



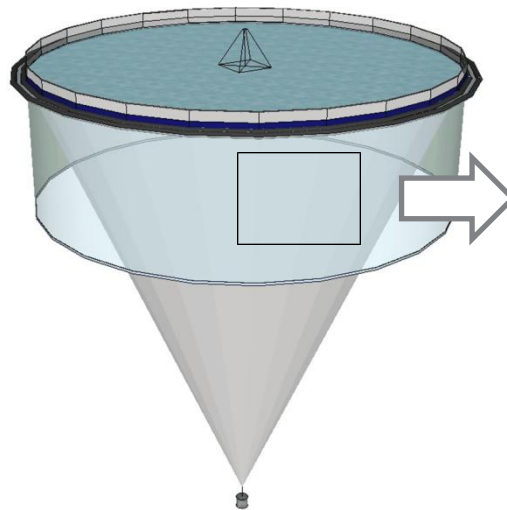
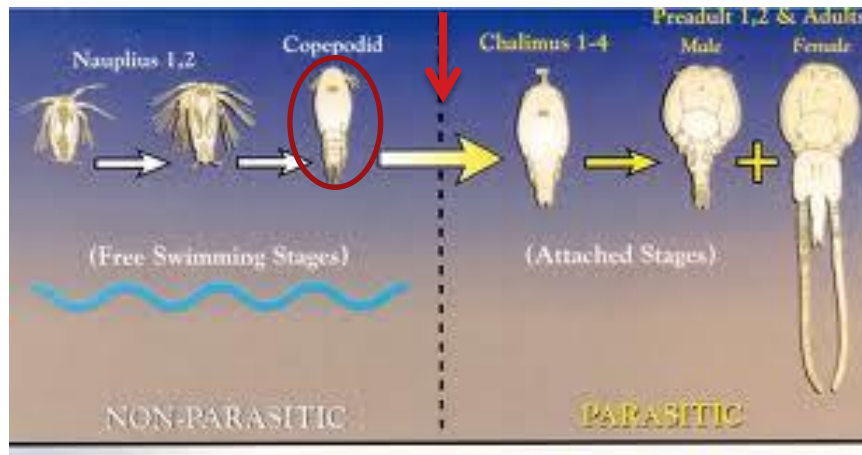
Skirt – a green solution against sea lice infestation

- Kurt Tande, R&D Manager
(www.calanus.no)

PARTNERS:

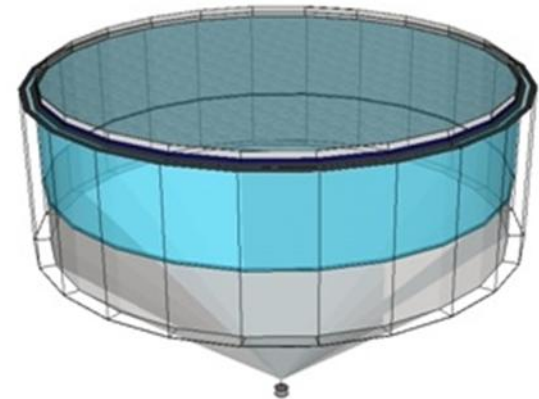
**NORDLAKS****NOVA**
SEA™**Vesterålen FISKEHELSETJENESTE AS****Veterinærinstituttet**
Norwegian Veterinary Institute
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The concept:



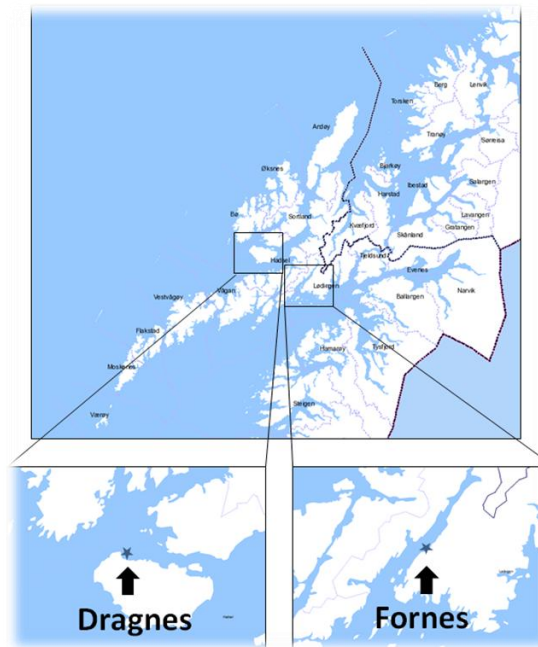
BASIC CONSTRUCTION

- Rectangular, 3-6 m longer than the circumference of the cage
- Installed as skirts (6, 8 or 10 m deep)
- Plankton net with 350 μm mesh size
- Light opening 50 %
- Nylon or polyester (PEH)
- Estimated life time ~ 4 yrs
- Calanus AS has a Norwegian patent from 2013 and a PCT application is submitted



TESTING THE HYPOTHESIS «no differences between treatment and control»

NORTH NORWAY



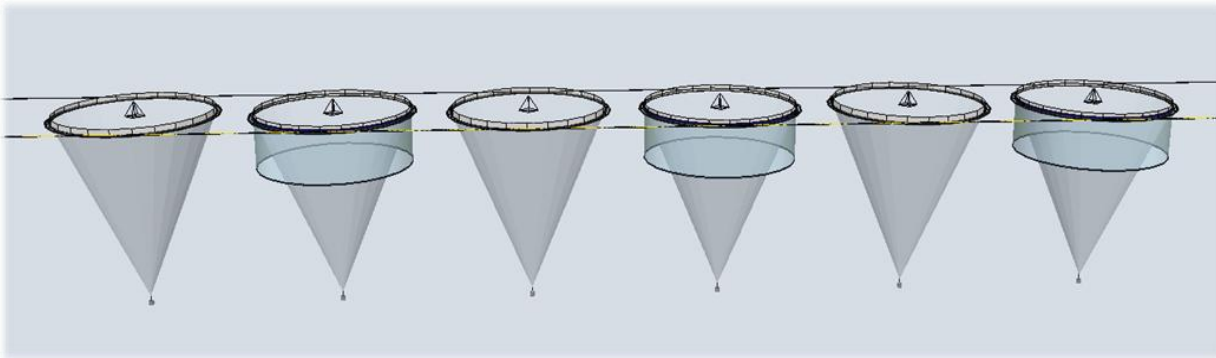
Dragnes 2012

Fornes 2011

APPROACH

[Fornes: 3 (10 m) vs 3 controls]

[Dragnes: 3 (10 m), 3 (6m) vs 3 controls]

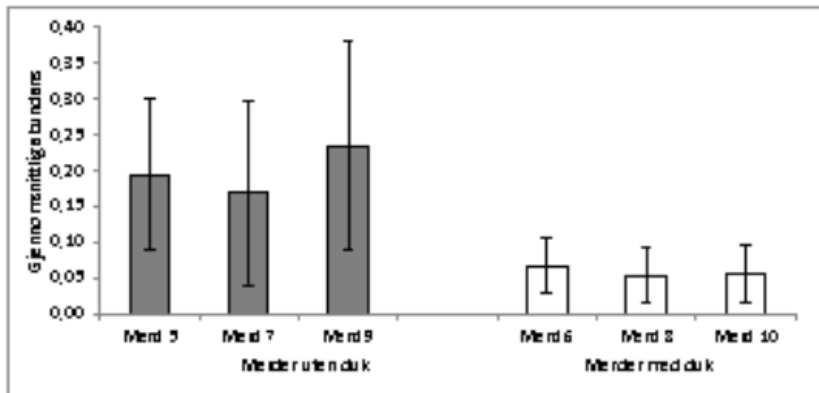


Monitoring:

- **Sea lice infestation**
- **Fouling**
- **Internal environment (oxygen)**
- **Fish growth and well-being**

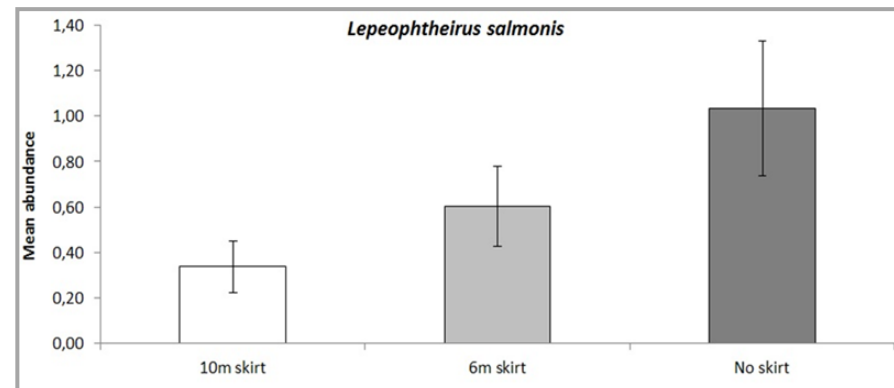
EFFECT 1: The skirt stops the infective stage

Fornes 2011



Reduction: ~ 75 %

Dragnes 2012



~ 65 % ~ 45 %

Effect 2: The skirt acts as an anti-fouling agent

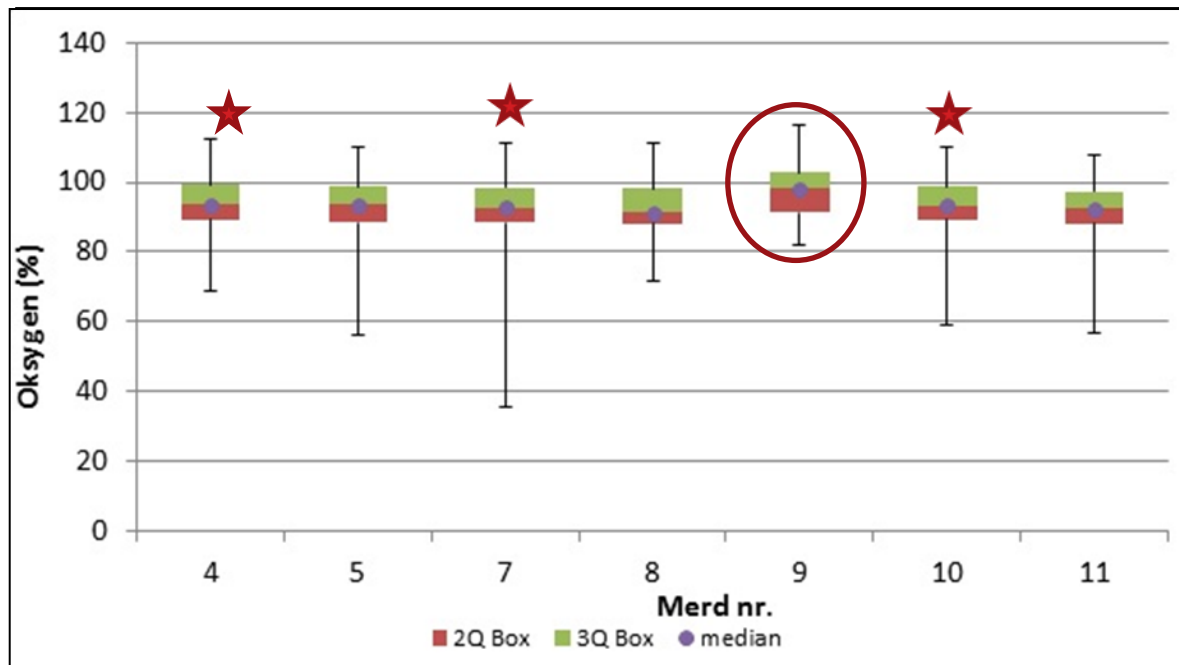
With skirt



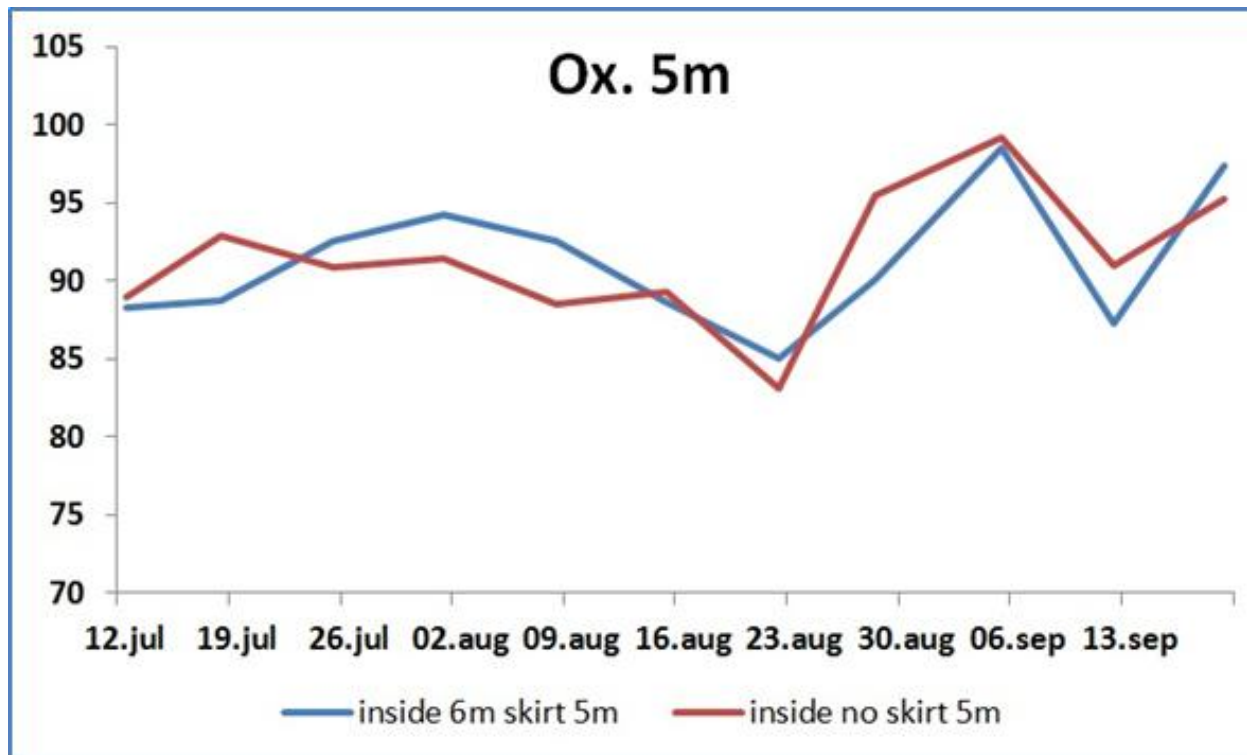
Without skirt



SMALL FISH: Dragnes 2012 (May-Nov)



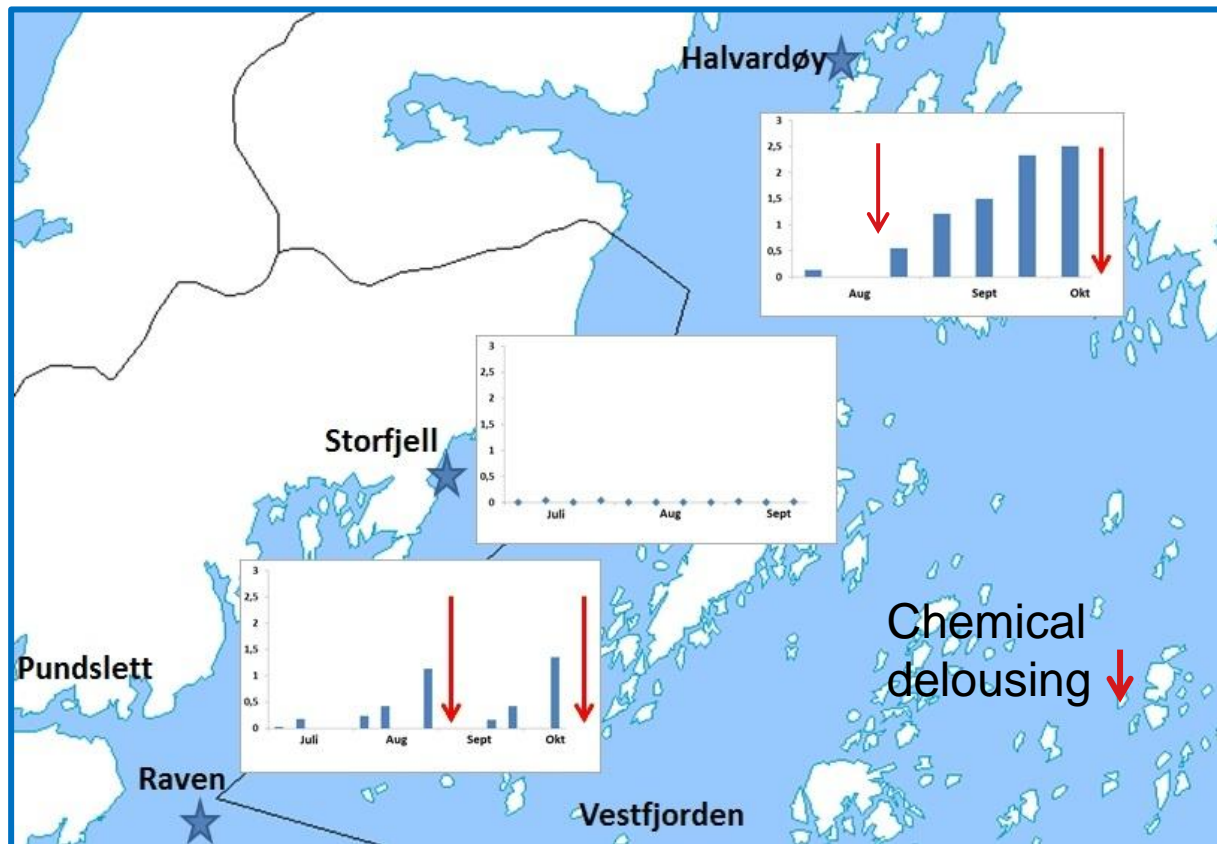
LARGE FISH: Dragnes 2013 (Jul-Sep)



Fish growth and well-being

- **Growth at Fornos (June-October)**
 - **With skirt: 1,56 % per day**
 - **Without skirt: 1,39 % per day**
- **Mortality at Fornos (June-October)**
 - **With skirt: 0,80 % over the period**
 - **Without skirt: 0,80 % over the period**

2013: Full scale use - reduces the need for chemical delousing



Findings from Vestfjorden (autumn 2013)

Infestation patterns of salmon lice:

- **Low average abundances for 5 months ($< 0,1$ lice per fish), due to the effect of the skirt and the reduction in transfer of infectious stages within a plant (Storfjell)**
- **By synchronous fish stocking of neighboring plants, average abundances would have been kept low over substantial longer time windows (due to reduction of transfer of infectious sea lice from Raven, Halvardøy and Storfjell)**

(Our results are supported by Aldrin et al. (2013) «*Space-time modelling of the spread of salmon lice between and within Norwegian Salmon Farms*»)

Plankton skirts are now a product in the market

- **Investment costs of plankton skirts are covered by expenses of one single chemical delousing!**
- **Technical reports of extra loadings and user handbook are available**
- **System for maintenance and support have been established**
- **9 companies are using the product at present**
- **Ca 80 nets in the sea**
- **5 full scales trials are ongoing (all with good results in reducing the salmon lice infestation to minimum levels)**

From treatment to prevention.....



Thank you for the attention!