

DiTail

Marine Disposal of Mine Tailings:

Impacts on Pelagic Ecosystem Components in
Norwegian Fjords

Julia Farkas, SINTEF Ocean

DiTail project



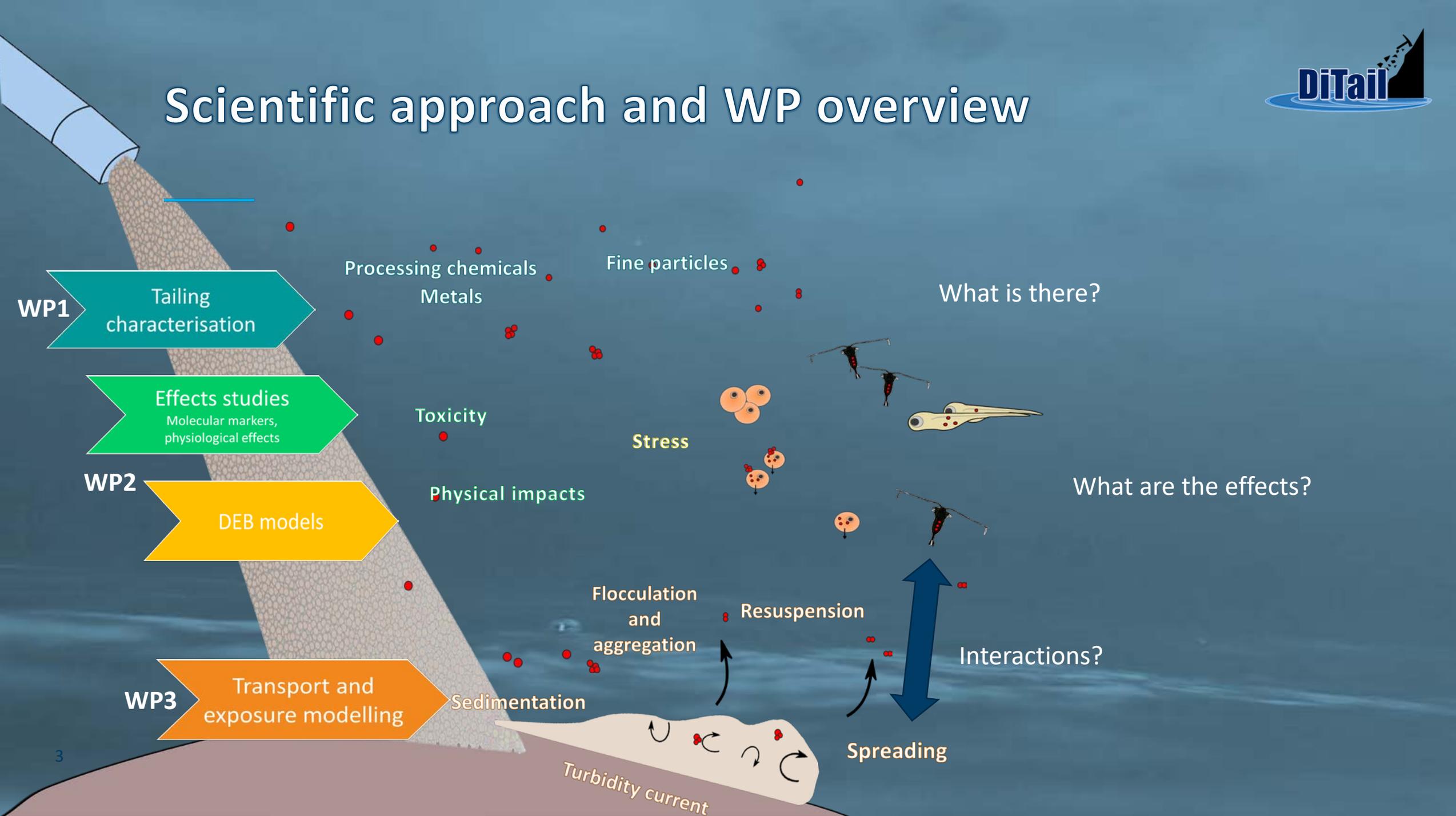
- **NFR research project**
- **3 years (Jan 2018- Dec 2020) + ½ year extension**
- Nord University, Bodø Faculty of Bioscience and Aquaculture
- SINTEF Ocean, Trondheim Environment and New Resources
- NTNU, Trondheim Department of Biology
- BioTrix, Trondheim Research provider
- DEBTox research (Netherlands) Research provider
- University of Chile (Chile) Department of Mining Engineering



Pål Olsvik



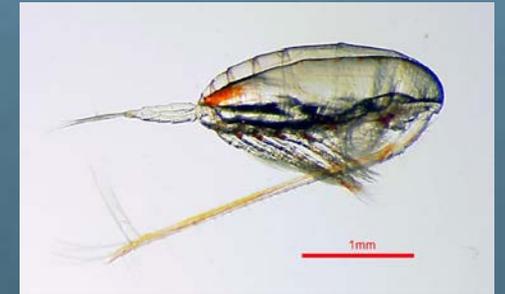
Scientific approach and WP overview



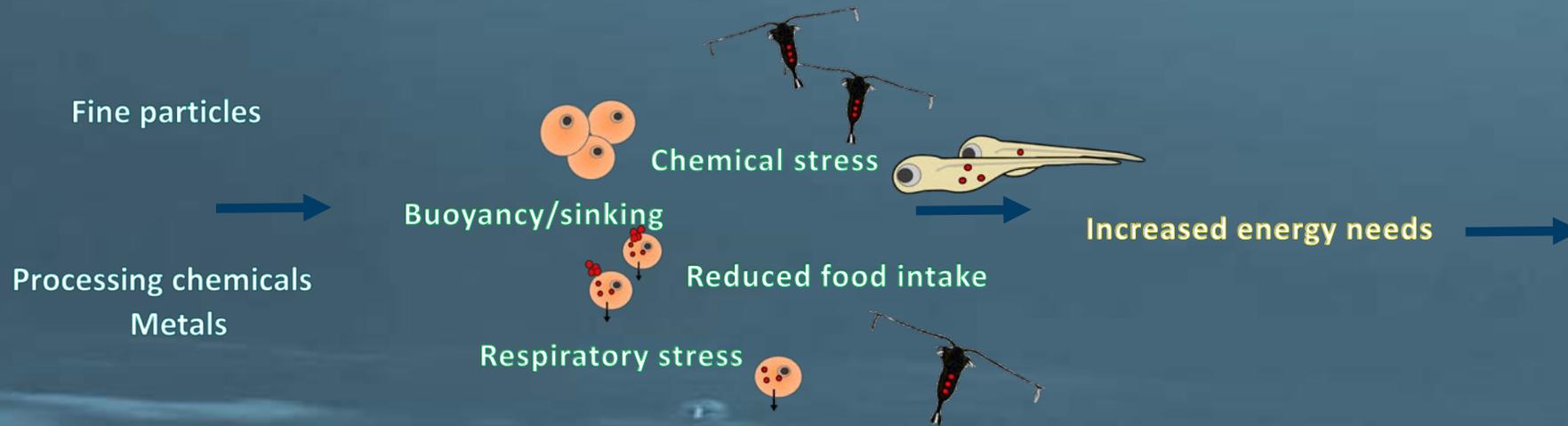
Effects

What can happen when organisms meet tailings?

Calanus (raudåte; *Calanus finmarchicus*)

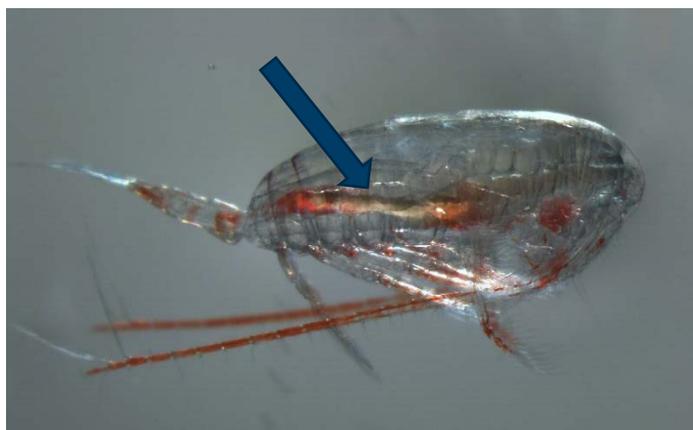


Cod (*Gadus morhua*) (+ haddock)



Exposure of *C. finmarchicus*

- No acute toxicity
- Uptake of tailings into digestive tract



Adult calanus exposed to tailings



Calanus faeces: fed with algae

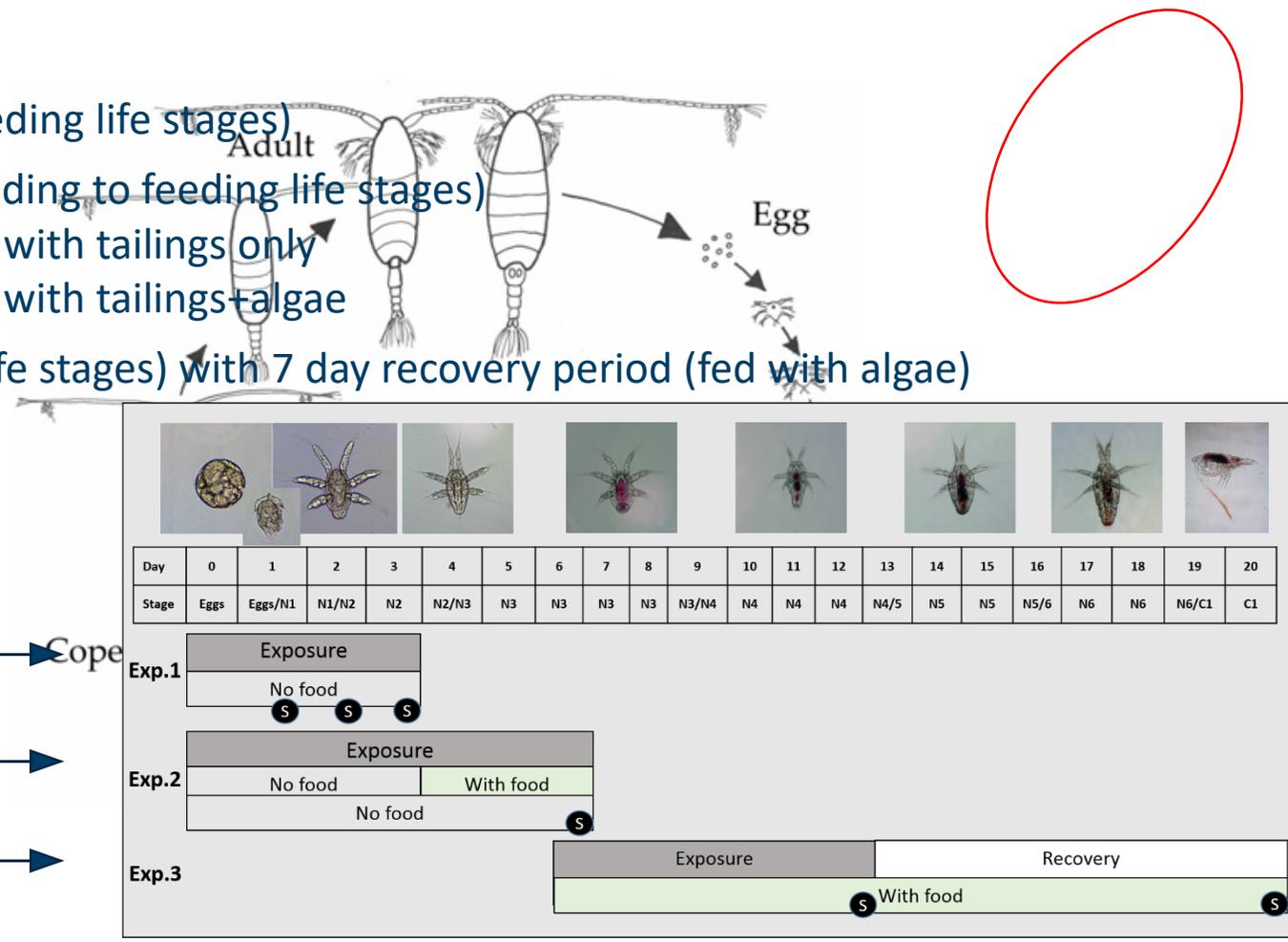


Calanus faeces: exposed to tailings/
tailings and algae

C. finmarchicus early life stages

3 EXPERIMENTS

- 1) Eggs to N2 (non-feeding life stages)
- 2) Eggs to N3 (non feeding to feeding life stages)
 groups with tailings only
 groups with tailings+algae
- 3) N3 to C1 (feeding life stages) with 7 day recovery period (fed with algae)



Results

1) Non feeding life stages

No significantly increased mortality

2) Early feeding life stages

uptake of tailings

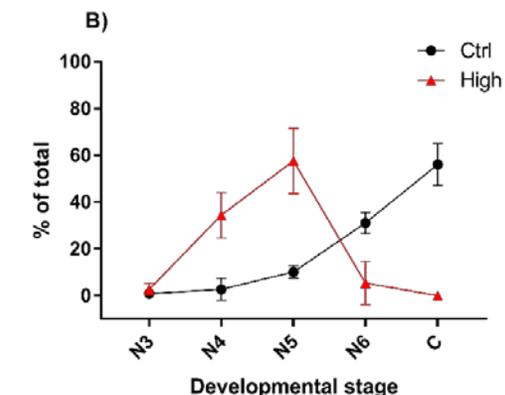
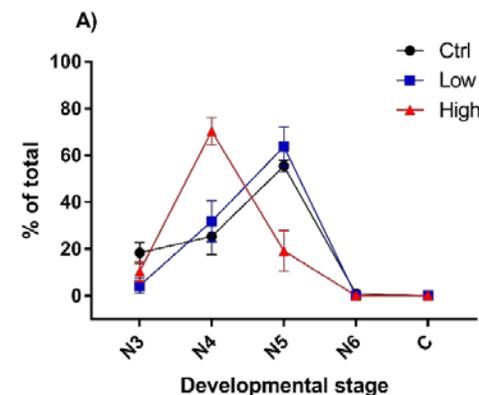
no significant developmental delay (energy reserves?)

animals non-active in no food groups (immobilisation=mortality?)



3) N3 to C1 feeding life stages

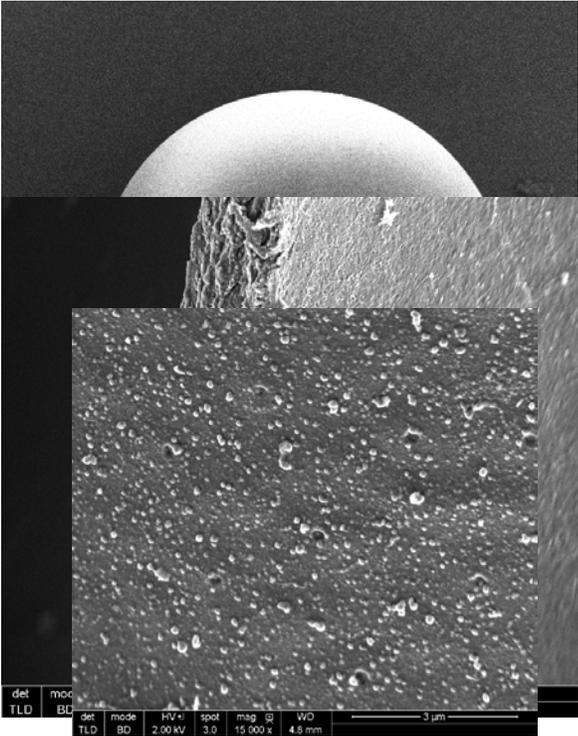
significant developmental delay even after 7 days recovery



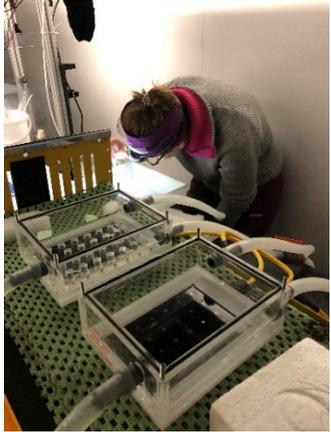
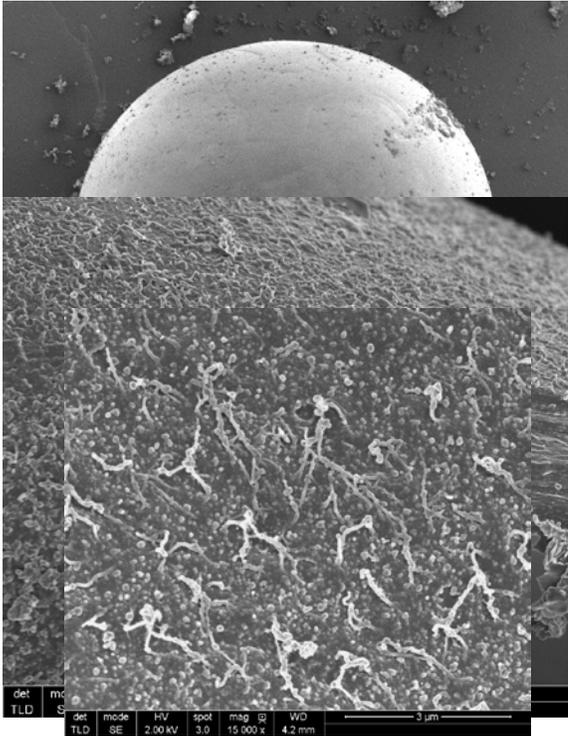
Fish early life stages

Tailing exposure

HADDOCK

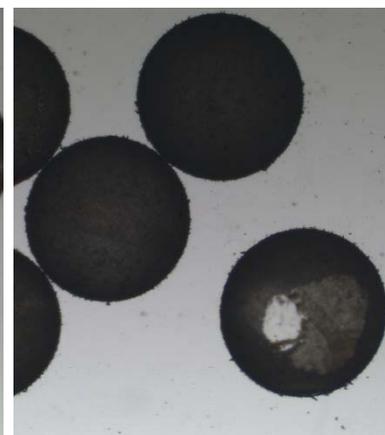


COD



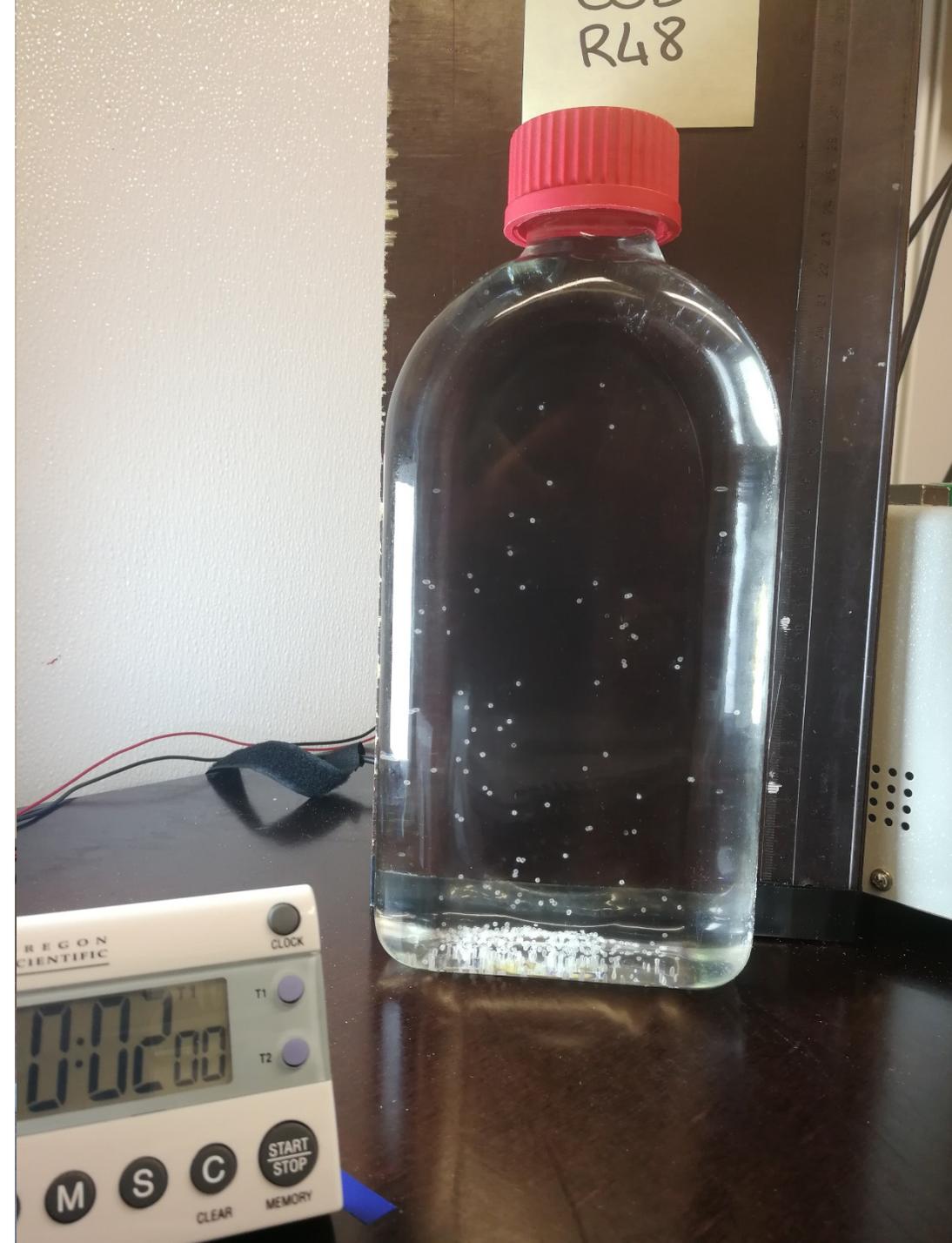
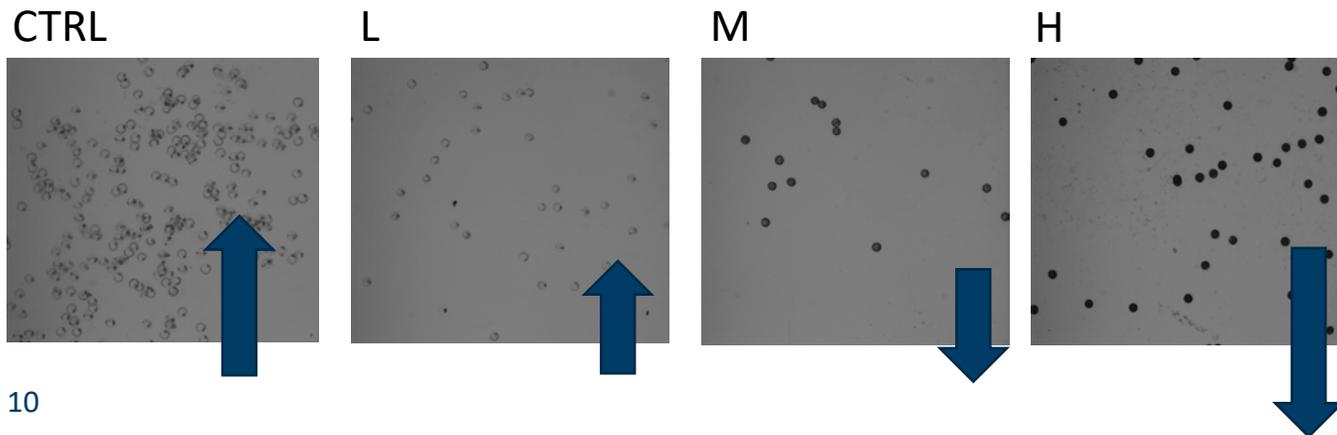
Preliminary results

- Rapid attachment of tailings to eggs
- Tailings stay on eggs also in recovery and until hatch



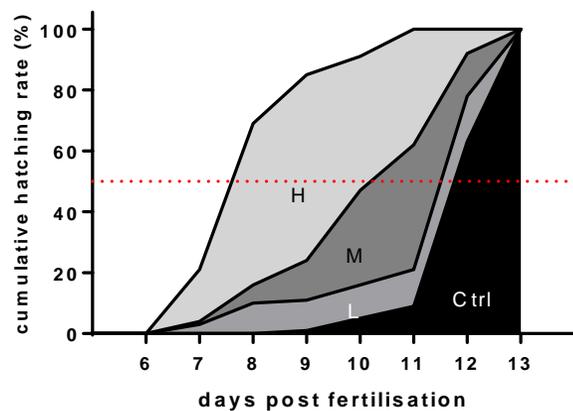
Sinking of eggs

- Reduced buoyancy and sinking
- Cod more "susceptible" than haddock
 - Cod eggs sinking in H and M exposures
 - Reduced buoyancy in L exposures

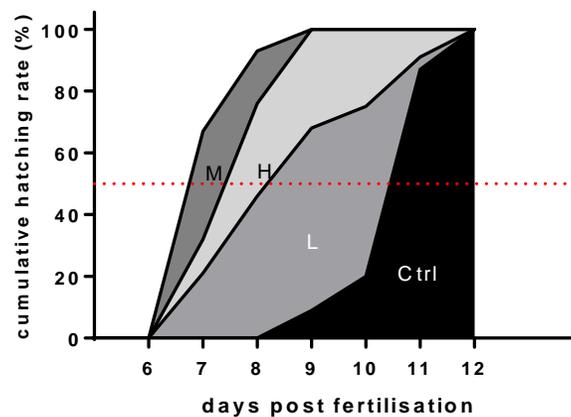


Hatching time and success

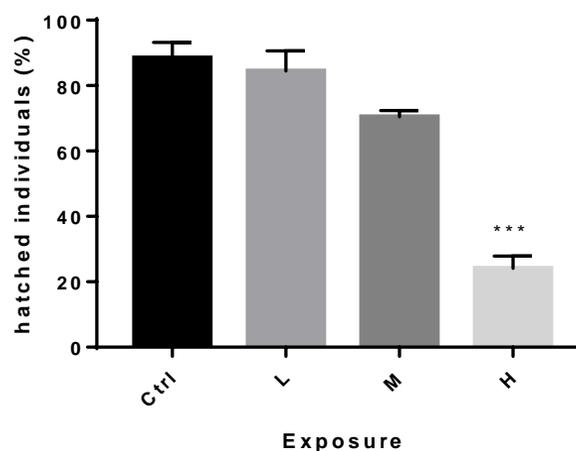
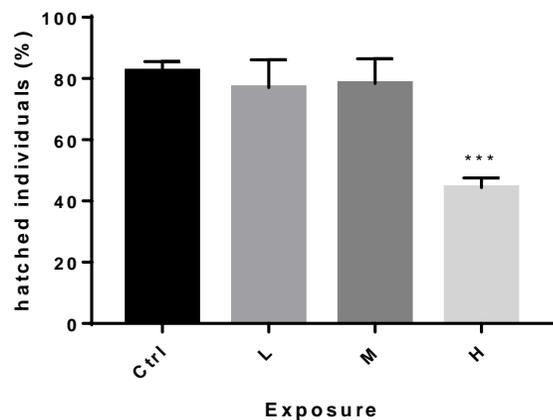
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COD



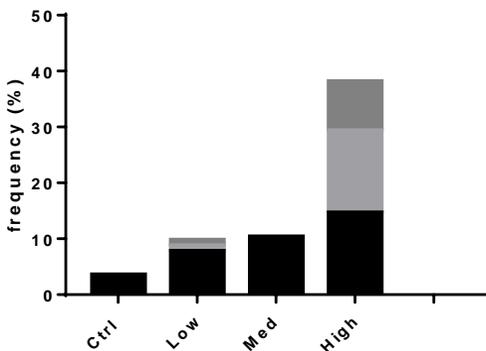
- Early hatching in exposed groups
- Reduced hatching success in H exposure groups



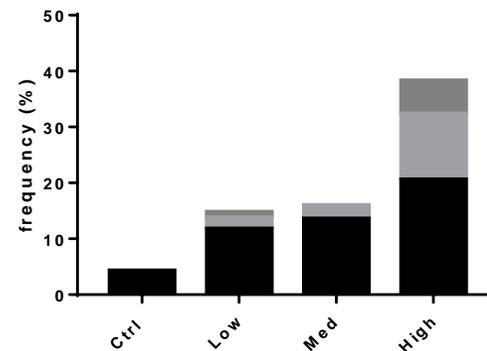
Deformations

Haddock

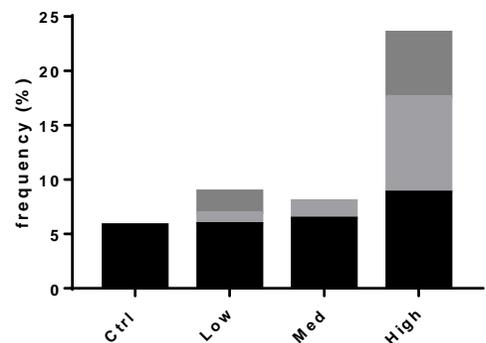
A) spine deformations



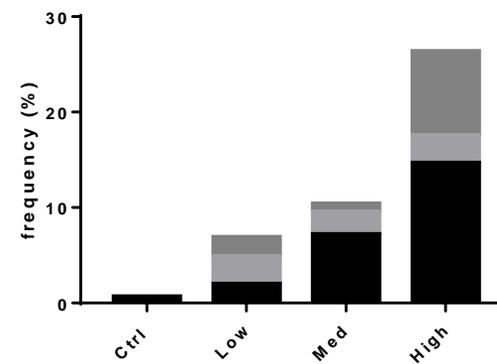
C) jaw deformations



B) craniofacial deformations



C) tail deformations



Summary and outlook



- Long term development of calanus
- Effects on energy assimilation

- Why do the particles attach - chemicals?
- Comparison with particles only/natural particles/other tailings
- How fast does this happen? Contact time in field?
- Mechanisms that lead to early hatching

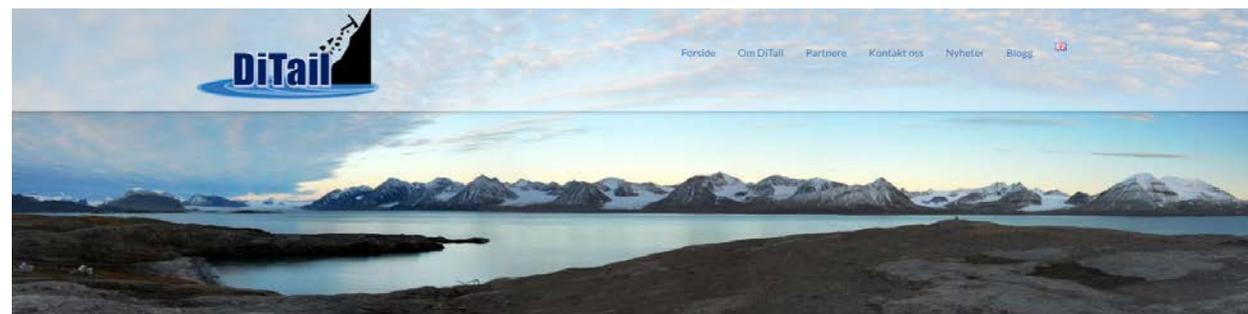
- Other tailings?



Thank you for your attention!

<http://ditail.no/>

https://twitter.com/di_tail

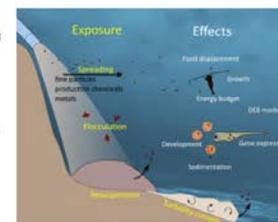


DiTail

Økende behov for metaller og mineraler verden over medfører miljøutfordringer. Moderne gruvedrift krever gode og langsiktige løsninger for deponering av restavfall i form av gråberg og finkornet masse.

Deponering av gruveavgang i sjø er kostnadseffektivt og en mye brukt metode i Norge. Sjødeponering av gruveavgang er imidlertid kontroversiell, og kan medføre spredning av partikler som kan være skadelige for vannlevende organismer. Stress som følge av påvirkning av partikulært materiale vil ikke nødvendigvis være dødelig for organismer i vannsøylen, men kan påvirke energibalansen og medføre mindre tilgjengelig energi til utvikling, vekst og reproduksjon.

Tidlige livsstadier av planktoniske dyr som hopperekreps (*Calanus finmarchicus*) og pelagiske fiskelarver er spesielt sensitive for stress da de trenger energi til utvikling og vekst.



Kategorier

- Fiskeforsøk (1)

Recent posts

- Forsøk med fiskeegg!

Twitter

- Preparing for #fishexperiments! Linn and Julia are testing the Loligo microplate



Teknologi for et bedre samfunn