Agenda item 7.3(d)
For information

Council

CNL(06)22

Interim Report by the Co-Conveners of the NASCO/ICES Bergen Symposium

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Introduction

1. In response to concerns about interactions between salmon aquaculture and the wild salmon stocks, NASCO and ICES have organised a series of international meetings with the aim of reviewing scientific understanding of the interactions and providing guidance on appropriate management responses. The first major international symposium on this subject was sponsored by the Norwegian Directorate for Nature Management and held in Loen, Norway, in 1990. A second major international symposium was held in Bath, England, in 1997 which reviewed the scientific and management aspects of interactions between salmon culture and the wild stocks.

2. Aquaculture is certainly not the only threat to wild salmon stocks and NASCO is addressing a wide range of other issues relating to salmon conservation and management. However, the progress that is now being made in managing interactions between wild and cultured salmon must be maintained, enhanced and given more urgency, so as to ensure that all aquaculture practices are conducted in a sustainable manner that does not threaten the wild stocks. ICES and NASCO, therefore, agreed to hold a third international symposium in Bergen, Norway, from 18-21 October 2005. The Co-Conveners were Lars Petter Hansen (Norway) and Malcolm Windsor (NASCO). The objectives of this latest symposium were: (a) to summarise available knowledge on the interactions between aquaculture and wild salmon stocks and other diadromous fish species; (b) to identify gaps in current understanding of these interactions and to develop recommendations for future research priorities; (c) to review progress in managing interactions, and to identify the remaining challenges and possible solutions; and (d) to make recommendations for additional measures to ensure that aquaculture practices are sustainable and consistent with the Precautionary Approach.

3. The aim was to build on the existing collaboration between wild and farmed salmon interests so as to identify the remaining challenges and possible solutions in moving towards sustainable culture of Atlantic salmon. A total of 111 participants from 17 countries attended the symposium, including delegates with experience of research into, and management of, interactions between cultured and wild salmon in the North Atlantic Ocean, Baltic Sea and North Pacific Ocean. The symposium was structured into four plenary sessions and a poster session. In total, 35 invited and contributed papers and 13 poster papers were presented.

Opening of the Symposium

4. The symposium was opened by Ms Janne Sollie, Director General of the Directorate for Nature Management in Norway, who noted that understanding of interactions between cultured and wild salmon has increased markedly since the first ICES/NASCO symposium in 1990, and that it is now generally recognised that salmon farming can pose a serious threat to the wild stocks. She referred to the improved cooperation between the salmon farming industry, the authorities and various stakeholders, and to the fact that some progress is being made in addressing

interactions. However, she referred to two very significant events in Norway during 2005 which had resulted in the escape of approximately 600,000 farmed salmon to the wild. She stressed that additional measures are, therefore, essential in order to move closer towards sustainable aquaculture. There were welcoming addresses by the President of NASCO (Dr Ken Whelan) and a representative of ICES (Dr Niall O'Maoileidigh).

Keynote Session

5. The first session, chaired by Lars Petter Hansen and Malcolm Windsor, was a keynote session intended to set the scene with reviews of the value of wild Atlantic salmon, developments in the sustainability of the salmon farming industry, the stock status and management of wild Atlantic salmon, and the ecology of cultured Atlantic salmon and their interactions with wild fish. A number of points emerged from this session, including the following:

- in addition to the very significant social and economic values associated with salmon fisheries and eco-tourism, the general public care about, and are willing to pay to conserve, the wild Atlantic salmon. If the salmon farming industry is perceived to damage the wild stocks, consumers may reject its products;
- worldwide production of farmed salmon has trebled in the last decade and the continued success of the industry will require that the product is perceived to be safe and healthy, that it is not associated with degradation of the natural environment, and that the industry is seen to be open and transparent, and willing to focus on welfare issues and environmentally sustainable practices;
- wild Atlantic salmon stocks are very vulnerable, with many stocks in a depressed state and some critically endangered. Much has been done to reduce exploitation but many factors are influencing the stocks. Given the status of the stocks it is vital that human activities, including those arising from aquaculture, do not exacerbate the situation;
- cultured fish compete for space, food and breeding partners with wild salmon in nature and may partly displace and increase the mortality and reduce the growth rate of wild fish with effects on life-history traits, biomass and production.

6. Following the keynote session there were sessions focusing on genetic and ecological interactions and their management and on disease and parasite interactions and their management.

Genetic and ecological interactions and their management

7. This session was chaired by Mary Colligan (USA) and Tom Cross (Ireland). In total, 20 papers were presented. A number of points emerged from the session on genetic and ecological interactions, as follows:

- while there have been considerable improvements in containment and improvements in reporting, the number of escaped farmed salmon is still large relative to the abundance of wild salmon;

- escaped fish may disperse quickly from the site of release, moving predominantly with the currents, and their fate is highly variable and affected by a variety of factors;
- in Norway, the number of salmon in cages appears to be a better predictor of escapees in rivers and fisheries than the reported number of escapees, suggesting that there may be significant unreporting, possibly because of small-scale but frequent escapes ('trickle losses') during handling, net changes, etc. Storms were identified as a major source of escapes and the implications of climate change for future containment management measures will require careful consideration;
- theoretical modelling comparing wild salmon populations exposed to salmon farming and those not exposed indicates reduced productive capacity of wild salmon in areas with farms, with the size of the reduction linked to the scale of farmed production in the area;
- genetic change has been observed in some wild salmon populations exposed to escapees but not in others, suggesting that impacts from escapees are influenced by the number of escapees spawning and the abundance of the wild fish population in the river. Simulations, based on simplified input data, with fixed annual intrusion rates of 20% farmed escapees, suggest that substantial changes can take place in wild salmon populations within ten salmon generations and that these changes may be irreversible;
- risks are posed by stocking of cultured fish and the goals of such programmes need to be carefully considered;
- solutions to escapes from freshwater facilities are available and are inexpensive to implement. Improved physical containment measures are required for marine sites and biological containment should be considered.

Disease and parasite interactions and their management

8. This session was chaired by Malcolm Beveridge (Scotland) and Chris Poupard (Chairman of NASCO's NGOs). In total, 15 papers were presented; most concerned sea lice. A number of points emerged from the session on disease and parasite interactions and their management, as follows:

- increased understanding of all aspects of sea lice biology have led to better tools for identification of sea lice, facilitated the development of increasingly effective integrated lice management strategies and may lead to the development of an effective vaccine in future;
- sea lice infection pressure from salmon farms is an important issue affecting wild salmonids in many areas. Infestation levels on emigrating salmon smolts are highly site-dependent and the risk of infection varies from year to year and with hydrographic conditions, etc.;
- sea trout are highly susceptible to sea lice infestations, with the level of infestation decreasing with distance from marine salmon farms;
- for both salmon and sea trout, sea lice burden is now recognised as a strong predictor of mortality in areas with farms;
- sea lice management has evolved considerably in recent years but there are concerns about the reliance on a handful of key medicines. While there have been notable improvements in lice management strategies in recent years, challenges remain if wild salmon and sea trout stocks are to be effectively

protected. The use of wrasse may be an important option in integrated lice management regimes;

- both the prevention of the further spread of the parasite *Gyrodactylus salaris* and its elimination from infected rivers are essential.

Poster Session

9. This session was chaired by Arni Isaksson (Iceland) and Peter Hutchinson (NASCO). In the Poster Session, there were 13 presentations covering three main topic areas: studies of the abundance, distribution, behaviour and source of escapees; genetic aspects of stocking programmes; and sea lice biology. Poster papers were also presented on the use of aquaculture-free zones, the comparative feeding behaviour of cultured and wild salmon and the effects of domestication.

Synthesis Session

10. The final session was a synthesis session chaired by Malcolm Windsor and Lars Petter Hansen, and was intended to highlight the remaining challenges and possible solutions to these. Following a summary of the preceding sessions by each of the Session Chairmen, six participants from different interests were asked to give their perspectives on the information presented during the symposium, i.e. their "take-home" messages. There were two representatives of non-government organizations, two representatives of the fish farming industry and two representatives of administrations involved in the management of salmon farming or wild salmon. In these messages the salmon farming industry representatives acknowledged that it can no longer be claimed that salmon farming poses no threat to wild salmon but stressed that the industry has evolved considerably and there are causes for optimism and evidence that good management on farms can ensure that the wild and farmed salmon sectors can co-exist in harmony. Key challenges remaining include the introduction of further measures, including effective area management and fallowing, to protect wild salmon and sea trout stocks from sea lice, and additional measures to minimise escapees and their impact, including improved cage designs, risk assessments, awareness campaigns in relation to "trickle losses", third-party audits and consideration of the use of sterile fish. There is a need to avoid unnecessary confrontation and to build trust, to seek constructive dialogue and develop enhanced co-operation between wild and farmed salmon interests. That process has started and the Conveners hope that the emphasis now will be on moving forward with solutions to the remaining issues.

11. The symposium was closed by Mr Peter Gullestad, Director of the Norwegian Directorate of Fisheries and a Vice-President of ICES.

Publication of Proceedings

12. There will be two reports of the Symposium. A special issue of the ICES Journal of Marine Science will include a selection of the scientific papers following peer review. This issue will be published in September or October of this year and is being edited by Peter Hutchinson. In addition, the Co-Conveners will be preparing a report focussing on the management aspects, and it is hoped that this report will be published in the autumn.

Sponsorship

13. The symposium was well supported and the generous support of the following organizations is acknowledged:

Research Council of Norway, Directorate of Nature Management (Norway), Directorate of Fisheries (Norway), Norwegian Institute for Nature Research, Royal Norwegian Ministry of Fisheries and Coastal Affairs, Royal Norwegian Ministry of the Environment, Scottish Executive, DEFRA (UK), Fisheries and Aquaculture Research Fund (Norway), Directorate of Freshwater Fisheries and Salmonid Enhancement Fund (Iceland), National Marine Fisheries Service (USA), The Worshipful Company of Fishmongers (UK), Atlantic Salmon Trust (UK), Intervet International BV (Netherlands), Marine Institute (Ireland), Pharmaq AS (Norway), ScanVacc AS (Norway), Norwegian Farmers Union, Norwegian Salmon Rivers and the City of Bergen.

Acknowledgements

14. The Co-Conveners are grateful to the Symposium Steering Group (Malcolm Beveridge, Mary Colligan, Tom Cross, Knut Hjelt, Peter Hutchinson, Arni Isaksson, Geoff Perry and Chris Poupard) for their assistance in planning the Symposium and to all contributors for their presentations.

Malcolm Windsor and Lars Petter Hansen
Co-Conveners
8 May, 2006