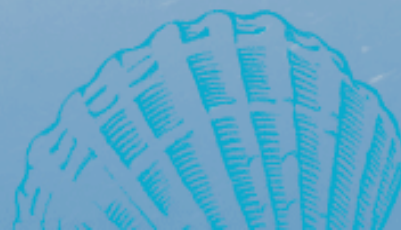
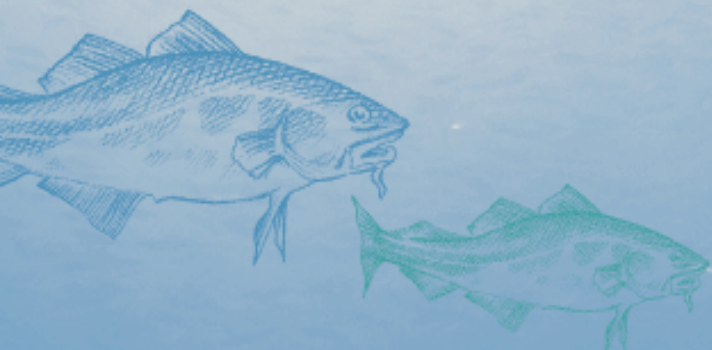




INSTITUTE OF MARINE RESEARCH
HAVFORSKNINGSINSTITUTTET






Depth distribution of amoeba within cage and effects of freshwater treatments

Prepared by

Frode Oppedal, Tim Dempster, Lars Stien, Barbara Nowak and
Daniel William Wright

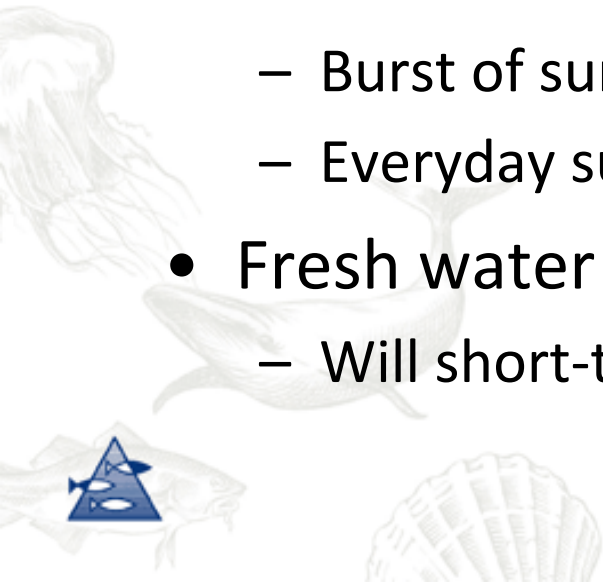


Institute of Marine Research
University of Melbourne
University of Tasmania
Bremnes Seashore/ Tassal/ Huon

3rd Gill Health Initiative meeting, Galway 16-17 April 2015

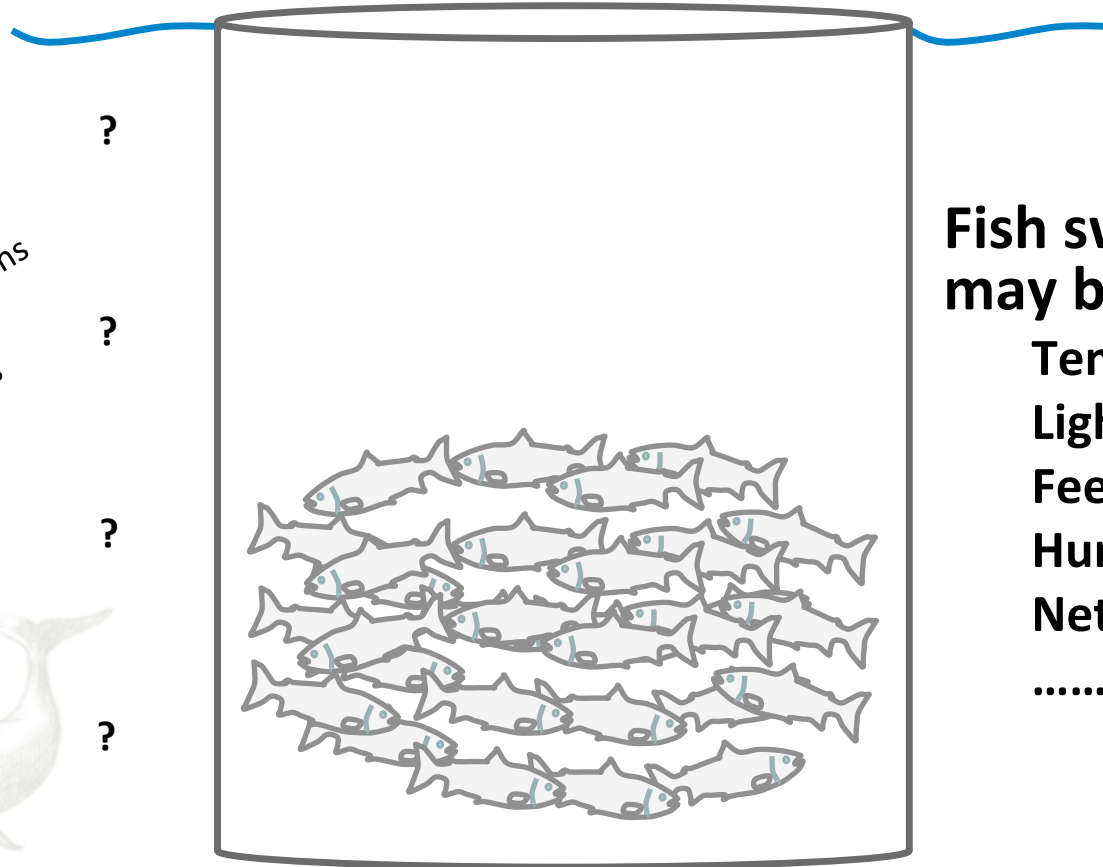
New approaches to conquer parasites

- Less infestation by deep swimming of salmon
 - But where are the amoeba in the water column?
- Snorkel cage principle
 - Reduce sea lice infestation, but amoeba?
- Surface treatment in a snorkel cage
 - Burst of surface rolling/ jumping
 - Everyday surface rolling
- Fresh water as treatment
 - Will short-term (seconds) exposure affect amoeba/ lice?



If amoeba is more abundant in surface, deeper swimming of salmon will reduce infestation!

Where are amoeba?
@ Paramoeba genus found
in mid- and deep-cage
@ Neoparamoeba perurans
not investigated
@ No surface samples



**Fish swimming depth
may be managed by:**

Temperature

Light

Feeding

Hunger

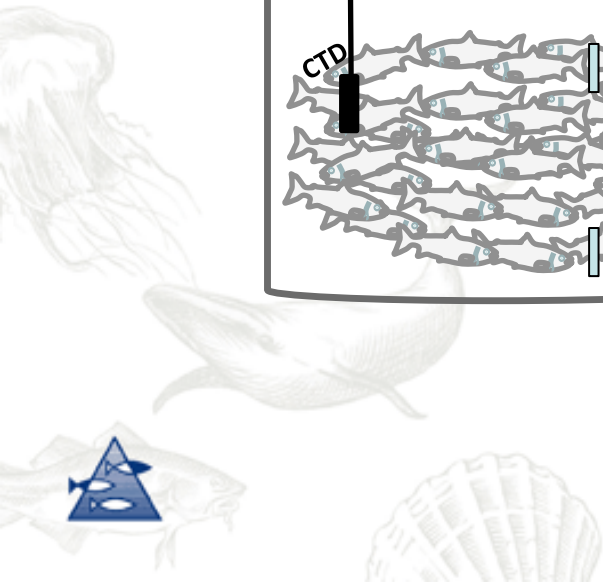
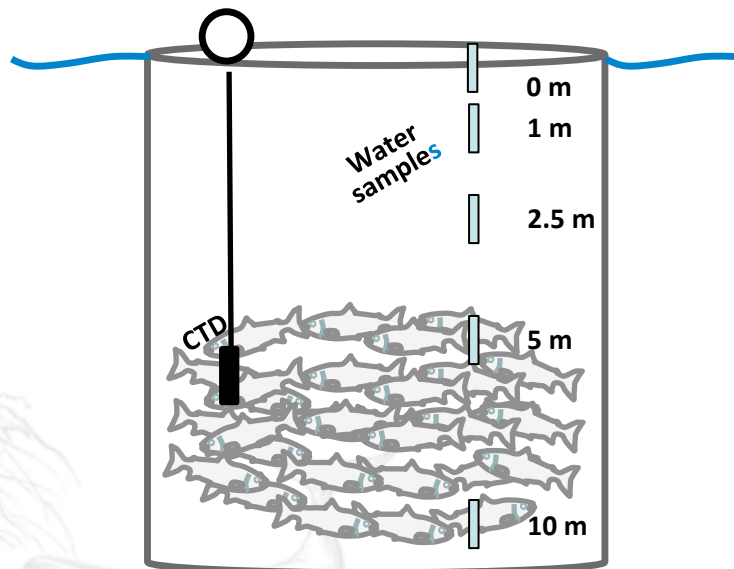
Net roof

.....

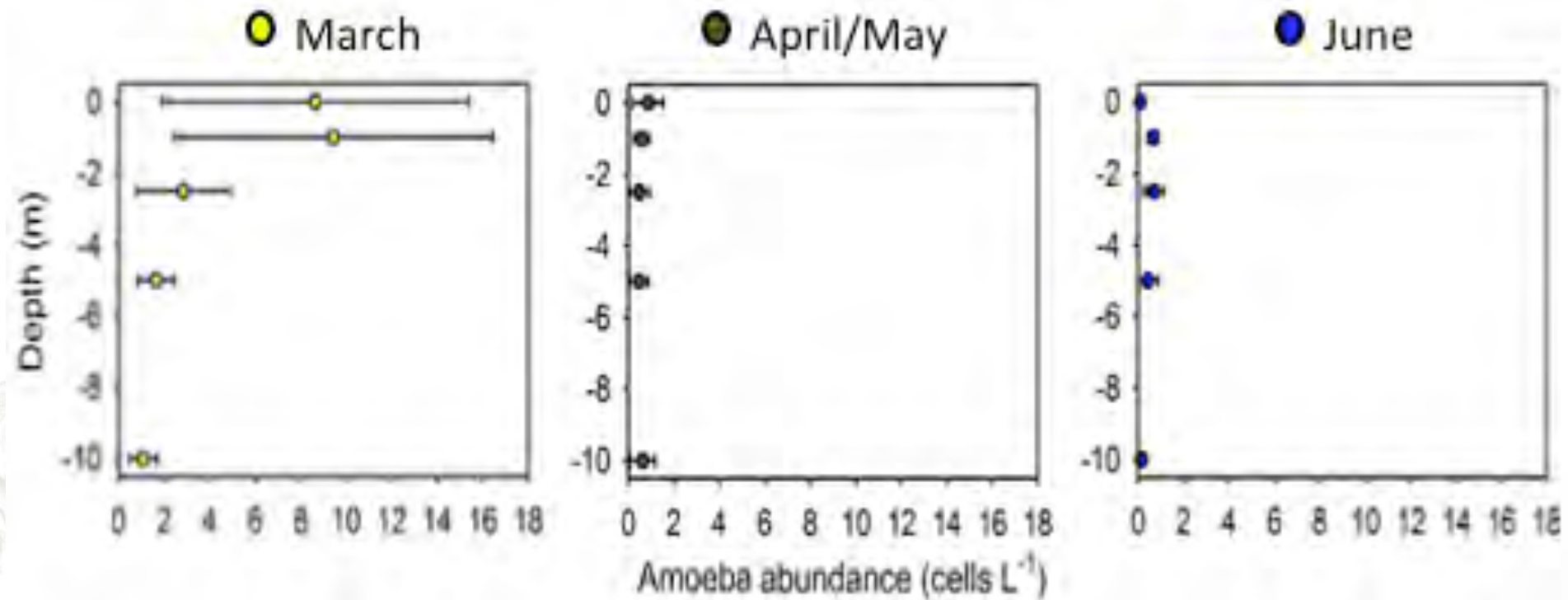


Sampling for depth of *N. perurans* within cages

SE Tasmania:
9 cages x 3 times of year

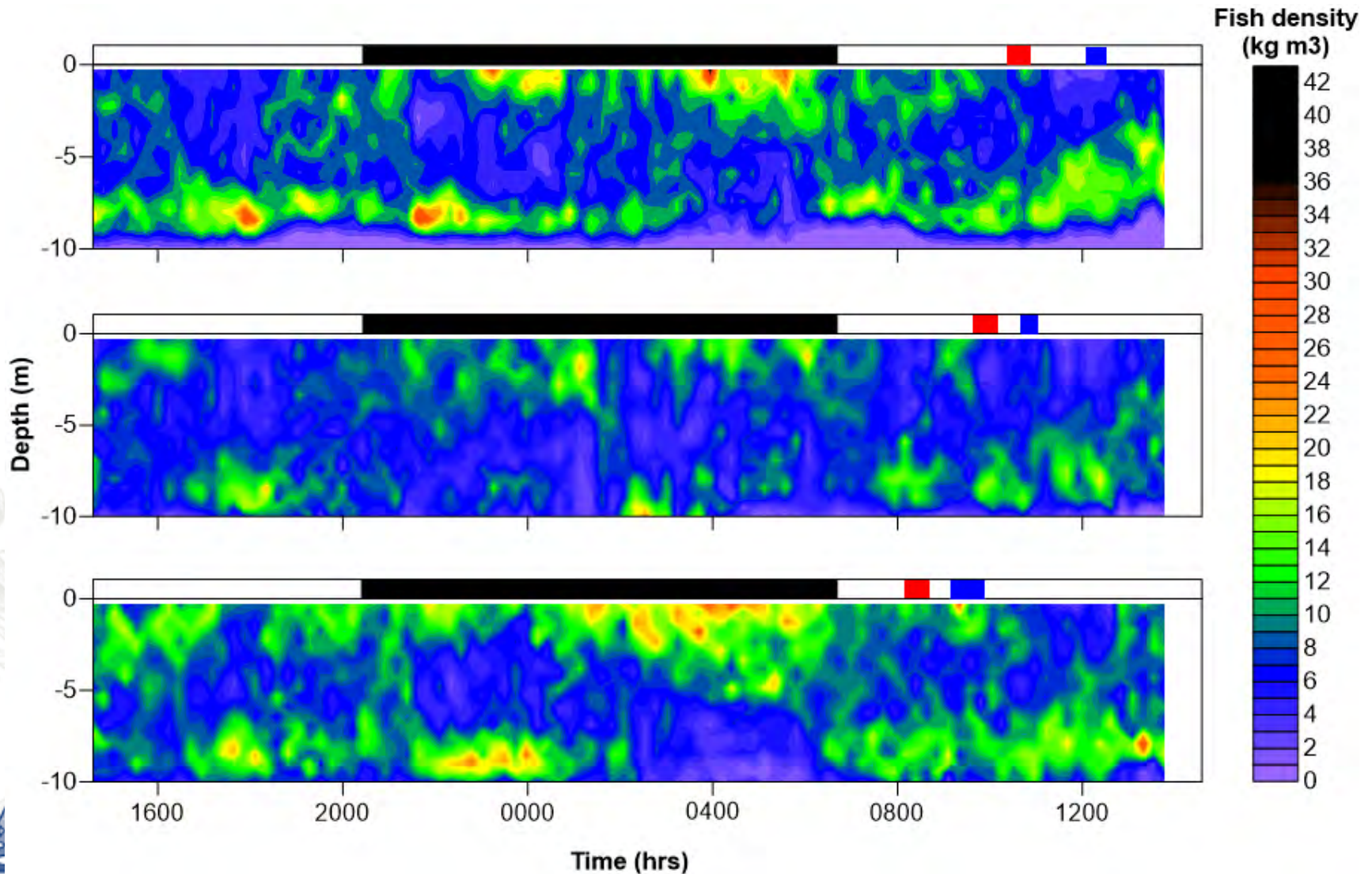


Depth of *N. perurans* within sea cages



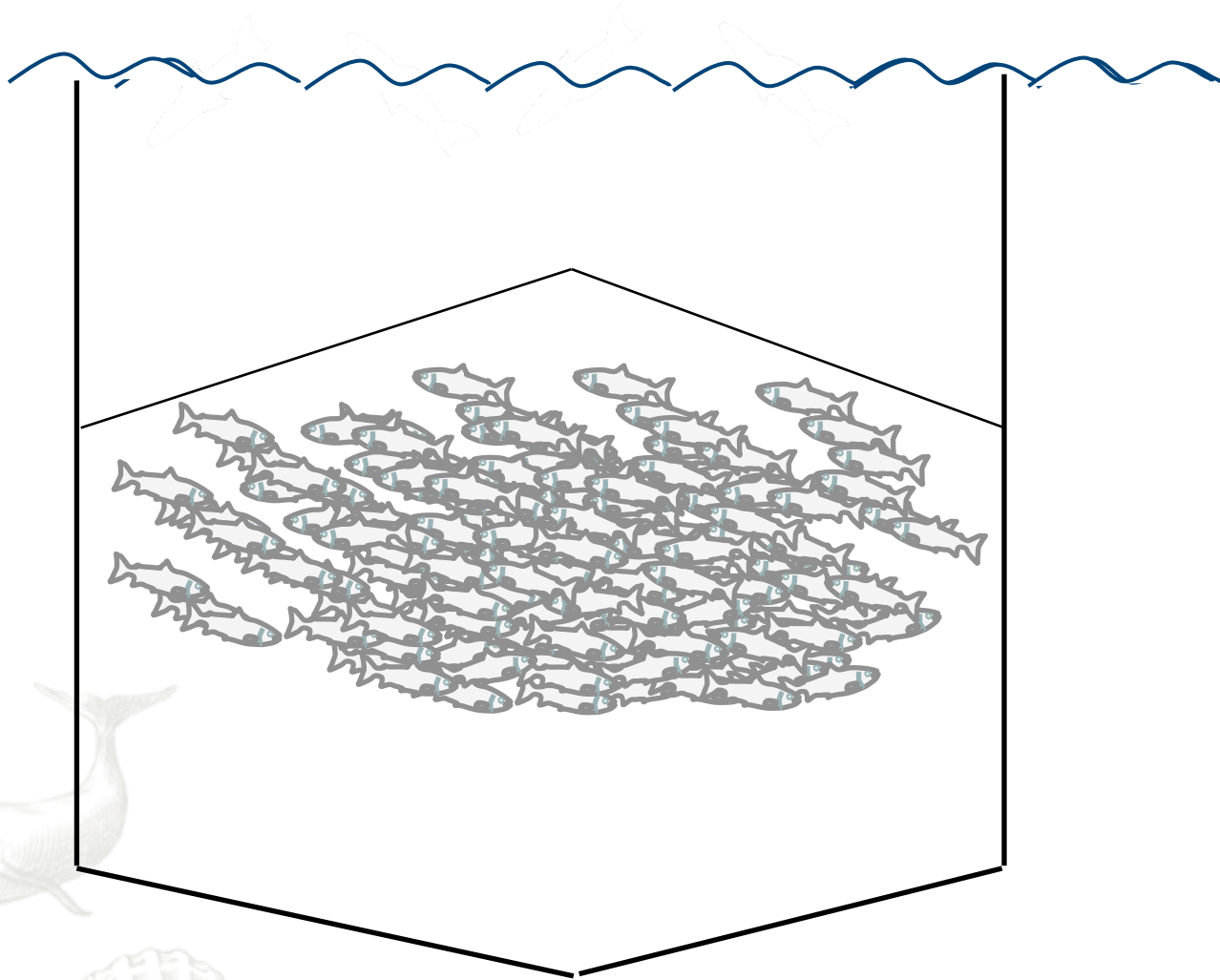
Depth of *N. Perurans* 2015 field collection including fish swimming depth

The bar along the top of each indicates night (black), day (white), feeding (red), and amoeba sampling (blue)

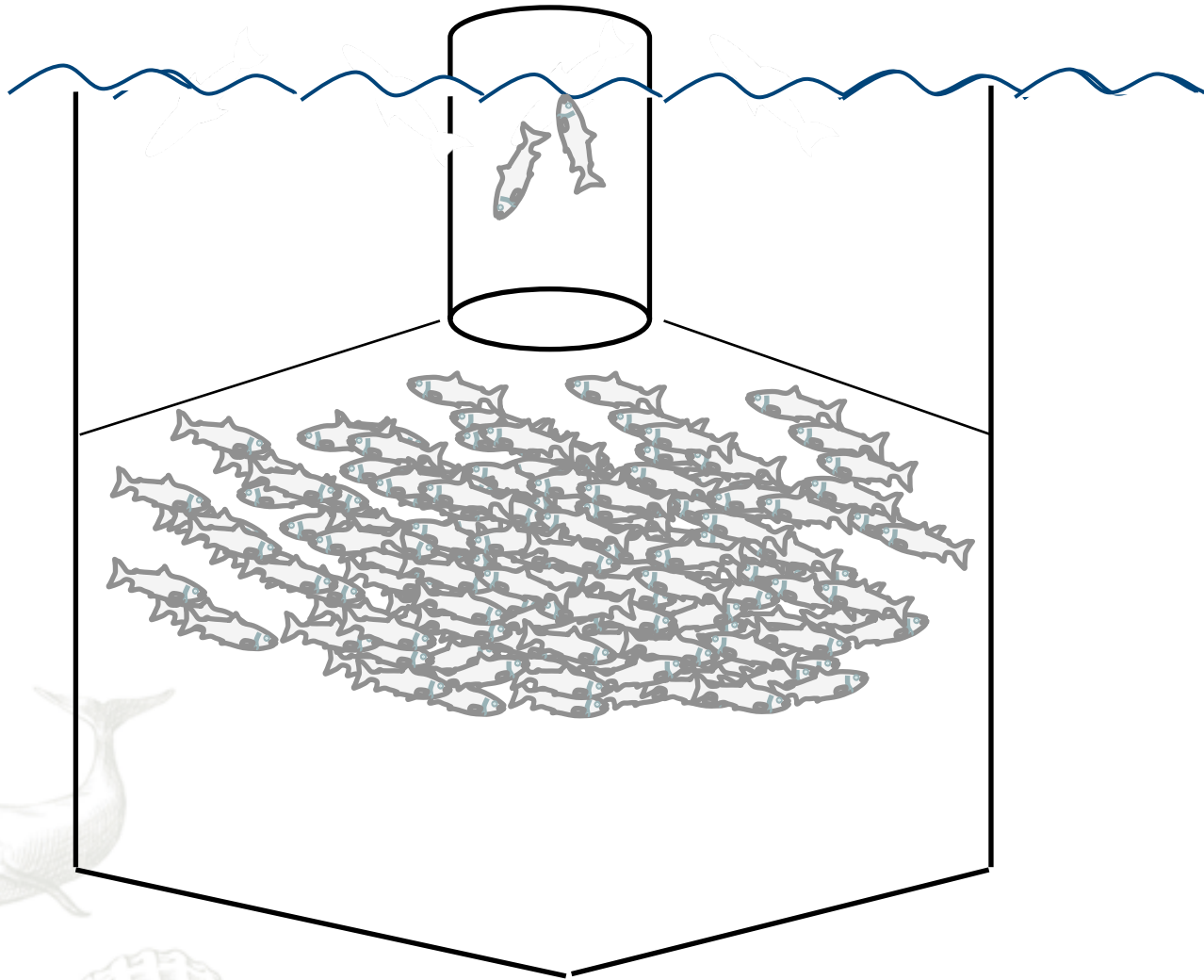


Net roof will force deeper swimming

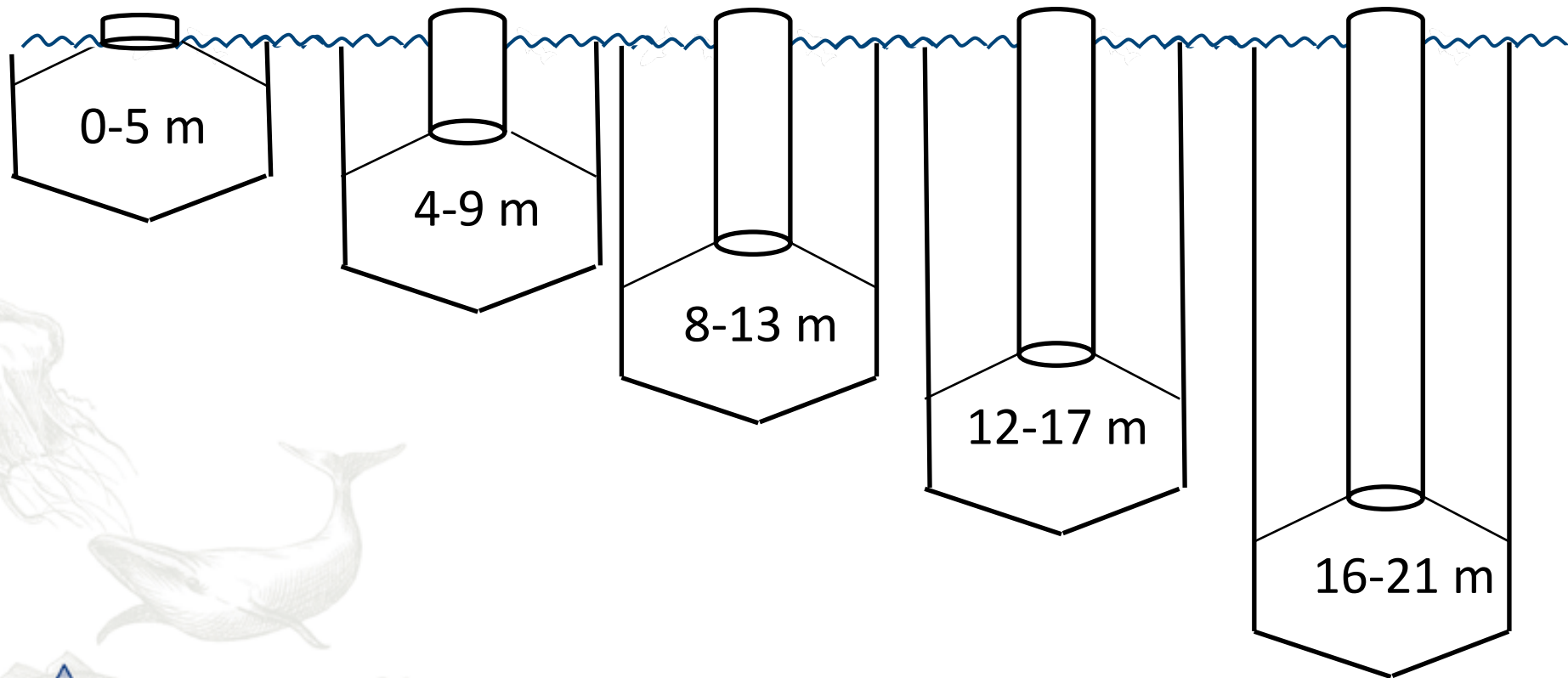
- but will only work for days due to the salmon need of swim bladder refilling



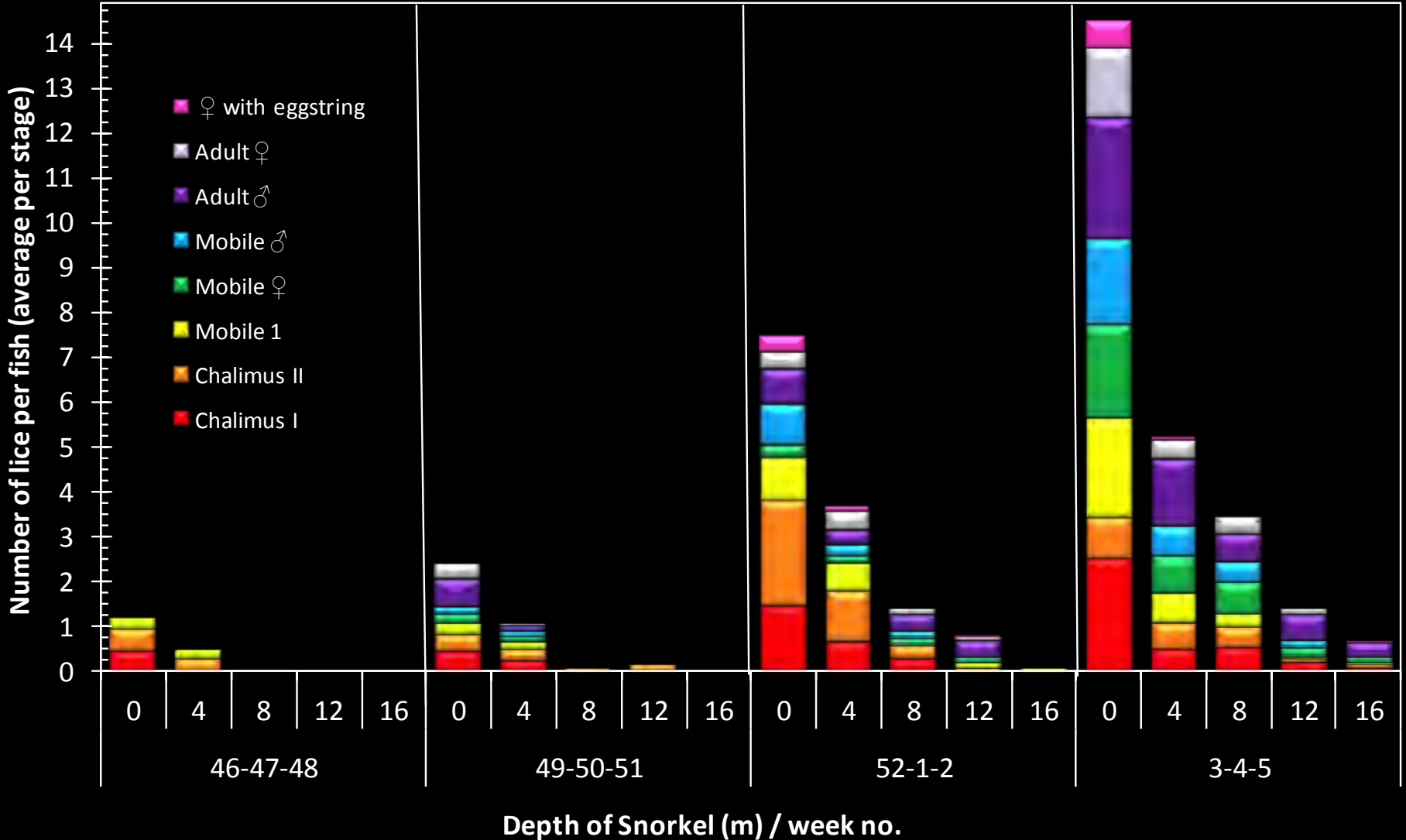
Snorkel cage may be used



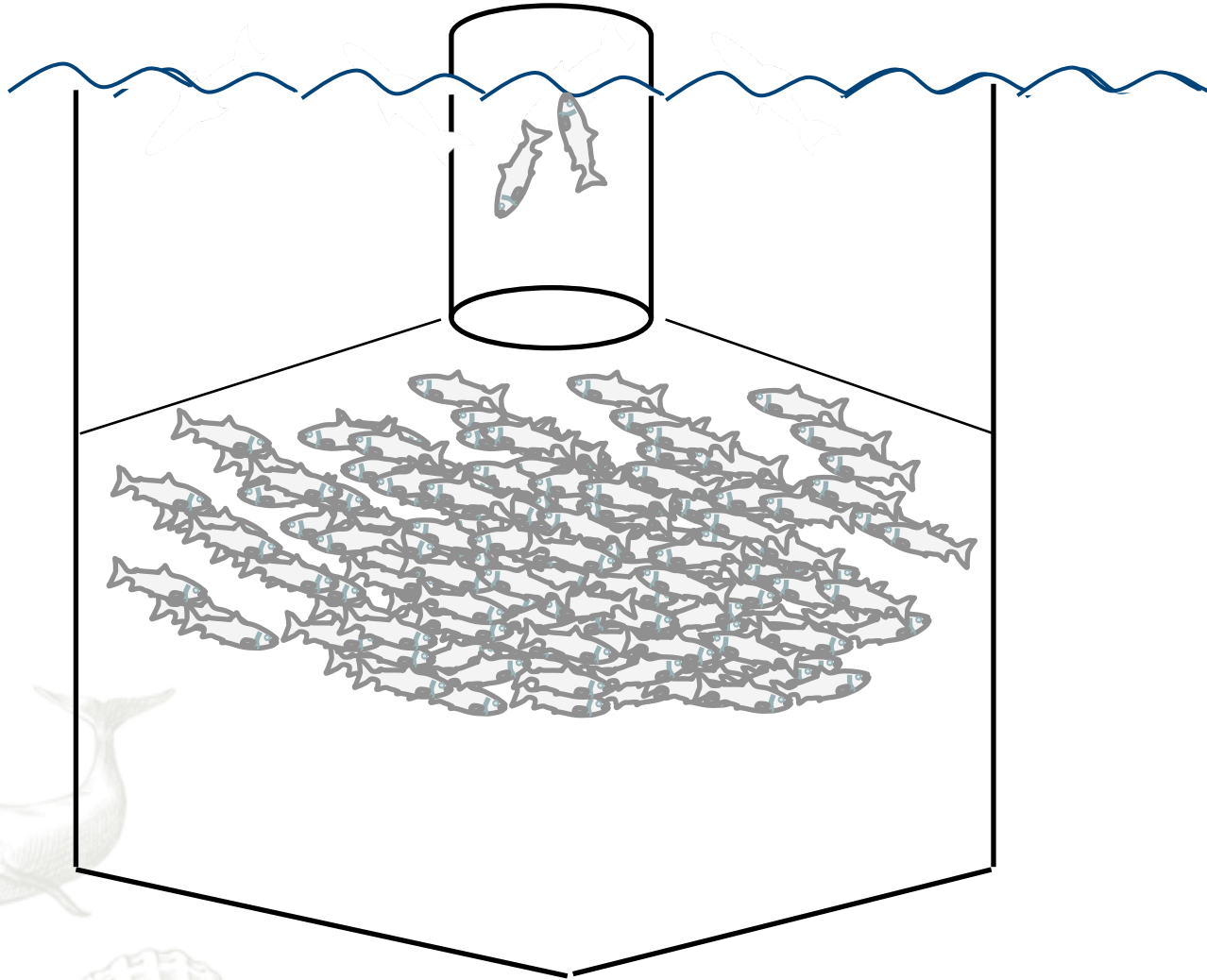
Recent snorkel trial: Depth of snorkel



Depth of snorkel correlate with lice infestation

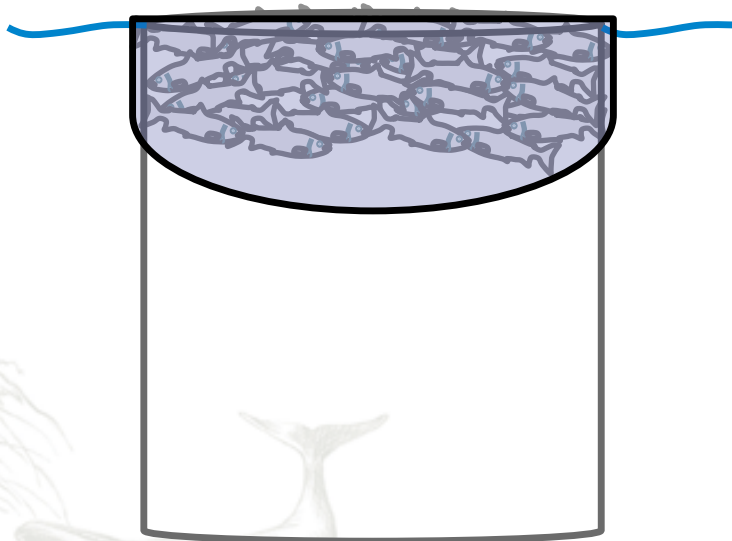


Snorkel cage may be used to avoid or delay AGD

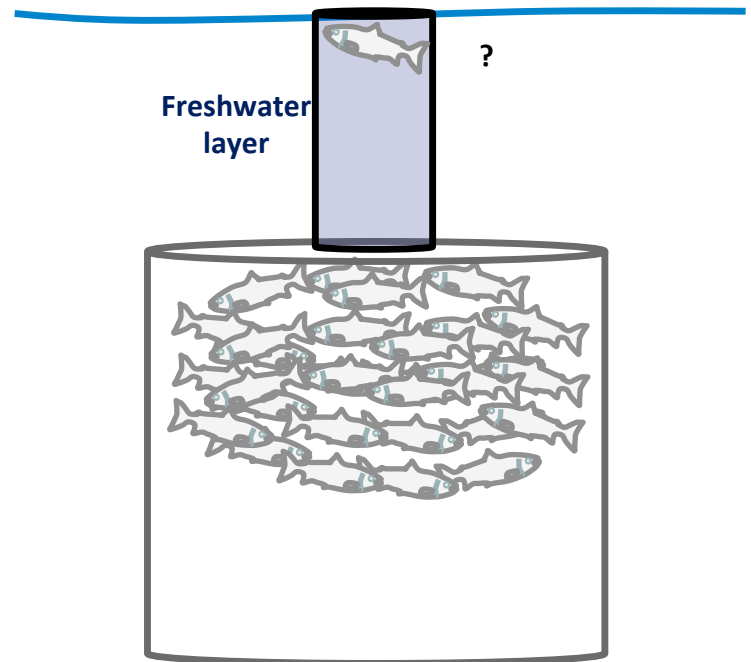


Present and future treatments options for AGD using freshwater

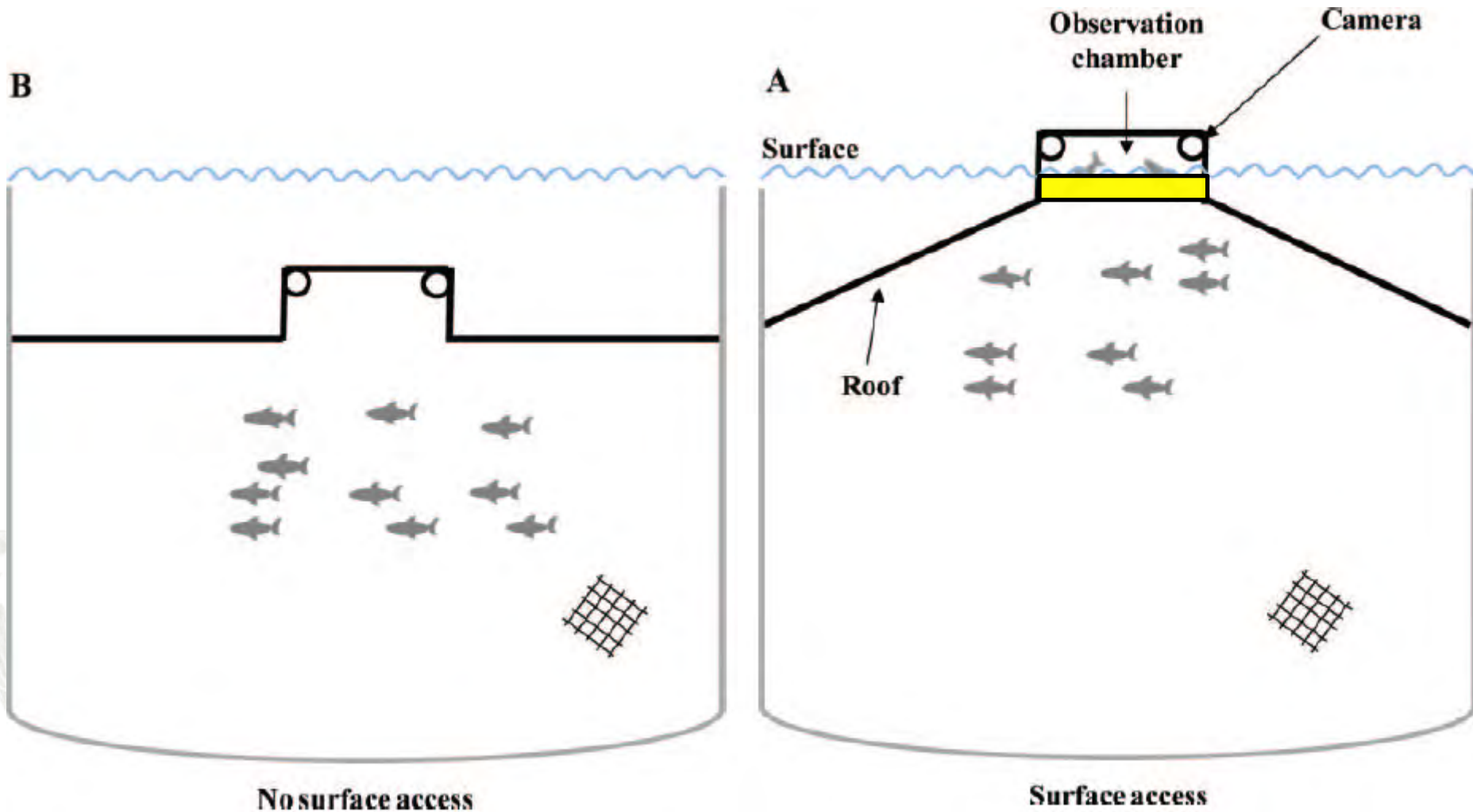
Freshwater bathing



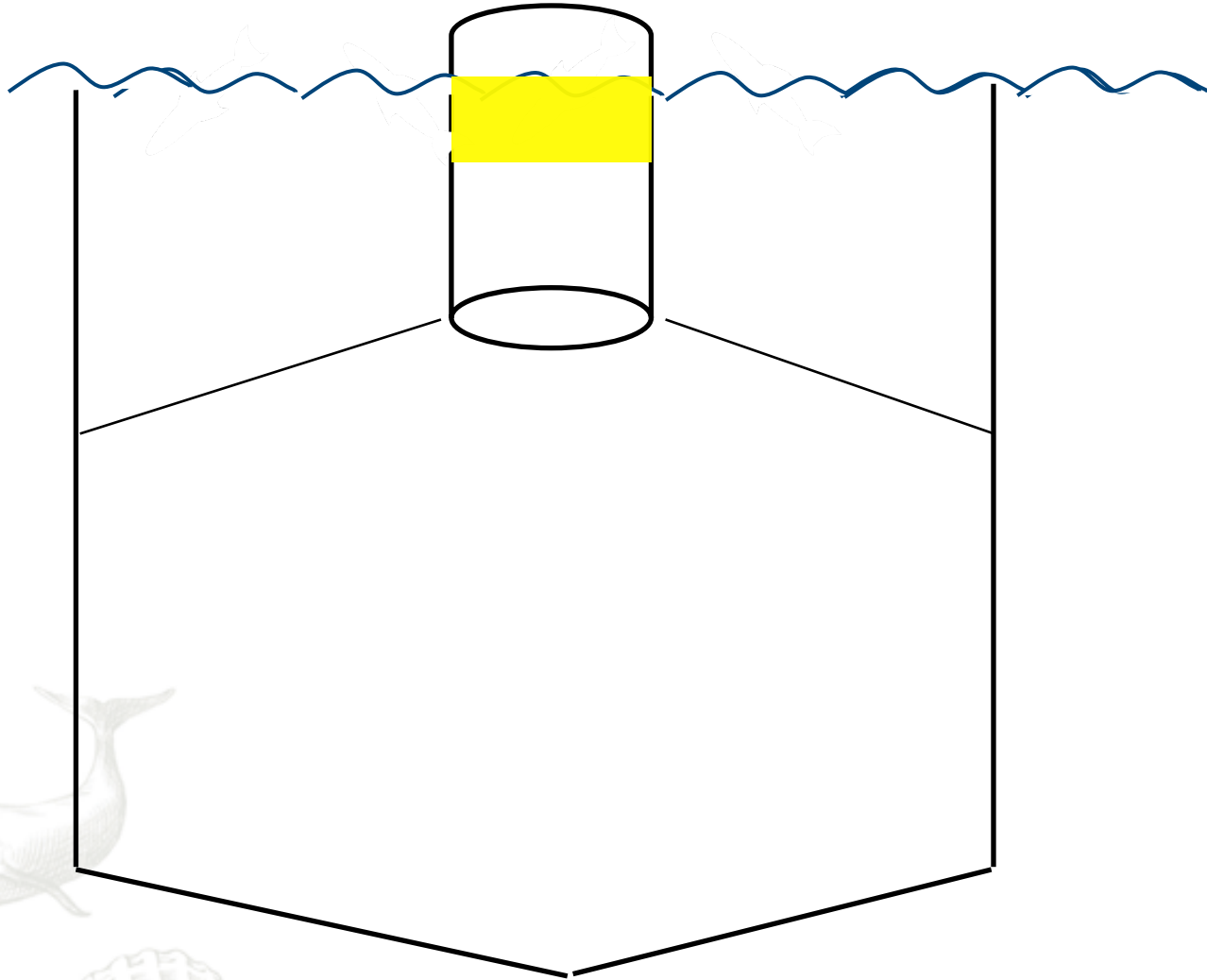
Freshwater layer



Treatment idea 2011



Treatment idea developed





1st commercial snorkel, spring 2014

Cage circumference: 160 m, 45 m depth, 185 000 fish

Snorkel circumference = 60 m, 10 m depth



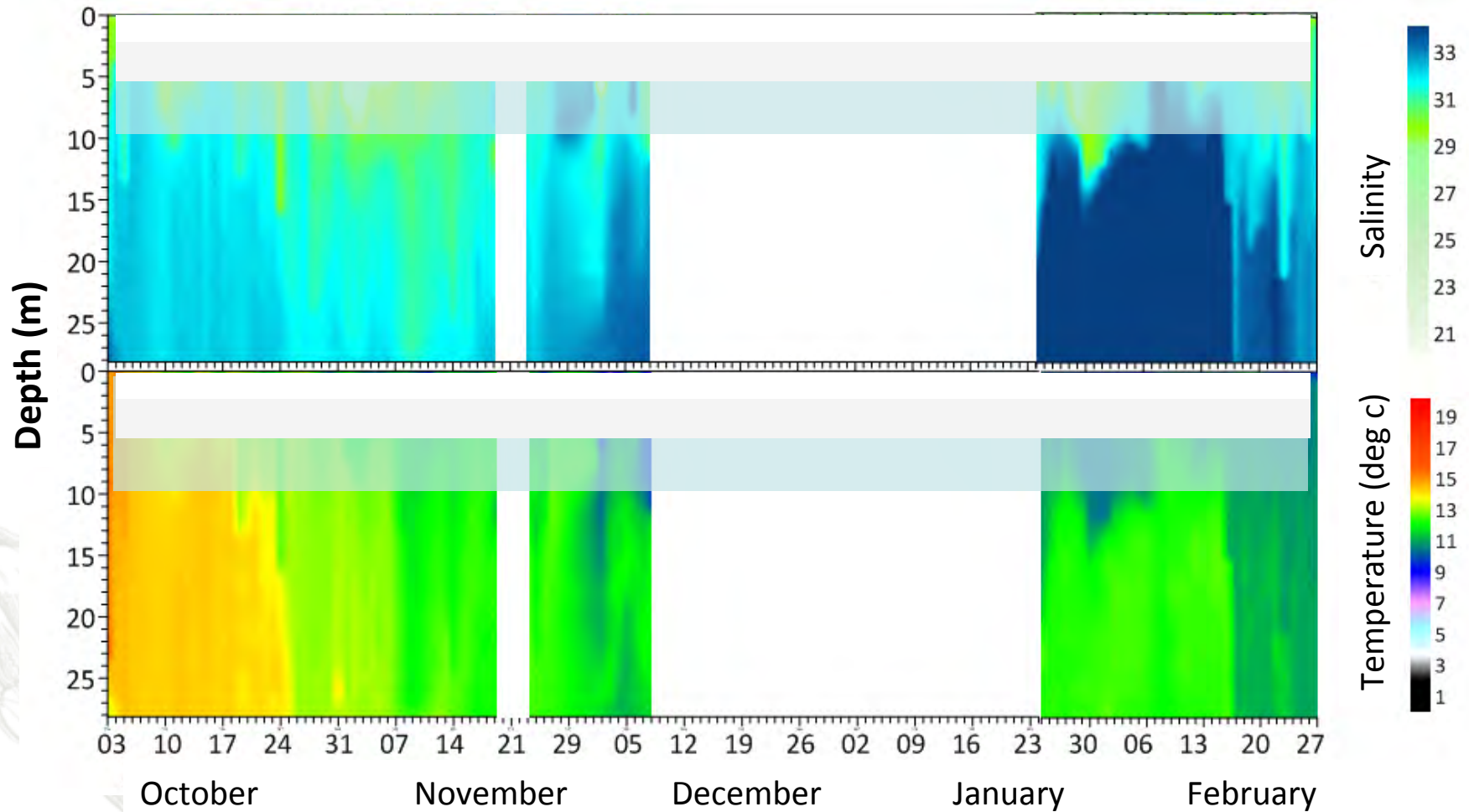
Commercial snorkel no. 9-13,

Cage circumference: 160 m, 35 m depth, 185 000 fish

Snorkel circumference = 90 m, 10 m depth



Commercial snorkel no. 9-13

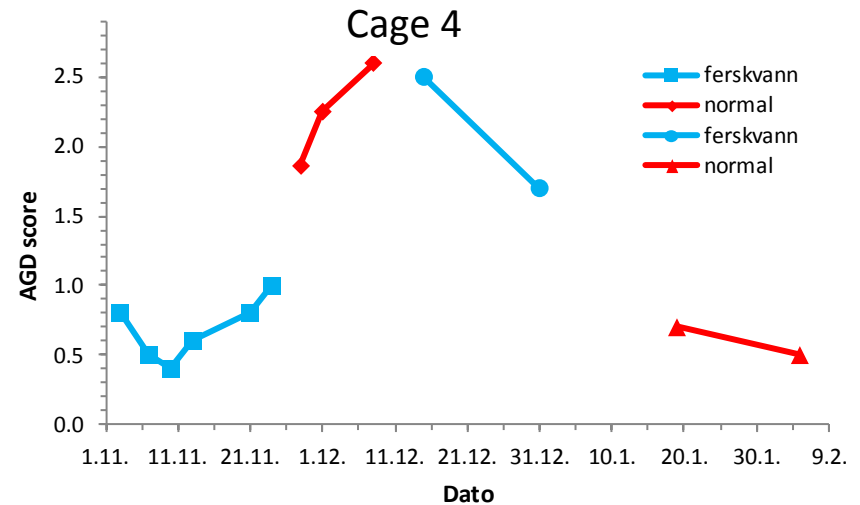
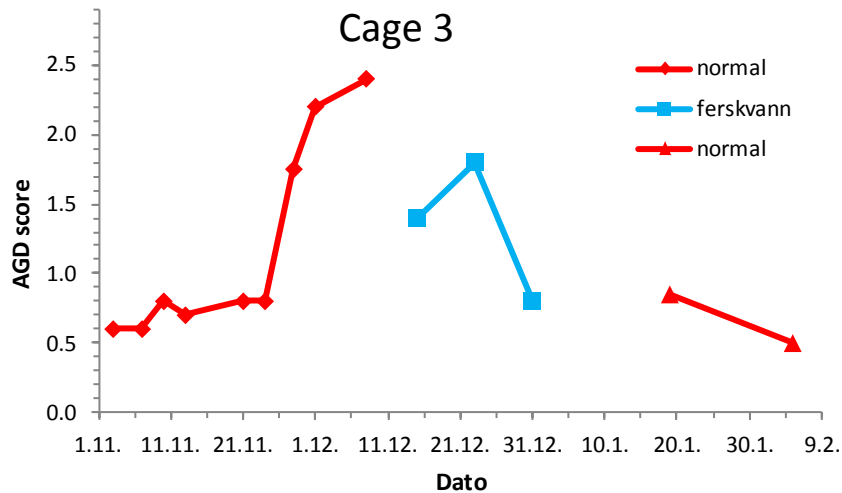
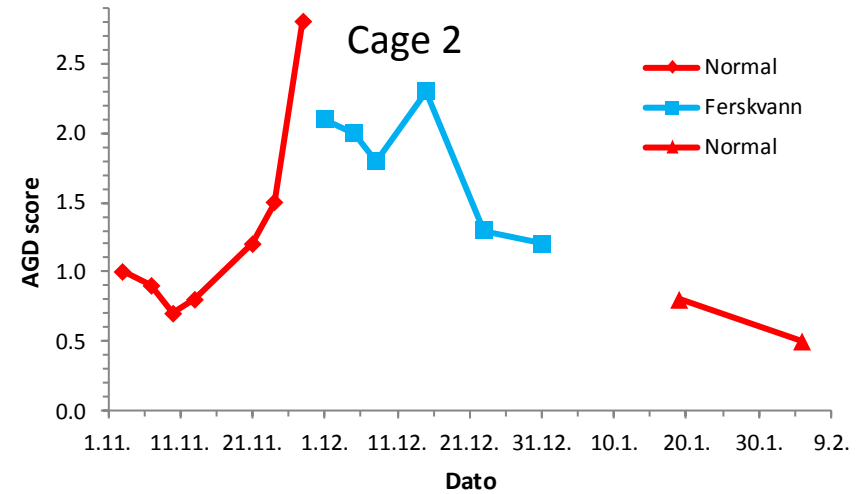
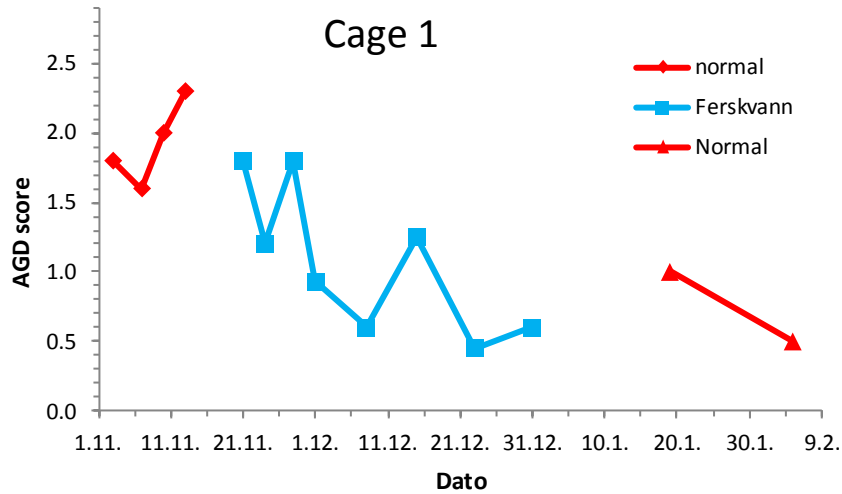


Snorkel environment equals 10 m environment

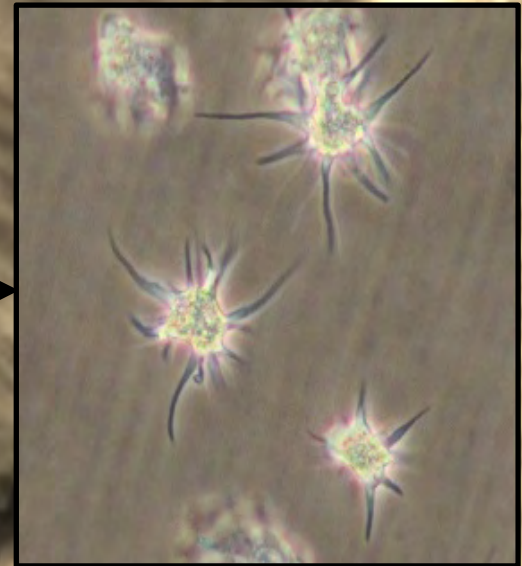
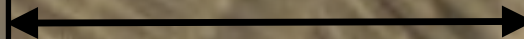
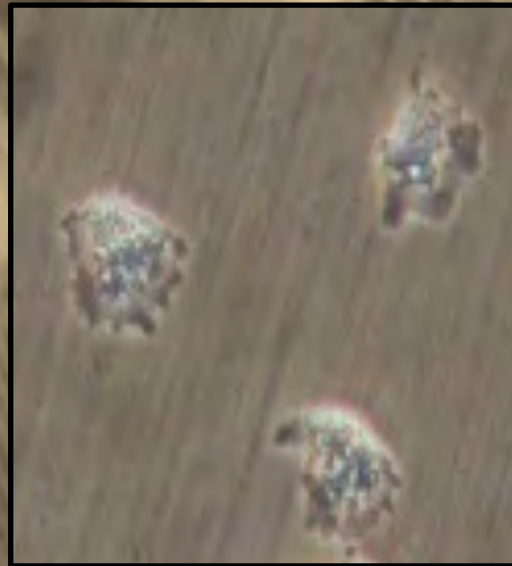
Freshwater addition created salinities of 0-5 and 5-10 at 0-2 and 2-5 m depth



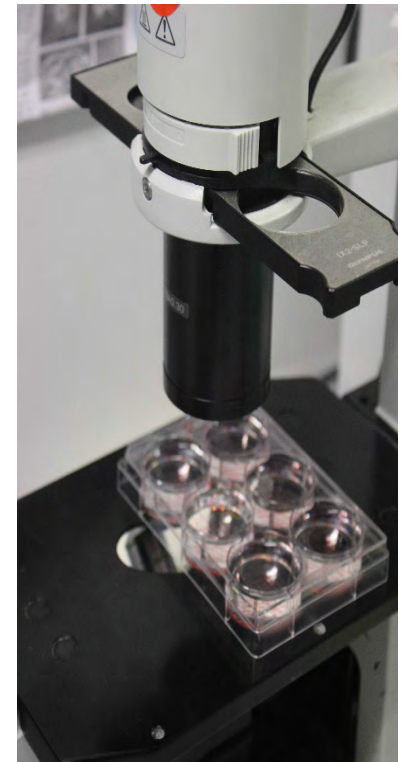
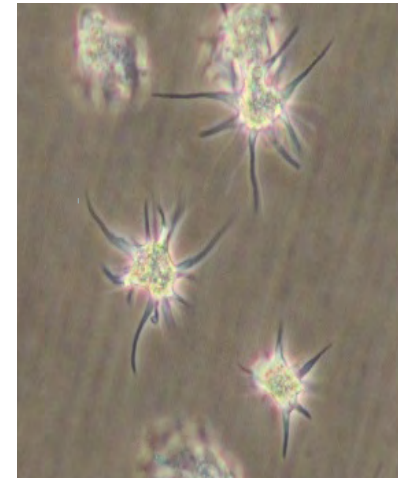
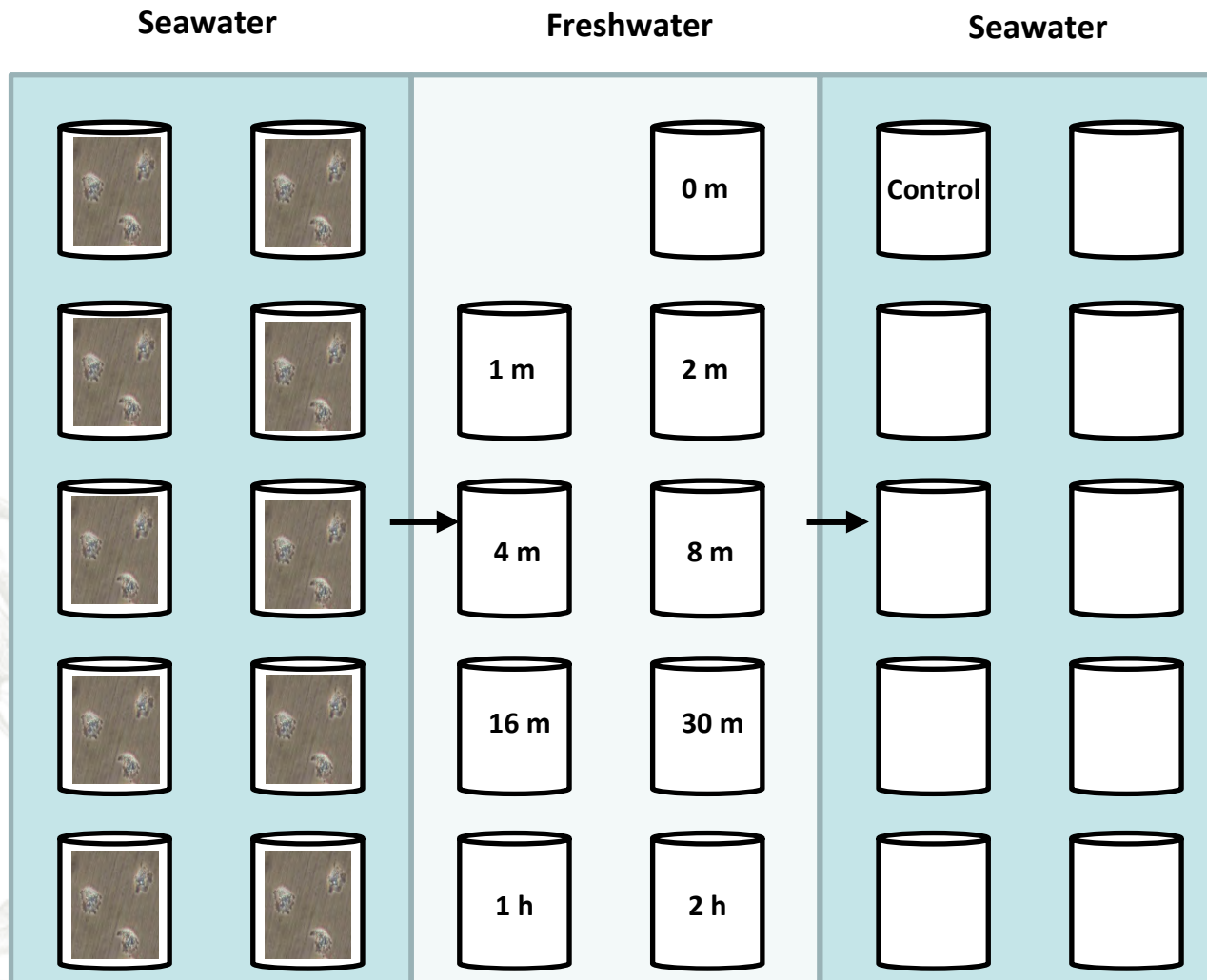
AGD score with freshwater in snorkel



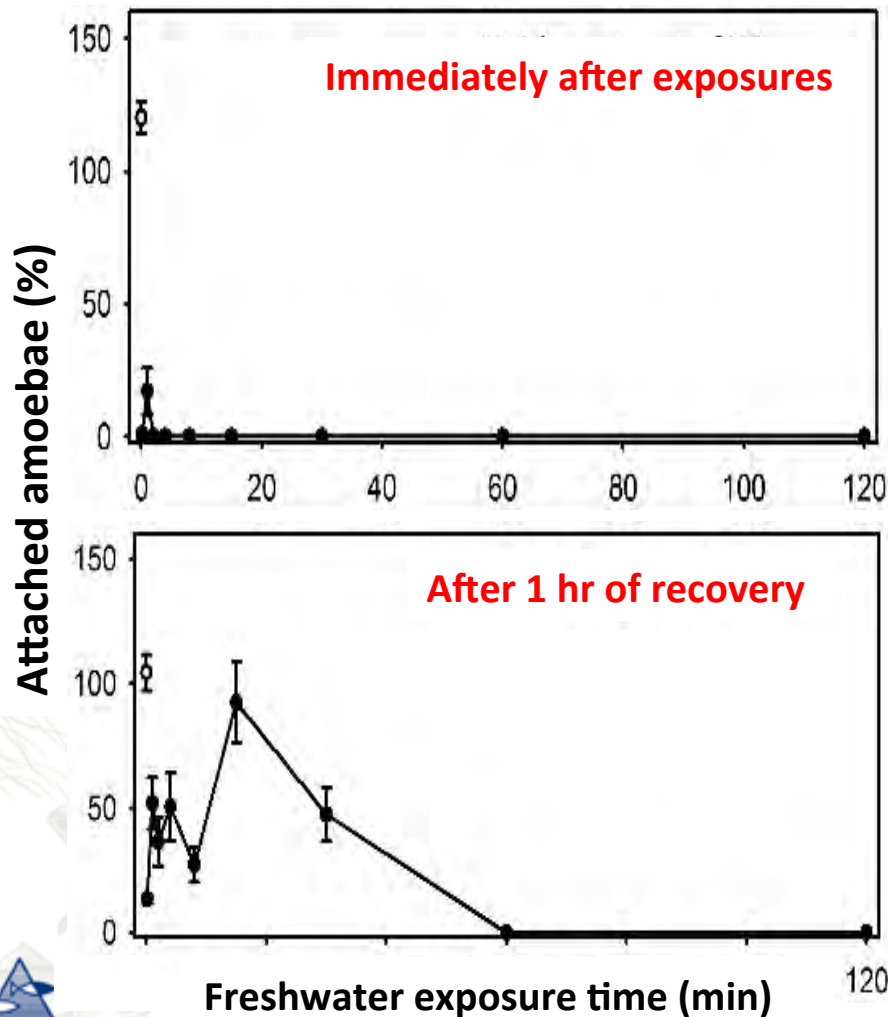
**Why does short-time
freshwater reduce AGD score
and disease?**



Lab study: Freshwater time effects - *N. perurans*



Lab study: Freshwater time effects - *N. perurans*



Seawater



Freshwater

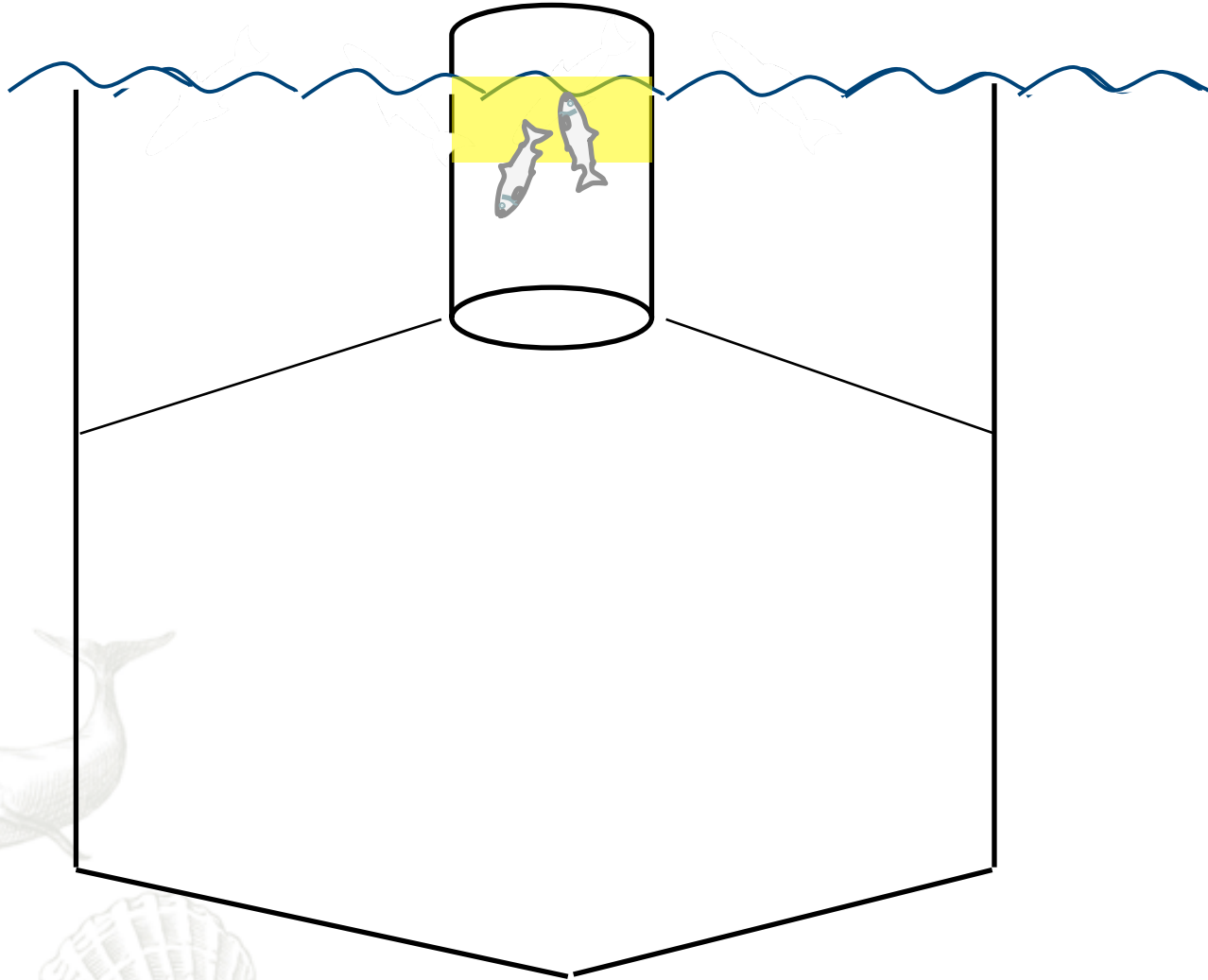


- Freshwater
- Seawater control



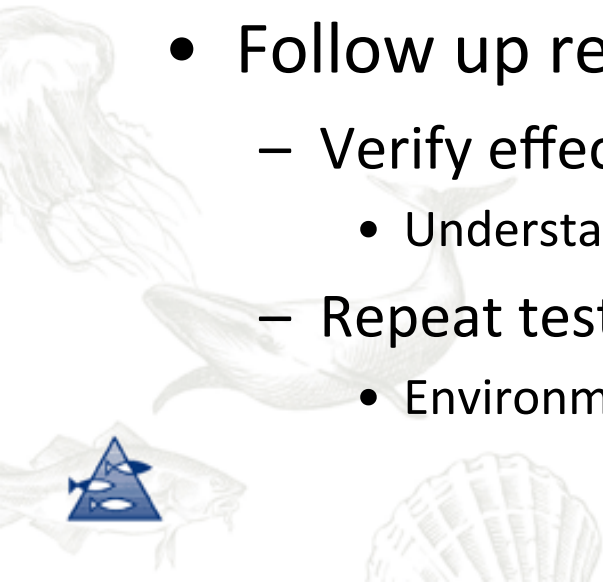
Amoeba detach when salmon pass the freshwater layer?

- and die if they stay there?



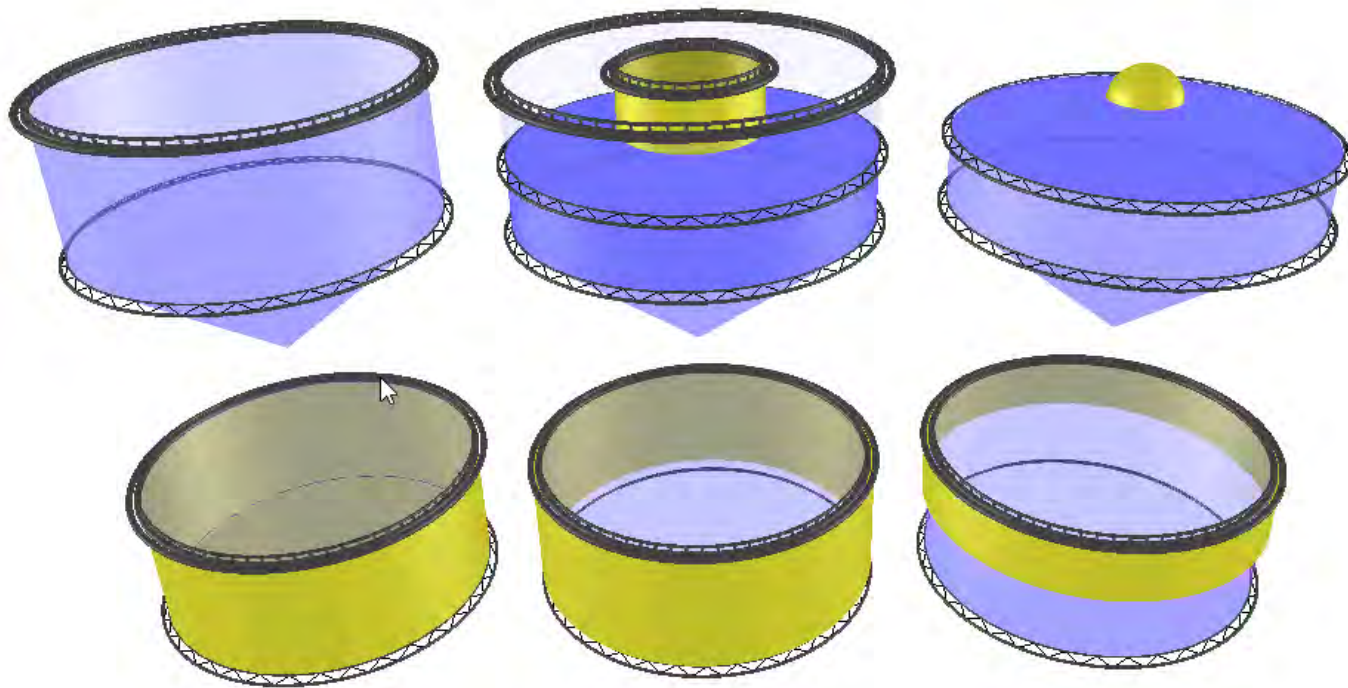
New approaches to conquer parasites

- Potential less infestation by deep swimming salmon
- Snorkel cage principle may be used
 - To avoid/ delay infestation
- Surface FW as preventative/ controlling treatment may be feasible
- Follow up research needed
 - Verify effects in small and medium scale
 - Understand dynamics
 - Repeat tests in commercial scale
 - Environment, fish behaviour and coping



Cages in future

- with freshwater layer on top?



Thank you for your attention,
to collaborators and
PhD Daniel William Wright

