA programme by identifying funding sources, they would also be able to assist by lobbying governments to contribute to the programme.

9. Date and Place of Next Meeting

9.1 The Liaison Group decided not to set a date and venue for its next meeting but the NASCO and ISFA Secretariats would make the necessary arrangements for a meeting in 2008. This meeting would be a one-and-a-half-day meeting with half a day allocated to the Liaison Group's business and a full-day session would be held on containment. This session would focus on the level and causes of escapes and approaches to minimising them, including staff training initiatives. It was agreed that the details for this session would be developed inter-sessionally and that representatives of equipment manufacturers and insurance companies might be invited to participate.

9.2 The representative of the SSPO indicated that he would be willing to develop a discussion document with his ISFA colleagues on how NASCO could further support the salmon farming industry, with a view to making this available for consideration at NASCO's Council meeting in June.

9.3 The NGO representative suggested that there may be merit in cooperating with the industry to develop a 'package' to support consumption of farmed salmon rather than wild fish as an additional conservation measure.

10. Any Other Business

10.1 The Secretary of NASCO indicated that he had been very frustrated at the lack of responses from ISFA to correspondence concerning arrangements for the meeting. The representatives of ISFA agreed to raise this at their meeting on 11 March and committed to resolving the issue. There was no other business.

11. Report of the Meeting

11.1 The Liaison Group agreed a report of its meeting.

12. Close of the Meeting

12.1 The Chair closed the meeting and thanked participants for their contributions.

SLG(07)12

Conditions for Attendance by Observers from NASCO's Accredited Non-Government Organizations at Meetings of the NASCO/North Atlantic salmon farming industry Liaison Group

1. The Chairman of NASCO's accredited NGOs and/or his/her designee shall be invited to participate in the meetings of the Liaison Group. The NGOs will advise the Group, through the NASCO Secretariat, of their representative(s) at least one month prior to the meeting of the Liaison Group.

2. The Chairman of the Liaison Group may recognise requests for the floor by the Chairman of NASCO's accredited NGOs and/or his/her designee on any agenda item under discussion before and after debate by the parties to the Liaison Group on that item.

3. The NGOs may not issue press releases or other information to the media on the deliberations at the meeting, but may be invited to participate in the development of any Press Release developed by the Liaison Group.

4. The NGOs shall comply with these and any other conditions developed by the Liaison Group. Non-adherence to these conditions may lead to suspension of observer status to the Liaison Group.

5. Initially, the observer status will apply for a trial period of two years.

Annex 2 of SLG(07)14

Meeting of North Atlantic Salmon Farming Industry and NASCO Liaison Group

Boston, USA
9 and 10 March, 2007

List of Participants

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Annex 3 of SLG(07)14

SLG(07)13

Meeting of North Atlantic Salmon Farming Industry and NASCO Liaison Group

Hyatt Regency Boston Hotel, Boston, USA 9 and 10 March, 2007

Agenda

1. Opening of the Meeting

2. Adoption of the Agenda

3. Reports on the Trondheim Workshop and Bergen Symposium

4. Follow-up Actions emerging from the Trondheim Workshop and Bergen Symposium

   (a) Area management initiatives
   (b) Salmon restoration programmes
   (c) Minimising genetic impacts of farmed fish on wild stocks and research on sterile salmon
   (d) Sea lice control
   (e) Follow-up workshop in 2009

5. Reports on Progress in Developing and Implementing Action Plans on Containment

6. The Williamsburg Resolution

7. Report on the Status of Wild Salmon Stocks

8. Progress Report on the SALSEA Programme

9. Date and Place of Next Meeting

10. Any Other Business

11. Report of the Meeting

12. Close of the Meeting

SLG(07)7

Returns under the Reporting Format for Guidelines on Containment of Farm Salmon

Iceland

Guidelines on Containment of Farm Salmon – Reporting Format

Guidelines on Containment of Farm Salmon					
2.1 Is there currently an Action Plan for containment of farm salmon so as to achieve a level of escapes that is as close to zero as practicable?	YES	X	NO		If 'yes', please attach a copy. If no, what is the anticipated timetable for development of an Action Plan?
	Although the Icelandic salmon farming industry is small (2 sites) there is an elaborate regulation in place regarding design and strength of cages. A contingency plan is in place and the farms are inspected twice a year. The regulation is in Icelandic but an English abstract is attached.				
2.2 Is information available on the level and causes of escapes?	YES	X	NO		If 'yes', please provide details.
	No escapes of farmed salmon have been reported and no escapees observed in Icelandic rivers during 2006. Marine farms are located in eastern Iceland far from the major salmon rivers.				
2.3 Is information available on implementation of, and compliance with, the Action Plan?	YES	X	NO		If 'yes', please provide details.
	Government inspectors have been helpful in designing contingency plans at marine farms and have subsequently followed up on the issue during inspections.				
2.4 Is information available on the effectiveness of the Action Plan in minimising escapes?	YES	X	NO		If 'yes', please provide details.
	Direct information on escapes is limited but judging from numbers of escapees in rivers the escapes are minimal.				
2.5 Have areas for research and development in support of the Action Plan been identified?	YES		NO	X	If 'yes', please provide details.

Note : "Action Plan" means a national Action Plan or regional Plans. Action Plans are the process through which internationally agreed guidelines on containment are implemented at national or regional level through existing or new voluntary codes of practice, regulations, or a combination of both.

Regulatory measure regarding equipment and internal inspection on Icelandic Fish Farms (nr. 1011/ 2003)

Abstract

Árni Ísaksson
Agricultural Authority of Iceland

Provisions

- The regulatory measure is composed of 9 chapters and 8 annexes.
- Chapter 1 (articles 1-2) defines the scope of the measure and technical words.
- Chapter 2 (article 3) contains provisions regarding a production log and its accessibility by inspectors.
- Chapter 3 (article 4) contains provisions regarding accidental releases from fish farms and how these should be dealt with through emergency measures.
- Chapter 4 (articles 5-9) defines the integrity of equipment used on fish farms as well as maintenance.
- Chapter 5 (articles 10-12) defines the inner inspection and risk analysis, which shall be performed on fish farms and approved by the Directorate of Freshwater Fisheries.
- Chapter 6 (article 13) contains provisions for the runoff from landbased farms, which shall be fish-proof.
- Chapter 7 (articles 14-15) specifies methods used for the transport of live salmonids between fish farms, especially if well boats are used. Towing of cages outside the jurisdiction of the fish farms is prohibited, as well as the containment of salmonids in cages, which are not part of a licensed unit.
- Chapter 8 (article 16) contains provisions regarding official inspection of the fish farms by the Directorate of Freshwater Fisheries.
- Chapter 9 (articles 17-18) specifies penalties and validation of the regulatory measure.

Annexes

- Annex 1 specifies the contents and the processing of the log book kept on the fish farm, which shall be available for inspection at any time.
- Annex 2 specifies procedures regarding accidental releases both with respect to reporting and emergency procedures.
- Annex 3 specifies how a fish farm shall be designed and constructed. It defines environmental variables that shall be withstood by different classes of sea-cages. Necessary anchors for each class are also specified.
- Annex 4 contains provisions regarding the inspection of netting used on sea-cages both above and below the sea-surface.
- Annex 5 specifies monitoring of the vicinity of the fish farm through netting series.
- Annex 6 outlines procedures to be devised by the fish farm management in order to minimize accidental releases from sea-cages.
- Annex 7 specifies necessary training of personnel working in fish farms.
- Annex 8 contains provisions on official verification of the effectiveness of the internal inspection performed by the fish farm management at least once a year.

Annex 5 of SLG(07)14

SLG(07)8

Returns under the Reporting Format for Guidelines on Containment of Farm Salmon

European Union (Scotland)

Guidelines on Containment of Farm Salmon – Reporting Format

<table>
<tr><td>Guidelines on Containment of Farm Salmon</td><td colspan="5"></td></tr>
<tr><td rowspan="2">2.1 Is there currently an Action Plan for containment of farm salmon so as to achieve a level of escapes that is as close to zero as practicable?</td><td>YES
✓</td><td></td><td>NO</td><td></td><td>If ‘yes’, please attach a copy. If no, what is the anticipated timetable for development of an Action Plan?</td></tr>
<tr><td colspan="5">NB – The Plan is currently an amalgamation of:
Strategic Framework for Scottish Aquaculture: http://www.scotland.gov.uk/Publications/2003/03/16842/20502

Environmental Impact Assessment (Fish Farming in Marine Waters) Regulations 1999 (it is envisaged that the provisions here will be superseded from April 2007 by new planning legislation and the Aquaculture and Fisheries (Scotland) Bill currently before the Scottish Parliament).

The work of Tripartite Working Group (comprising Scottish Executive, salmon farming industry and wild salmon interests).

The Registration of Fish Farming and Shellfish Farming Business Order 1985 (as amended by SSI No 2002/220), which requires that Scottish Ministers be notified in writing where there is cause to suspect that there is significant risk that an escape has occurred).

Salmon farming industry’s Industry Code of Good Practice: http://www.scottishsalmon.co.uk/aboutus/codes.asp

Fish farming industry has also developed an independent UKAS-accredited audit system which includes reporting in a transparent manner.

The Aquaculture and Fisheries (Scotland) Bill: Passed by the Scottish Parliament on 1 March 2007, awaiting Royal Assent and commencement: http://www.scotland.gov.uk/Topics/Fisheries/afBill/parlafbill

For further details on these measures, see attached paper Annex I.</td></tr>
</table>

2.2	Is information available on the level and causes of escapes?	YES ✓		NO		If 'yes', please provide details.
		See attached tables and figures in Annex II.				
2.3	Is information available on implementation of, and compliance with, the Action Plan?	YES ✓		NO		If 'yes', please provide details.
		See attached paper Annex I.				
2.4	Is information available on the effectiveness of the Action Plan in minimising escapes?	YES ✓		NO		If 'yes', please provide details.
		See attached paper at Annex I.				
2.5	Have areas for research and development in support of the Action Plan been identified?	YES ✓		NO		If 'yes', please provide details.
		Scottish Aquaculture Research Forum (SARF): http://www.sarf.org.uk/				

Note : "Action Plan" means a national Action Plan or regional Plans. Action Plans are the process through which internationally agreed guidelines on containment are implemented at national or regional level through existing or new voluntary codes of practice, regulations, or a combination of both.

ANNEX I of SLG(07)8

Update on Escapes and Containment for Tripartite Working Group - February 2007

Background

Fish farming in Scotland now produces around 135,000 tonnes annually and is worth about £280M. It is vitally important in terms of number of jobs generated and the locations in which it operates. It is an industry that plays an important part in our rural development plans, especially in the western and northern isles of Scotland where many communities are literally sustained by the employment provided by fish farming.

As the industry has expanded, some public concerns have arisen over fish farm escapes and the possible impact that they could have on wild fisheries. Escaped fish have the potential to spread disease, compromise genetic integrity and increase competition in the freshwater environment. Wild Atlantic salmon is a species of European importance, by virtue of being listed in Annex II of the *EC Habitats Directive.*

The Scottish Executive recognises the concerns and risk that escaped farmed fish could interbreed with wild stocks and that any risk of interbreeding should be reduced to an absolute minimum.

Initiatives in place

The principal tool for tackling these issues of public concern and delivering a sustainable industry is the Strategic Framework for Scottish Aquaculture (SFSA) which was launched in 2003. The SFSA was developed by the Scottish Executive (SE) with the full participation of the industry, the wild fish sector and other key stakeholders. The SFSA contains an 'action plan' currently with [36] priorities for action. Progress is monitored by the Ministerial Working Group on Aquaculture (MWGA) and reports are published every 18 months. Since the launch of the framework very good progress has been achieved.

Another important tool is the Tripartite Working Group (TWG) which involves the Executive, wild fish sector, the fish farming industry and key regulators such as Scottish Natural Heritage (SNH) and SEPA. The aim of the TWG is to facilitate a dialogue between the fish farming industry and wild fish interests and to encourage best practice through the development of Area Management Agreements (AMAs). The TWG participants believe that the process is working well.

A number of mechanisms to deal specifically with containment and escapes have also been introduced. It is now standard practice for the Scottish Ministers, in their role as statutory consultees – under *the Environmental Impact Assessment (Fish Farming in Marine Waters) Regulations 1999* – to request that operators produce containment measures and contingency plans as part of any new or modified application for a finfish farm.

In 2002, Scottish Ministers introduced mandatory notification procedures and guidance that apply to all finfish farms in Scotland. *The Registration of Fish Farming and Shellfish Farming Business Order 1985* (as amended by Scottish Statutory Instrument number 2002/193, itself amended by SSI No. 2002/220) requires that the Scottish Ministers be notified in writing immediately where there is cause to suspect that there is significant risk an

escape has occurred. The 'escapes notifications forms' (Annex 1 & 2 of the Order) and accompanying guidance - "*What to do in the event of an escape of an escape of fish from a fish farm"* - have been further updated. The amended Order will be laid before Scottish Parliament by Spring 2007 and expected to come into force by June 2007.

Containment of fish to prevent escapes is a key priority of the Strategic Framework for Scottish Aquaculture (SFSA). Since the SFSA was published in 2003, a Containment Working Group (CWG) comprised of key stakeholders, including industry and wild fish interests, has produced a new Containment Guidance for regulators and industry on behalf of the Highlands and Islands Aquaculture Forum (HIAF) that was included in the Industry Code of Good Practice. A code of Good Practice for Scottish Finfish Aquaculture has been operational since January 2006. A link to the code on the Scottish Salmon website is attached: www.scottishsalmon.co.uk/aboutus/codes.asp.

Industry has developed an independent UKAS-accredited audit system which includes reporting compliance in a transparent manner. The code will be monitored by an independent group – the code of good practice management group - and will be kept under constant review, taking account of best available advice and practice. This group will report to the Ministerial Working Group on Aquaculture on progress and compliance.

The Aquaculture and Fisheries (Scotland) Bill was introduced to Parliament in June 2006 and proposes powers which will eradicate bad practice by underpinning industry's own code of practice. It introduces a duty on fish farmers to collect, retain and make available for inspection information relating to containment of fish. It also introduces powers to allow inspectors access to ascertain whether fish have escaped from a farm and to investigate the risk of potential escapes and allows enforcement action to be taken where farms do not have satisfactory measures in place to contain fish. A link to the Aquaculture and Fisheries (Scotland) Bill is attached:
http://www.scotland.gov.uk/Topics/Fisheries/afBill/Intro.

Since statutory reporting was introduced in 2002, fish farm escapes have reduced. Whilst this demonstrates progress, very adverse storms such as the one experienced in the Western Isles in January 2005 will lead to anomalies but we want to ensure that an overall downward trend continues.

The Executive has been notified of the following farmed Atlantic salmon escapes:

2002	1309,996	
2003	151,853	
2004	90,594	
2005	877,883	(the majority due to the January 2005 storms) + 125,000 on-site mortalities (dead in damaged nets)
2006	157,753	

Excluding the Western Isles storms, the three most common causes of escape for the period May 2002 – December 2006 were: predation; equipment failure; and human error. FFA has agreed to undertake a review of causes of escapes and report back to Containment Working Group. This will help to inform future review of containment guidance. A summary of escapes incidents and causes in 2002-2006 is attached at Annex A.

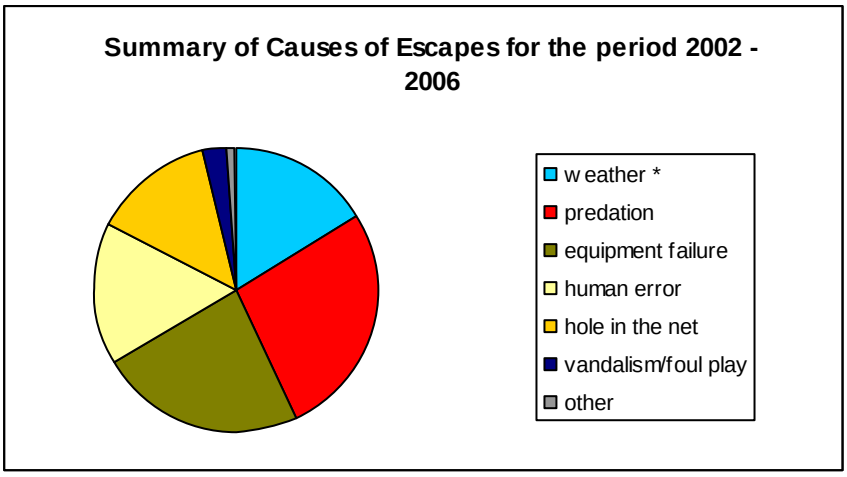
SEERAD, 19 February 2007

ANNEX A of SLG(07)8

CAUSES OF ESCAPES MAY 2002 - DECEMBER 2006

Cause	no. incidents	%
weather *	14	16.28
predation	23	26.74
equipment failure	20	23.26
human error	14	16.28
hole in the net	12	13.95
vandalism/foul play	2	2.33
other	1	1.16
Total	**86**	**100**

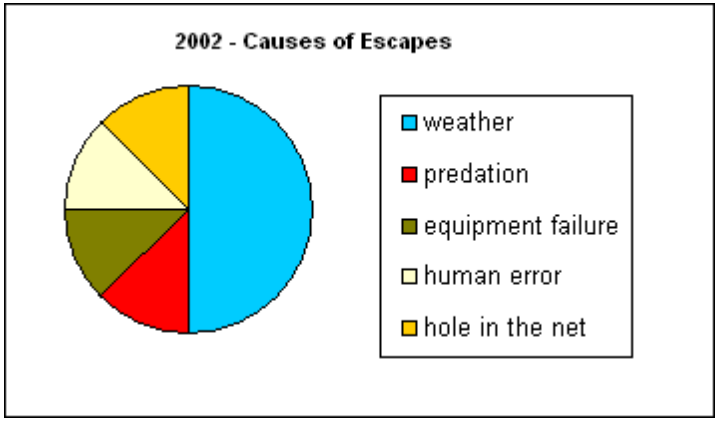
* not including 14 incidents during the 2005 January storms

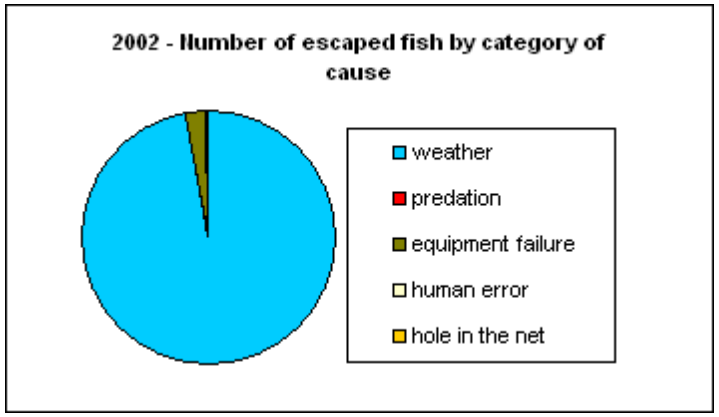


causes of farmed salmon escapes

2002 - 8 escape incidents

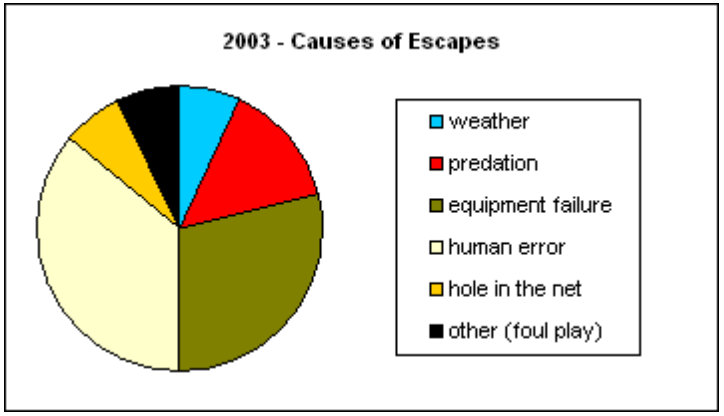
Cause	no incidents	%	no. fish escaped	% of total
weather	4	50	301,255	97.180286
predation	1	12.5	58	0.0187099
equipment failure	1	12.5	8,147	2.6280984
human error	1	12.5	500	0.1612924
hole in the net	1	12.5	36	0.0116131
Total	**8**	**100**	**309,996**	**100**

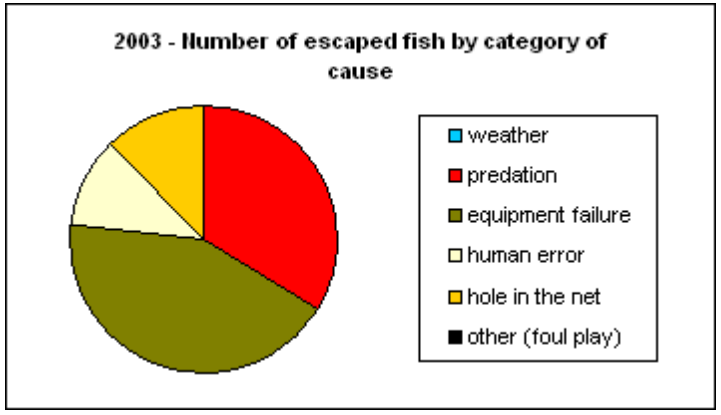




2003 - 14 escape incidents

Cause	no incidents	%	no. fish escaped	% of total
weather	1	7.143	200	0.1317063
predation	2	14.29	51,033	33.606843
equipment failure	4	28.57	65,226	42.953383
human error	5	35.71	16,978	11.18055
hole in the net	1	7.143	18,416	12.127518
other (foul play)	1	7.143	0	0
Total	**14**	**100**	**151,853**	**100**

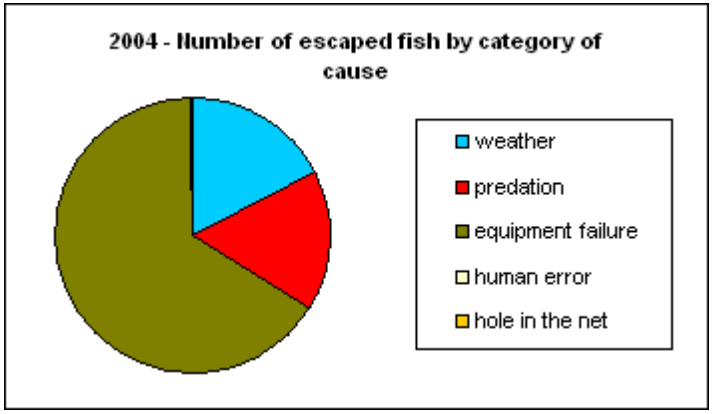




2004 - 13 escape incidents

Cause	no incidents	%	no. fish escaped	% of total
weather	1	7.692	15,946	17.601607
predation **	5	38.46	14,701	16.227344
equipment failure	5	38.46	59,747	65.950284
human error	1	7.692	200	0.2207652
hole in the net *	1	7.692	0	0
Total	**13**	**100**	**90,594**	**100**

* one suspected, but not confirmed, escape has not been included
** the number of escaped salmon remained unknown for one of the escapes caused by predation

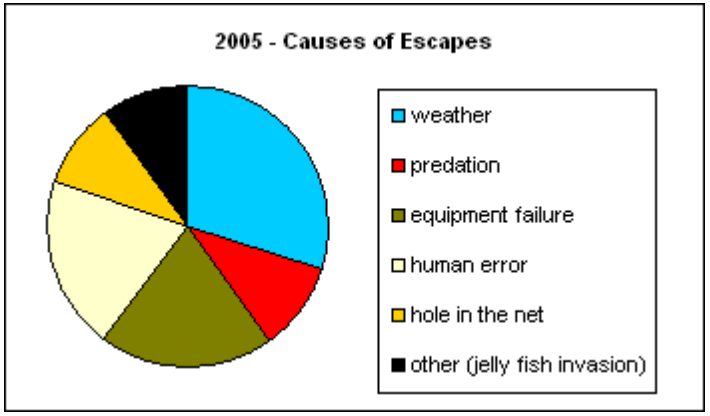


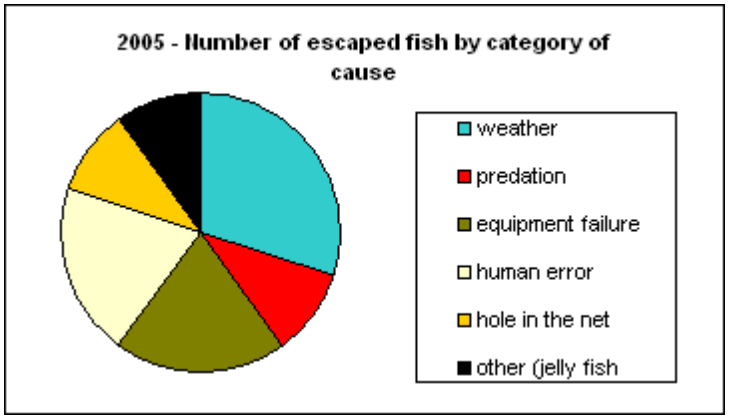
2005 - 10 escape incidents

Cause	no. incidents	%	no. fish escaped	% of total
weather * **	3	60.7	72,000	65.685639
predation	1	10.7	8,500	7.7545547
equipment failure	2	7.1	22,500	20.526762
human error	2	7.1	3,608	3.2915804
hole in the net	1	10.7	3,000	2.7369016
other (jelly fish invasion)	1	3.7	5	0.0045615
Total	**10**	**100**	**109,613**	**100**

* not including 14 incidents during the Western Isles storm in January resulting in 893,270 escaped salmon - including 60,000 on-site mortalities that were recovered

** including 65,000 dead salmon that were recovered

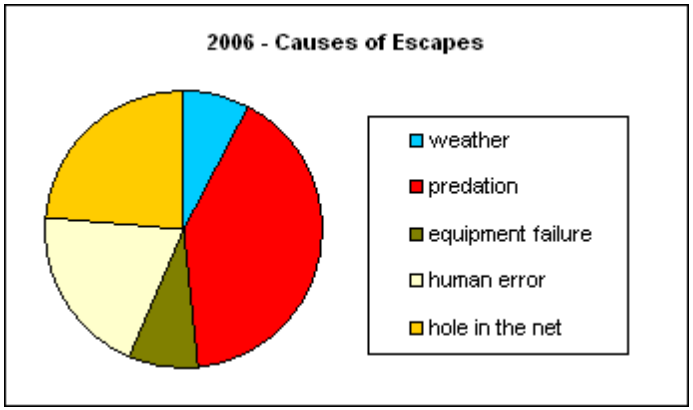


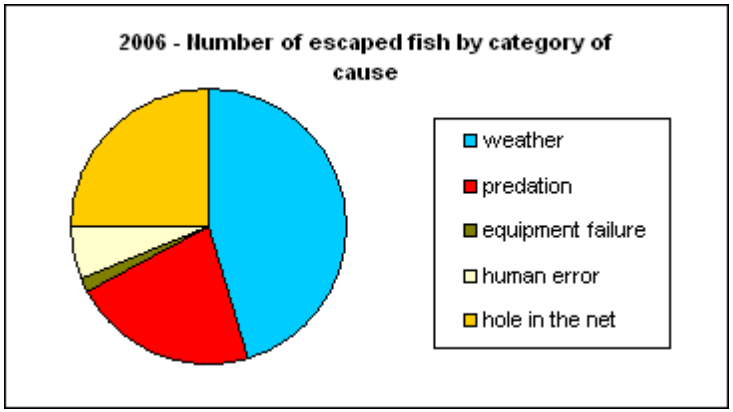


2006 - 25 escape incidents

Cause	no. incidents	%	no. fish escaped	% of total
weather *	2	8	130,000	45.177635
predation	10	40	62,998	21.893082
equipment failure	2	8	4,683	1.6274374
human error	5	20	18,122	6.2977623
hole in the net	6	24	71,950	25.004083
Total	**25**	**100**	**287,753**	**100**

* all fish died during a storm and were recovered





SLG(07)9

Returns under the Reporting Format for Guidelines on Containment of Farm Salmon

Norway

Guidelines on Containment of Farm Salmon – Reporting Format

Norway – Feb. 2007
Report to liaison Group Boston March 9th – 10th .

Guidelines on Containment of Farm Salmon					
2.1	Is there currently an Action Plan for containment of farm salmon so as to achieve a level of escapes that is as close to zero as practicable?	YES x		NO		If 'yes', please attach a copy. If no, what is the anticipated timetable for development of an Action Plan?
		A copy of the Action Plan called "Vision No Escapees" is attached.				
2.2	Is information available on the level and causes of escapes?	YES x		NO		If 'yes', please provide details.
		Relevant information is available at www.fiskeridir.no				
2.3	Is information available on implementation of, and compliance with, the Action Plan?	YES x		NO		If 'yes', please provide details.
		The Action Plan will be implemented during 2006 and 2007, and the status of the process will be available in Norwegian at www.fiskeridir.no				
2.4	Is information available on the effectiveness of the Action Plan in minimising escapes?	YES		NO x		If 'yes', please provide details.
		It is too early to measure the effectiveness of the Action Plan as it will be implemented during 2006 and 2007.				
2.5	Have areas for research and development in support of the Action Plan been identified?	YES x		NO		If 'yes', please provide details.
		The Action Plan describes certain areas for research – B1, B5, B6, B8, C3.				

Note : "Action Plan" means a national Action Plan or regional Plans. Action Plans are the process through which internationally agreed guidelines on containment are implemented at national or regional level through existing or new voluntary codes of practice, regulations, or a combination of both.

Vision NO ESCAPEES (2006-2007)

The Directorate of Fisheries' Action Plan to achieve a level of escapees from fish farms, which is as close to zero as practicable.

Original version, ultimo March 2006

REF. NO.	Action
A	**Better regulations**
A1	Three quick suggestions for amendment of rules (1) double safeguarding of outlets, (2) mesh size in compliance with fish size, (3) the visibility of aquaculture installations on ship radars. The Directorate of Fisheries will propose amendments of the rules for three risk prevention actions, which elaborate the requirements for good husbandry procedures.
A2	Examine the possibility of developing improved regulations. The Directorate of Fisheries will appoint a working group to go through the regulations' suitability in preventing and minimizing escapees. Relevant governmental departments and organisations will be invited to join. The work will, amongst other, embrace the actions A3-A7. The actions will in varying degree demand amendments of the regulations.
A3	Develop special husbandry procedures requirements for cod cultures. There are two specific problems with Atlantic cod farming: they escape easily and they spawn in the fish cages. The distance between cod aquaculture installations and wild cod natural spawning grounds might not necessarily be large. This generates special challenges when the regulations are to ensure that breeding cod takes place in good husbandry fashion.
A4	Requirements for re-catching escaped fish, after an escape episode. It is important the process of catching the escapees is executed efficiently and without delay. Experience has shown that discussions regarding the price to fishermen, after the escape has happened, can delay the process needlessly. There is also the question, as to what extent the involved fish farmer should be responsible for taking the costs with re-catching escapees from the breeding grounds. This must be examined in more detail.
A5	Examine requirements for aquaculture in large units, perhaps an upper limit for quantity of fish permitted in any unit. The development in the aquaculture industry has moved in the direction of more fish per aquaculture unit. The consequence where one or more of these units break down is relatively high. Escapees from one of the largest units can, in magnitude, be compared to the total number of Atlantic salmon, native to all Norwegian salmon rivers, in the sea. Thus, the Directorate of Fisheries believes a set of husbandry requirements must be developed for these particularly large units, or perhaps a maximum limit for the quantity of salmon, which can be held in a single unit.
A6	Consider a mandatory scale sampling from remaining fish groups, when the Directorate of Fisheries inspects the installation after an episode of escapees. The fish scales give information concerning age, and growth patterns, but can also give genetic information. The cost of collecting such fish scale samples is low, but very demanding on the resources needed to carry out the genetic analysis. The advantage is that one can carry out the analysis when needed. The results of the genetic analysis can be used to link escapees to a source. This can become an essential administrative function in the future.
A7	Review and consider more stringent demands for sites. The Directorate of Fisheries wish to review regulations and practice, especially in light of B1.

B	Better administrative tools
B1	Risk assessment aquaculture The Directorate of Fisheries wish, in several ways, to enforce risk assessment in the question of escapees. Environmental risk must, *inter alia*, be assessed in comparison to wild fish populations. However, escapees can be given some type of score in accordance with assumed consequence, which can again make the administration capable of adjusting the use of resources and prioritise the different types of escapee episodes.
B2	Evaluate the escapee statistics and establish a better database for escapees. Today's escape statistics are the fish farmer's own submitted records of the escapes. This has a considerable potential for improvement, both when it comes to precision, and also with reference to how individual escape episodes are characterised (see B1).
B3	Develop and establish effect indicators/vulnerability indicators used in assessing the effect of escapees. Developmental tasks should be accomplished in cooperation with several governmental departments and organisations. This shall form the basis for the Directorate of Fisheries' monitoring of the effects caused by of escapees (see action C3).
B4	Develop and implement a risk based control system for aquaculture – AKVARISK. In 2005 the Directorate of Fisheries began to develop a risk-based control system for aquaculture. The system will be implemented in 2007 (see action C1).
B5	Monitoring program National Salmon Fjords/National Salmon Rivers The Directorate of Fisheries shall, within its area of expertise (escaped aquaculture fish), contribute in such a way that the monitoring program can verify the arrangement concerning the National Salmon Fjords and Rivers. The monitoring program will demand financial participation from the governmental departments involved. This will, in turn, create budgetary consequences for the Directorate of Fisheries.
B6	Examine the possibility of sterilizing aquaculture fish. By sterilizing all bred fish, the possibility of escapees interbreeding with wild populations is avoided. Use of such techniques must be examined with respect to animal welfare, aspect of market reactions, progress in breeding, etc. The Directorate of Fisheries will emphasize a broad specialized investigation into this approach, together with an examination of the legal aspects.
B7	Minimum requirements for good husbandry, contents of contingency plans and monitoring escapes. The regulations demand that aquaculture operations must comply with good husbandry procedures. A definite understanding of good husbandry procedures in conjunction with the security for preventing escapes, varies with technology and expertise. The Directorate of Fisheries wish to identify this fact, using, *inter alia*, the experience gained from auditing aquaculture operations. We find reason to draw up internal synopses, which should eventually be made public on the Internet.
B8	Develop new research-based implements. In cooperation with the Directorate of Nature Management, the Directorate of Fisheries took the initiative for the research program, TRACES, which began in 2006, after a pre-project in 2005. The initial requirements for good effect indicators/vulnerability indicators for wild fish populations made it necessary to implement research efforts for their development. There will be new requirements defined constantly within this action, where each project will demand its own financing.

C	Increased and better efforts
C1	Full production – aquaculture control. In 2006 one third of all Atlantic salmon and rainbow trout sites will be controlled by the Directorate of Fisheries, either through (1) audits in cooperation with the Norwegian Food Safety Authority, in accordance with the regulation Internal Control – aquaculture, (2) technical control or (3) a special control campaign (see action C2). Fish farmers most exposed to defined risks will be controlled first (see action B4). In addition to on-growing installations, smolt installations, brood-stock facilities and research and training facilities will also be controlled. Installations for on-growing of cod will be included as well. All controls in 2006 will have escape impediment as their main focus area. From the beginning of 2007 the aquaculture control will demand a fortified budgetary foundation.
C2	Control campaign. After many escape episodes the Directorate of Fisheries has decided to execute, in 2006, a special control campaign against escapees (constitutes a part of action C1). This special control campaign implies inspection of 60 on-growing installations for Atlantic salmon and rainbow trout and 15 installations for on-growing of cod.
C3	Initialisation of a separate monitoring program for environmental effects due to aquaculture. The environmental action plan, prepared by the Ministry of Fisheries and Coastal Affairs, foresees a monitoring program for environmental effects of aquaculture. The Directorate of Fisheries suggests that the environmental effects of escapees are included in the initialisation process. The action will demand special allocations.
C4	Positioning of aquaculture installations (STAK). The Directorate of Fisheries is, in 2006, carrying out an extensive collection of data, in order to obtain exact positioning of all floating aquaculture installations. This will have great significance in the attempt to avoid collisions and subsequent escapes.
C5	Evaluate routines and actions in conjunction with fish escapes. After the escape episodes in the first few weeks of 2006, the Directorate of Fisheries will examine their own routines and actions in conjunction with large escapes. We will do this in search of the possibility for improvement, and we count on putting forward a proposal for both better routines and new measures of training.
C6	Contingency response exercises jointly with the administrative authorities and fish farmers (against fish escapes). We wish to evaluate the possibility of contingency response exercises as an effective instrument, when preparing for action in conjunction with large escapes. Consideration must be given to how such exercises should be organised, and if amendments to regulations are needed. There must, however, be a constructive budgetary foundation established for such an action.
D	**Better communication and interaction with other governmental departments**
D1	Better interaction with the police and prosecuting authorities. The Directorate of Fisheries wish to improve their own procedures in relation to the interaction with the police and prosecuting authorities. The Directorate sees the distinct benefit in contributing, in a better way than at present, to ensure that charges put forward are enlightened in the best possible manner.
D2	Examine the possibility for an operational cooperation with the Norwegian Coastguard and the Norwegian Nature Inspectorate. Both the Coastguard and the Norwegian Nature Inspectorate have a long-standing presence along the coast, which makes them especially valuable as joint venture partners in the effort against escapees. The Directorate of Fisheries wish to generate a good collaboration with them both in the effort against escapees.

E	**Better communication and interaction with the industry.**
E1	A permanent escape commission including a system for public sharing of experience. The Directorate of Fisheries has, in 2006, put forward a proposal for an escape commission. A publicly appointed commission will need its own budget. The commission must ensure that legal qualification and transparency are considered. (The commission was appointed in the summer of 2006.)
E2	Contribute in the development of voluntary standards beyond the administration's minimum requirements. The Directorate of Fisheries will at some stage challenge the aquaculture industry to establish and follow standards beyond those already imposed by regulation.
E3	Better interaction with the insurance industry. The Directorate of Fisheries will work towards (1) securing conformity between the escapee numbers reported to the Directorate and the escapee numbers that justifies the compensation paid from the insurance companies (2) exchanging experience and (3) examining the possibility for a type of natural hazard arrangement for catching escapees or other clean-up operations (see also action A4) .
E4	Contribute to the audit of NS9415. The Directorate of Fisheries will contribute to the audit of the industry's technical standard, with collection of findings and competence.
E5	Make known enterprises engaging in escapee-free operations and run responsible husbandry procedures. The Directorate of Fisheries will try to identify such enterprises and learn what characterises them/their husbandry procedures. We will proceed to establish a separate prize for good husbandry procedures that carries the Director General of Fisheries' acknowledgments.
E6	Dialogue and information efforts. The Directorate of Fisheries aims to develop the dialogue with various partners and public governmental departments in the effort against escapees. The Directorate has already gained experience concerning this action and knows it is an important part of the task at hand.

Report to liaison group March 2007

Supplement to the report from the Directory of Fisheries

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knuta.hjelt@fhl.no

Escapees and episodes 2006

	1. Qu	2.Qu	3. Qu	4.Qu	Total	1. Qu	2.Qu	3. Qu	4.Qu	Total
Predators	0	5 000	500	1 000	6 500	0	1	2	1	4
Handling	0	14	2 000	10 146	12 160	0	1	2	3	6
Running over by boat	100	0	0	0	100	1	0	0	0	1
Towing	0	0	0	0	0	0	0	0	0	0
Technical failure	423 663	7 918	3 400	68 315	503 296	11	1	2	6	20
Propellers - net	0	300	0	8 074	8 374	0	1	0	2	3
Floating objects	47 000	0	43 500	101 100	191 600	1	0	1	3	5
Other	0	2 000	6 623	37 202	45 825	0	1	1	5	7
Technical failure - smolt	0	0	14 000	4 000	18 000	0	1	6	1	8
Total	470 763	15 232	70 023	229 837	785 855	13	6	14	21	54

Industry activities

- **FHL taskforce on escapees primo 2006**
  - **Directory of Fisheries, insurance, farmers, FHL (- Directory of Nature and WWF)**
  - **Advisory to the board of FHL, possible actions to reduce risk and prevent escapees, propose possible changes or additional regulations/laws to prevent escapees, areas of research needed, improved practice/technology for recapture**
  - **Pushed for establishing an official commission on escapes from aquaculture**

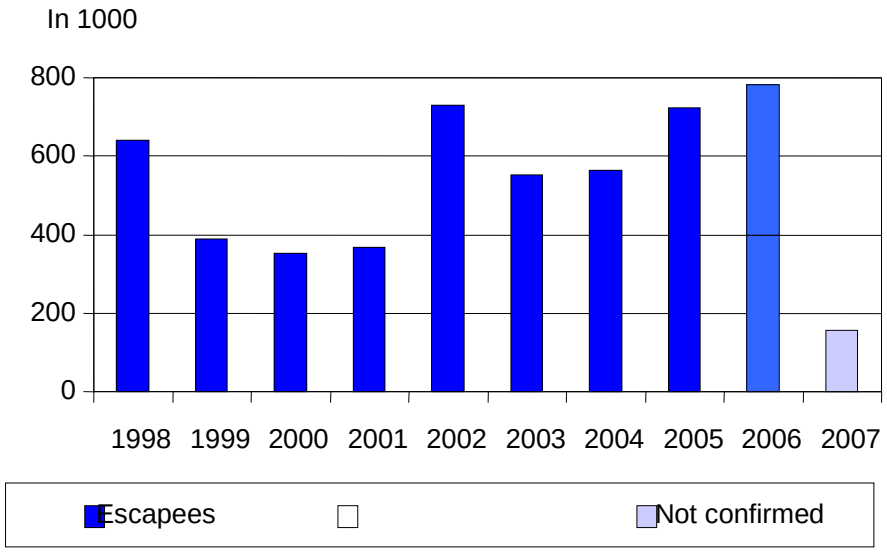
The commission on escapes from aquaculture

- **Department of Fisheries appointed a "commission on escapes from aquaculture" July 2006**
  - **Persons from: Norwegian research council, WWF, Sintef, The Standardization Organizations in Norway, The Norwegian accreditation body, Ethikon, "equipment producers for aquaculture", Fish farmer, FHL**
  - **Get information and initiate investigations to find causes of accidents, systematically work to prevent escapees, reduce risks, propose changes in regulations, standards etc.**
  - **Findings and information public available**
  - **Reports to the Directory of Fisheries**

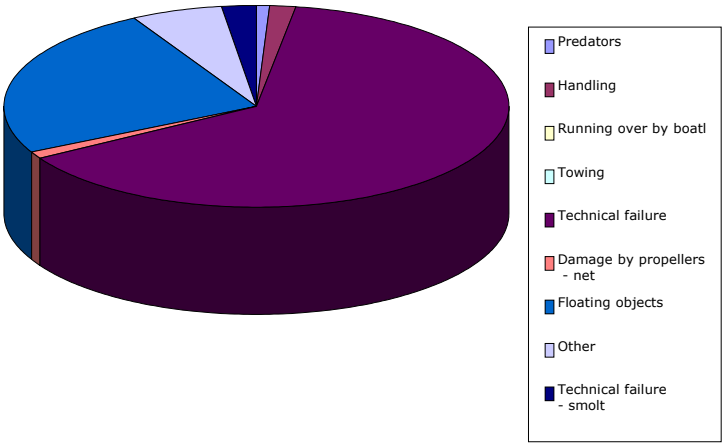
Summing up

- **Technical demands for equipment, accreditation**
- **Accumulation of new knowledge – influence on administration of industry, regulations, standards etc**
- **Industry and regulators working together**
- **Regional courses education – experiences from accidents, new knowledge etc**
- **"Almost accidents" also focused**
- **Focus on recapture – practical actions**

Escapees 1998 - 2006

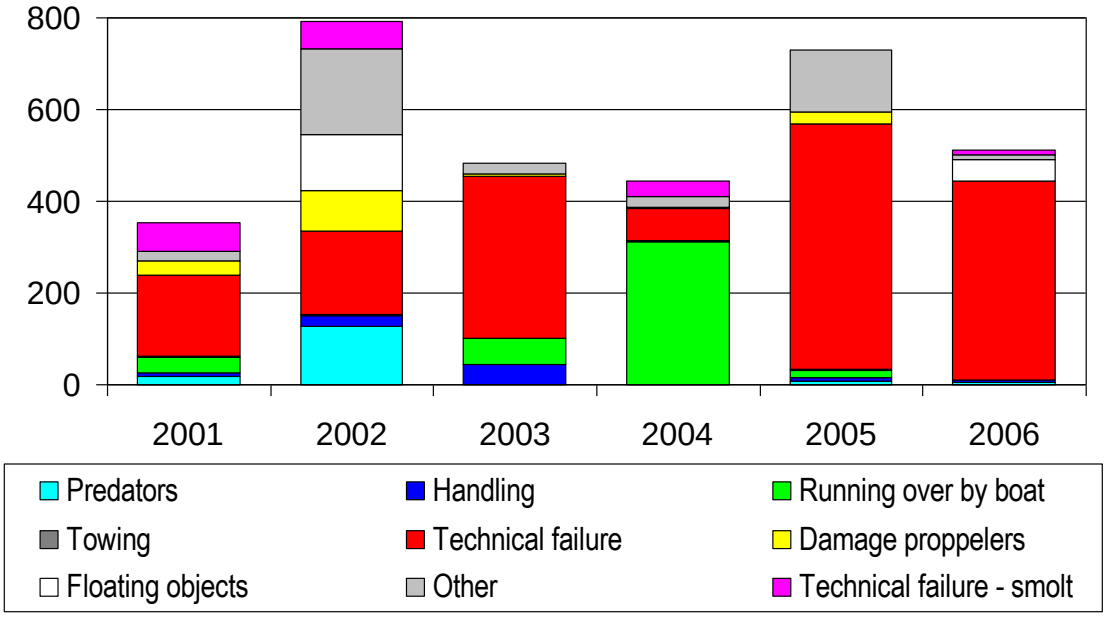


Causes of escapees 2006



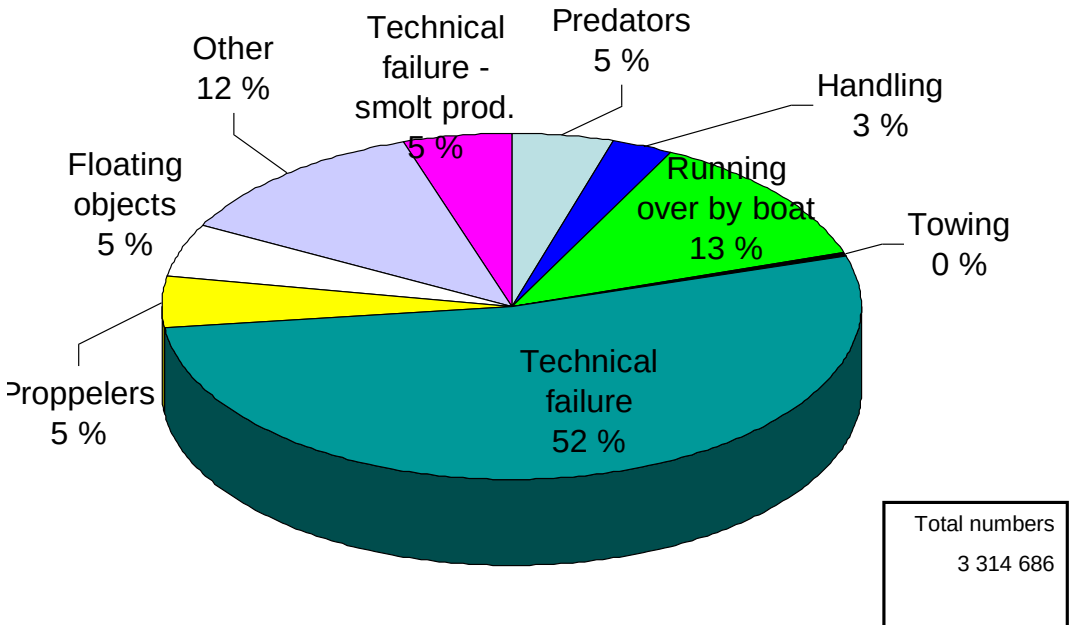
Escapees Salmon and RB-Trout 2001 – September 2006

Directory of Fisheries, Axel R. Anfinsen



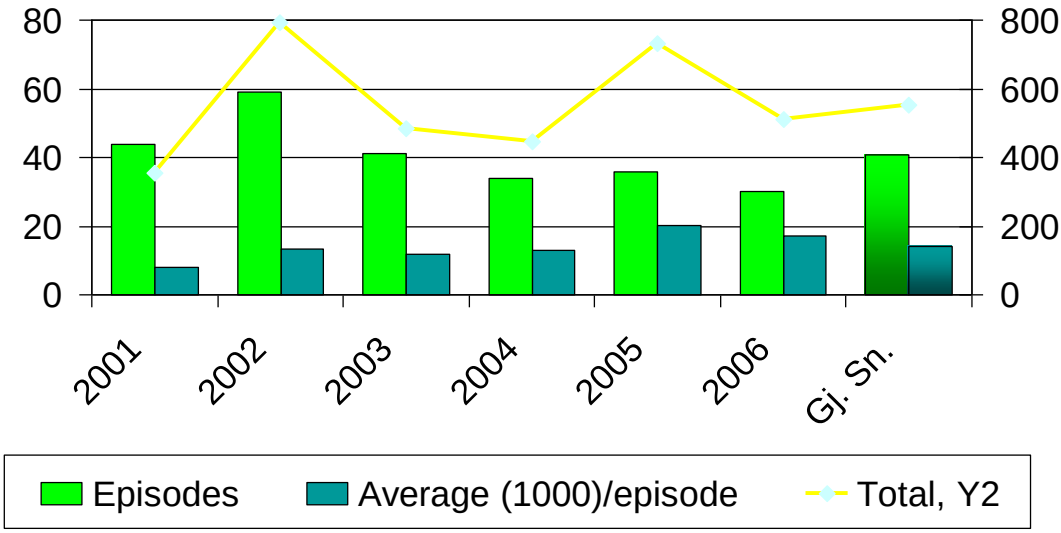
Escapees, salmon and RB-trout 2001 - September 2006

Directory of Fisheries, Axel R. Anfinsen



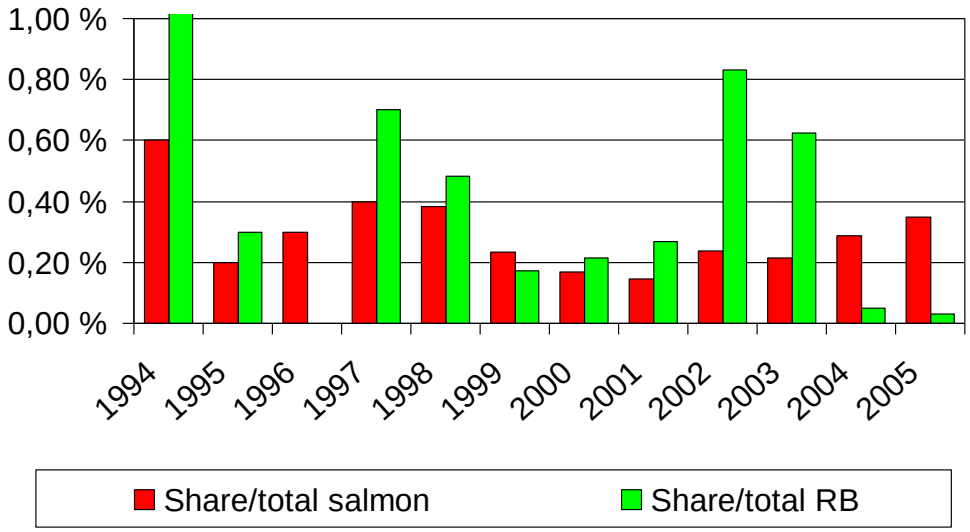
Escapees Salmon and RB-trout 2001 – September 2006

Directory of Fisheries, Axel R. Anfinsen

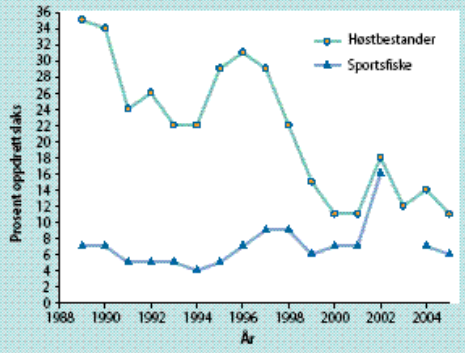


Salmon and RB-trout Escapees/share of total

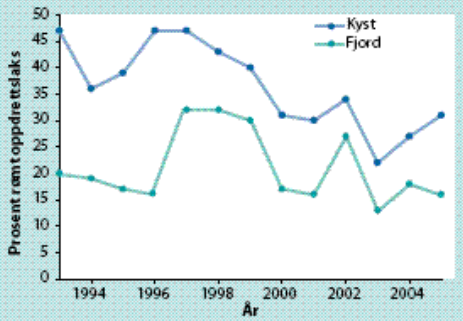
Directory of Fisheries, Axel R. Anfinsen



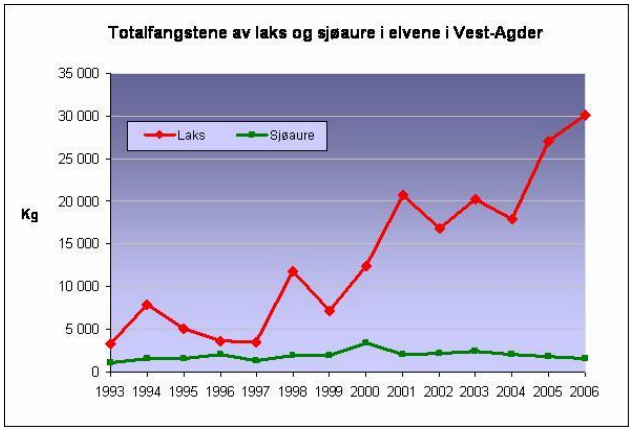
Estimated percentage of escapees - late Autumn/angling (rivers) and sea catch. 1989 - 2005



Figur 3.1
Beregnet prosentandel rømt oppdrettslaks i sportsfiske og i prøvefiske/stamfiske like før gyting om høsten i perioden 1989-2005. I 2003 ble det ikke beregnet prosentandel rømt oppdrettslaks i sportsfiske. Figuren er fra Hansen et al. (2006).



Figur 3.2
Gjennomsnittlig prosentandel oppdrettslaks (uveid gjennomsnitt over lokaliteter) i sjølaksefisket i perioden 1993-2005. Fangstene er delt inn i kystnære områder og fjorder. I disse beregningene er de samme lokalitetene brukt hvert år. Figuren er fra Hansen et al. (2006).

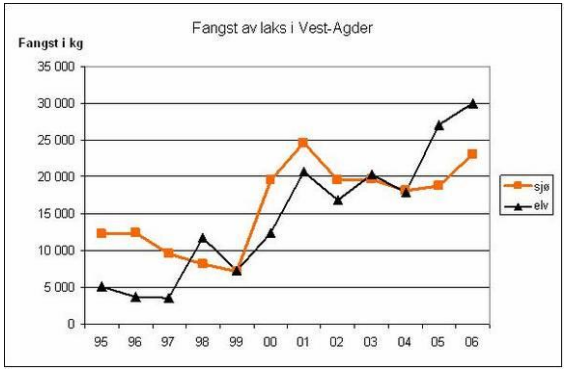


Total capture of salmon and sea trout in the rivers and sea of county Vest-Agder 1993 – 2006.

All rivers lost their salmon population due to acid rain so this is capture of salmon that have repopulated the rivers during the last 20-30 years.

Liming has been done in some rivers due to acidic water quality. 1/3 of the -06 catch has been taken in river Otra. The repopulation of Otra has happened in spite of no liming and no enhancement activities.

Source: county governor of Vest-Agder



SLG(07)10

Returns under the Reporting Format for Guidelines on Containment of Farm Salmon

Russian Federation

Guidelines on Containment of Farm Salmon – Reporting Format

Guidelines on Containment of Farm Salmon						
2.1	Is there currently an Action Plan for containment of farm salmon so as to achieve a level of escapes that is as close to zero as practicable?	YES	X	NO		If 'yes', please attach a copy. If no, what is the anticipated timetable for development of an Action Plan?
		There still remains only one Atlantic salmon farm in Russia – "Gigante-Pechenga" (Kola Peninsula). The Plan of Action for this farm was developed in 2001 (attached). No new actions were included or taken in 2005-2006.				
2.2	Is information available on the level and causes of escapes?	YES	X	NO		If 'yes', please provide details.
		The requirement is still in force to provide all relevant information to regional control and enforcement authorities. No reports of escapes in 2005-2006.				
2.3	Is information available on implementation of, and compliance with, the Action Plan?	YES	X	NO		If 'yes', please provide details.
		Federal Service for Veterinary and Phytosanitary Control and Murmansk Region Committee for Veterinary Medicine and Protection of Wildlife undertake regular inspections of the farm for compliance.				
2.4	Is information available on the effectiveness of the Action Plan in minimising escapes?	YES	X	NO		If 'yes', please provide details.
		Catches from commercial fishery, recreational fishery and scientific research fishing are screened to identify the presence of farmed salmon. No reports of occurrence of farm salmon in 2005-2006.				
2.5	Have areas for research and development in support of the Action Plan been identified?	YES	X	NO		If 'yes', please provide details.
		In 2005-2006 scientific studies were undertaken on the subject: "Genetic monitoring of the status of wild Atlantic salmon populations in zones of intensive aquaculture". Smolts of Atlantic salmon from the farm and wild salmon smolts from neighbouring rivers (rivers Pechenga and Titovka) were examined (micro-satellite and allozyme analysis). The studies provided data that allow identification of populations within one water system with a high degree of confidence. Micro-satellite loci can in some cases be used in salmon aquaculture to identify fast- and slow-developing groups within one generation. It has been demonstrated that at this stage a complex of microsatellite and allozyme analyses of polymorphism in DNA and protein is the most informative way of identification of different stocks.				

Note : "Action Plan" means a national Action Plan or regional Plans. Action Plans are the process through which internationally agreed guidelines on containment are implemented at national or regional level through existing or new voluntary codes of practice, regulations, or a combination of both.

Action Plan for Containment of Farm Salmon

(Gigante-Pechenga salmon rearing facility)

A. Actions in connection with preventing escape of fish from cages

1. Installation and strengthening of cages should be done by employees in accordance with technical documentation and relief of the area.
2. Only nets with a mesh size according to the fish size should be used. Nets should be regularly inspected and replaced when necessary by nets with adequate mesh size. To prevent sea algae growth, nets should be cleaned regularly using special equipment.
3. A diver should be available to proceed with inspection of the technical condition of the farming complex, twice a month in the summer season and as required in winter. Results from inspections are to be recorded in a logbook.
4. A net to prevent birds from entering should be stretched over the cages.
5. There should be a 100-meter zone around the cages where fishing and boat traffic should be illegal.
6. All information relating to operation of the farm should be recorded and sent to relevant government authorities responsible for aquaculture management when requested.
7. The Plan of Action should be available at the farming facility.

B. Actions in case of escape of fish from cages

1. In the case of fish escaping, immediate measures should be implemented within two hours after the escape is discovered. A gill net with the correct net mesh size should be set in an effort to recapture escaped fish. Representatives from the District Inspection office should be invited and be present. Gill nets should be kept at the farming facility of Gigante-Pechenga.
2. In the case of fish escapes, details of all operations and actions taken from the escape discovery till when the contingency situation is over should be recorded in a logbook.
3. All actions taken by fish farmers should be in accordance with the Instructions for fish farmers. The Plan of Action and the Instructions should be available at the fish farm.
4. The Production Manager is responsible for the implementation of the Plan of Action.
5. In the case of fish escaping, the following should be informed immediately within two hours of the discovery:
    - Murmanrybvod (Directorate for Fisheries Control and Enforcement and Fish Protection)
    - the district inspection office of Murmanrybvod;
    - the regional and district veterinary services;
    - "Gigante Pechenga" office.

The information that is sent to these organizations should include the following:

- The time of the escape;
- The estimated number of escaped fish;
- The average weight;
- The age.

STATUS OF ATLANTIC SALMON STOCKS IN RUSSIA IN 2006

In the Russian Federation the Atlantic salmon is present in rivers of the White and Barents Sea basins; there are also records of its occurrence in the Kara river, the Kara Sea basin.

The abundance of Atlantic salmon of the White and Barents Sea stock complex was assessed on the basis of smolt counts and parr density estimates for index rivers, adult counts and catch statistics and estimates of conservation limits (CL). Abundance of salmon and spawner stock for the Russian stock complex were estimated by PFA model (Pre-Fishery Abundance model) on the basis of declared and unreported catches and estimates of exploitation rate (Potter *et al*., 1998; 2004). The results indicate that the dynamics of salmon abundance in Russian rivers do not show any long-term trend and the spawner stock has been above its conservation limit only since the 1990s after a long period of low abundance. Adult returns peaked in 2001 and have been declining since then, and have now approached the lowest point of the cycle. The spawner stock is rather close to the conservation limit. The analysis has shown that the Russian stock complex is made up mainly of salmon stocks from rivers on the Kola Peninsula (79 rivers). Salmon stocks in most of those rivers are healthy and their status does not cause any concern. However, it should be noted that the status of stocks in this region varies considerably between rivers, therefore management of fisheries needs to be very cautious, particularly when it concerns the coastal fisheries. In rivers of the Karelian Republic (17 rivers), salmon stocks are in poor condition. In rivers of the Archangel Region, Komi Republic and Nenets National Okrug (23 rivers), most of the stocks are also in poor shape. On the whole, the situation with the state of stocks practically has not changed since 2004, therefore overall exploitation rate on the Russian stock complex should not increase, and management of fisheries should be based on the assessment of status of individual populations.

SLG(07)11

Returns under the Reporting Format for Guidelines on Containment of Farm Salmon

USA

Guidelines on Containment of Farm Salmon – Reporting Format
US – March 2007

Guidelines on Containment of Farm Salmon					
2.1 Is there currently an Action Plan for containment of farm salmon so as to achieve a level of escapes that is as close to zero as practicable?	YES	X	NO		If 'yes', please attach a copy. If no, what is the anticipated timetable for development of an Action Plan?
	State and Federal permits in place for aquaculture activities require the development of a site-specific containment plan for all active freshwater hatcheries and marine sites culturing Atlantic salmon. For more details about implementation timetables in the State of Maine Department of Environmental Protection general aquaculture permit; Section I Protection of salmon: (http://www.maine.gov/dep/blwq/docstand/aquaculture/MEG130000).				
2.2 Is information available on the level and causes of escapes?	YES	X	NO		If 'yes', please provide details.
	Escape reporting is required for all active freshwater and marine sites culturing Atlantic salmon. Marine site inventories are reported monthly to State of Maine Department Marine Resources (DMR). Additional information on the causes of escapes is maintained in the Department Marine Resources database (see attached Definition and Classification of Escape Event Causes). Four marine salmon aquaculture sites in New Brunswick, Canada, were vandalized from early May through November 2005, resulting in approximately 136,000 escaped farmed salmon. Most escapees were unmarked one-sea-winter salmon of similar size (5-10 lbs). Eight escaped aquaculture fish were documented in the Dennys river in 2005. Four escaped aquaculture fish were documented in the Dennys river in 2006. All escapes identified are presumed to be from the escape event in 2005.				

2.3	Is information available on implementation of, and compliance with, the Action Plan?	YES	X	NO		If 'yes', please provide details.
		Compliance with State and Federal permit conditions is monitored annually by conducting audits of active freshwater hatcheries and marine sites. These audits are conducted by an independent third party and include inspection of records as well as physical inspection of equipment and operations. Containment Management System audit scores for all facilities reviewed in 2007 (11 marine sites and 3 hatcheries) received a level 1 rating, indicating no remedial corrective actions were required.				
2.4	Is information available on the effectiveness of the Action Plan in minimising escapes?	YES	X	NO		If 'yes', please provide details.
		Annual assessments conducted on some Atlantic salmon rivers in Maine indicate possible aquaculture-origin fish captured or observed. Levels of escaped aquaculture-origin fish entering Maine rivers appear to be decreasing (Table 1).				
2.5	Have areas for research and development in support of the Action Plan been identified?	YES	X	NO		If 'yes', please provide details.
		Identifying aquaculture fish continues to be an area of future research and development. State and Federal agencies continue to work with the Maine Atlantic salmon aquaculture industry to develop an effective genetic marking program for all fish reared in the U.S. More research is needed to identify suitable methods for recapturing escaped farmed fish.				

Note : "Action Plan" means a national Action Plan or regional Plans. Action Plans are the process through which internationally agreed guidelines on containment are implemented at national or regional level through existing or new voluntary codes of practice, regulations, or a combination of both.

Definition and Classification of Escape Event Causes
National Fish and Wildlife Foundation Grant,
Maine Aquaculture Association (MAA)

Ad-hoc Committee: Mike Pietrak - MAA, Jennifer Robinson - Cooke Aquaculture, Dave Bean - NOAA and Matt Young - MEDEP

Steering Committee Charge: Provide a standard definition and classification of the causes of escape events that can be used in the DMR database.

The following classification system is based on a four-digit number. The first number refers to the overall major cause of the escape event. The second refers to a subcategory of events (or predator) that is defined under each major cause. The third number refers to the equipment system that failed as a result of the major cause described in the first two numbers. The final number deals with whether or not the equipment that failed was installed and maintained according to the site-specific CMS plan.

The system is laid out in outline fashion with each digit as a new level in the outline. For example 2,1,1,1 is a severe weather event in which the waves from the storm caused damage to gear and as a result a tear in the primary containment net; all gear was installed properly. Where needed, definitions of what should be classified in a specific category are provided.

Major Cause of Event:

1) Predation; *An escape event resulting from a failure or breach of the net system or other equipment that was directly due to the attempts of a predator to get inside a cage.*

    Predator
    1) Seal
    2) Bird
    3) Terrestrial Mammal
    4) Other

        Failure
        1) Fish escaped through failure of the primary containment net.
        2) Fish escaped through the bird net or because of bird predation and a bird net was not present.
        3) Fish escaped through the jumpskirt, for example: *an otter got into the cage through the jumpskirt and carried out a fish which escaped from it.*
        4) Predator net.

            Properly installed and operated
            1) Procedures in site-specific predation plan were being followed and equipment that failed was installed according to CMS plan and met COC standards.
            2) Procedures in site-specific predation plan were not being followed or equipment that failed was not installed according to CMS plan or did not meet COC standards.

2) Severe Weather; *An escape event resulting from a failure or breach of the net system or other equipment that was directly due to a variety of severe weather or storms.*

Event

1) Storm event: Damage from wind, waves or other phenomena caused by a storm.
2) Ice event: Damage from icing of gear.

Failure

1) Net system.
2) Mooring system.
3) Cage system: i.e., handrails, collar, walkways, etc.
4) Other equipment failed and this failure directly allowed the escape to occur.

Properly installed and operated

1) Procedures in the site-specific severe weather plan were being followed and equipment that failed was installed according to CMS plan and met COC standards.
2) Procedures in the site-specific severe weather plan were not being followed or equipment that failed was not installed according to CMS plan or did not meet COC standards.

3) Foreign Object Interaction; *An escape event resulting from a failure or breach of the net system or other equipment that was directly due to a collision, including a boat or other object such as driftwood, into equipment on the site.*

Event

1) Boat Collision: Actual collision of a boat (including harvest boats, work barges, moored feed barges and non-farming-related boats) into a cage or pulling away from a cage without untying from the cage. The damage from the collision is the primary cause of failure to containment systems, thereby allowing fish to escape. Propeller damage may or may not be a secondary cause of escape.
2) Propeller: The propeller of a boat causes the primary damage to containment systems, leading to the escape of fish. This can occur without the boat necessarily colliding with the cage.
3) Object other than boat: This category includes all other potential objects such as drift logs. Permanently moored feed barges that slip their moorings should be called a ‘boat collision’.
4) Other

Failure

1) Net system.
2) Mooring system.
3) Cage system: i.e., handrails, collar, walkway, etc.
4) Other equipment failed and this failure directly allowed the escape to occur.

Properly installed and operated

1) Equipment that failed was installed according to CMS plan and met COC standards.
2) Equipment that failed was not installed according to CMS plan or did not meet COC standards.

4) Husbandry Practices; *An escape event resulting from a failure or breach of the net system or other equipment that was directly due to any normal or abnormal activity on the farm by company employees conducting fish culture activities.*

Event

1) Stocking procedures: Any activities related to, or during, stocking a cage.
2) Harvesting procedures: Any activities related to, or during, harvesting a cage.
3) Handling procedures: Any normal husbandry activities including: grading, vaccination, splitting a cage, sampling or entering and exiting cage (diver or boat).
4) Other.

.

Failure

1) Net system.
2) Mooring system.
3) Cage system: i.e., handrails, collar, walkways, etc.
4) Human error: This category should be selected if the primary cause was the failure of site workers to follow SOP for the activity or some other human error.
5) Other equipment failed and this failure directly allowed the escape to occur.

Properly installed and operated

1) Equipment that failed was installed according to CMS plan and met COC standards and existing SOPs were followed.
2) Equipment that failed was not installed according to CMS plan or did not meet COC standards or existing SOPs were not followed.

5) Unauthorized Human Interactions; *An escape event resulting from a failure or breach of the net system or other equipment that was directly due to unauthorized human interactions.*

Event:

1) Vandalism.
2) Poaching: Any activity related to illegal fishing inside of the cages.
3) Fishing gear: Any activity related to legal or illegal fishing outside of the cage. For example, dragging for urchins damages mooring system and results in an escape. If the escape is caused by the boat doing the dragging actually colliding with the cage then it should go under boat collisions (category 31).
4) Other.

Failure:

1) Net system.
2) Mooring system.

3) Cage system: i.e., handrails failed due to wind.
4) Other equipment failed and this failure directly allowed the escape to occur.

Properly installed and operated
1) Equipment that failed was installed according to CMS plan and met COC standards and existing SOPs were followed.
2) Equipment that failed was not installed according to CMS plan or did not meet COC standards or existing SOPs were not followed.

6) Equipment Failure; *An escape event resulting from a failure or breach of the net system or other equipment that was directly due to equipment failure under normal conditions.*
This category should only be used when the reason for the equipment failure does not fall into one of the other major categories.

Reason:
1) Equipment used on site was not suitable for the site conditions.
2) Equipment was not properly maintained.
3) Equipment was not properly installed.
4) Equipment was defective.
5) Other.

Failure:
1) Net system.
2) Mooring system.
3) Cage system: i.e., handrails failed due to wind.
4) Other equipment failed and this failure directly allowed the escape to occur.

Properly installed and operated
1) Equipment that failed was installed according to CMS plan and met COC standards.
2) Equipment that failed was not installed according to CMS plan or did not meet COC standards.

Table 1. Aquaculture Atlantic Salmon Caught in Weirs in Maine Rivers, in Numbers of Fish, 1994-2006 (U.S. Atlantic Salmon Assessment Committee Reports, 1995-2006).

YEAR	St. Croix	Union	Narraguagus (DPS river)	Dennys (DPS river)	Pleasant (DPS river)	Narraguagus, Dennys, and Pleasant Total (DPS rivers)
1994	97	n/a	1	48	n/a	49
1995	14	n/a	0	4	n/a	4
1996	20	n/a	8	21	n/a	29
1997	27	n/a	0	2	n/a	2
1998	24	n/a	0	1	n/a	1
1999	23	63	3	n/a	n/a	3
2000	30	6	0	29	0	29
2001	58	2	0	65	0	65
2002	5	6	0	4	0	4
2003	9	0	0	2	0	2
2004	4	0	0	0	0	0
2005	35	4	0	8	n/a	8
2006	7	0	1	4	n/a	5

n/a- No trapping facility in place and/or operational