Agenda item 6.2
For information

Council

CNL(16)41

Norway – Measures introduced to meet NASCO goals of reducing impacts from sea lice and escapees on wild salmon

(Tabled by the Norway)

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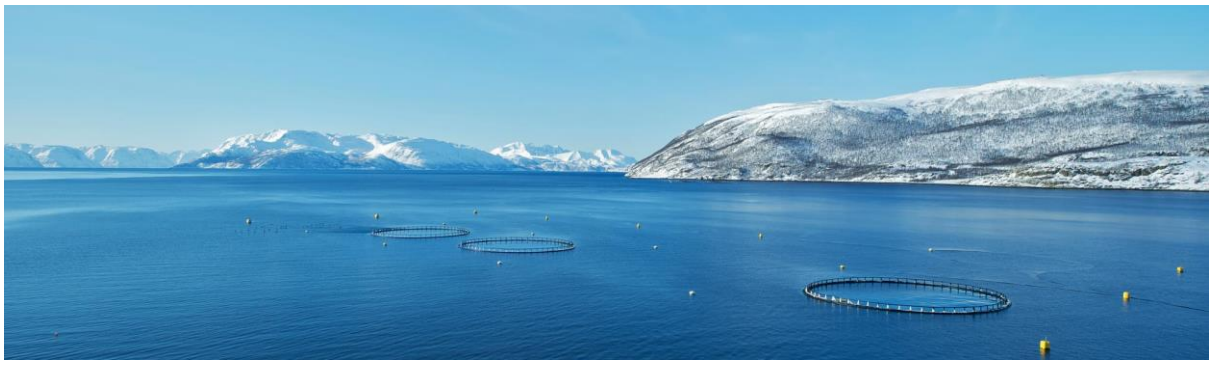
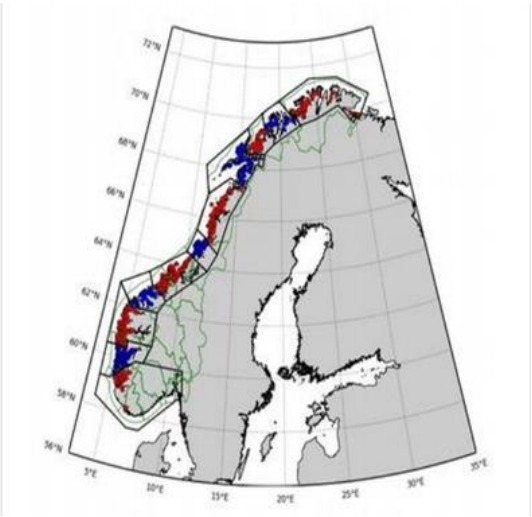
In order for Norway to maintain its position as a world-leading producer and exporter of salmon, the production must be social, economic and environmental sustainable. It is the Norwegian Governments policy to enable growth and competitiveness, within a framework of environmental sustainability. This paper provides a short outline of the main current measures taken to minimise the impact of sea lice and escapees from salmon farming on wild salmonids in Norway.



White Paper to the Storting on growth in the aquaculture industry

The Norwegian Government presented a White Paper to the Storting (The Norwegian Parliament) on growth in the Norwegian salmon farming industry in March 2015. To lay the foundation for further growth they have proposed a new system that shall keep the industry's environmental footprint within acceptable limits. The White Paper was debated in Parliament 15 June 2015. The Parliament endorsed the main elements of the White paper.



The Parliament have decided that environmental impact (footprint) shall be the factor determining future growth in the salmon farming industry. They also decided to divide the coast into production areas. The Institute for Marine Research (IMR) has prepared a proposal for dividing the Norwegian coast into a number of such production areas, using different models and analyses on how particles (organic matter or pathogens) spreads along the coast using data from the siting of fish farms and coastal currents. Furthermore, the Parliament have decided to use sea lice impact on wild populations as the indicator when determining whether a production area is suited for growth or not.

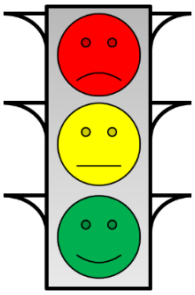
When identifying relevant indicators, it is essential that changes in the environmental footprint correlate with the biomass within a given production area. Consequently, not all environmental challenges are suitable as indicators.

Table 1: *Assessment of possible indicators*

Issue	Can an indicator be designed, i.e. impact measured in the environment?	Is there a good correlation between biomass and the size of the indicator?	Is there a good correlation between source and where impact is measured?
Escapes	Yes (prevalence at breeding grounds and genetic drift in wild populations	No	No
Pollution/Effluent	Yes (level of dissolved nutrients and organic material)	Yes	Yes
Diseases/parasites	Yes (mortalities in wild stocks)	Yes	Yes
Feed resources	No	Yes	No

It was concluded that sea lice, is the only appropriate indicator in the short and medium term, that can be used in this system for capacity adjustment at the licensing level within defined production areas. The selection of indicators will if necessary be adjusted, if environmental challenges changes; this will allow for inclusion of other (or removal of existing) indicators for environmental impacts in or from the system over time.

If the indicator in a production area is green, it means capacity should be increased by 6 percent. Yellow means capacity should be unchanged, while red means capacity should be reduced. Capacity increases will be considered every other year, based on the results from the indicator system.



Sea lice

Monitoring

The impact of sea lice from farmed fish on wild fish has until now been determined through field studies on wild salmonids. This is both time consuming and expensive. We now shift the main monitoring over to a model based system using data on sea lice (copeopdites) emission from all sea based facilities in a production area, and relate this to the risk for unacceptable impact on wild salmonids. Norwegian research institutions will test the model this season. Surveillance on wild salmon will be used to verify the results. The model will continuously be adjusted as new knowledge is acquired.

Table 2: *Action limits regarding sea lice impact on wild salmonids*

None /Low influence	**Moderate influence**	**High influence**
It is likely that < 10 % of the wild salmonids dies due to sea lice infestations	It is likely that 10 – 30 % of the wild salmonids dies due to sea lice infestations	It is likely that > 30 % of the wild salmonids dies due to sea lice infestations

Regulations

The introduction of the new system does not imply any significant changes regarding sea lice regulations applicable to the individual site. The sea lice regulations in Norway require the farmers to coordinate their sea lice control and have operational plans to control sea lice agreed to by the Norwegian Food Safety Authorities (NFSA). The maximum limit, set at 0,5 adult female lice per fish (using a standardised counting method), shall ensure a proactive sea lice control. There are compulsory weekly reporting to the NFSA of sea lice counts, together with sea temperature, treatments (including drug used and amount), results from sensitivity tests and number of cleaner fish.

Norwegian fish farmers are required to take coordinated de-licing measures every spring at low treatment thresholds (0.1 motile/adult female lice), to protect the Atlantic salmon smolt migrating to sea. Monitoring show that the campaigns have been successful. However, there are still reports of high levels of sea lice on sea trout (*Salmo trutta trutta)* in certain areas.

The NFSA may order coordinated de-licing operation, fallowing and if necessary slaughtering. In addition, they can establish special areas with stricter regulations than the general regulatory framework. During 2015 NFSA took action against a number of fish farms who were exceeding the sea lice limit in a more or less systematic manner; requiring slaughter and/or reduction of site-MAB (maximum allowed biomass) for the next production cycle.

The Norwegian Veterinary Institute are responsible for the national monitoring programme of sensitivity of drugs against sea lice. In Norway reduced sensitivity and resistance to pharmaceutical products used in sea lice control is widespread along the coast. This shows the importance of using other measures than pharmaceuticals. An action plan regarding reduced sensitivity and resistance are under development.

Genetic impact

Escapees

Even though it was concluded that genetic impact is not a suitable indicator in the new system for capacity adjustment at the licensing level, the Norwegian authorities are currently putting great emphasis on reducing challenges following escapes of farmed salmon. "Prevention is better than cure", hence the government emphasize the necessity to prevent escapees. Examples of this are technical requirements for aquaculture installations The Norwegian Standards for sea based aquaculture facilities (NS 9415) and land based facilities (NS 9416), and the strengthening of the inspection services of the Directorate of Fisheries.

The Directorate of Fisheries has for several years had a special focus on escapes of small numbers of smolts. One element in this respect has been a focus on correct mesh size in the nets according to the size of the fish that is put into the nets. They now assess that the

reported numbers of escapes from the operators are closer to the real number of escapes than what has been the case previous years. In 2016, the Directorate will pay special attention to escapes from smolt production sites on land, as they have discovered that there is a problem regarding the escape of smaller fish from such farms.

The funding of the monitoring of escaped fish in rivers has been strengthen from 2014, and does now cover approximately 165 rivers. The strengthening of the monitoring program have resulted in better quality and quantity of the programIn 2015, 128 rivers were assessed to have a moderate prevalence of escaped fish (< 10 %) while 17 river were assessed to have a high prevalence of escaped fish.

There are regional differences in the prevalence of escaped fish in rivers, but generally, the prevalence of escaped fish in the years 2006 to 2015 has been gradually declining.

Table 3: *Number of reported escape incidents countrywide as of 29.2.2016**

Reported escape incidents											
	2006	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	***2014***	***2015***	***2016****
Salmon	32	23	20	34	38	17	9	19	*38*	*33*	*3*
Trout/Rainbow trout	6	3	2	1	4	4	2	2	*5*	*3*	*1*
Cod	11	9	17	23	11	3	2	2	1	0	0

Table 4: *Reported numbers of escaped fish countrywide as of 29.2.2016*

Year	Number of escaped salmon	Number of escaped rainbow trout	Number of escaped cod
2004	553 000	10 000	20 000
2005	717 000	8 000	213 000
2006	921 000	15 000	290 000
2007	298 000	315 000	85 000
2008	111 000	7 000	304 000
2009	225 000	133 000	222 000
2010	291 000	6 000	166 000
2011	365 000	4 000	7 000
2012	38 000	133 000	57 000
2013	198 000	200	55 000
2014	303 200	2 700	14 000
2015	160 000	84 000	0
2016*	1 000	53 000	0

The polluter-pays principle

The Norwegian Government have implemented the principle of ”polluter-pays” in aquaculture, as regards escapees through binding agreements with the industry together with legislative measures. In 2015 an arrangement for removal of escapees based on indicators for acceptable threshold of farmed salmon in the rivers during spawning season of the wild salmon, was implemented.

Table 5. *Indicators and action limits for prevalence of farmed fish in rivers*

Indicator	Not required to plan mitigating measures	Planning of mitigating actions should be considered	Required to plan mitigating actions
Yearly percent	< 4 % escaped fish in catches from a river	4 – 10 % escaped fish in catches from a river	> 10 % escaped fish in catches from a river

By legislation, the aquaculture industry was given the responsibility for financing mitigating measures in rivers with a high prevalence of escaped fish. The industry should also cover expenses with recapturing escapees in the sea, if the source of the fish is unknown. An organisation is established after the principle ”one for all – all for one”, but the arrangement encourages the industry to develop good methods of traceability. The goal is that all farmed fish are traceable and that only the owner of the fish (the polluter) should pay. The use of sterile fish is also rewarded.

Sterile fish

The use of sterile fish in fish farming can contribute to reduce genetic and ecological impact from escaped farmed fish. Research on sterile farmed salmon are still ongoing to evaluate animal welfare considerations as well as performance in relation to various environmental factors. Consequently, research licenses are currently using triploid fish. In addition, several commercial salmon-farmers have started up using triploid fish as in "green" salmon farm licenses (see below).

Technology development

Technological solutions that may solve the industry's major environmental challenges, are continually being tested and developed, and the government have implemented several measures to facilitate the development to bring the technology forward.

"Green licenses"

In 2013, the Norwegian government decided to allocate 45 new licenses for salmon and rainbow trout. The objective of the allocation was to stimulate the industry to develop and start using technology that was more environmentally friendly in relation to sea lice and escapees than what was normally being used.

Licenses for technology development project

The Norwegian Government has now decided to allocate special licenses for technology development projects, which can contribute to solve one or more of the environmental or area challenges of the industry. The project have to entail considerable innovation and investments. As of now, only one company has been given such licenses. However, a significant number of applications are in the process of being assessed.

Onshore salmon farming

In order to facilitate growth in the salmon farming industry the Parliament have decided to not limiting the number of licenses to onshore salmon farming. Furthermore, such licenses, will be grated without paying the normal licence-fee.