Strategi - lave nivå og tidlige stadier

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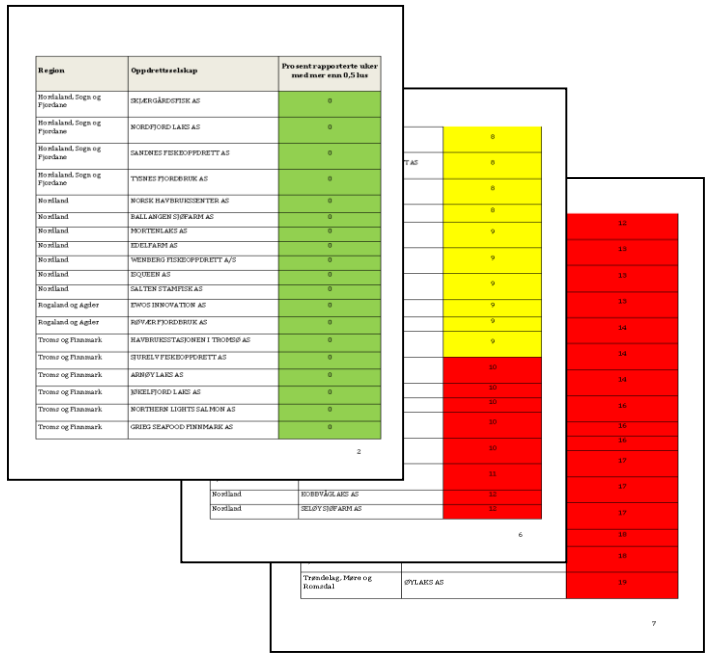
FHF Lusekonferanse (Trondheim) 22 January 2019

Agenda

- Zero adult female strategy, background and purpose
- Experiences
- Conclusions



Region	Oppdrettsselskap	Prosent rapporterte uker med mer enn 0,5 lus
Hordaland, Sogn og Fjordane	SKJÆRGÅRDSFISK AS	0
Hordaland, Sogn og Fjordane	NORDFJORD LAKS AS	0
Hordaland, Sogn og Fjordane	SANDNES FISKEOPPDRETT AS	0
Hordaland, Sogn og Fjordane	TYSNES FJORDBRUK AS	0
Nordland	NORSK HAVBRUKSSENTER AS	0
Nordland	BALLANGEN SJØFARM AS	0
Nordland	NORTHERN LAKS AS	0
Nordland	EIDELFARM AS	0
Nordland	WENBERG FISKEOPPDRETT A/S	0
Nordland	EQUEEN AS	0
Nordland	SALTEN STAMFISK AS	0
Rogaland og Agder	EWOS INNOVATION AS	0
Rogaland og Agder	RØVÆR FJORDBRUK AS	0
Troms og Finnmark	HAVBRUKSSTASJONEN I TROMSØ AS	0
Troms og Finnmark	SURELV FISKEOPPDRETT AS	0
Troms og Finnmark	ARNØY LAKS AS	0
Troms og Finnmark	HKELFJORD LAKS AS	0
Troms og Finnmark	NORTHERN LIGHTS SALMON AS	0
Troms og Finnmark	GRIEG SEAFOOD FINNMARK AS	0
Nordland	HOBBVÆGLAKS AS	12
Nordland	SELØY SJØFARM AS	12
Trøndelag, Møre og Romsdal	ØYLAKS AS	19

Background

- **Are interventions done at too high lice levels?**
  - Infection pressure is generated and spreads internally and externally
    - Internal infection pressure plays a significant role
- **Monitoring and control**
  - Better planning and early intervention
  - Single cage intervention instead of whole site

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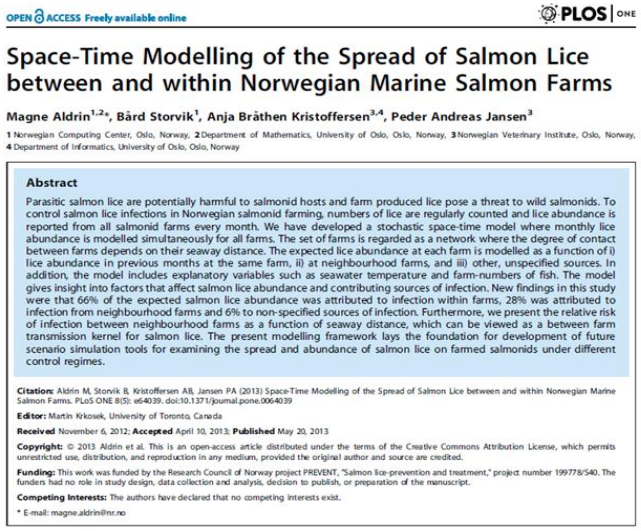

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Space-Time Modelling of the Spread of Salmon Lice between and within Norwegian Marine Salmon Farms

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Abstract

Parasitic salmon lice are potentially harmful to salmonid hosts and farm produced lice pose a threat to wild salmonids. To control salmon lice infections in Norwegian salmonid farming, numbers of lice are regularly counted and lice abundance is reported from all salmonid farms every month. We have developed a stochastic space-time model where monthly lice abundance is modelled simultaneously for all farms. The set of farms is regarded as a network where the degree of contact between farms depends on their seaway distance. The expected lice abundance at each farm is modelled as a function of i) lice abundance in previous months at the same farm, ii) at neighbourhood farms, and iii) other, unspecified sources. In addition, the model includes explanatory variables such as seawater temperature and farm-numbers of fish. The model gives insight into factors that affect salmon lice abundance and contributing sources of infection. New findings in this study were that 66% of the expected salmon lice abundance was attributed to infection within farms, 28% was attributed to infection from neighbourhood farms and 6% to non-specified sources of infection. Furthermore, we present the relative risk of infection between neighbourhood farms as a function of seaway distance, which can be viewed as a between farm transmission kernel for salmon lice. The present modelling framework lays the foundation for development of future scenario simulation tools for examining the spread and abundance of salmon lice on farmed salmonids under different control regimes.

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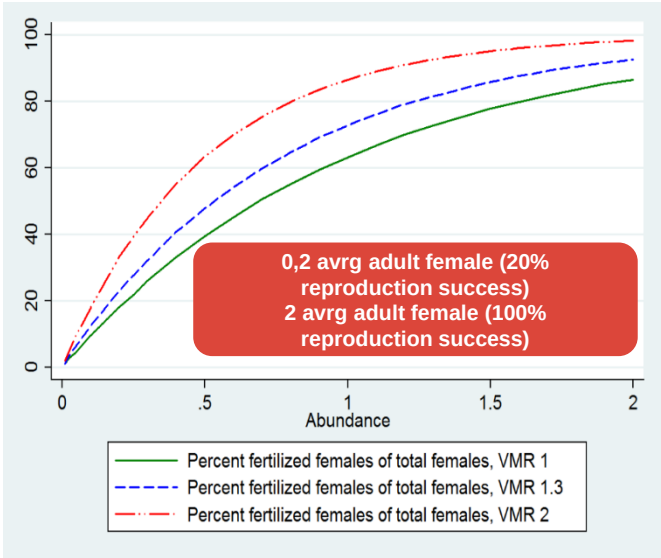

Source of infection pressure

Internal infection pressure is the main driver of lice levels

- Aldrin et al. 2013 & Revie et al. 2015
  - On average the main source of infection pressure is internal

Lice reproductive success is dependent on the amount of lice present

- Stormoen et al. 2012: reproduction rate is not linear, and with lower adult female level there is lower reproduction success

Lice control on your own site is the most important measure to keep lice at a low level

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Zero adult female strategy

Strategy launched <u>spring 2015</u>

- Count all pens weekly to allow for early intervention and reduce infection pressure (internal & external)
- Use preventative tools to avoid infection
- Intervene on a single pen level
- Intervene before pens have reached 0.2 adult females
- Use non-medicinal methods where possible

→ Aim: Early lice mitigation on cage level will give lower infection pressure

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Photo: Melanie Andrews

Zero adult female strategy review: data

Large dataset

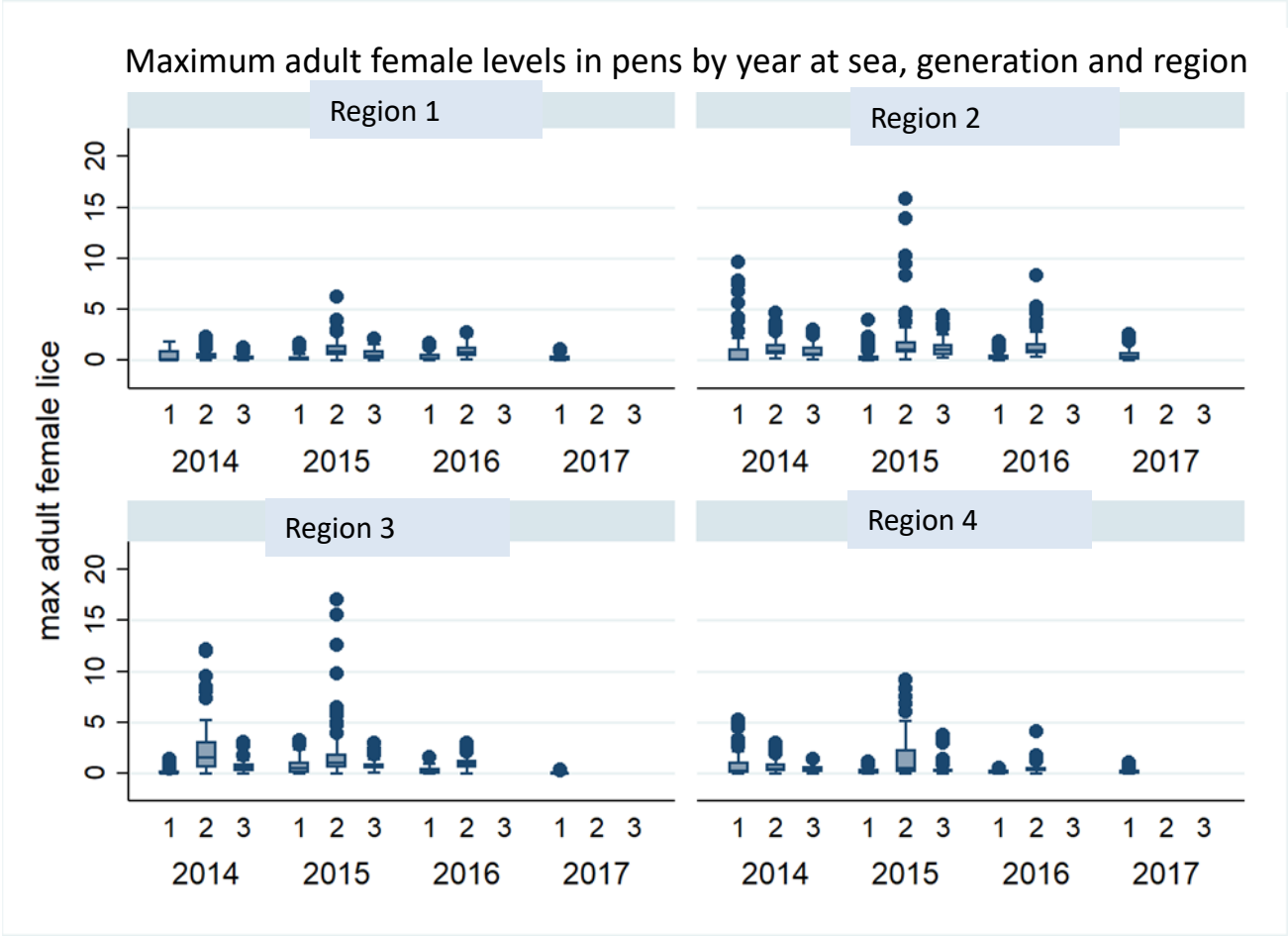
- 14G, 15G , 16G and 17G (incomplete)
- All regions
- Total 221 seawater cycles

Analysis;

- By generation, calendar year and year at sea
  - per region and per site
- Treatments; meds and non-meds (what and when)
- Adult female levels
- Treatment intervention level
- Proportion of cages treated
- Cleanerfish (%) per site and region

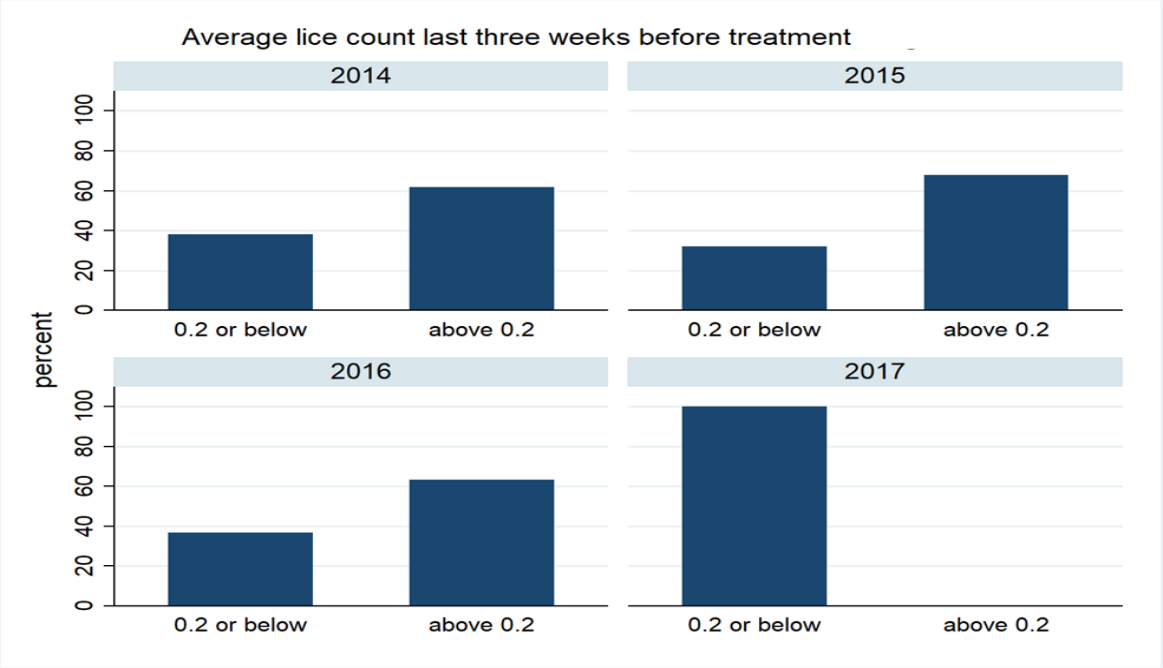
Experiences - overview of sea lice levels

- 2015G second year at sea the most challenging for all regions
- Second year at sea 16G, positive trend compared to 15G for all regions
- Early on we had capacity issues with respect to NMM
  - Delayed intervention



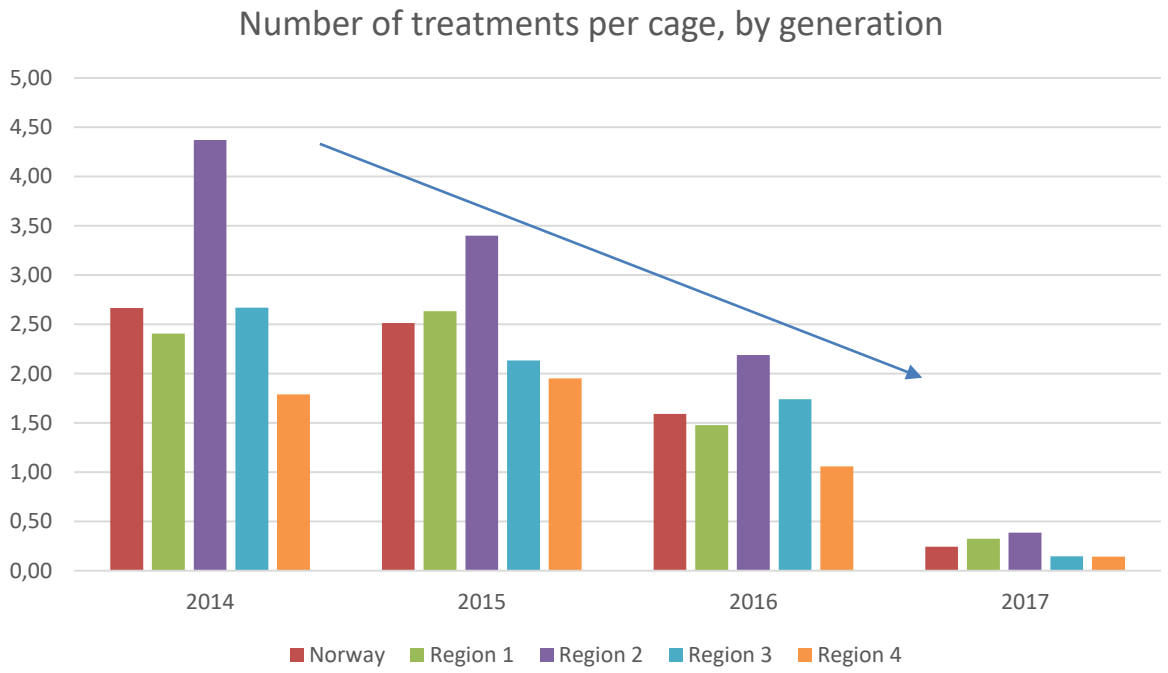
Experiences - lice count before treatment

- Despite regional differences, one region reached 100 % compliance with the strategy
- In 2014, 60 % of interventions were initiated when adult female levels were >0,2
- In 2017, 100 % of interventions were initiated when adult females levels were <0,2



Experiences - number of treatments per pen, by generation

- Overall positive trend from 2014G in each Region
- Region 1 and 4 with slight increase from 2014G to 2015G
- Region 2 with strong reduction



Experiences - if <100% compliance

- In some areas, not fully compliant with the strategy
  - ~ 35% treated in compliance 1st year at sea
  - ~ 20% of pens treated in compliance 2nd year at sea
- Indications of relationship between adult female level and number of pen treatments

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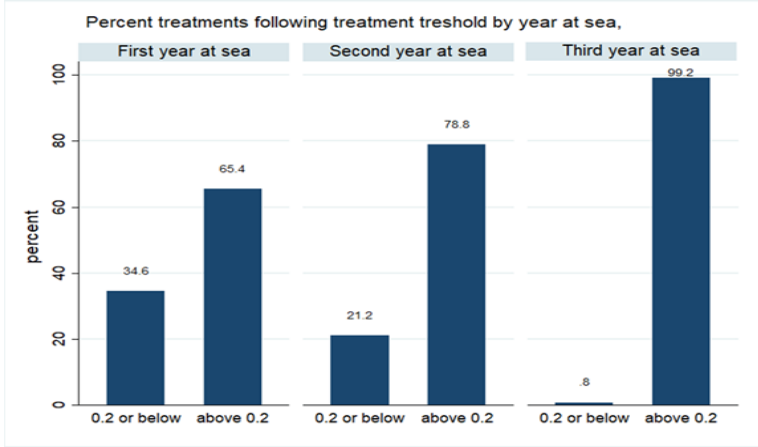

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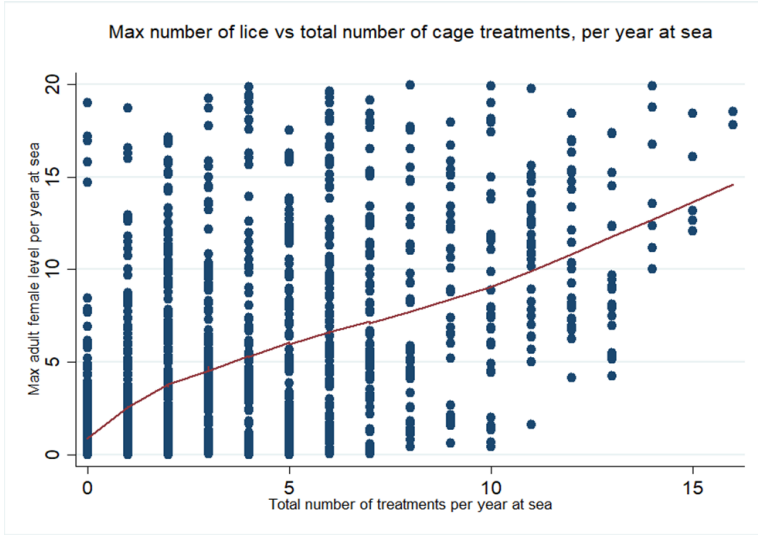

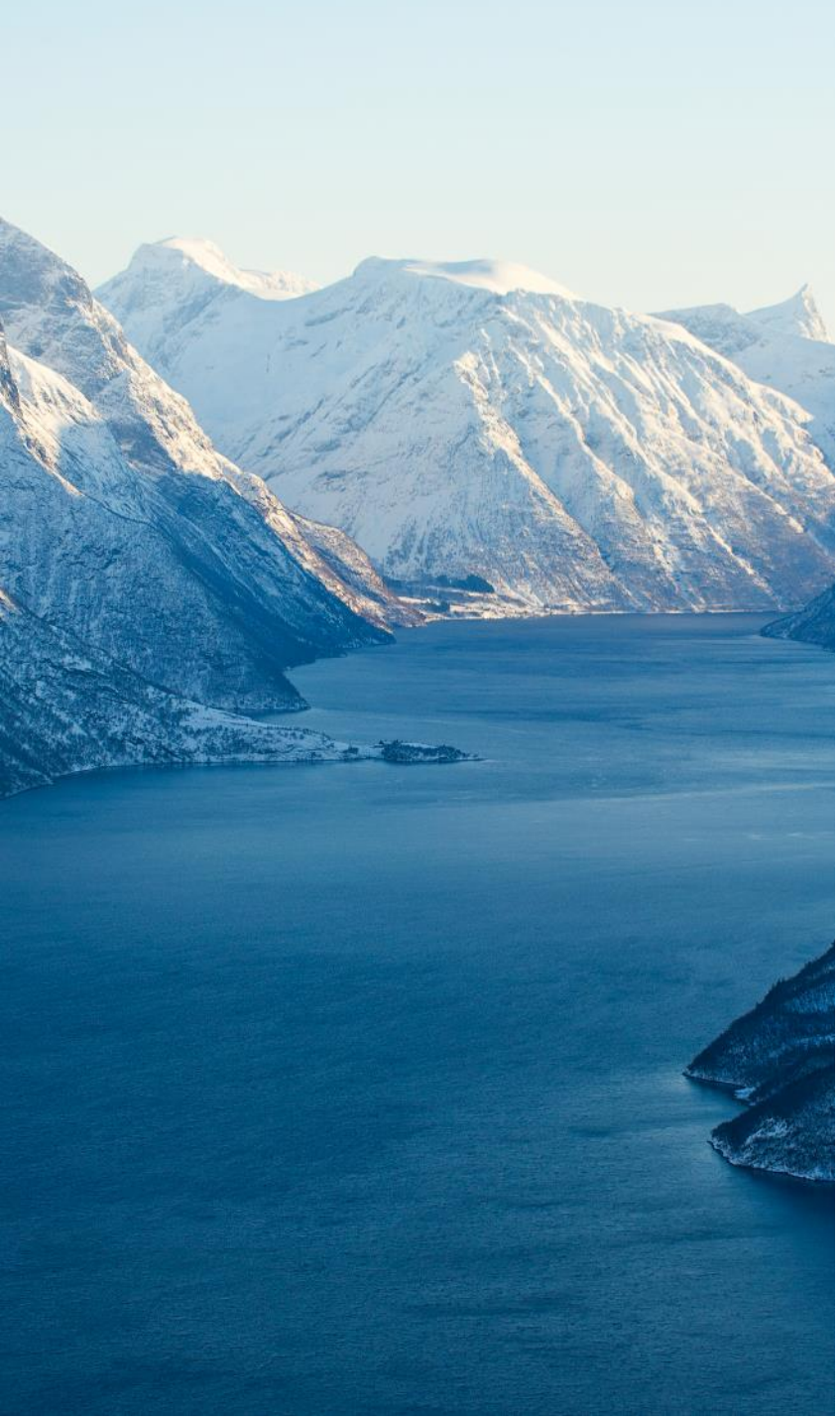

Conclusions

- Counting all pens weekly implemented
- Change in lice levels indicates better control 1st year at sea
  - However, still occurrences of higher lice levels
- Interventions have shifted towards less whole site treatments (35 % in 2014G to < 20 % in 2017G)
- Number of treatments per pen reduced from 14G to 16G (17G not finished analyzed)
- Lice levels at intervention with NMM has gone down
- Degree of compliance affects the outcome
- Strong indications that higher adult female level results in greater number of pen treatments

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Thank you