

Lusesnorkel



# Snorkel - forsøk nr.1

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Laks som svømmer på 0-4 m dybde får høyere lusepåslag enn laks som svømmer dypere (4-8 og 8-12 m).

## Hvordan få laks dypere (unna larver):

- Lys og fôring dypt i merden
- Nedsenkete merder
- Skjørt
- Snorkel



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The effect of artificial light treatment and depth on the infestation of the sea louse *Lepeophtheirus salmonis* on Atlantic salmon (*Salmo salar* L.) culture

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### Abstract

Two field studies were carried out with farmed Atlantic salmon (*Salmo salar* L.) in sea cages to examine various effects of artificial light (AL) and the vertical distribution of salmon on lice infestation. The use of AL light caused an overall increase in lice infestation in both experiments. The first study showed that salmon held at 0–4 m depth in cages developed higher infestation than salmon held at greater depths (4–8 and 8–12 m) under both natural light (NL) and AL. In the second study, salmon maintained in 14-m deep sea cages that were exposed to AL with different light intensities. The AL treatments resulted directly in different diel and seasonal patterns of vertical distribution of the salmon and also different temporal patterns in lice infestations. So indirectly the infestation pattern appeared to be correlated with median day-time swimming depth of the salmon.

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**Keywords:** Swimming behaviour; Artificial light; Sea lice; *Lepeophtheirus salmonis*; Infestation; Atlantic salmon; *Salmo salar*

### 1. Introduction

The louse *Lepeophtheirus salmonis* (Krøyer, 1837) infestation on cultured Atlantic

# BREAKE



Senter for Forskningsdrevet Innovasjon/ NFR + industri + forskningsinstitusjoner



AKVA GROUP



ERLING HRUG



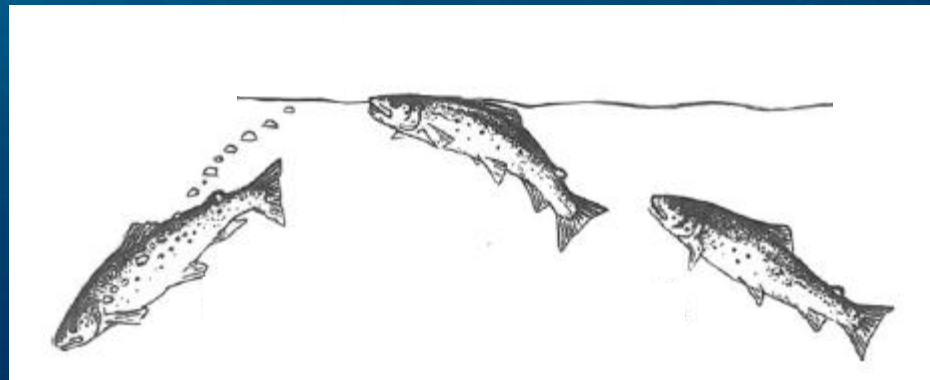


# Laks – åpen svømmeblære

Laks svelger luft i overflaten for å fylle svømmeblæren

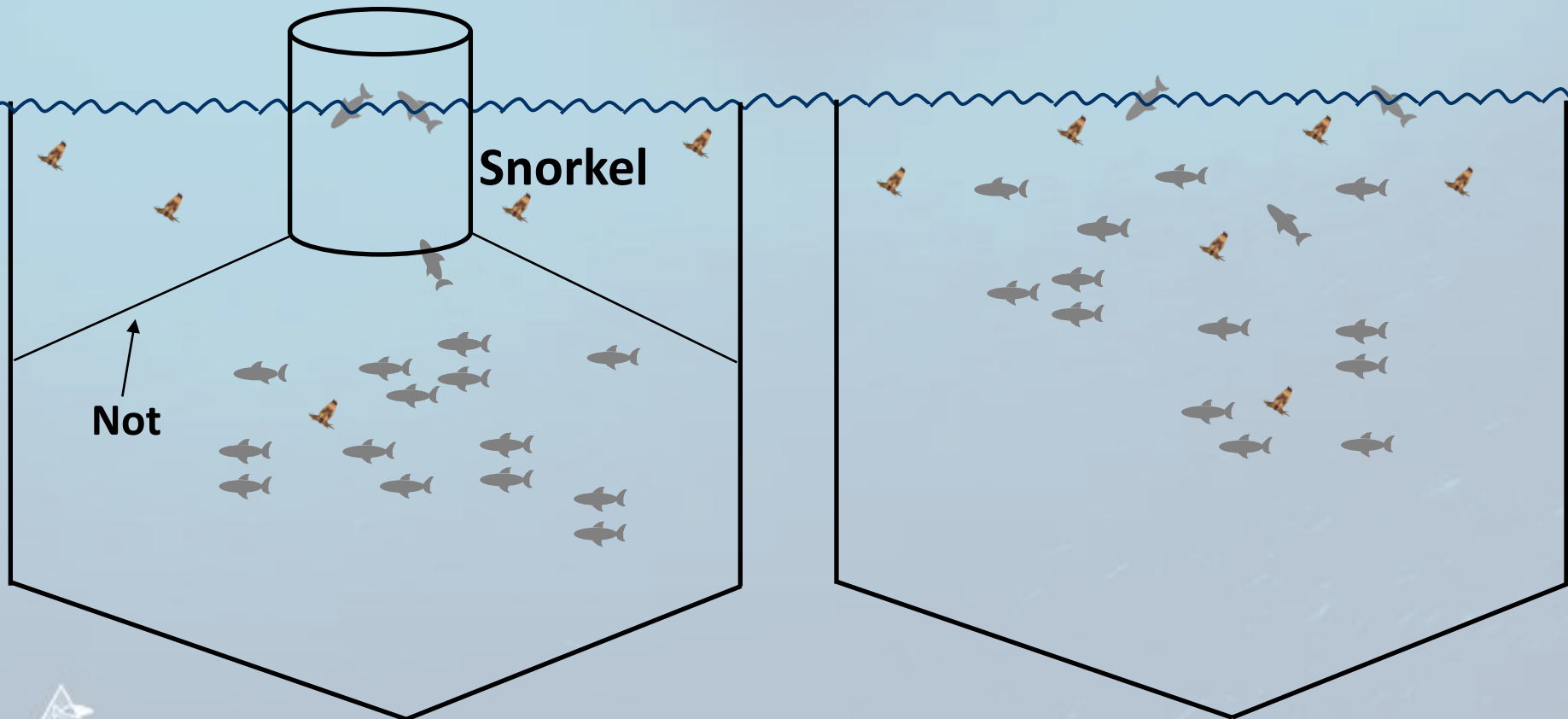
Hvis laks ikke har tilgang til overflaten vil svømmeblæren bli tom.

- økt svømmehastighet/ tilt
- redusert appetitt, vekst, K, FCR
- økt sår, finne og snuteslitasje
- komprimert ryggrad
- uakseptabel velferd



# Mål: teste lusepåslag i merder med snorkel

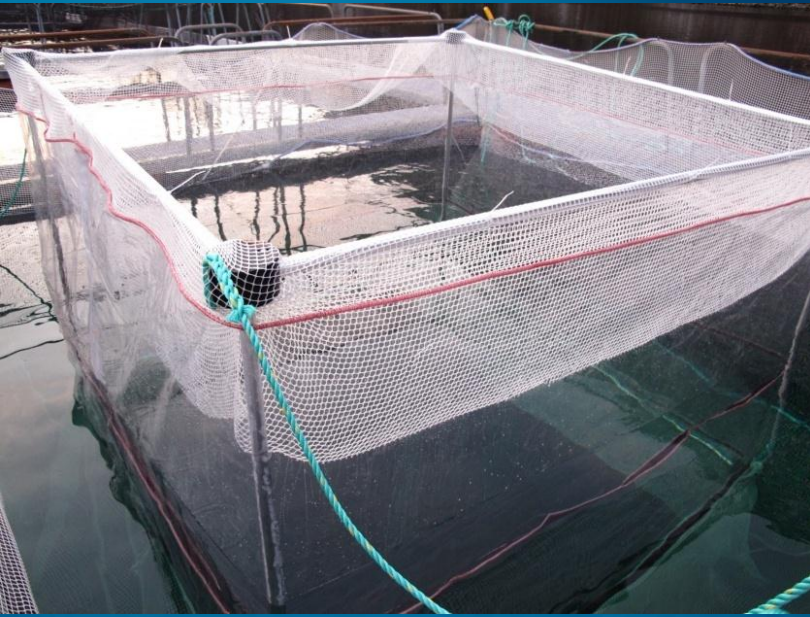
Fisk i snorkelmerd er forhindret fra å svømme i vannvolumet på 3-5 øverste meterne, men fyller svømmeblæren gjennom snorkelen.



**Merd med snorkel**

**Kontrollmerd**

# Prototype





# Start av forsøk, mai 2012



## Havforskningsinstituttet Sauaneset

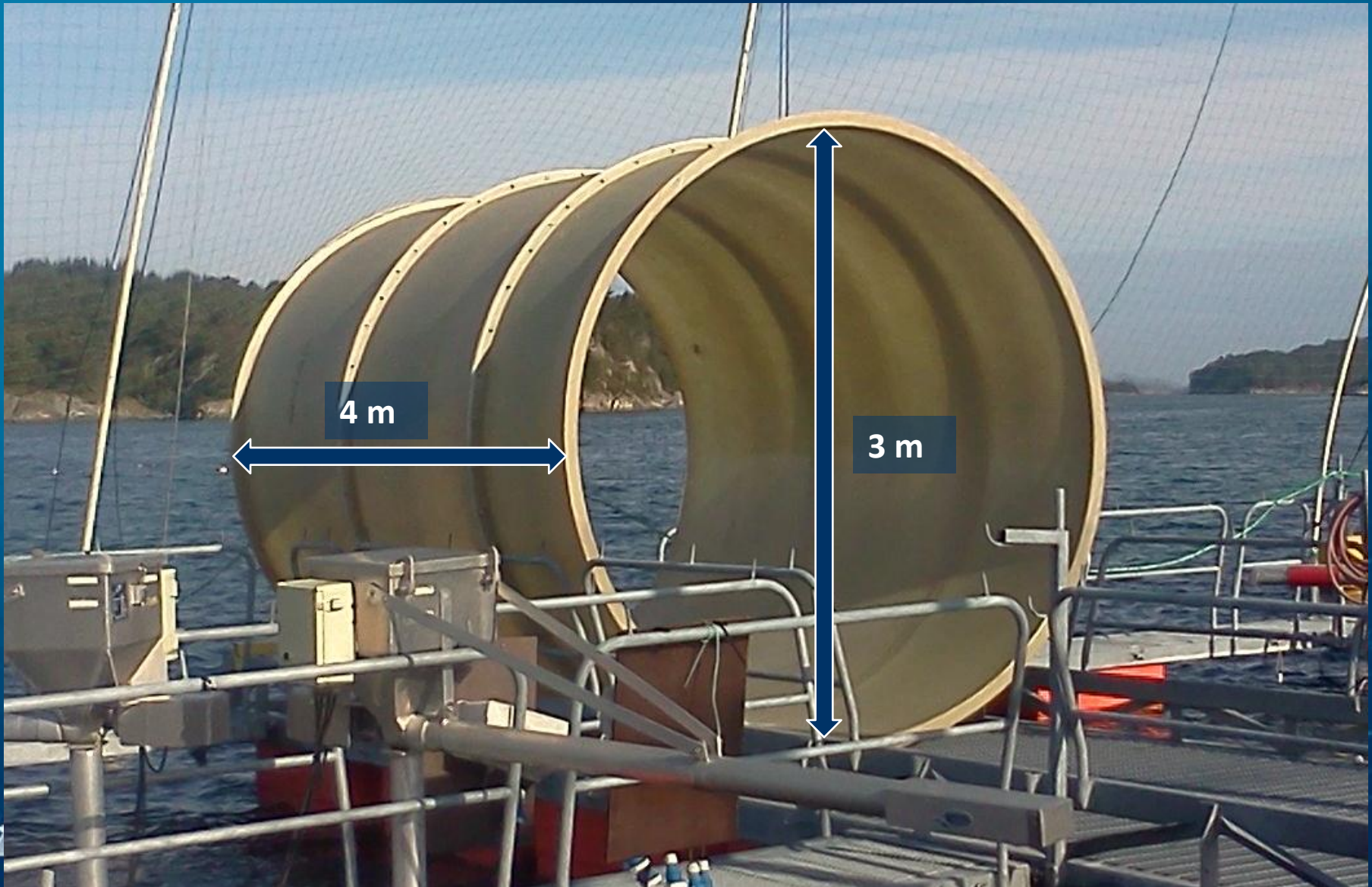


= Snorkel     = Kontroll





# Snorkelstørrelse



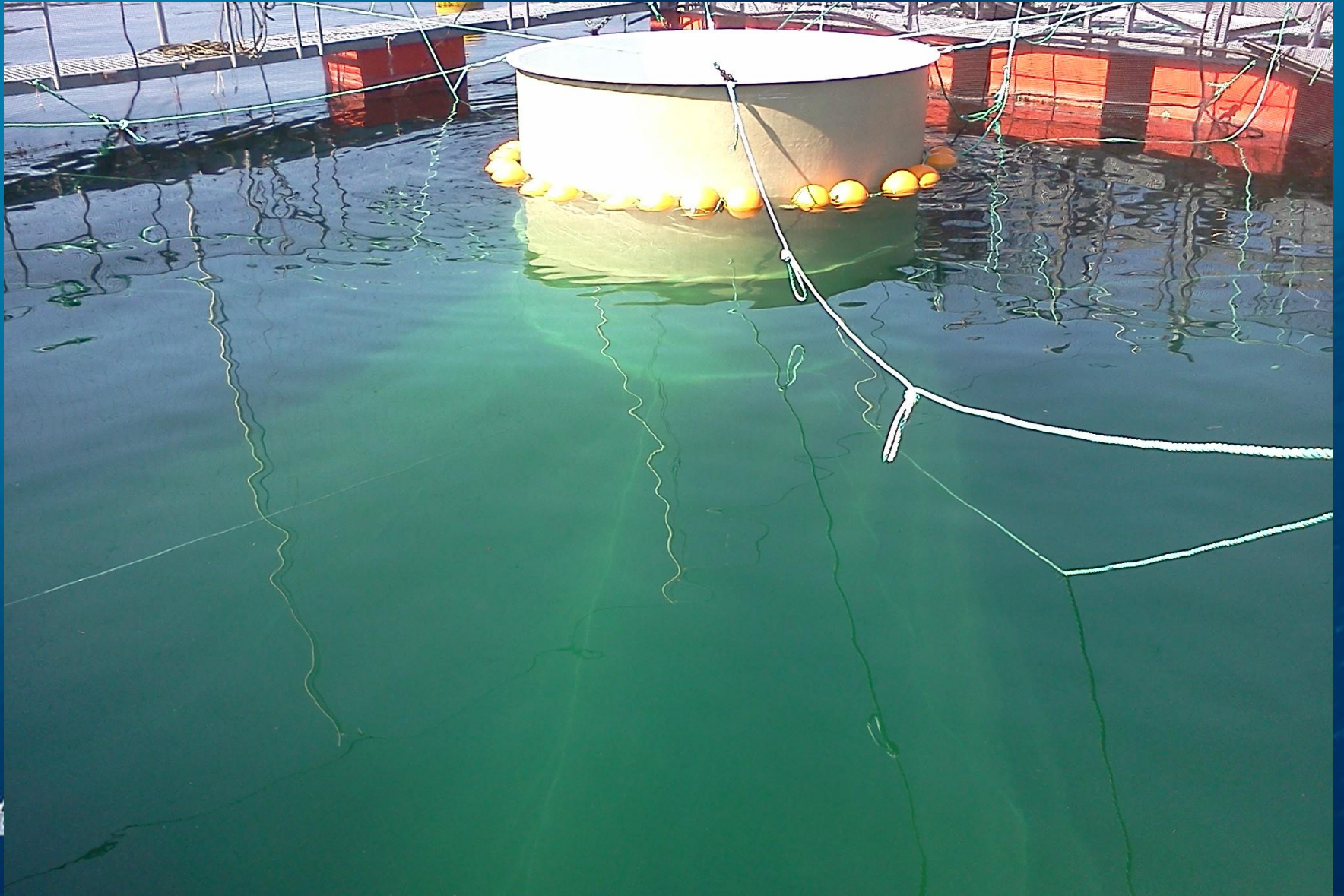


# Oppsett





# Oppsett





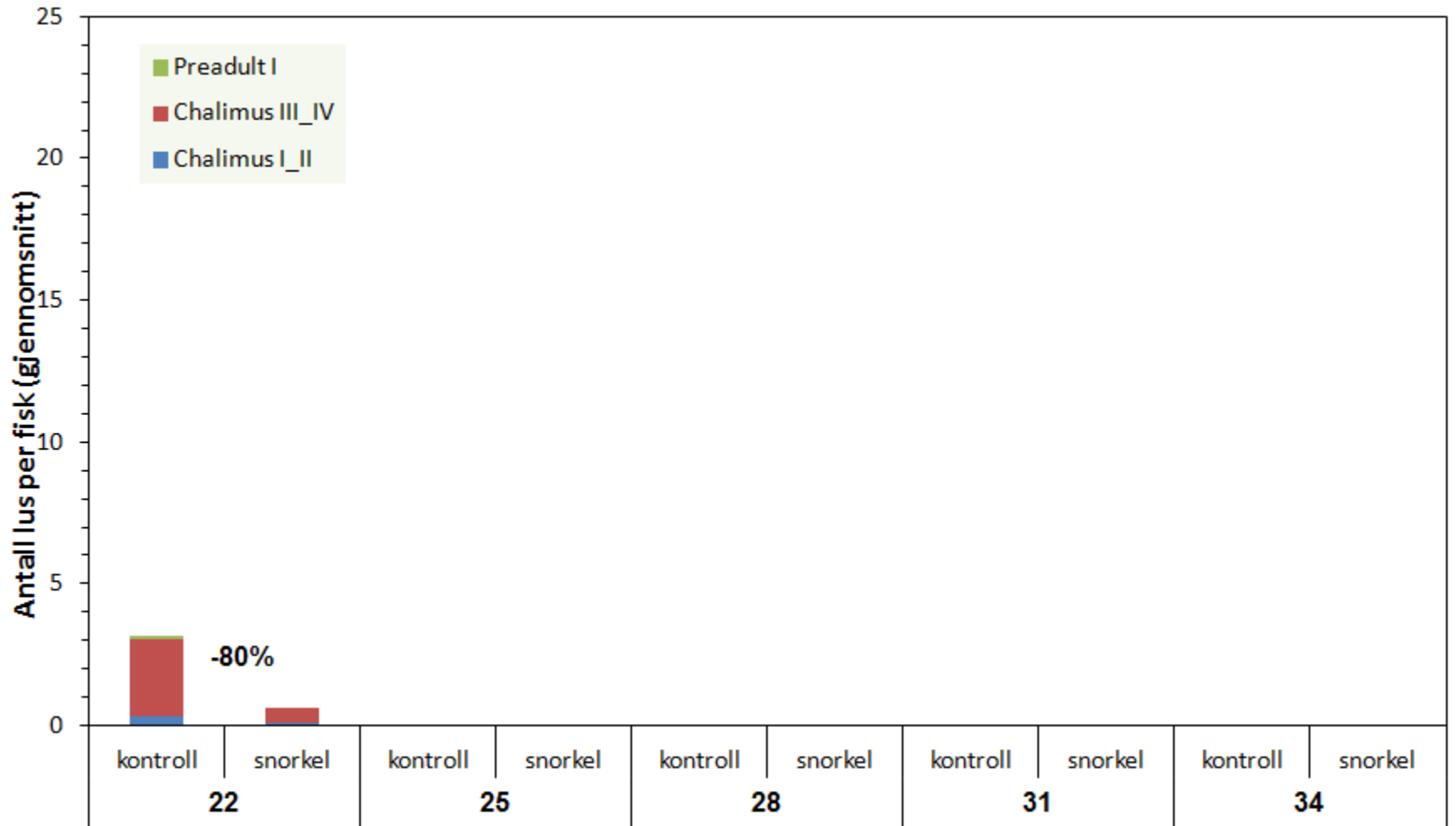
# Oppsett





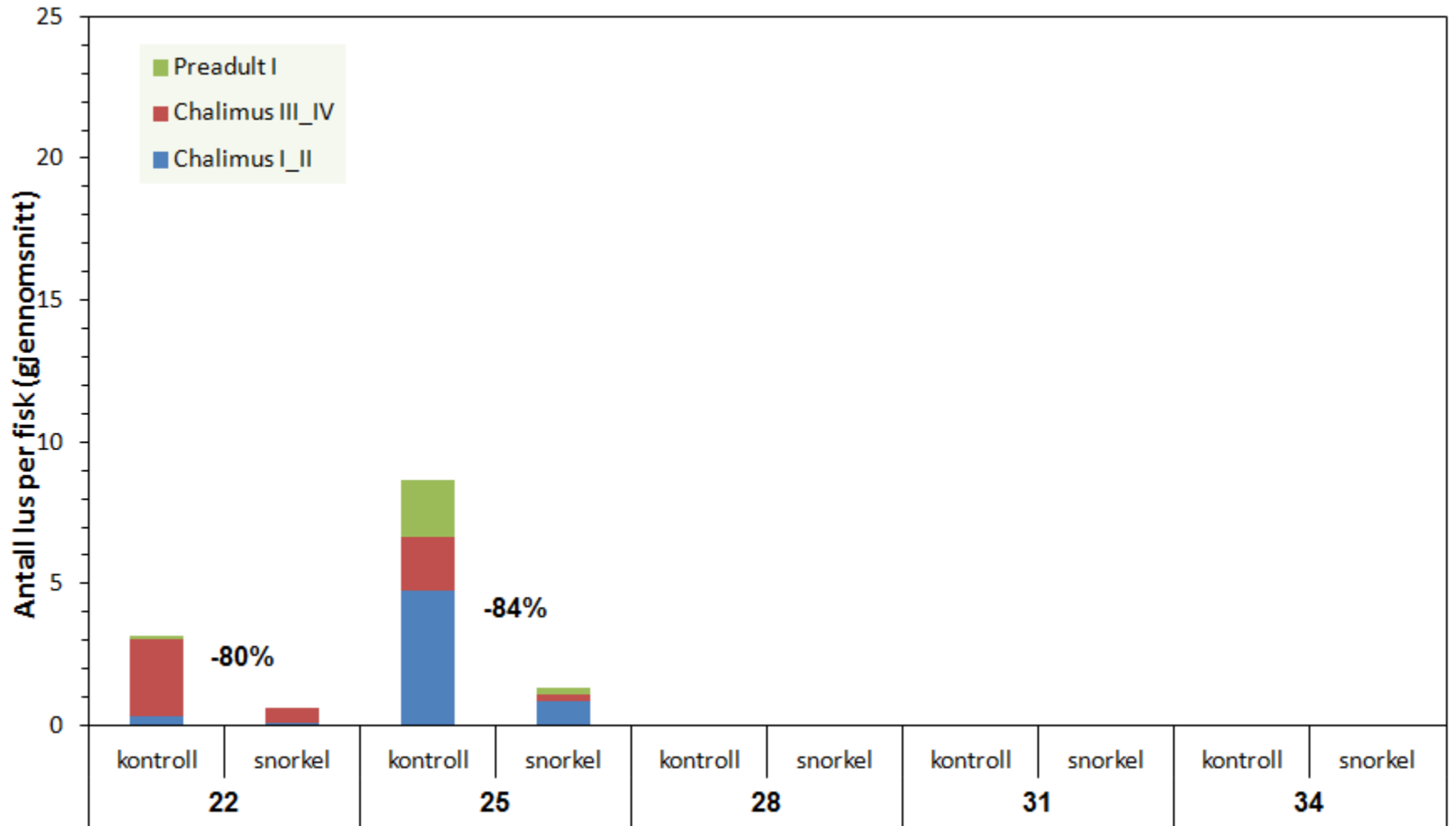
# Uke 22, første telling:

# -80%



# Uke 25, andre telling:

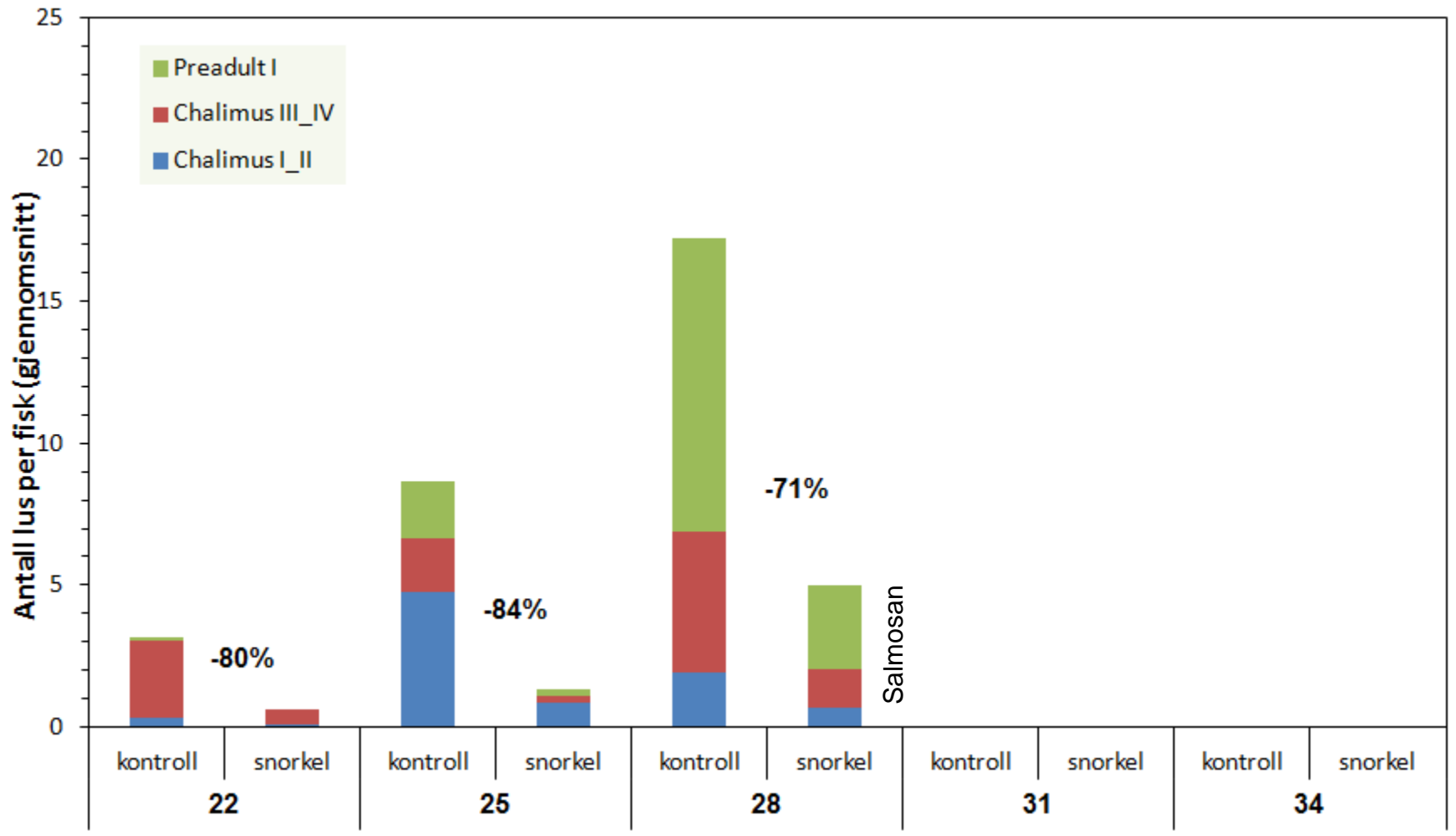
# -84%





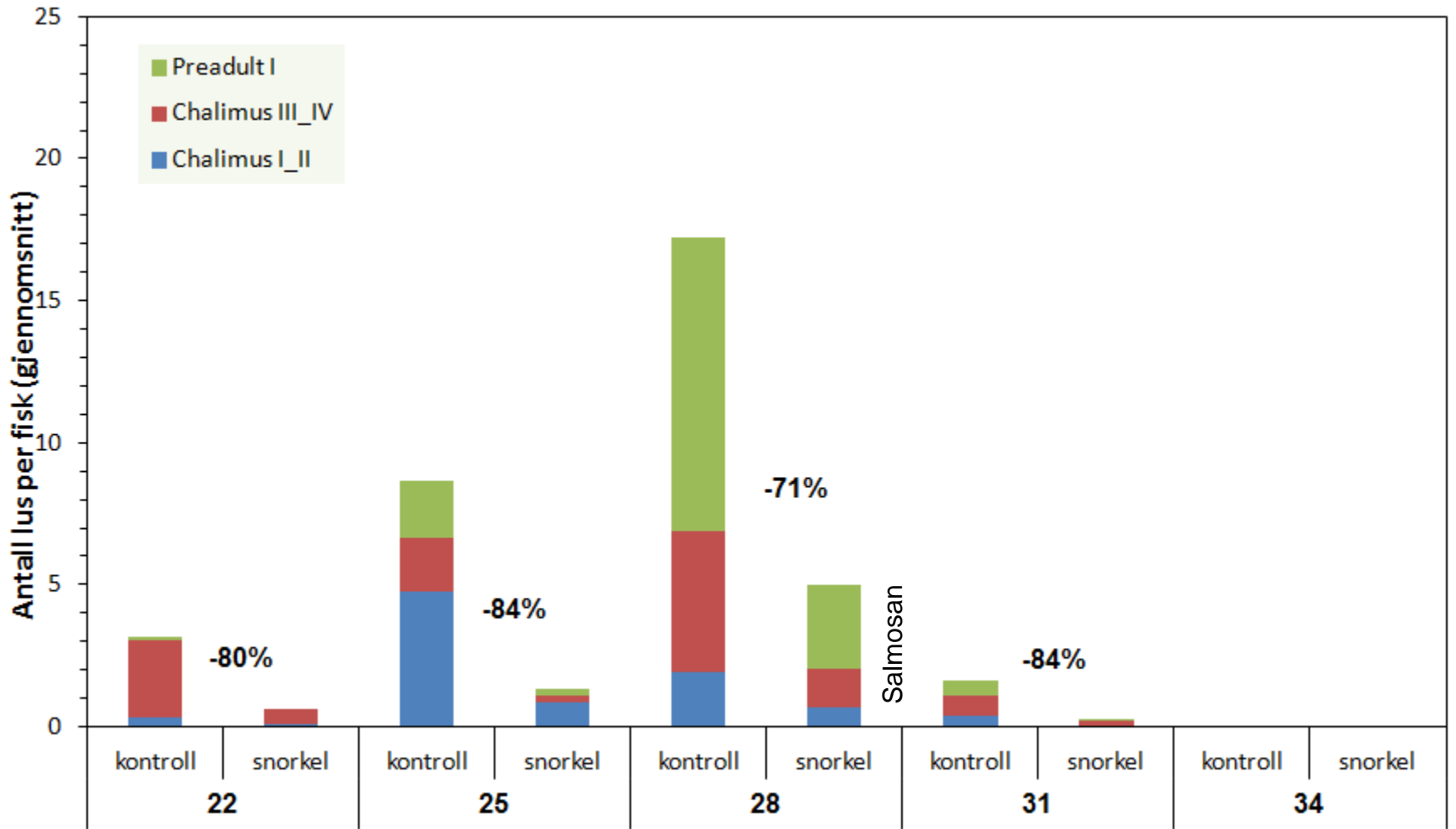
# Uke 28, tredje telling:

# -71%



# Uke 31, fjerde telling:

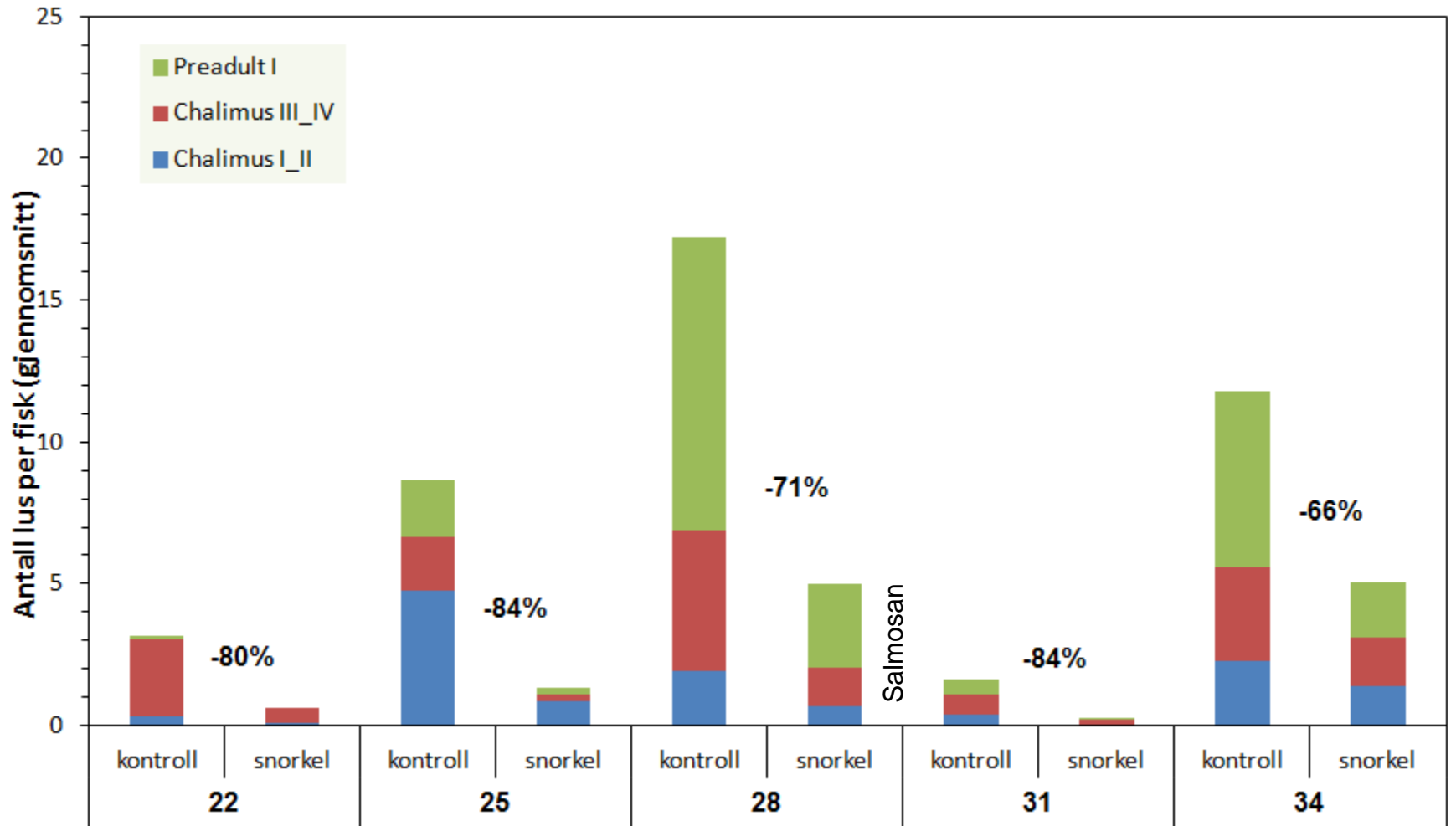
# -84%



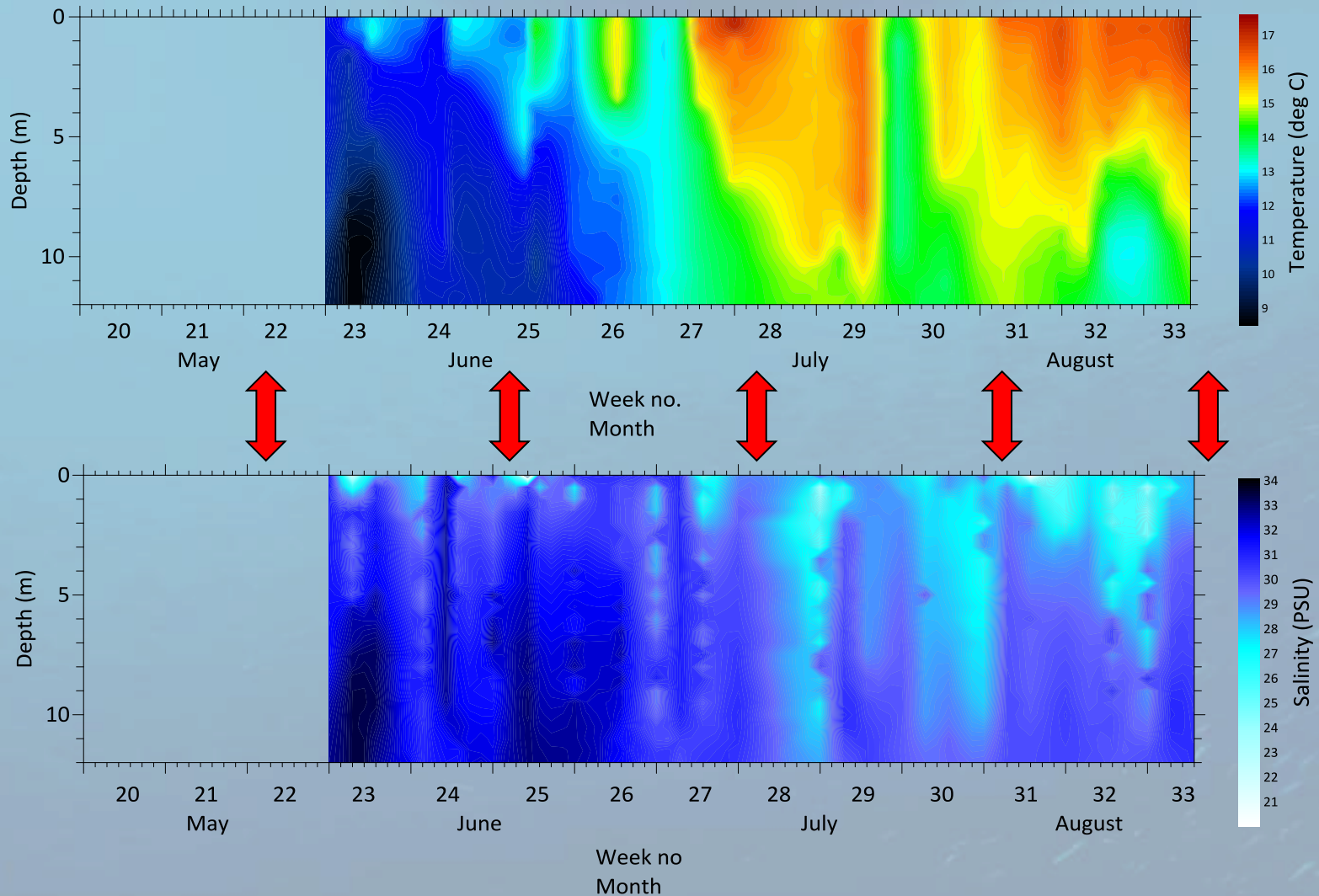


# Uke 34, femte telling:

# -66%

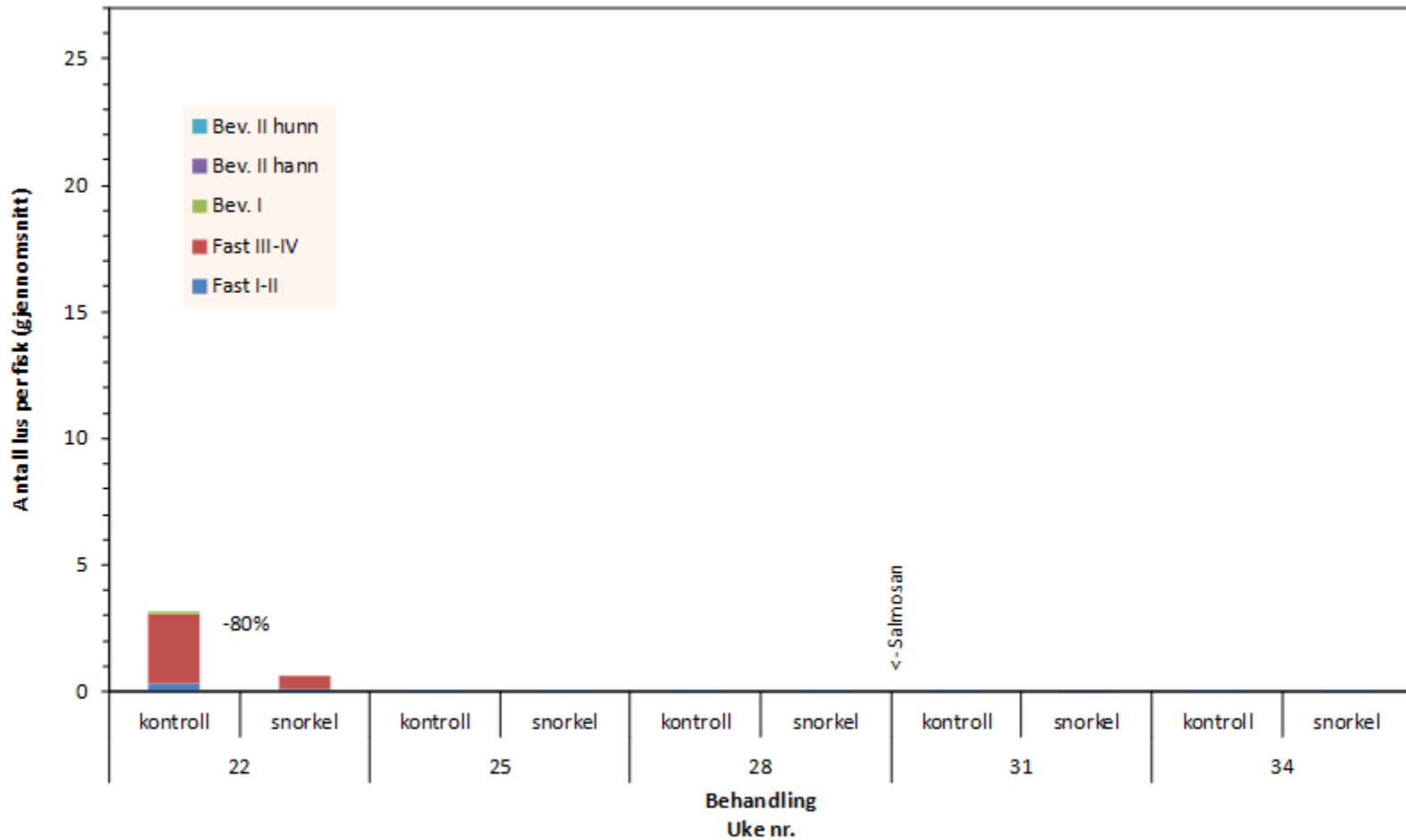


# Temperatur og saltholdighet



# Uke 22, første telling:

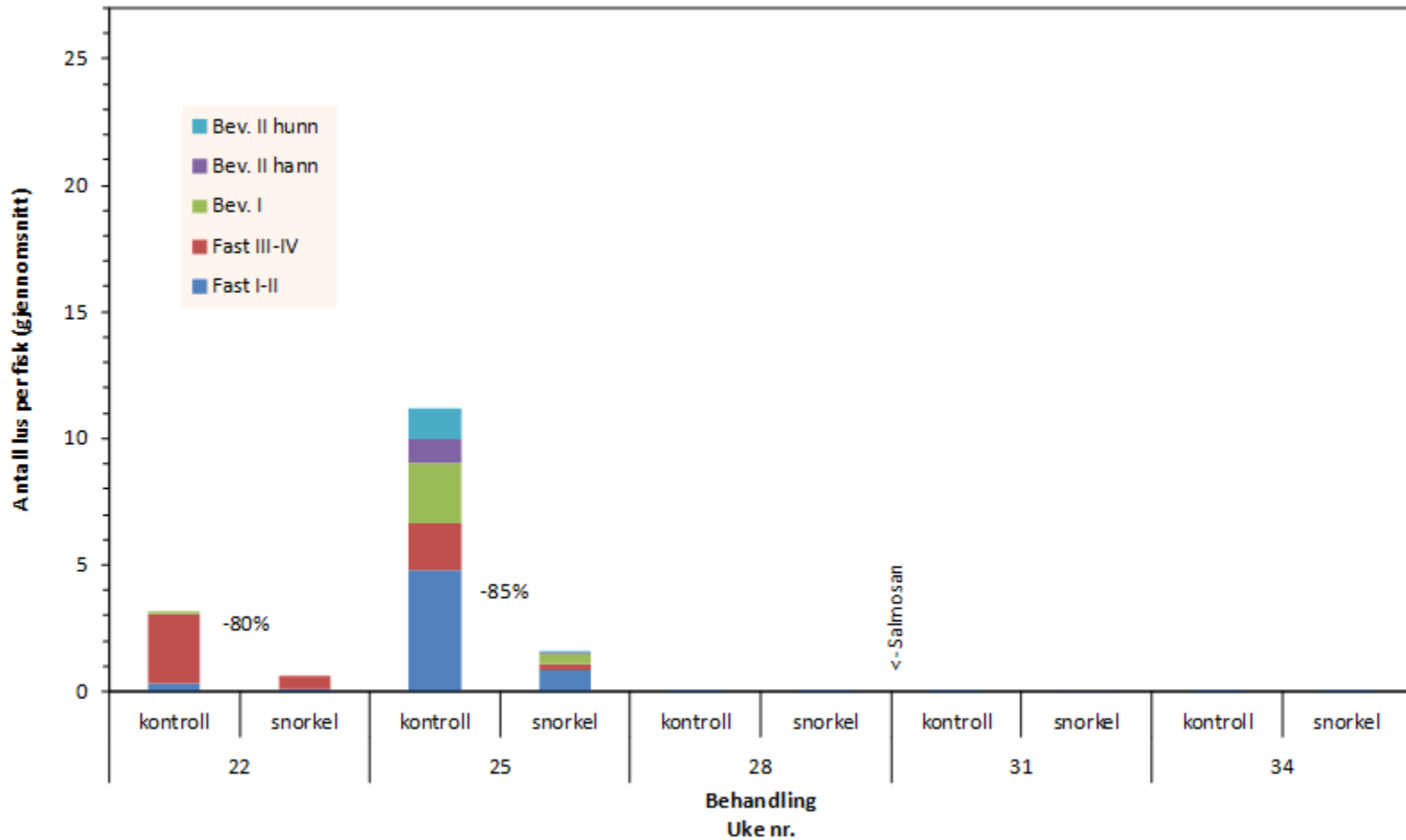
# -80%





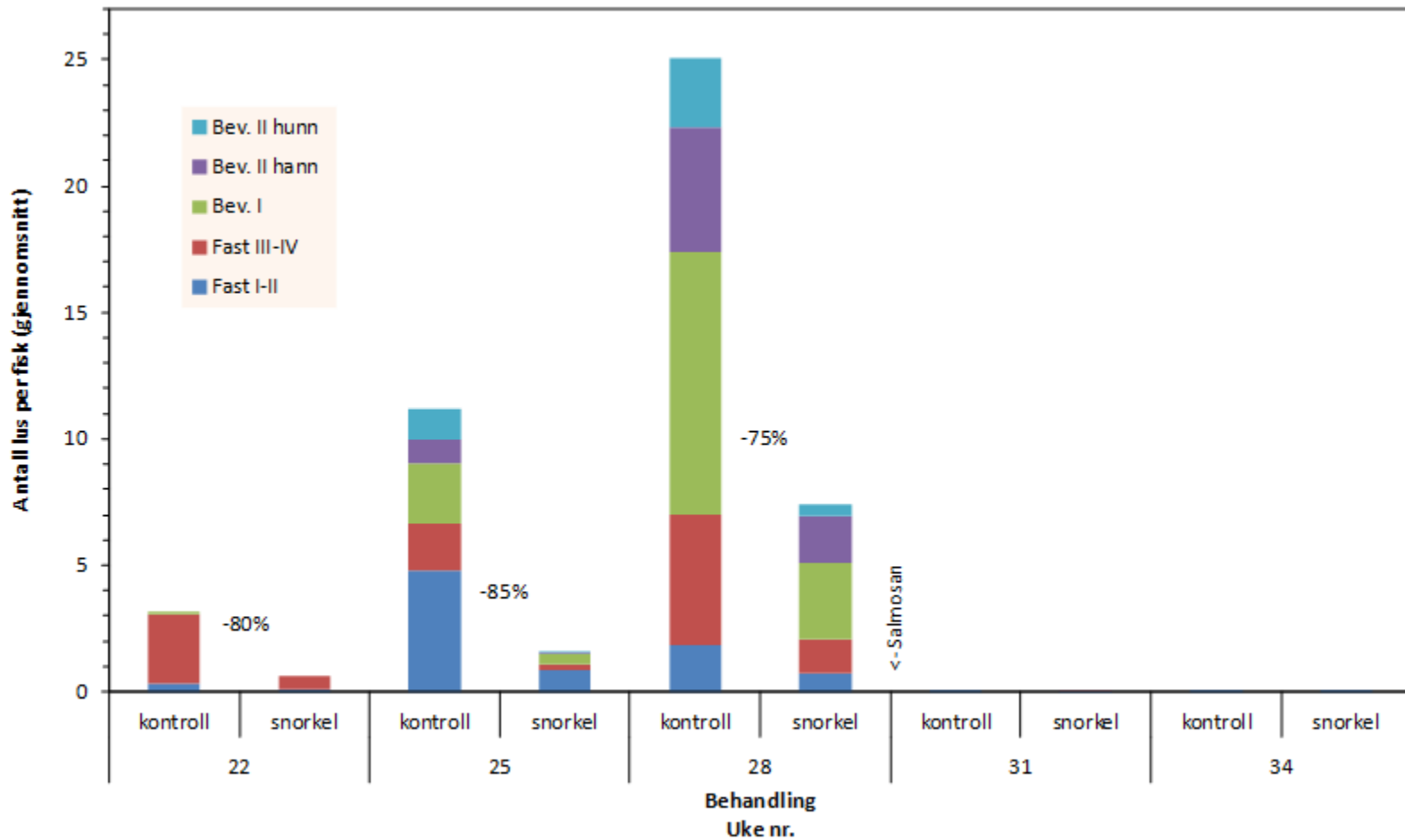
# Uke 25, andre telling:

# -85%



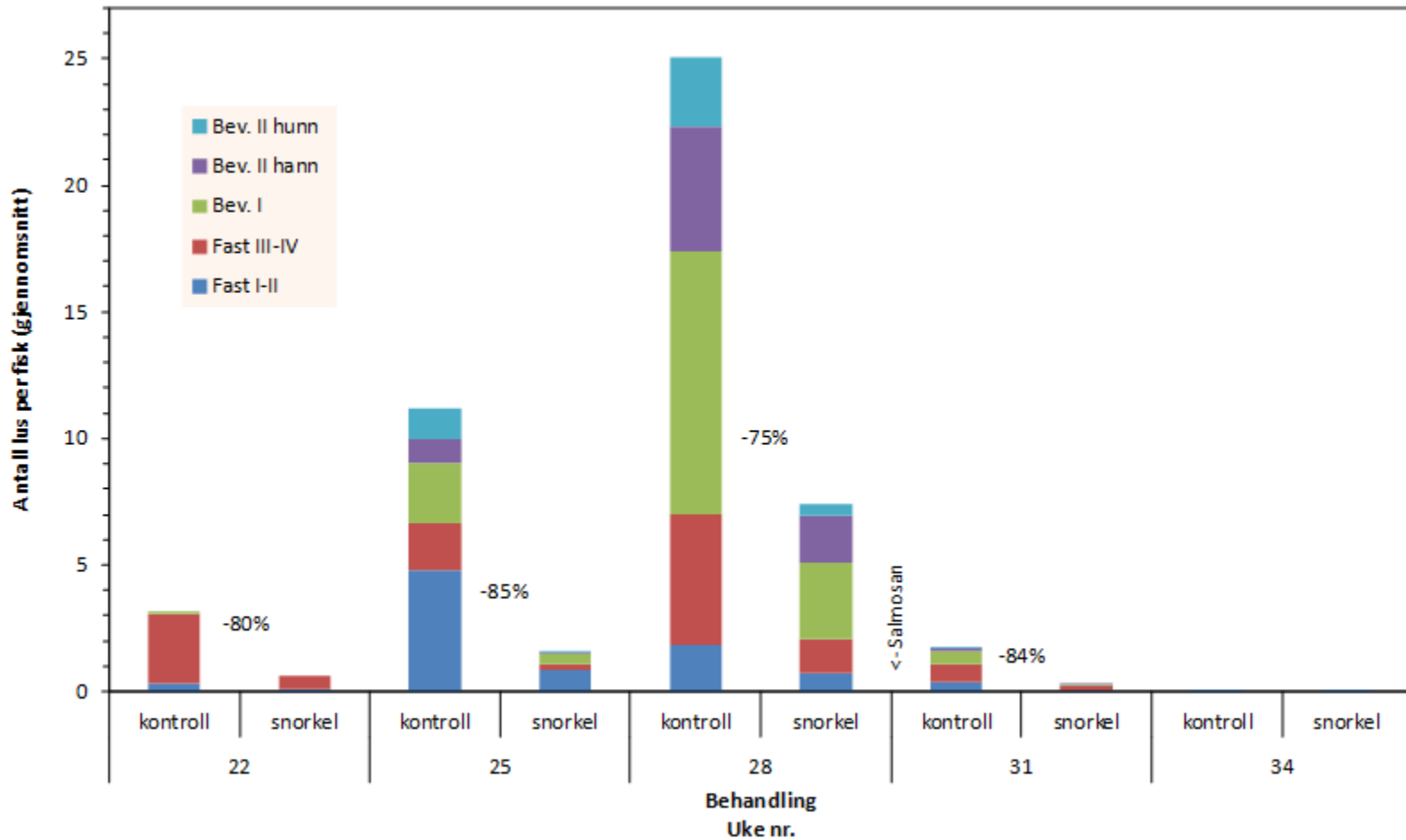
# Uke 28, tredje telling:

# -75%



# Uke 31, fjerde telling:

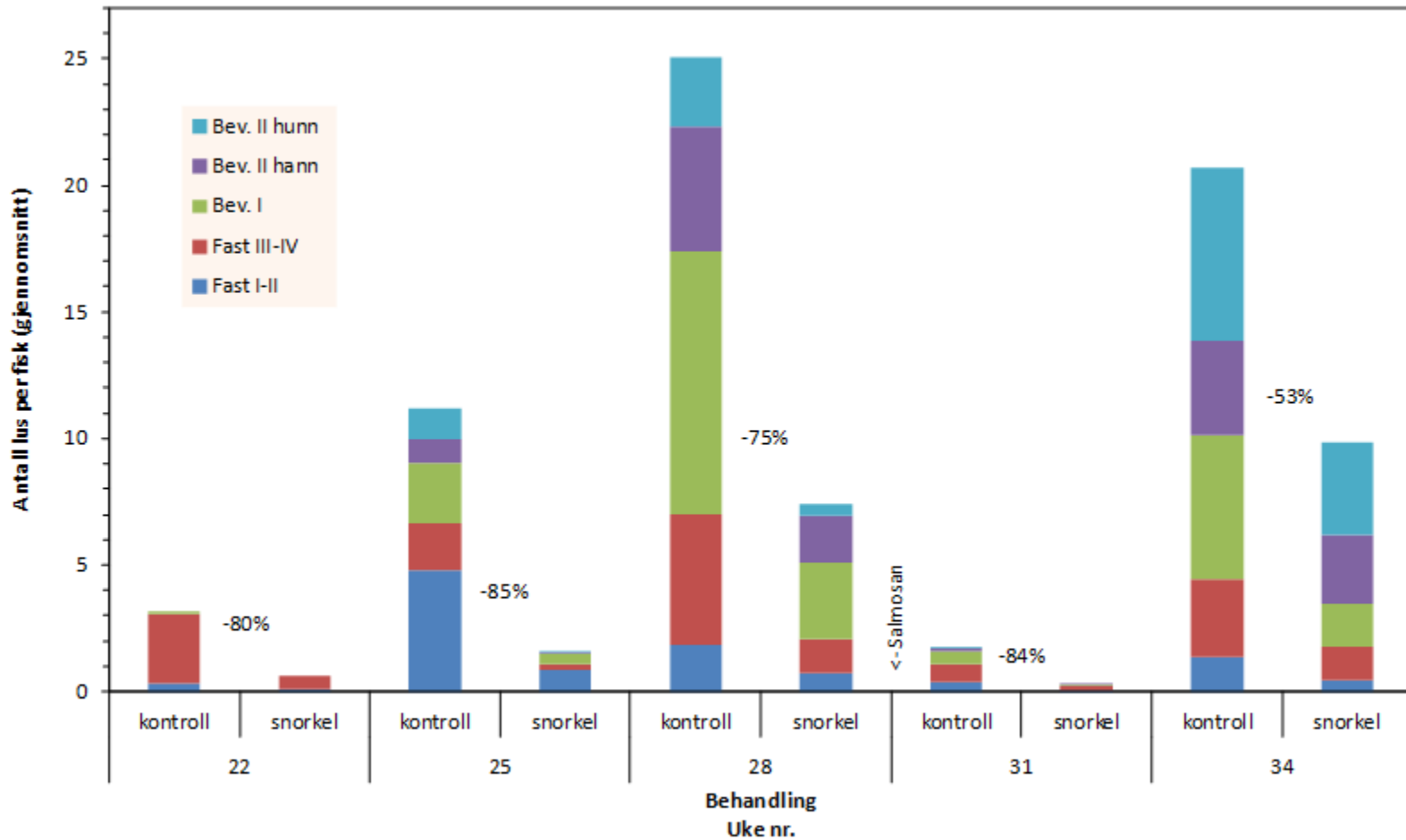
# -84%





# Uke 34, femte telling:

# -53%



**Snorkelforsøk,**

**Konklusjon:  
Snorkelen fungerte som tenkt.  
Betydelig mindre lusepåslag.**

**MEN!**

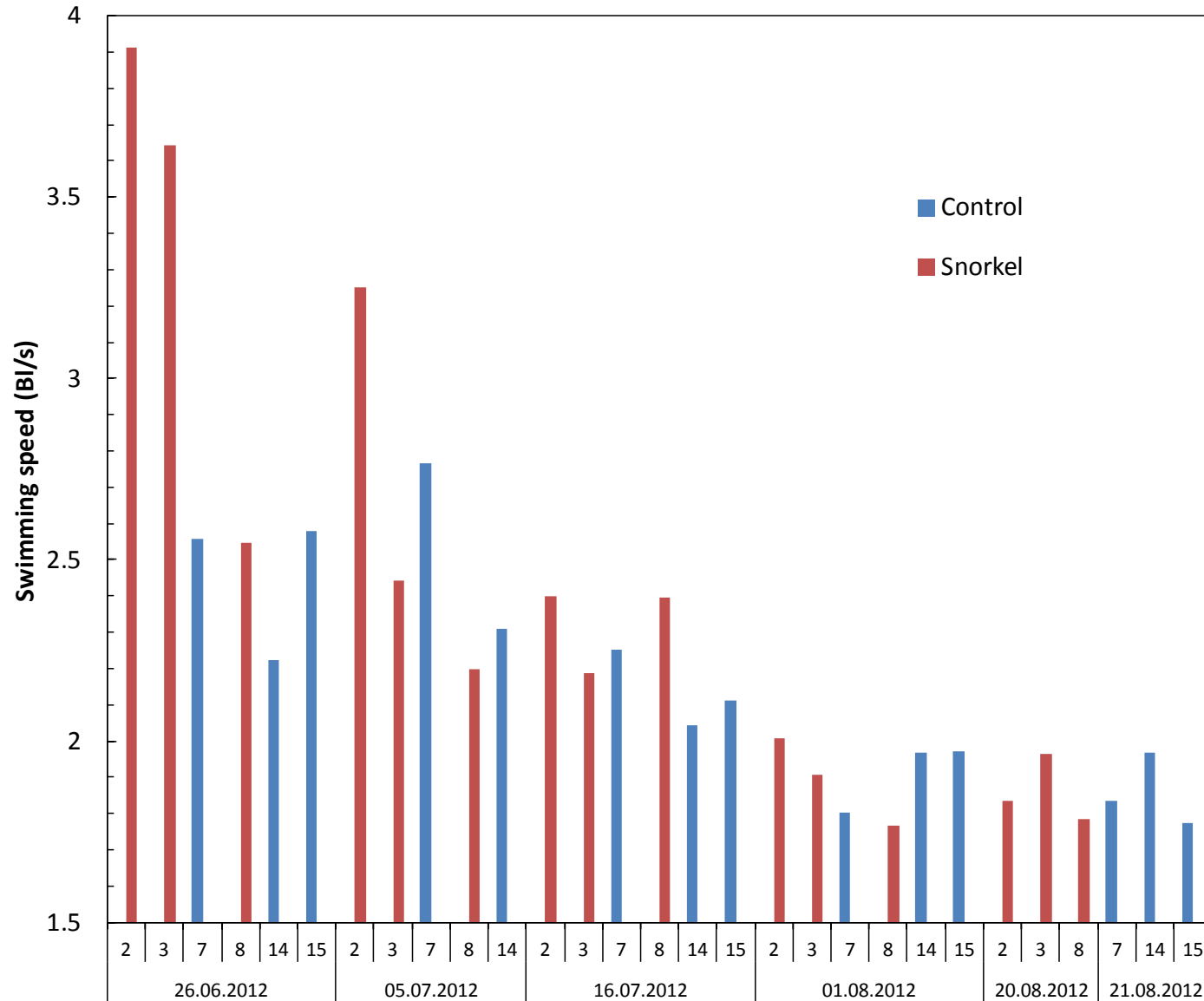




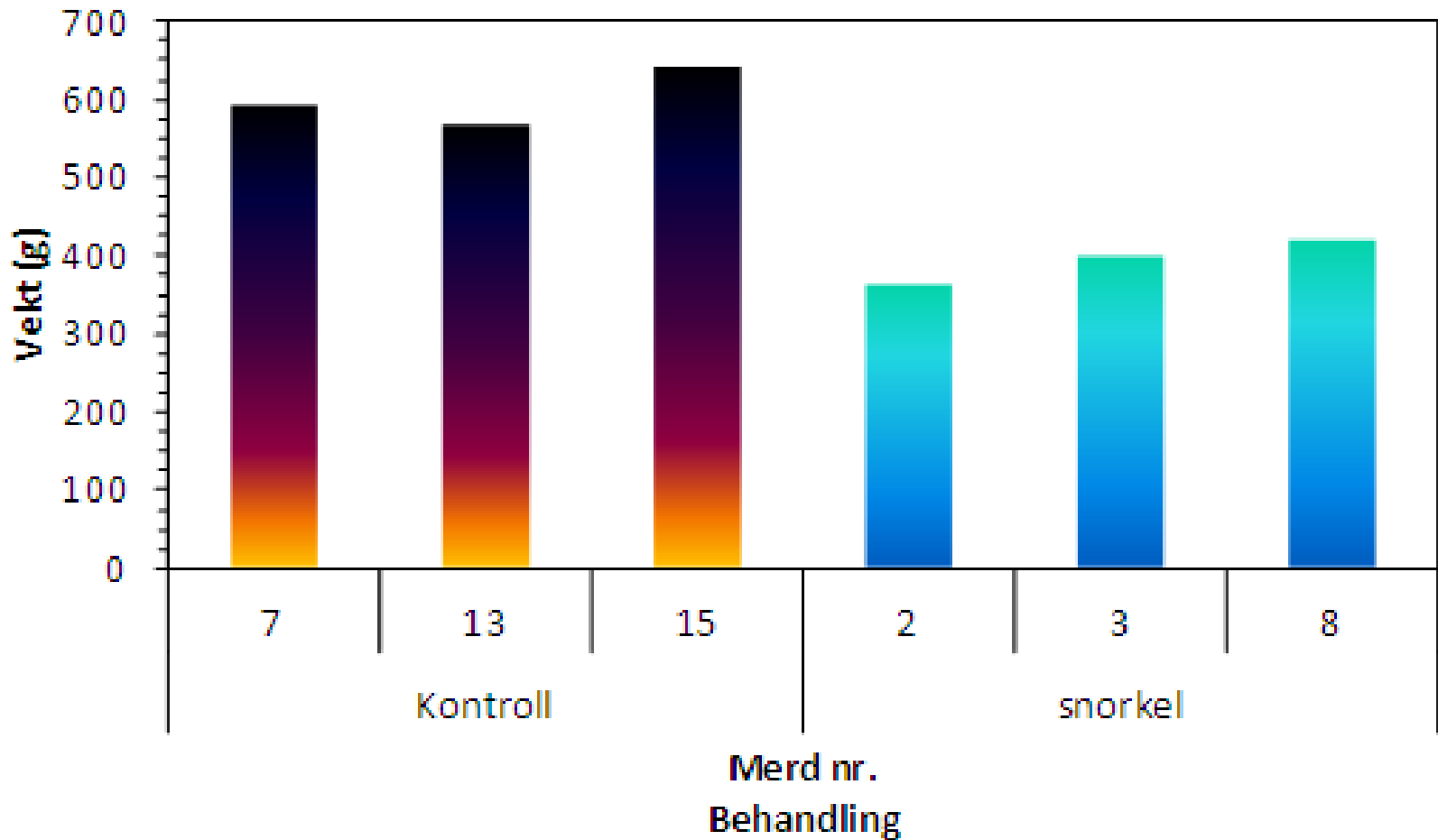


# Økt svømmehastighet?

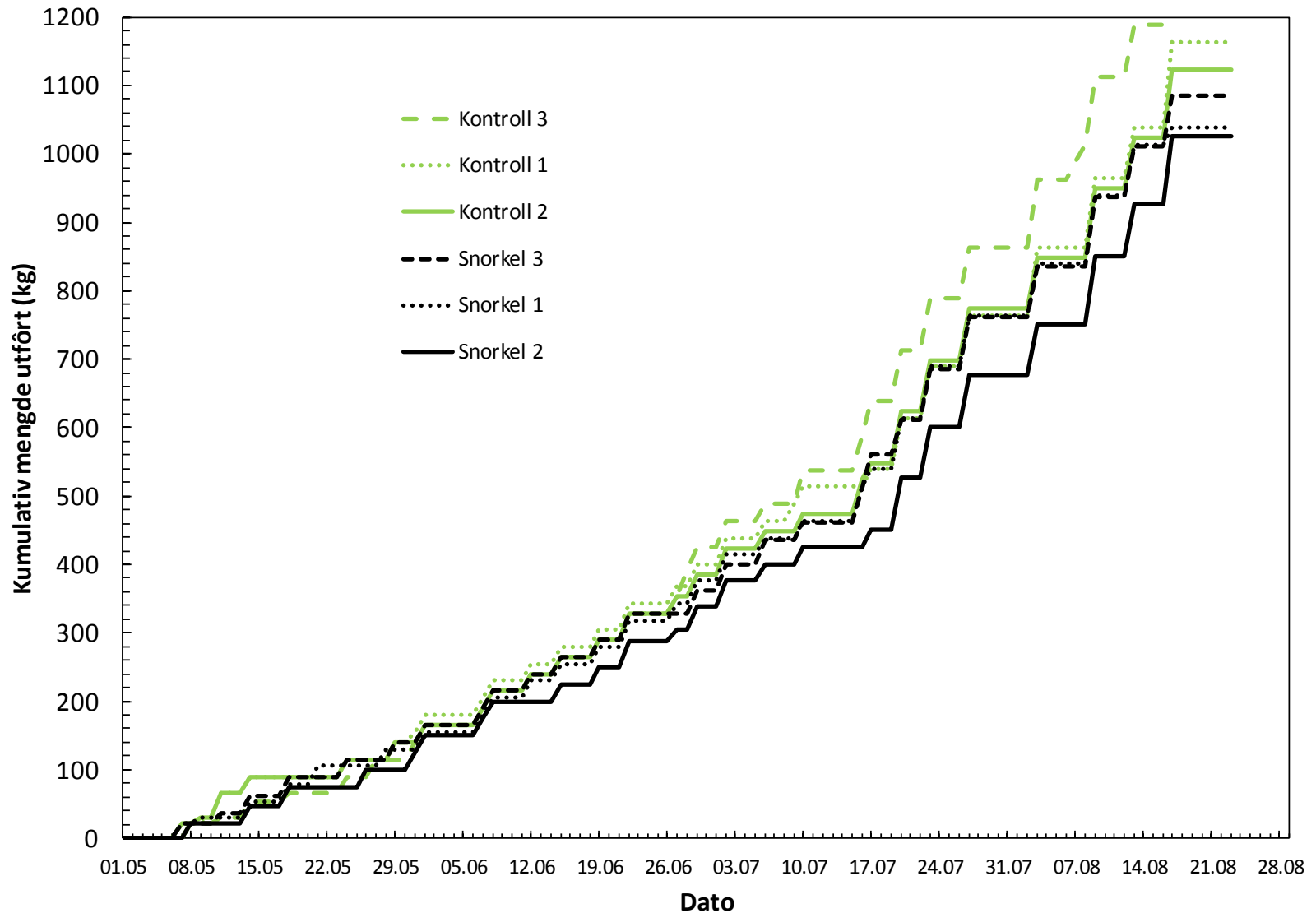
- indikator på oppdriftsproblem ved manglende svømmeblærefylling



# Slutt vekt redusert med 33%



# Fôring, kumulativ mengde



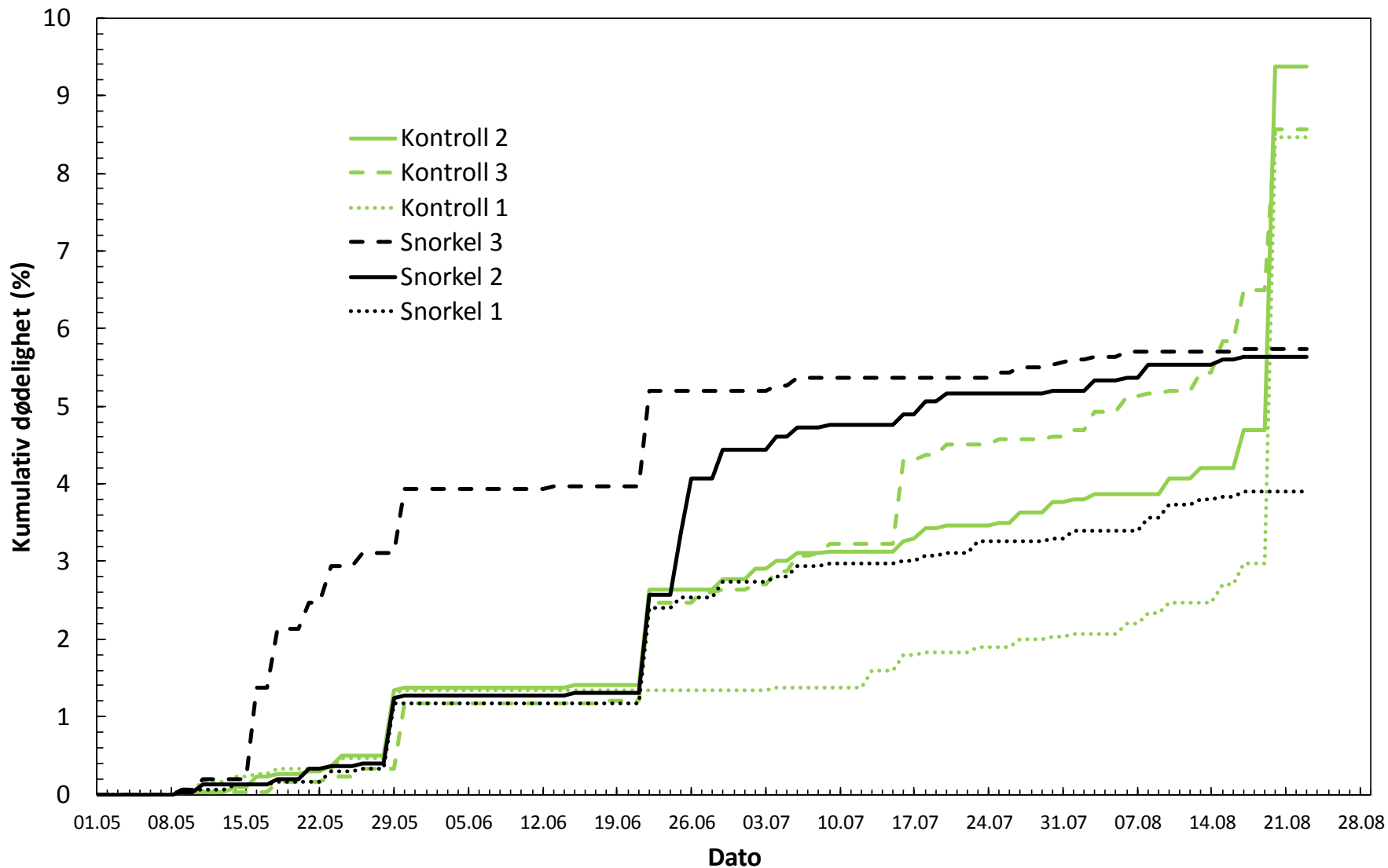








# Dødelighet, kumulativ





### Konklusjon:

**Snorkelen fungerte som tenkt.  
Betydelig mindre lusepåslag.**

### **MEN!**

- Fôring og vekst
- + Dødelighet
- + Tapere

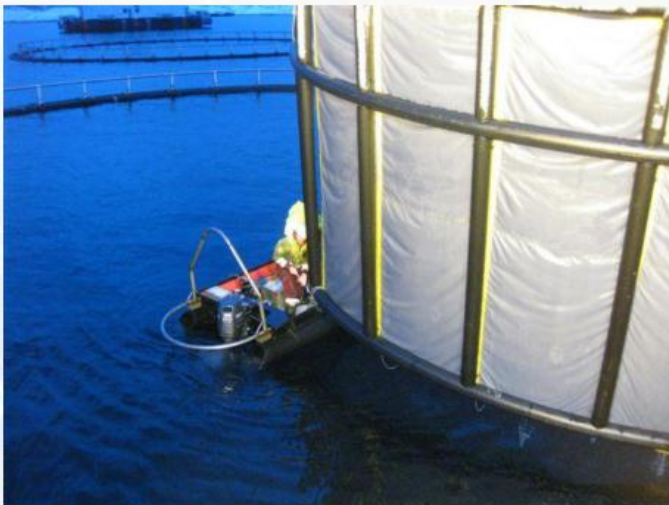
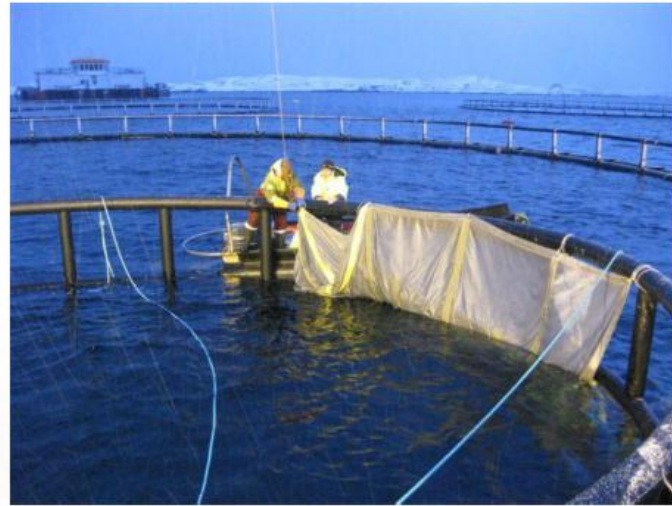


# Utfordringer

- Appetitt og tilvekst
- Virker snorkelprinsippet for alle fisk?
- Hvordan påvirkes miljøet
- Produksjonseffektiviteten
- Fiskevelferd – teknologi på biologiens premisser
  - Atferd, produksjonseffektivitet
  - "novel" fisk, fiskestørrelse/ alder, individvariasjon
  - Snorkeldesign: (størrelse: areal, dyp), hor. plassering, farge, materiale
  - Miljø: DO, temperatur, pumpe vann, fôring (unnvikelse vs. tiltrekking)



# Storskala Pilot







Takk for oppmerksomheten