

Territorial clearance of a PD epidemic caused by SAV2 in Mid-Norway

Bjørn Gillund¹, Kari Lervik¹, Aoife M. Westgård², Paul J. Midtlyng³

¹Sinkaberg Hansen, ²Emilsen Fisk/Aqua Kompetanse, ³NMBU Faculty of Veterinary Medicine, Oslo

TriNation, Dublin 12th June 2019

PD epidemic caused by SAV2 in Mid-Norway

- The northern part of Mid-Norway experienced a dynamic SAV2 epidemic in the 2016-2017 salmon yearclasses
- Strong control measures were implemented
- The autumn 2017 smolts and both smolt outputs in 2018 have been frequently qPCR screened without positive findings
- We will summarise a number of control tactics employed, and give our opinion on which measures should be emphasized in order to effectively control PD also in other territories

PD legislation in Norway

National PD regulations:

Prevent, limit and avoid spread of PD

- 1 PD zone: endemic area (red markers)
 - SAV2 and/or SAV3
 - Purpose: reduce the consequence of disease
- 2 surveillance zones: free-zone (green arrows)
 - Purpose: prevent establishment of PD
- Monthly qRT-PCR sampling of min. 20 fish/site



Brief history of SAV2 in the area

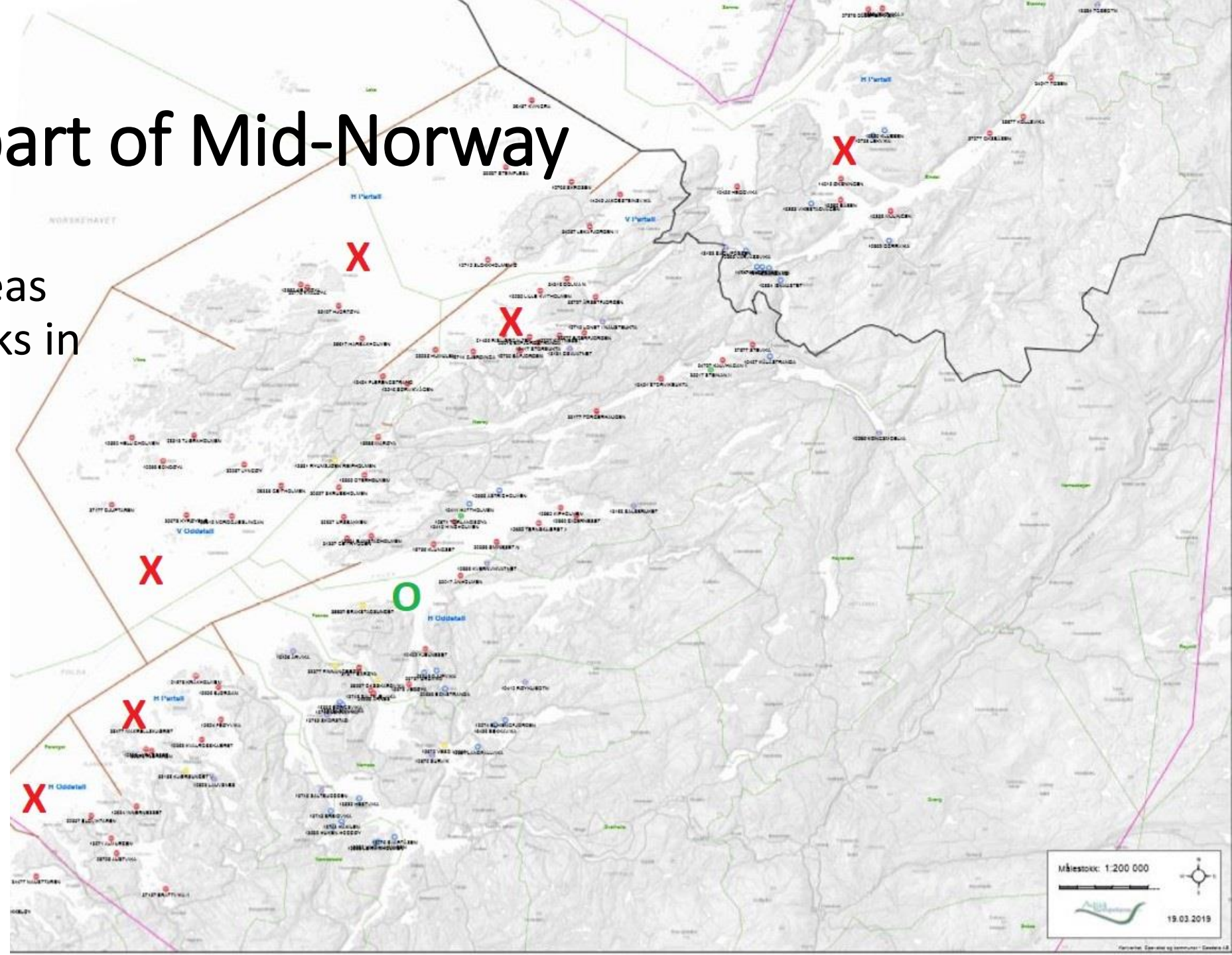
- **2011-2016:** occasional PD-positive sites
 - Handled by stamping-out or relocation of fish to endemic area
- **2017:** several sites PCR-positive
 - 17 sites (1/3 of sites in the area affected)
 - Autumn 2016 and Spring 2017 outputs
- **2019:** Still no qPCR-positive sites

	Jan	2011
Ramstadholmen	Mar	
	May	
	Jul	
	Sep	
	Nov	
	Jan	2012
	Mar	
	May	
Austvika	Jul	
	Sep	
Eidviktaren	Nov	
	Jan	2013
	Mar	
	May	
	Jul	
	Sep	
	Nov	
	Jan	2014
	Mar	
Skrubbholmen	May	
Heggvika	Jun	
	Aug	
Bondøya	Sep	
Flotaren	Nov	
	Jan	2015
	Mar	
	May	
Humulen	Jun	
	Sep	
	Nov	
Eidviktaren	Jan	2016
	Mar	
	May	
Austvika	Jun	
	Aug	
	Sep	
Tosen + Lismåsøy	Nov	
	Dec	



Northern part of Mid-Norway

Smolt output areas
with PD outbreaks in
2016/2017



Control tactics employed



Zone structure and fallowing

- Thorough discussions and work over time to optimize smolt output areas
- Important principle:
 - Limit transfer of infection from larger fish to smolts
 - «genuine fallowing»
 - Areas that may affect smolts must be harvested before stocking with next generation
 - Currents in the area considered while planning the zone and management structure
 - Reduces risk of passive spread of (any) infectious agent
 - More efficient fallowing regardless of infectious agent



Vaccination campaign against PD 2017

- All autumn 2017 smolts stocked in the middle part of the «Follafjorden» output area were vaccinated against PD
- Several PD outbreaks in the bordering area
- No PCR-positive finding despite intensive testing
- This generation remained SAV-2 free and is now slaughtered



Vaccination campaign 2018

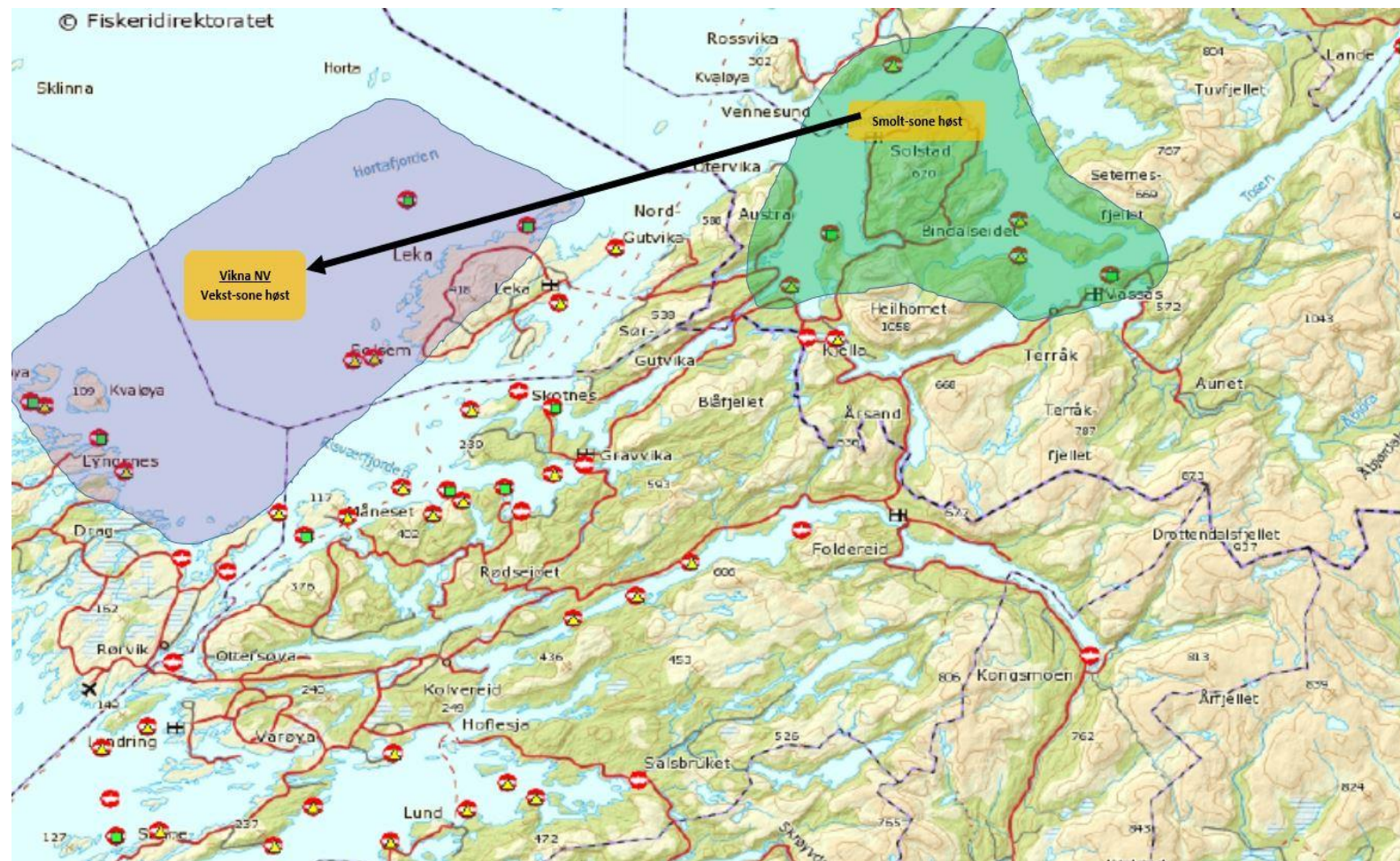
- Spring 2018 smolts going to the area «Vikna Nordøst», and Autumn 2018 smolts going to «Bindalsfjorden» were also vaccinated, except for 1 site
- We believe blanket vaccination coverage can play a key role in reducing virus propagation and spread of latent-SAV2 infection



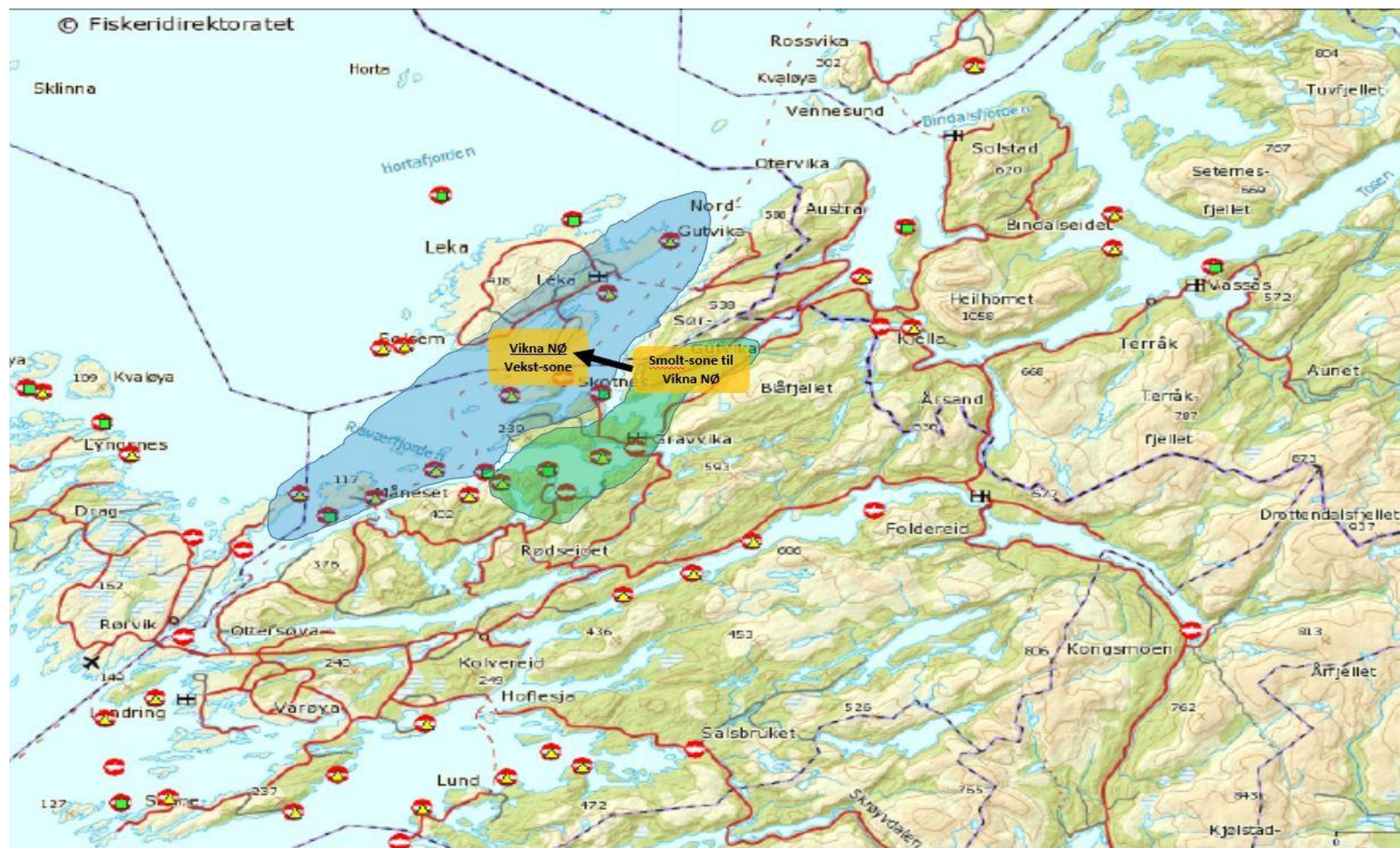
«The Kindergarden principle»

- Smolts should be stocked to a protected fjord site (minimally affected by surface currents)
- Short distance move to final rearing sites after 6-9 months
- Same generation, and same health status as the fish already inside the grower area to which they are relocated

Kindergarden principle: example 1



Kindergarden principle: example 2

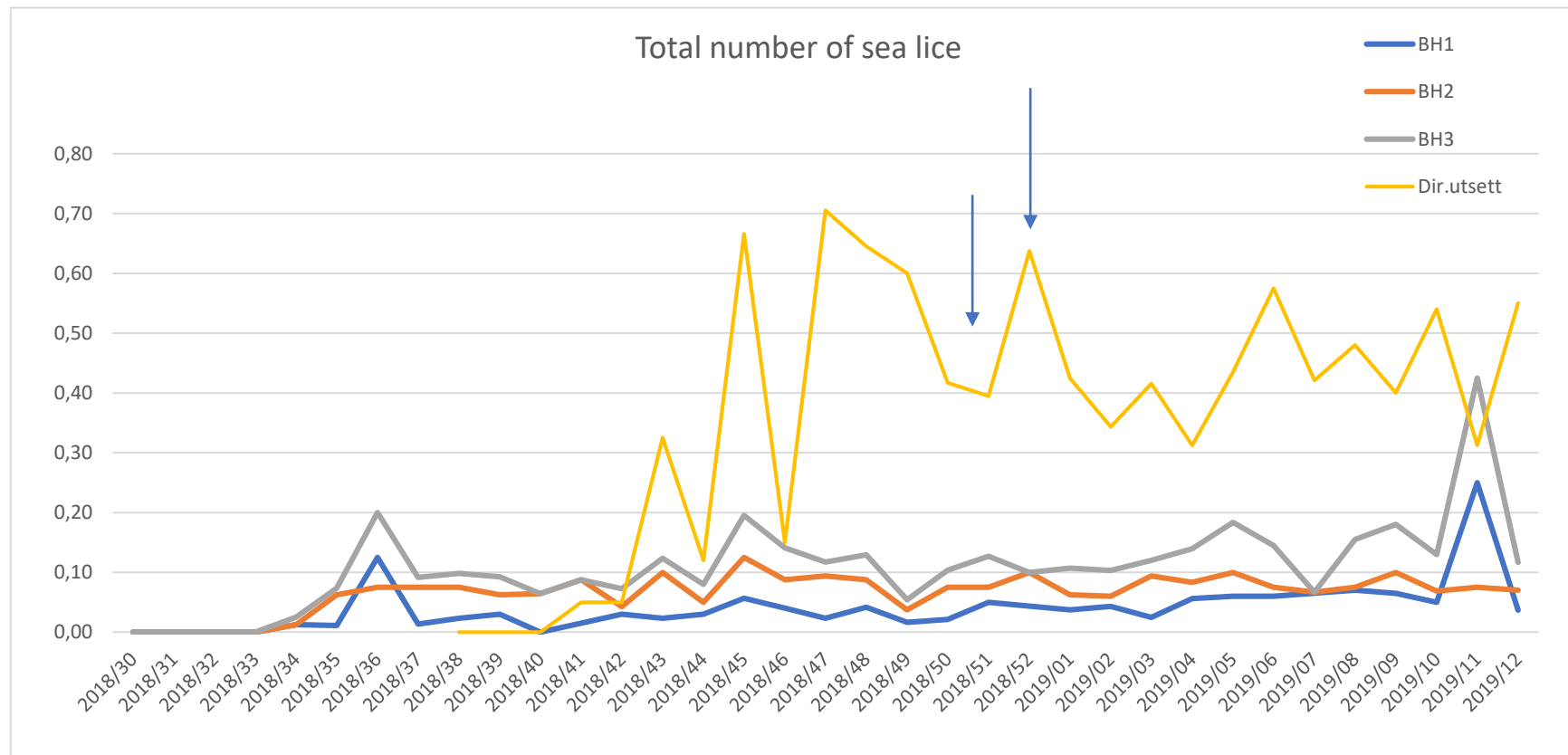


Kindergarden principle - benefits

- Protection from disease spread by currents and by frequent well boat traffic
- Low lice counts indicate absence of incoming water from older salmon yearclasses = reduced intergenerational spread of infection
- Few or zero treatments against sea lice
 - Reduced risk of vector related infection the first 6-9 months in sea
 - Reduced risk of stress induced disease, and better welfare
- Yearly fallowing of the kindergarden sites for 3 months

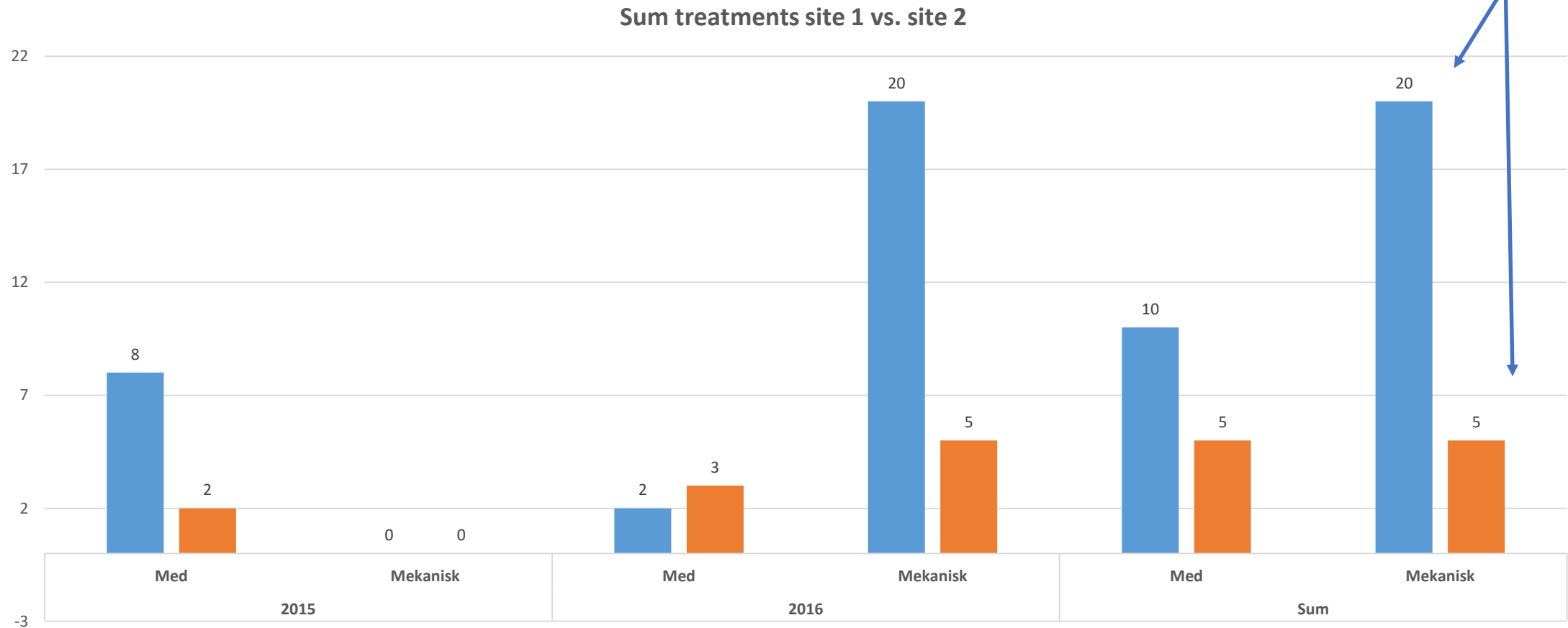
Comparison of lice counts

- Direct stocking: treatment with Slice in w51 and fresh water in w52
- Kindergarden sites: not treated 10 months after stocking



Louse treatment incidence (2015-2016)

This shows the effect of the kindergarden principle 2nd year in the sea



Low risk relocation of fish from kindergarden sites

- Important to separate low risk relocation from high risk relocation
- Large distance move between areas with different status regarding infectious agents is obviously high risk
- Short distance move between zones with similar infection status should be considered low risk
- «All in- all out» principle combined with low risk relocation is a widely applied principle in other industrialized animal productions:
 - Swine
 - Poultry

Biosecurity measures

- Cooperation between all companies in the area
- Joint plans and measures in order to increase biosecurity
- Regional chartering of well boats (working locally)
- Investment in non-medical delousing equipment
- Equipment kept and used only in a restricted area
- «Closed» slaughter of PD fish and strict rules regarding hygiene after a boat has handled PD fish compose an important part of local regulations
- Additional biosecurity measures for Kindergarden fjords
 - Traffic control in/out
 - Extra screening for infections

Discussion

- SAV2 is one of the most contagious viruses in the salmon industry
- Main reservoir: sites with clinical PD that shed virus large-scale
- Infection pressure must be reduced in order to avoid further spread
- Rational and cost-efficient measures needed to enable control of the disease
- The measures applied in Mid-Norway has shown to be more succesful than previously used control tactics
- Time to increase efforts in endemic areas
- Vaccination in a step-by-step manner: limit clinical outbreaks, losses and spread of virus
 - Especially important in «fire gate» areas close to the border of the free zone

Summary

- Last site with SAV2-positive fish slaughtered in October 2018
 - 8 months without any PD-positive fish in northern Mid-Norway
- Control measures actively applied and enforced:
 - Vaccination
 - Zone structure and «genuine fallowing»
 - Kindergarten principle
 - Biosecurity
- An important lesson from our area is that challenges with sea lice, PD and ISA cannot be solved as a single matter or throughout single measures. These challenges must be addressed with a comprehensive and well thought through strategy that includes all aspects from smolt to slaughter.

Thank you for your attention

