

Use of deep lights and feeding, and skirts for lice infestation prevention

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*This trial was hosted by *Centre for Aquaculture Competence (CAC), which is a joint venture for large-scale R&D between Mowi, Skretting and AKVA Group.*



MOWI[®]

SKRETTING



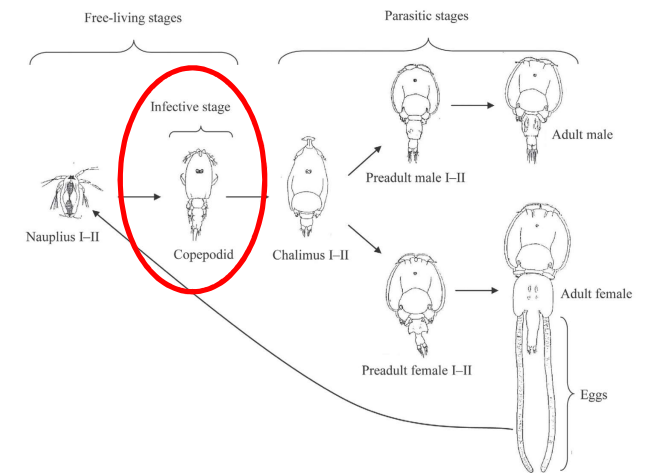
AKVAGROUP[™]

FHF
FISKERI- OG HAVBRUKSNÆRRINGENS FORSKNINGSFOND

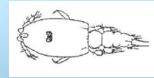
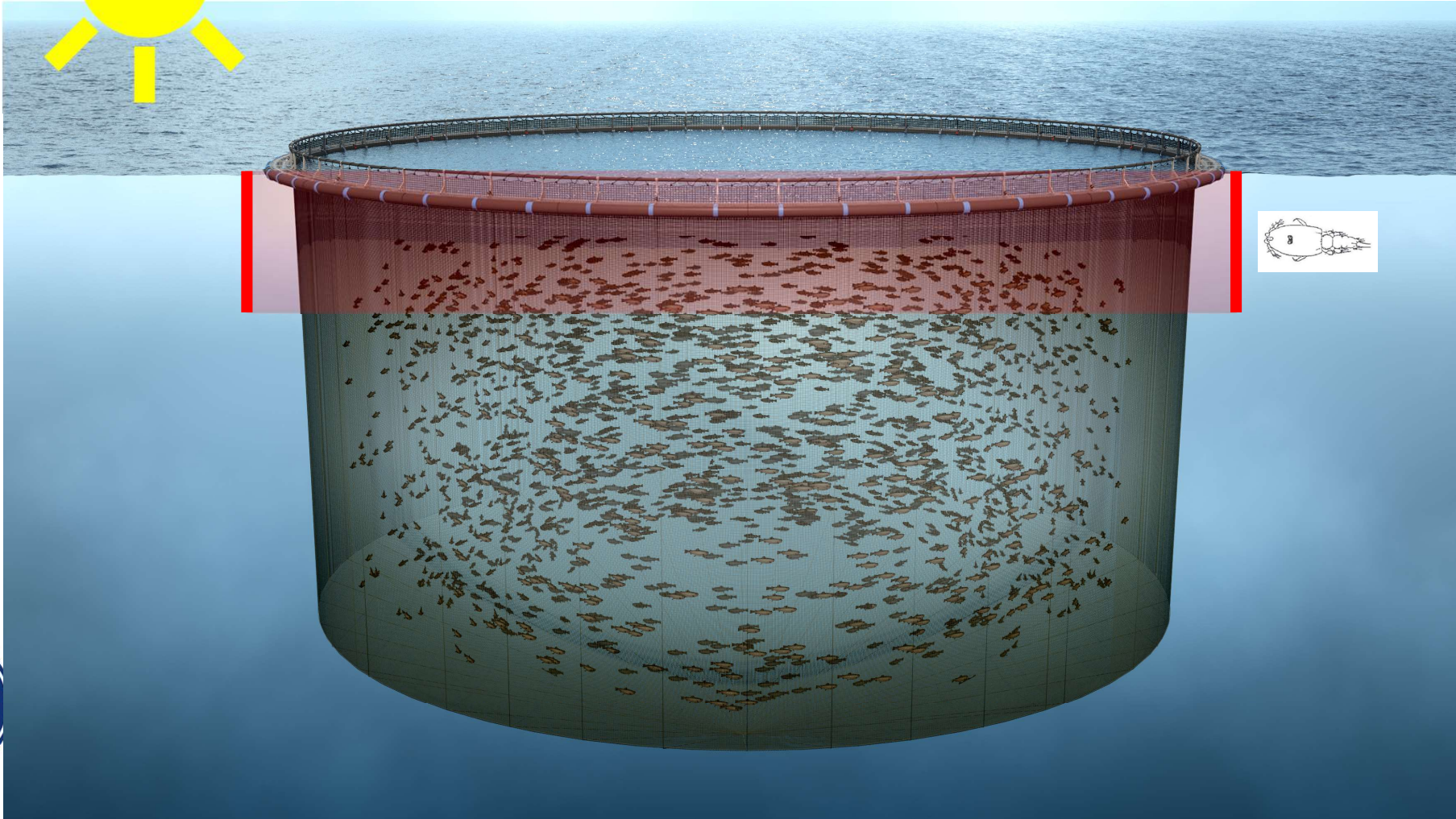


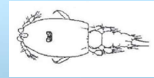
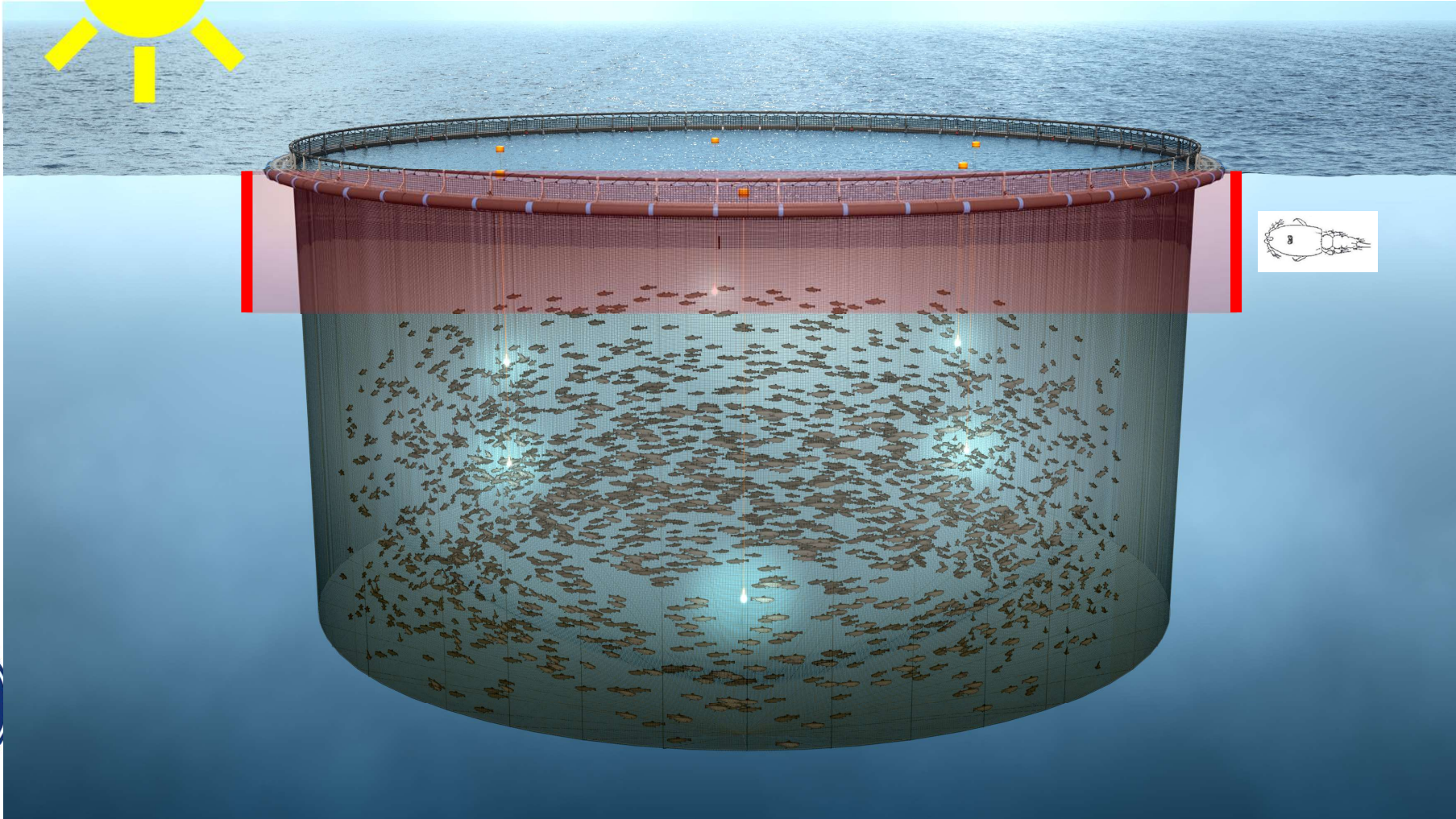
The Sea Lice Issue

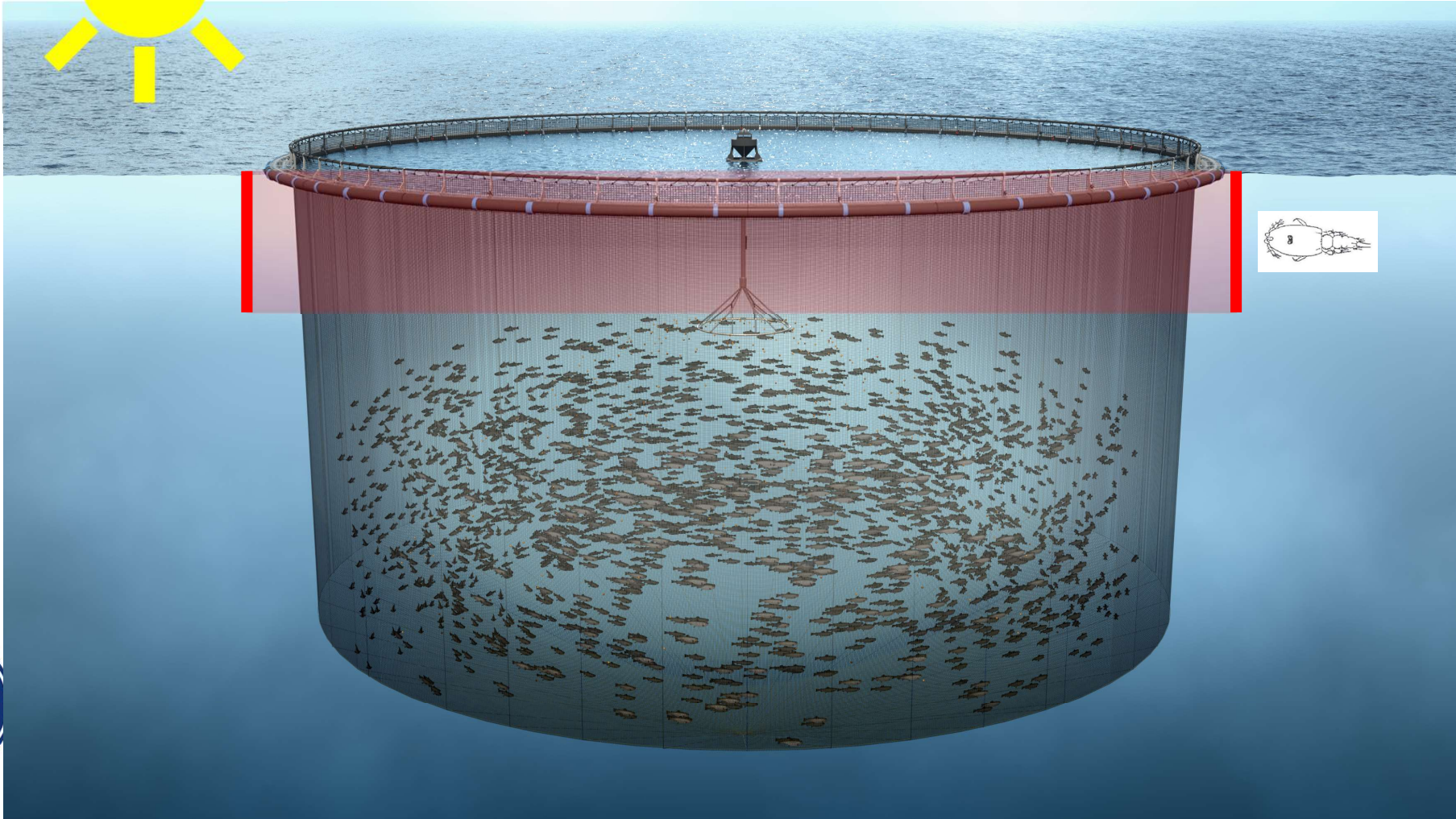
- Effect on wild populations of salmon
- Economic cost
- Environmental impacts
- Social costs

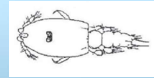
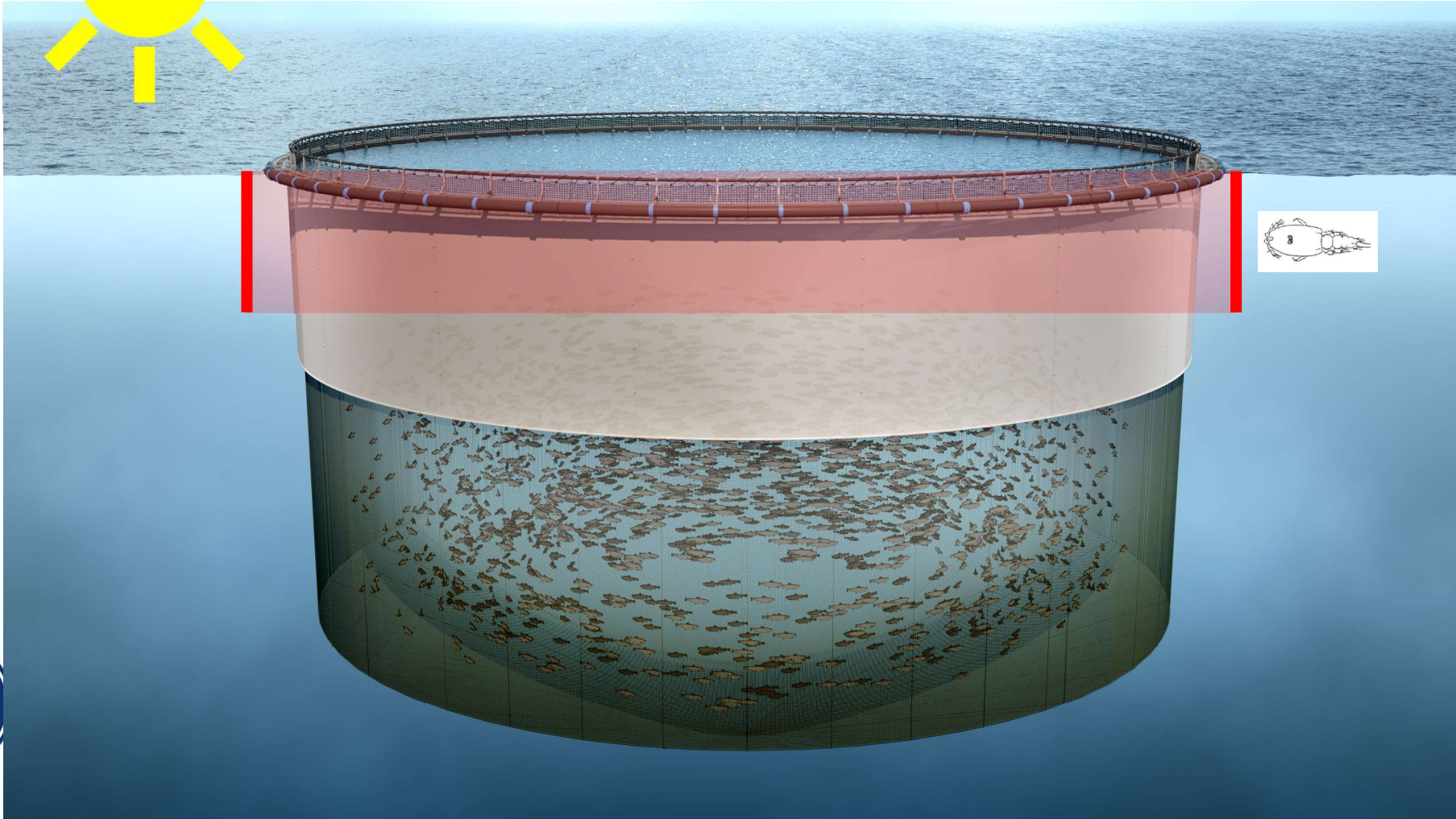


Increased focus on non-chemical treatment/prevention methods



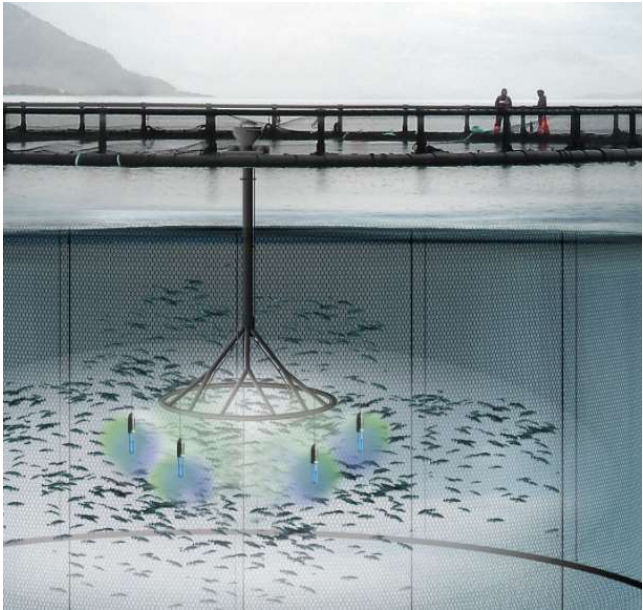
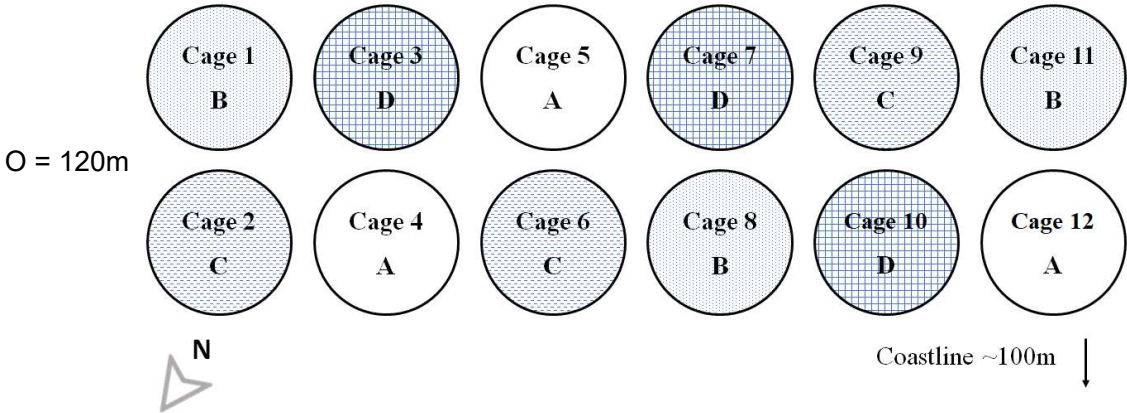






Experimental set-up

Study period: Nov 2016 - Dec 2017



Group A
Cleanerfish only



Group B
Cleanerfish
+ Functional Feed



Group C
Cleanerfish
+ Functional Feed
+ Sub lights/feed



Group D
Cleanerfish
+ Functional Feed
+ Sub lights/feed
+ Skirt



The Salmon Welfare Index Model

GRAD	Emaciation	Snout wound	Vertebral deformity	Lower jaw deformity	Upper jaw deformity	Fin damage	Opercula	Eye status	Skin condition
1	Ingen avmagring 	Ingen sår 	Ingen deformitet 	Normalt 	Normalt 	Friske finner 	Normalt 	Funksjonelt øye 	Normal hud
2	Potensiell avmagring 	Små sår/blødninger 	Kort hale, normal vekt 	Potensiell/liten misdannelse 	Potensiell/liten misdannelse 	Arrvev/liten nekrose 	Delevis dekkning - ensidig 	Liten skade - ensidig 	Leget arrvev
3	Utpreget avmagring 	Store sår/blødninger 	Stor deformitet 	Klart synlig misdannelse 	Klart synlig misdannelse 	Moderat skade 	Delevis dekkning - tosidig 	Liten skade - tosidig 	Skjell tap
4				Stor misdannelse 	Stor misdannelse 	Ålvorlig skade 	Fraværende - ensidig 	Tosidig katarakt/nedsatt 	Sår < 1 cm
5							Fraværende - tosidig 	Årvolig skade/blind 	Sår > 1 cm
6									Dype/ flere/ infiserte sår
7									Livstruende sår

+ lice
+ condition factor

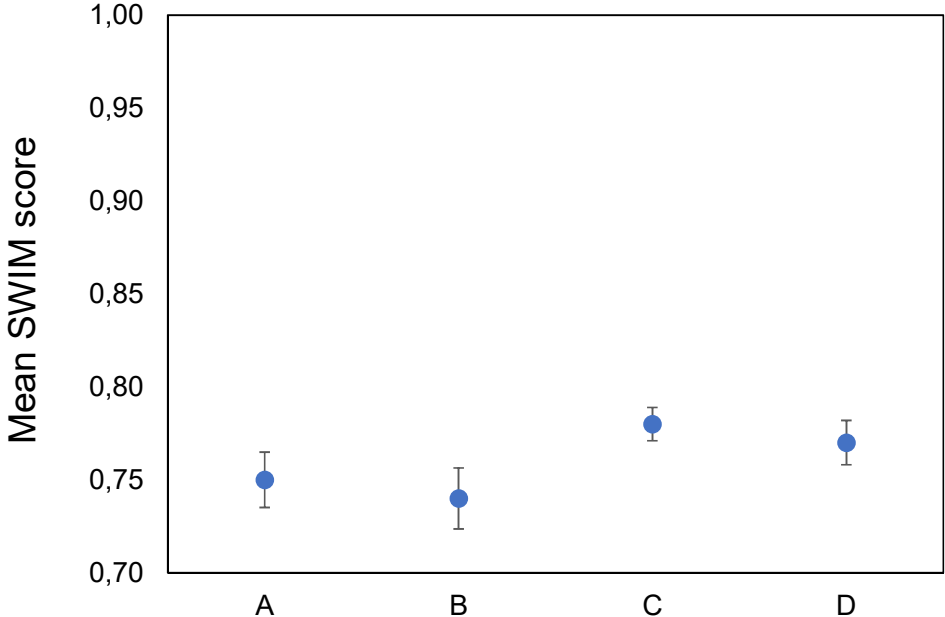
Normal/
undamaged →

Increasing
severity ↓

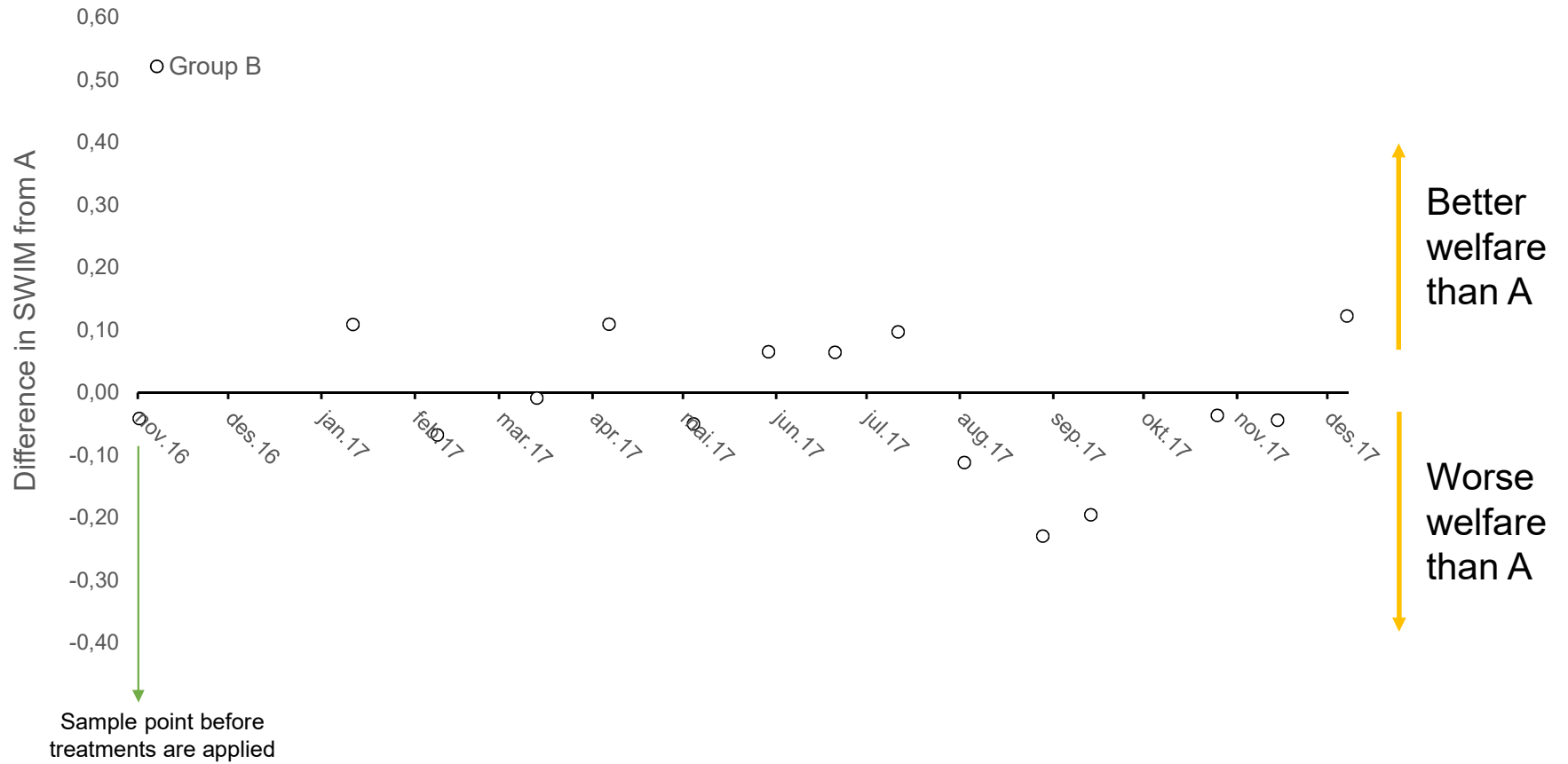
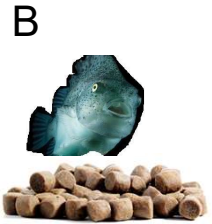


Stien et al. 2013

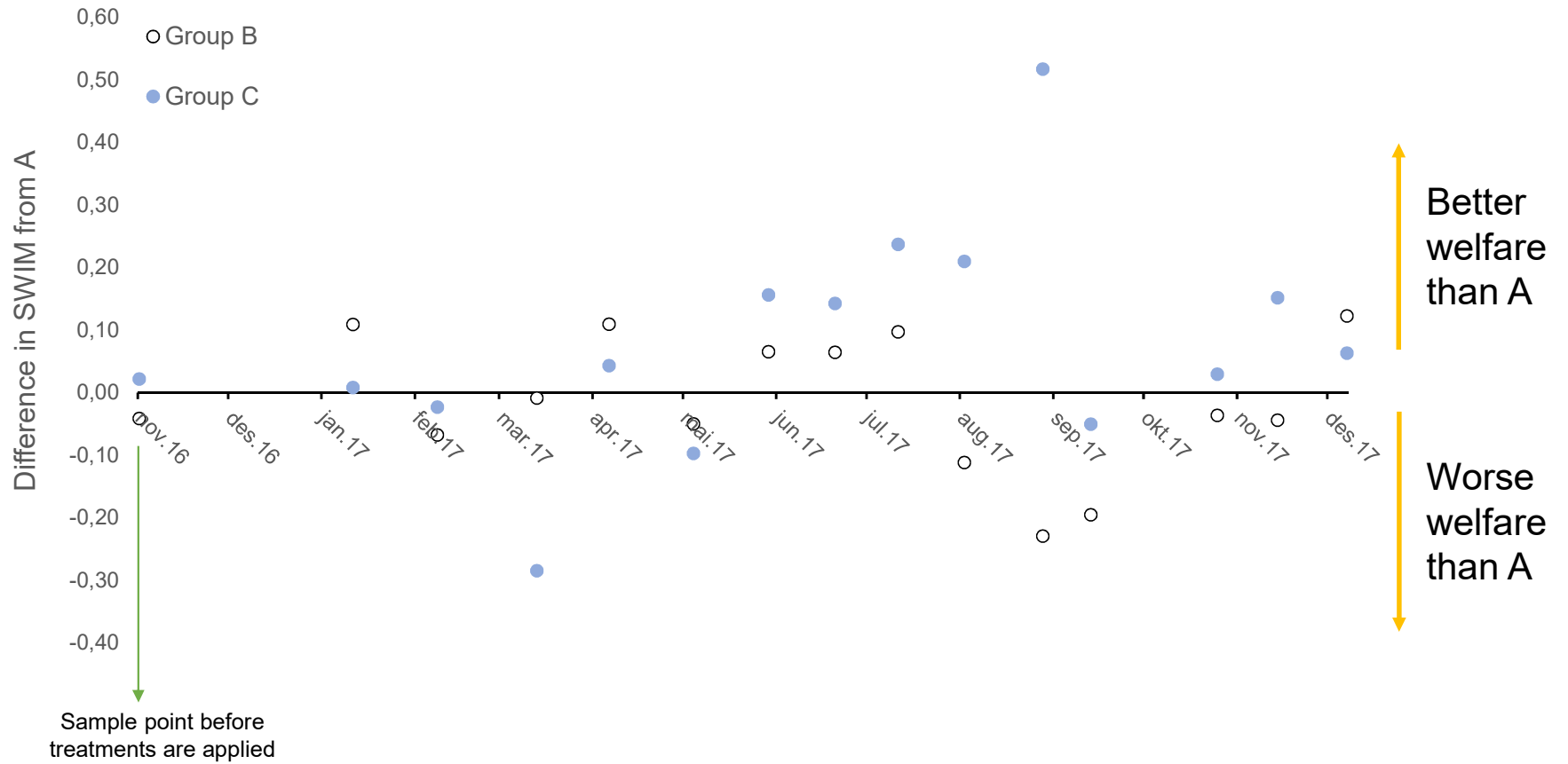
Fish Welfare



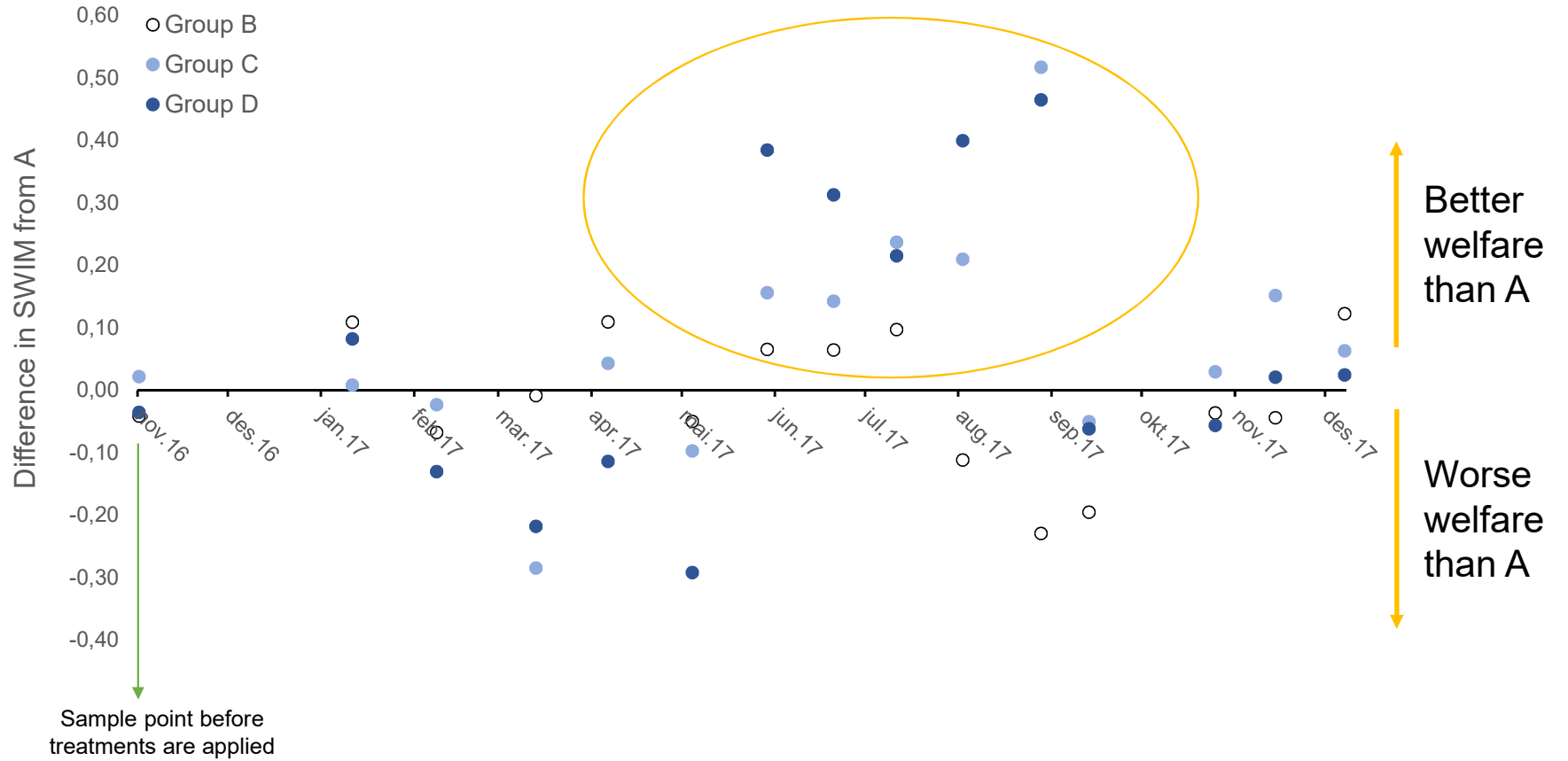
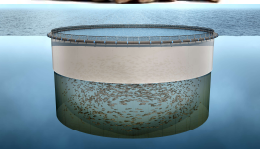
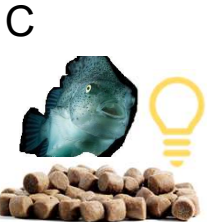
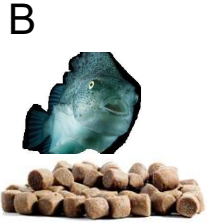
Fish Welfare



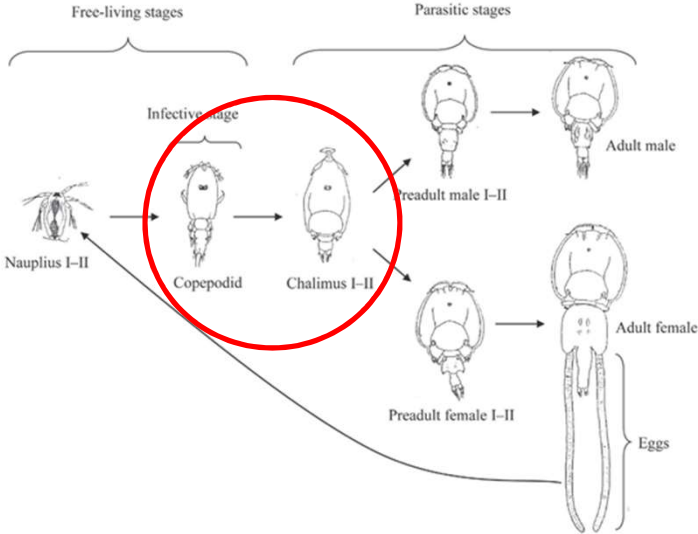
Fish Welfare



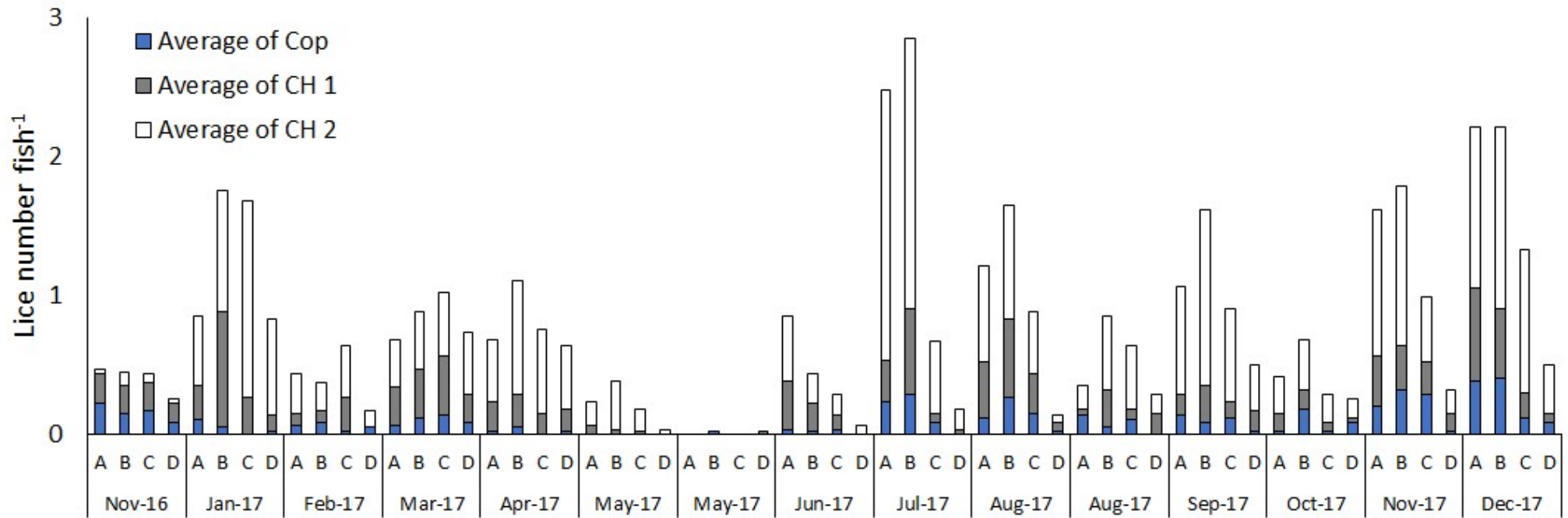
Fish Welfare



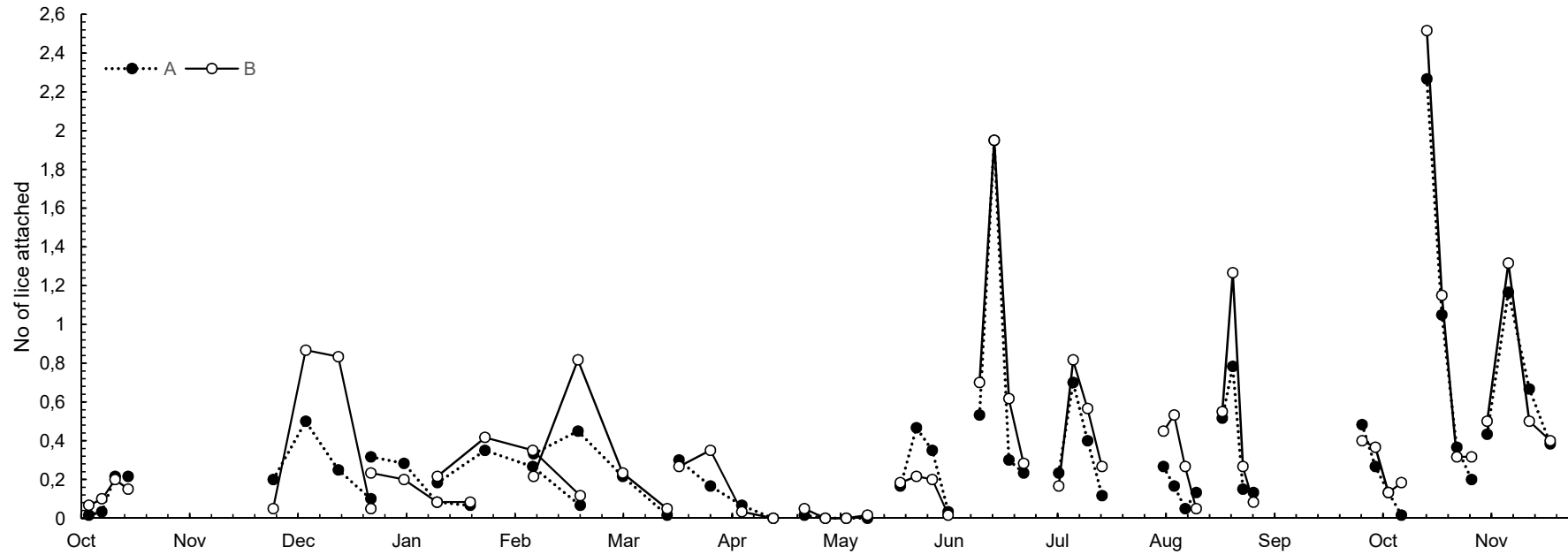
New infestations



New infestations

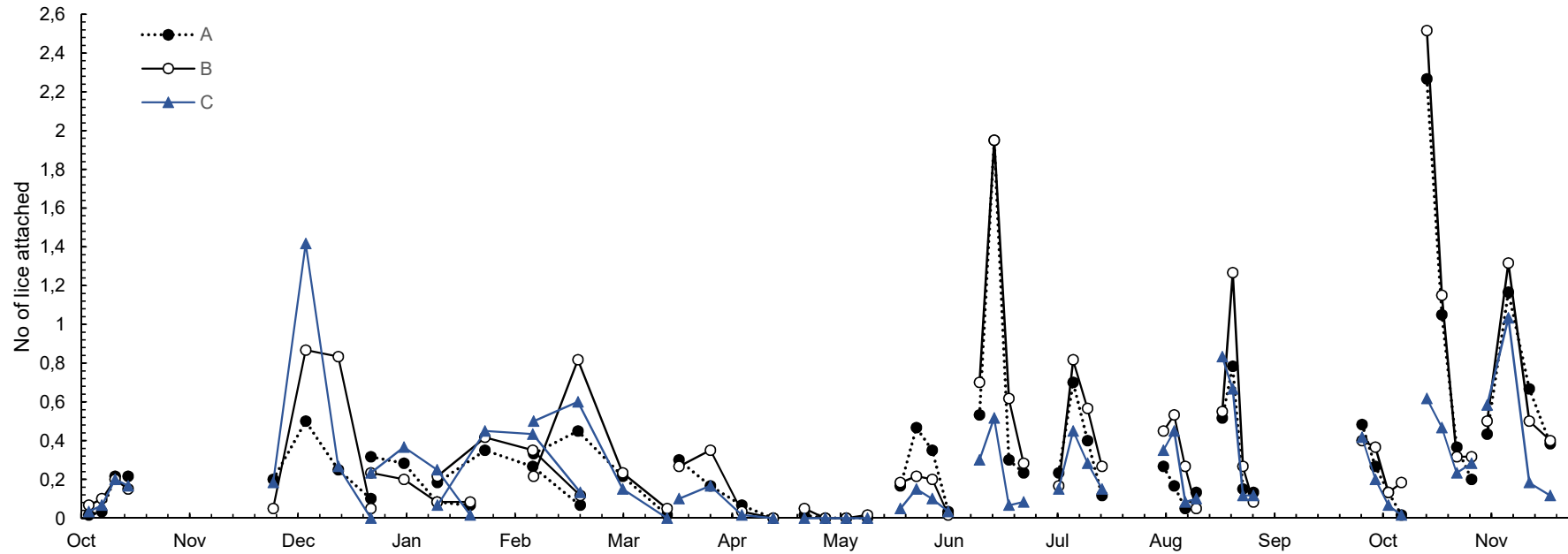


New infestations



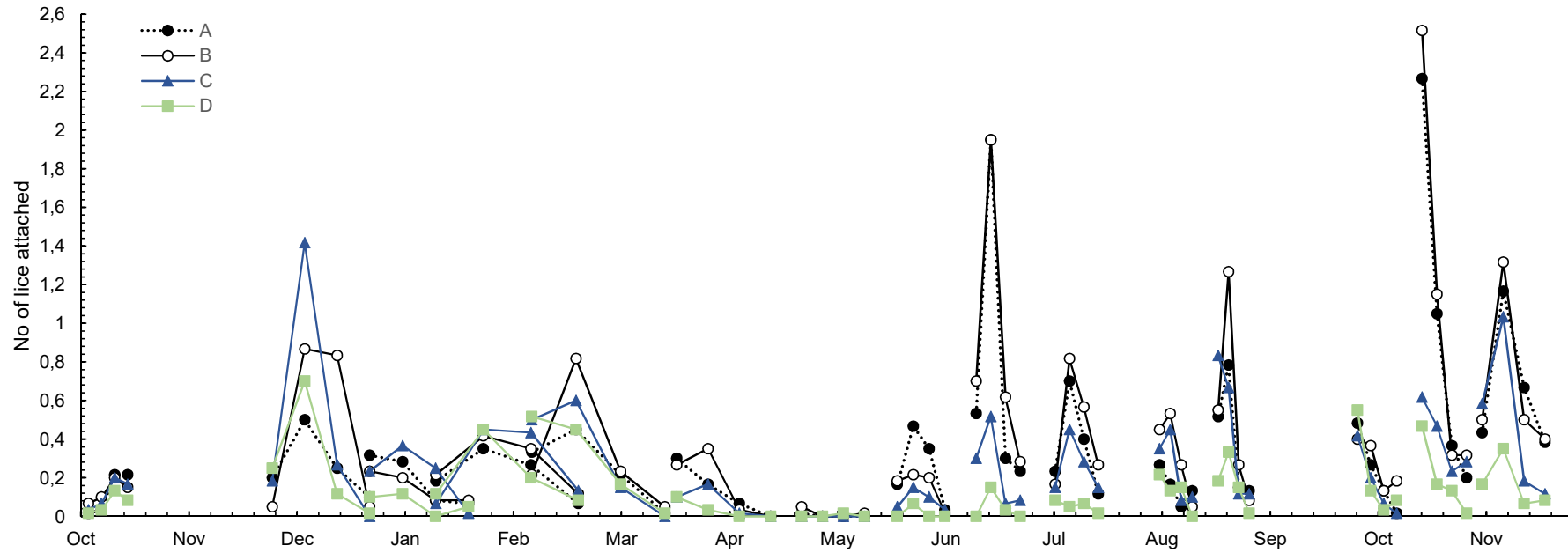
Back-calculating attachment dates using temperature-development rate model for lice

New infestations



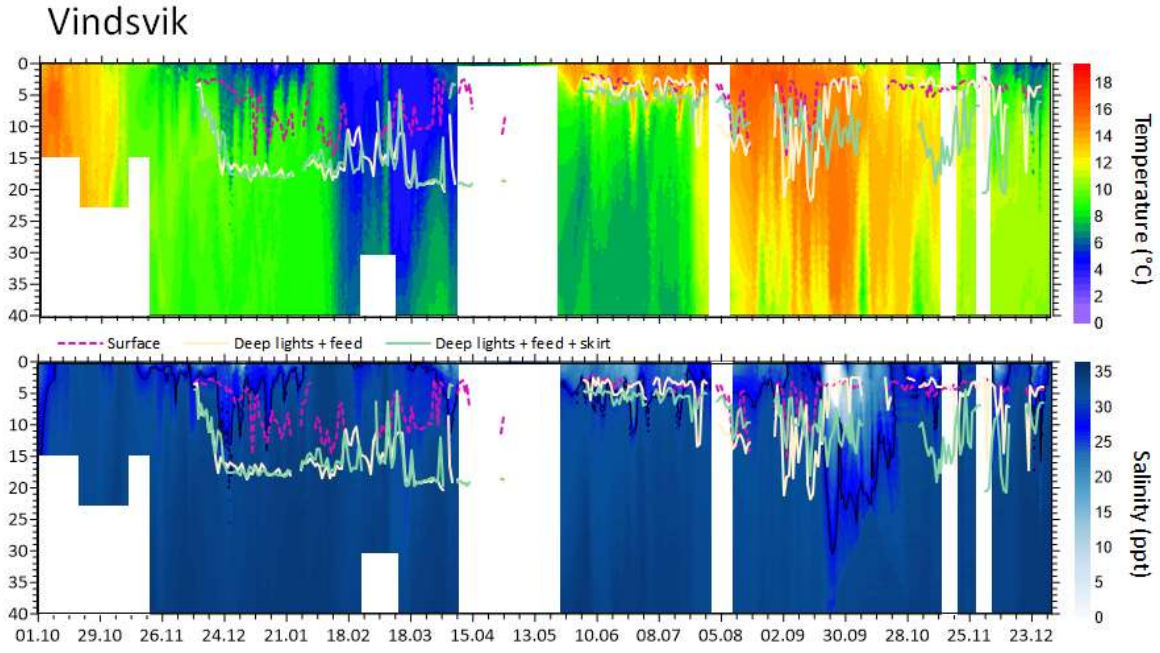
Back-calculating attachment dates using temperature-development rate model for lice

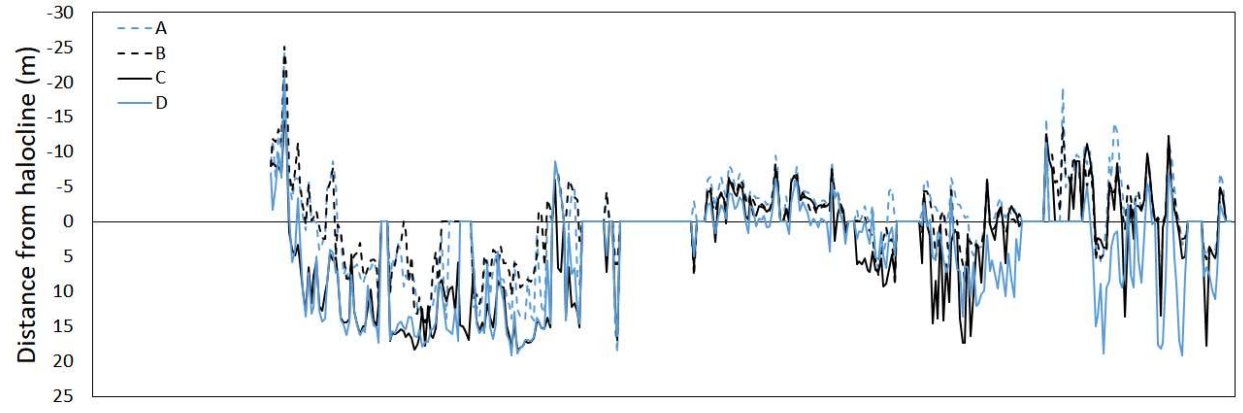
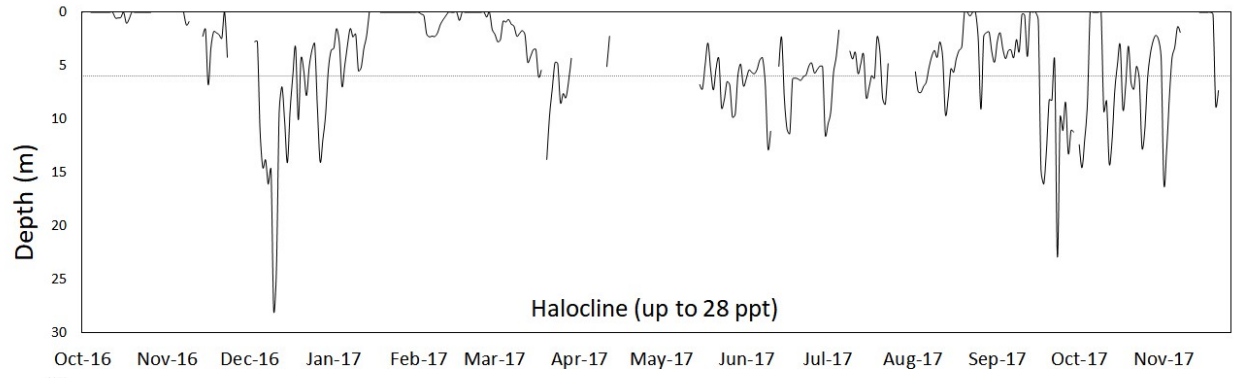
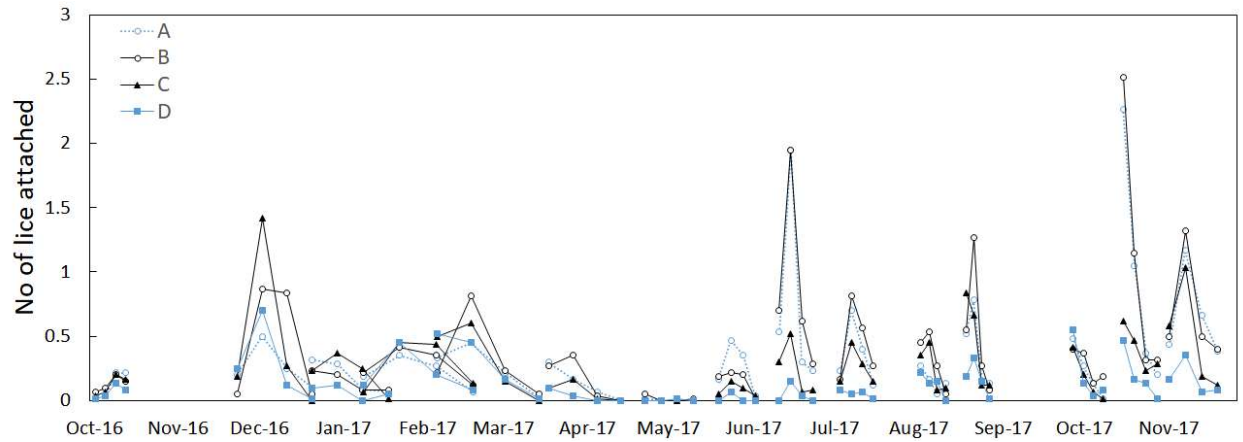
New infestations



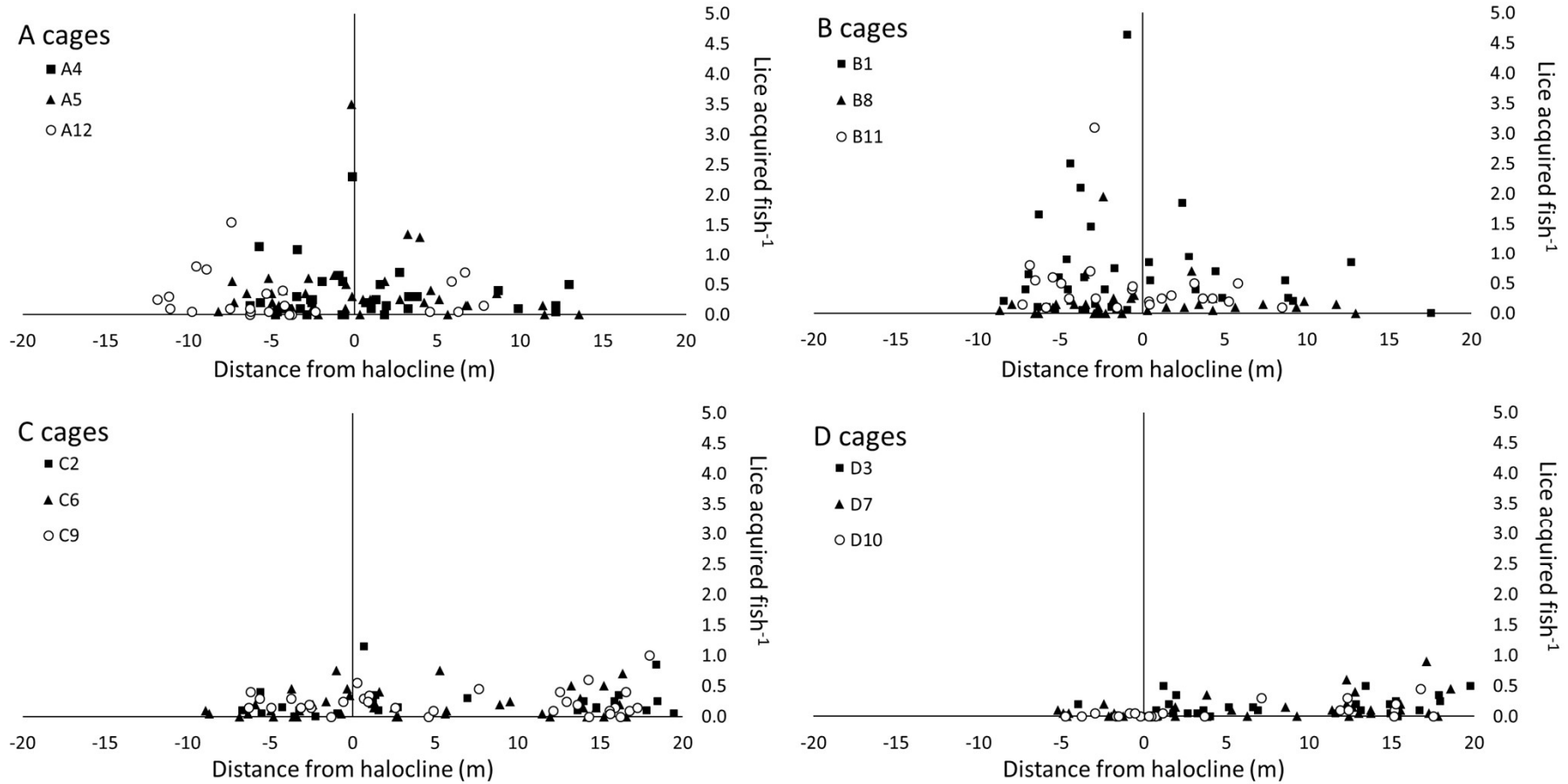
Back-calculating attachment dates using temperature-development rate model for lice

Did fish with the Subfeeders swim deeper?



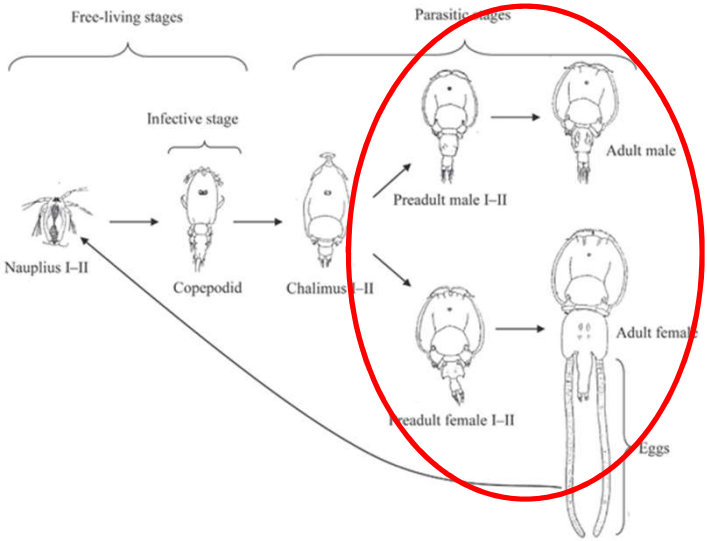


Infestation vs swimming depth

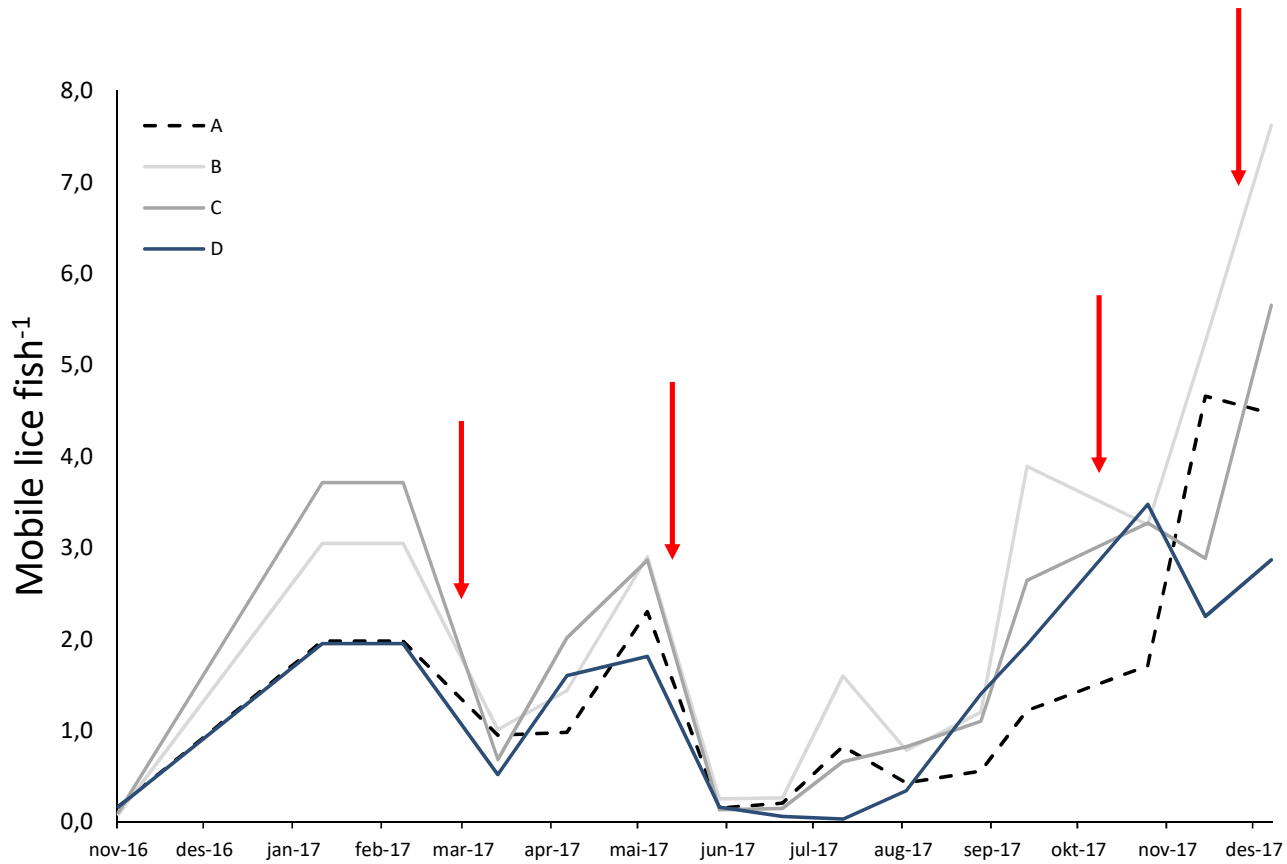


Data only shown for days when infestation level, swimming depth, AND salinity profiles are available

Mobile lice



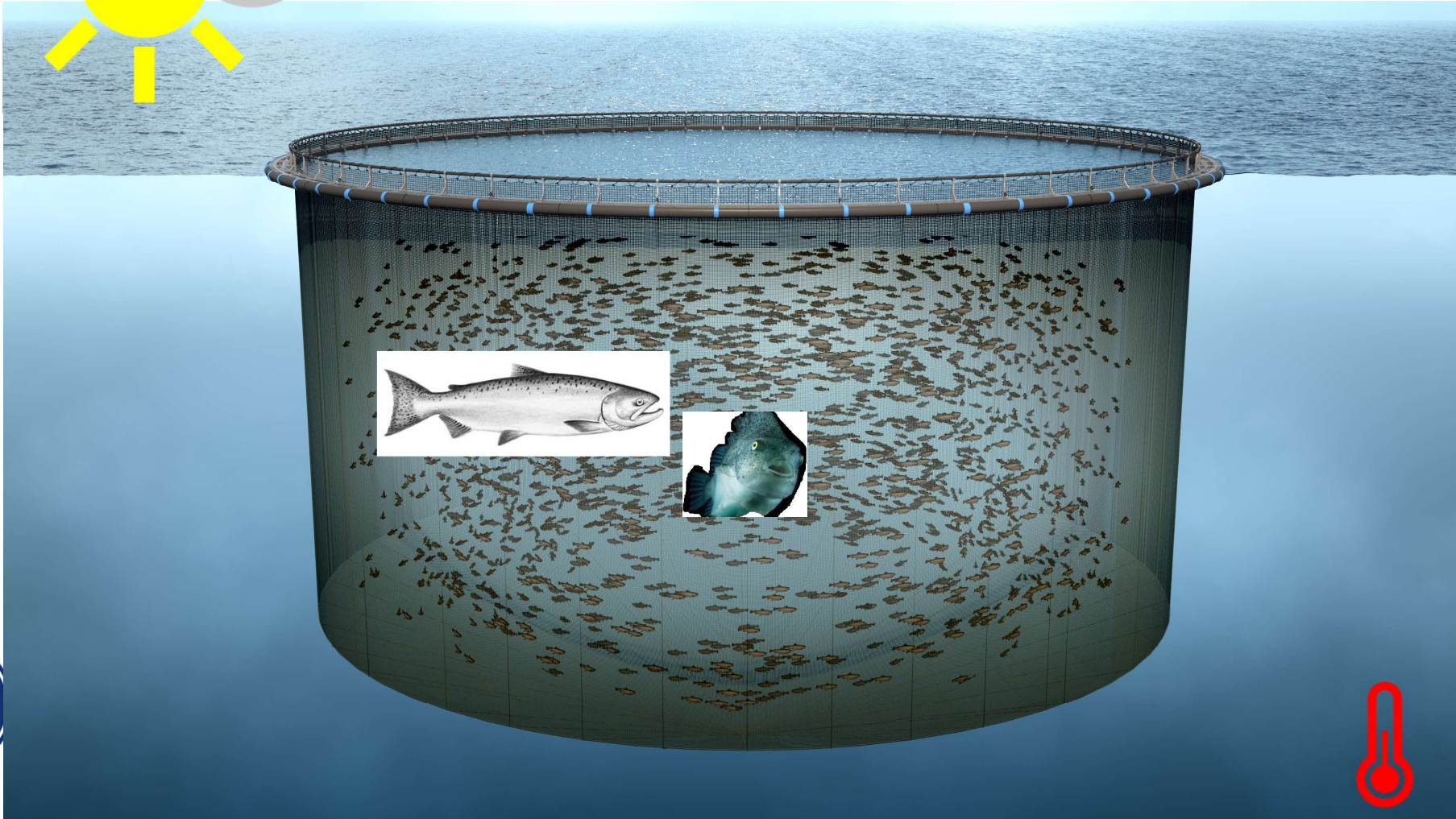
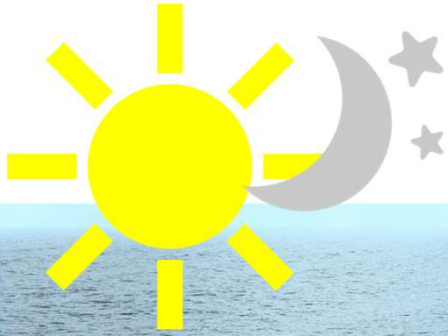
Mobile lice

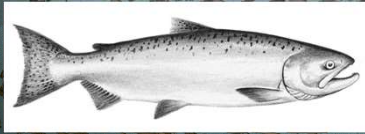
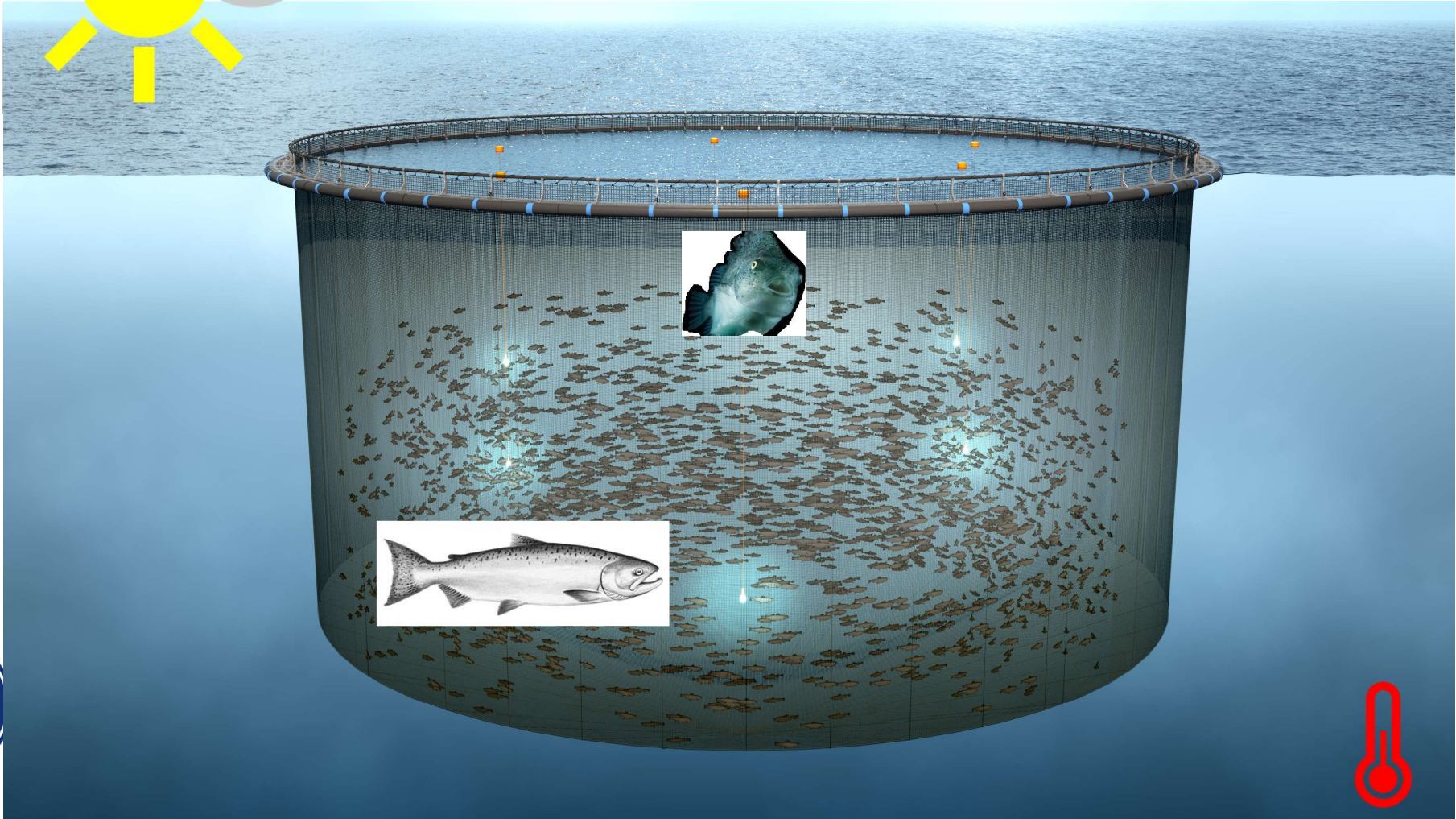
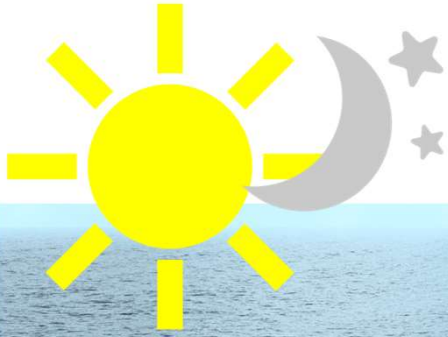


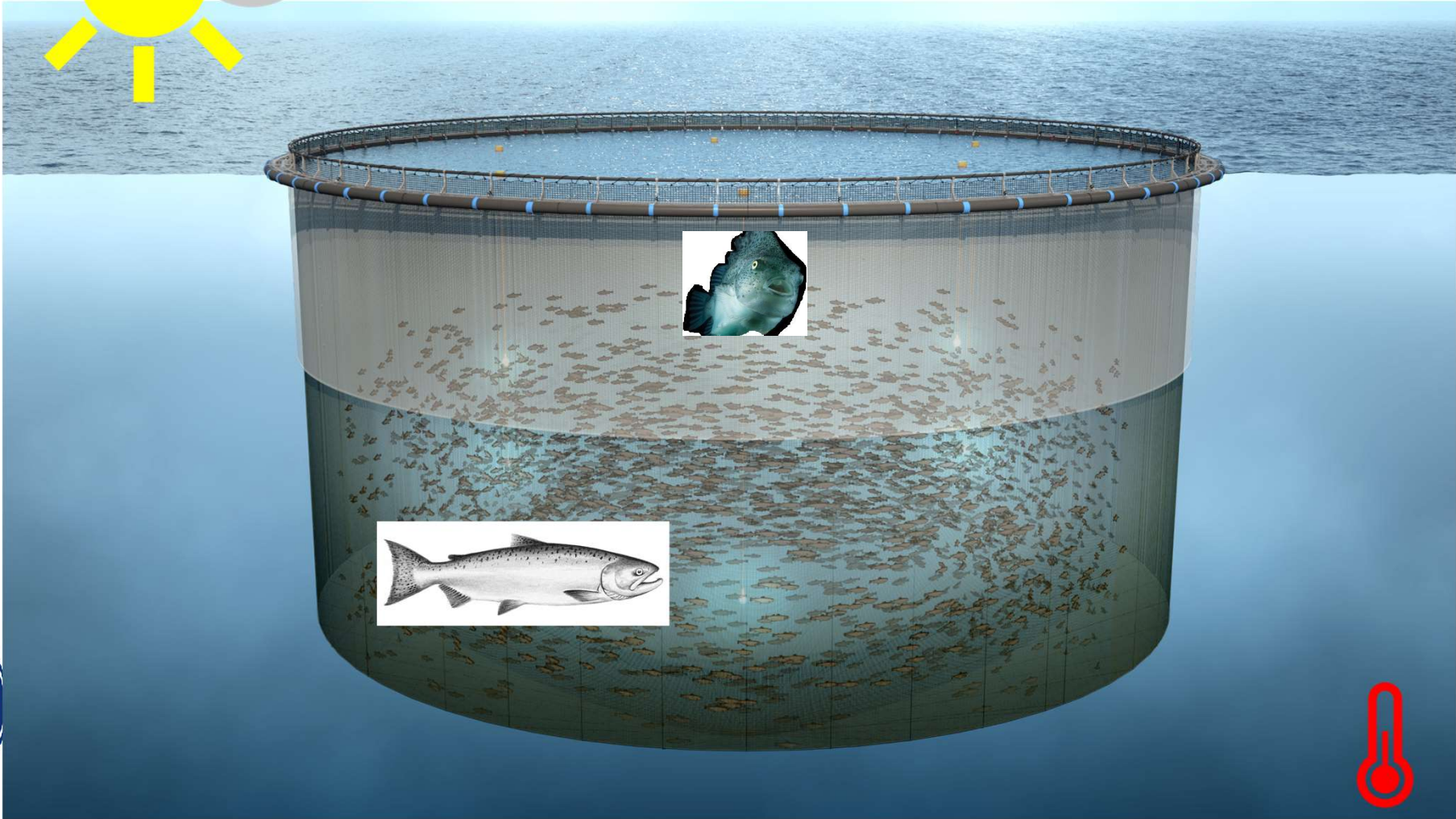
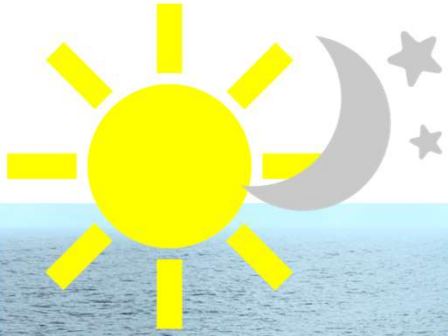
Group	Number of treatments
A	14
B	16
C	14
D	14

No difference in the number of delousing events









Initial conclusions:

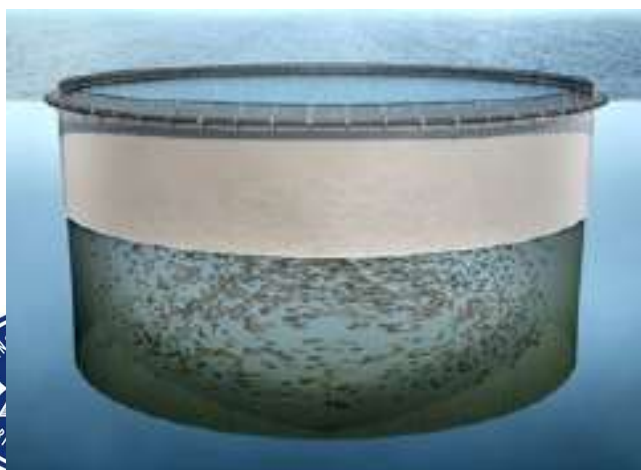
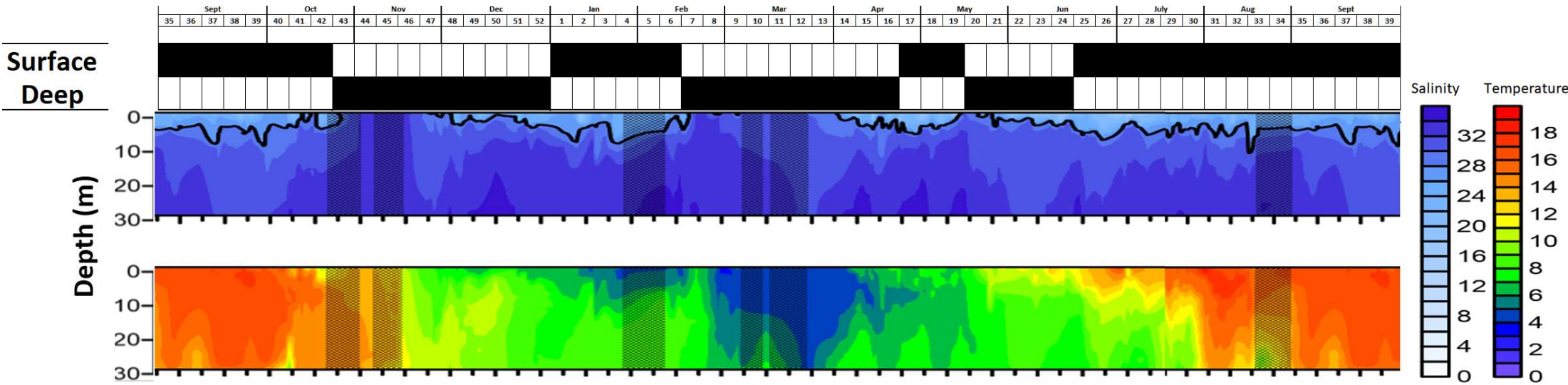
- Over all, welfare is not affected by the provision of functional feed, or the installation of deep lights/deep feeders or lice skirts. In fact, cages that had deep lights + deep feeders had improved welfare scores during some periods
- Cages that had all treatments (D group) acquired the least lice over the year
- However, this did not translate to a decrease in delousing treatment frequency, with equal number of delousing events required.
- This may be due to the efficiency of cleaner fish in D groups

Next steps – flexible prevention:

- Testing cage prevention technologies but with flexible implementation that responds to environmental conditions.



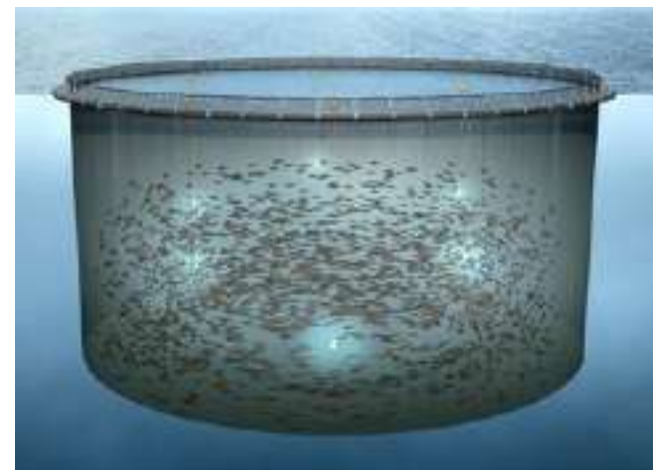
Fosså 2018-2019



Lice skirt + aeration (6m)



Deep feeding (8m)



Deep lights (10m)

Thank you!

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The report from HI can be found on
hi.no
Rapport fra Havforskningen

The final FHF report is currently in
preparation

