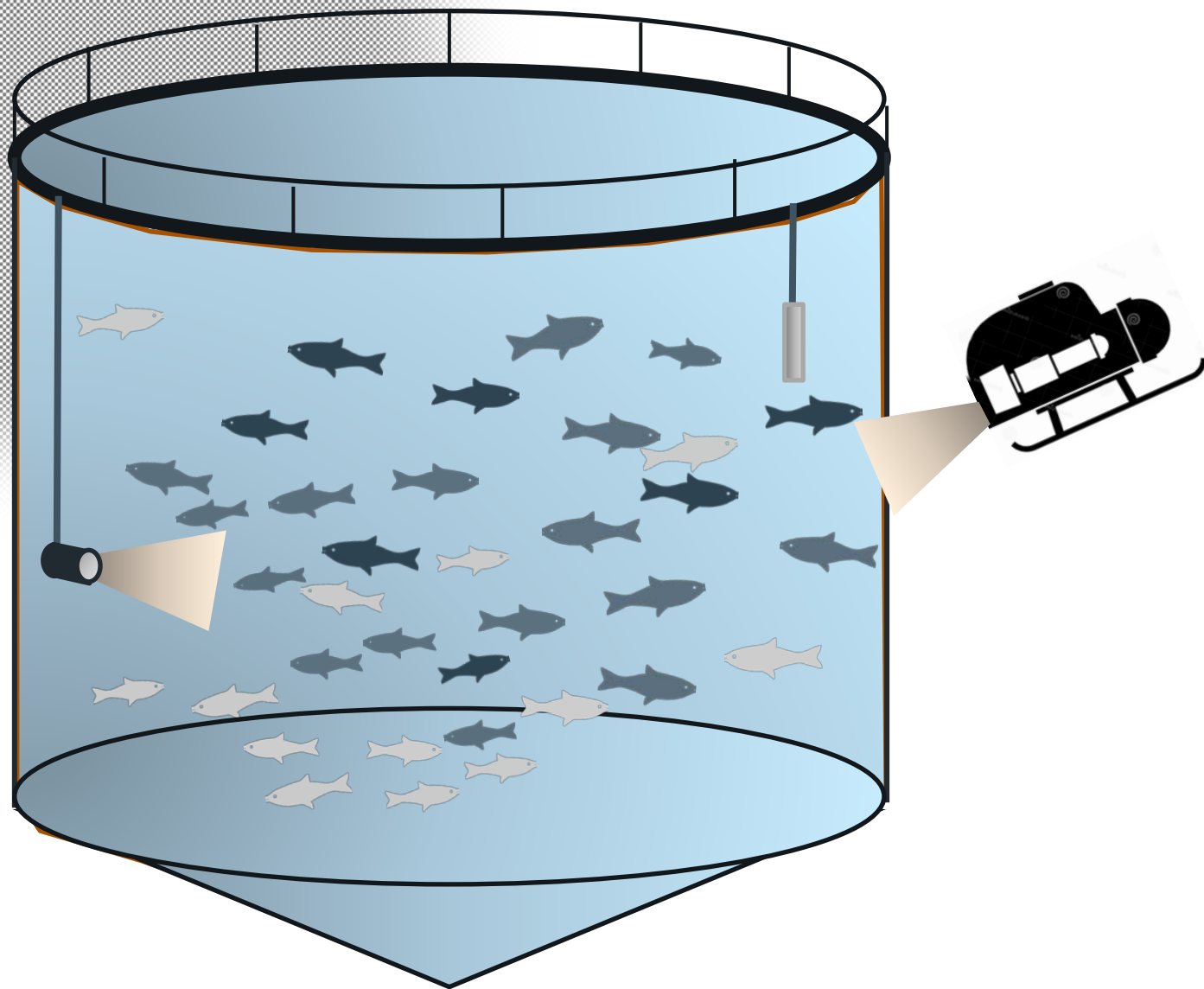
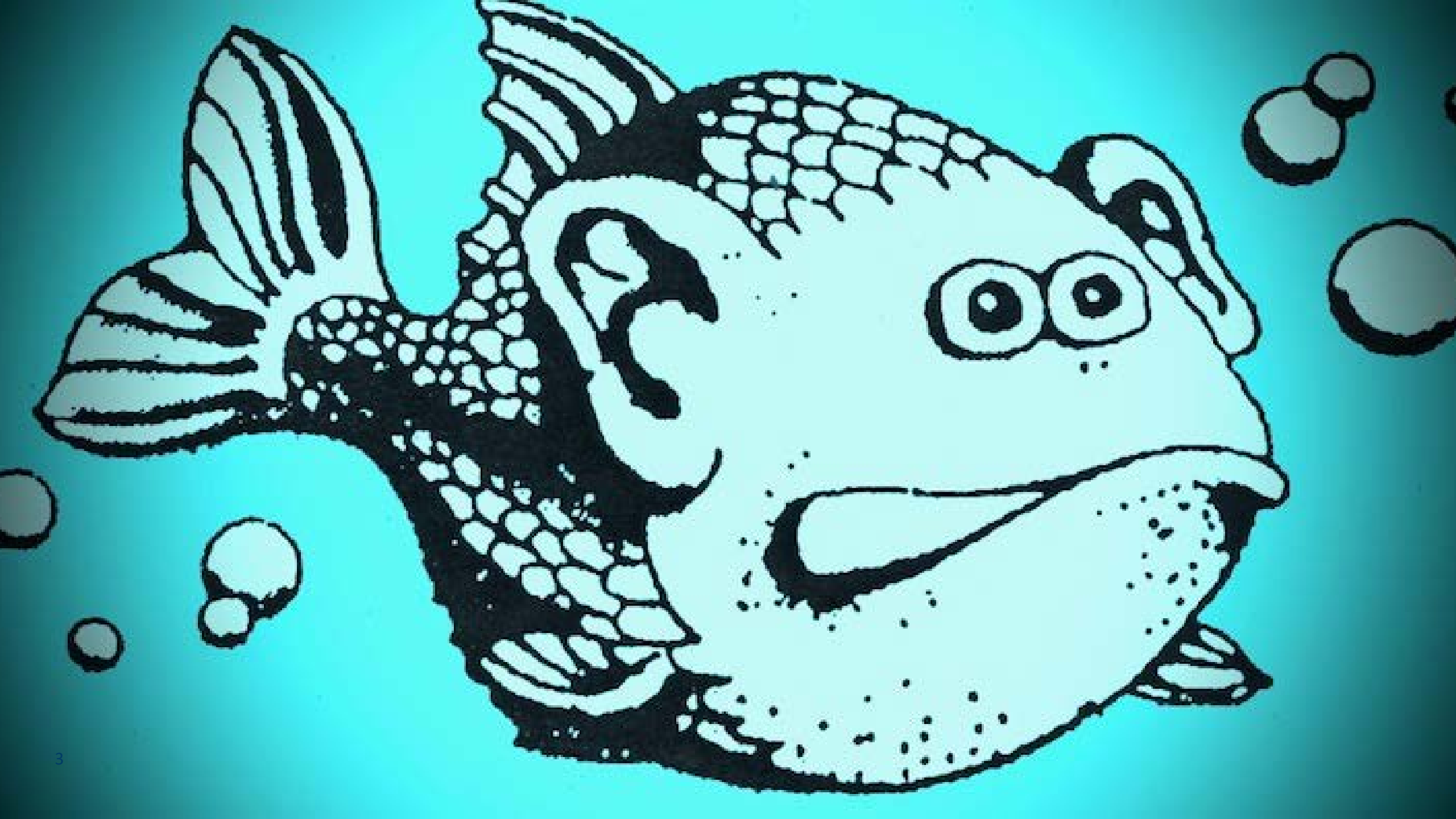


# Lyd i merd

Carolyn M. Rosten, John Reidar Mathiassen,  
Kristbjörg Edda Jónsdóttir og Zsolt Volent













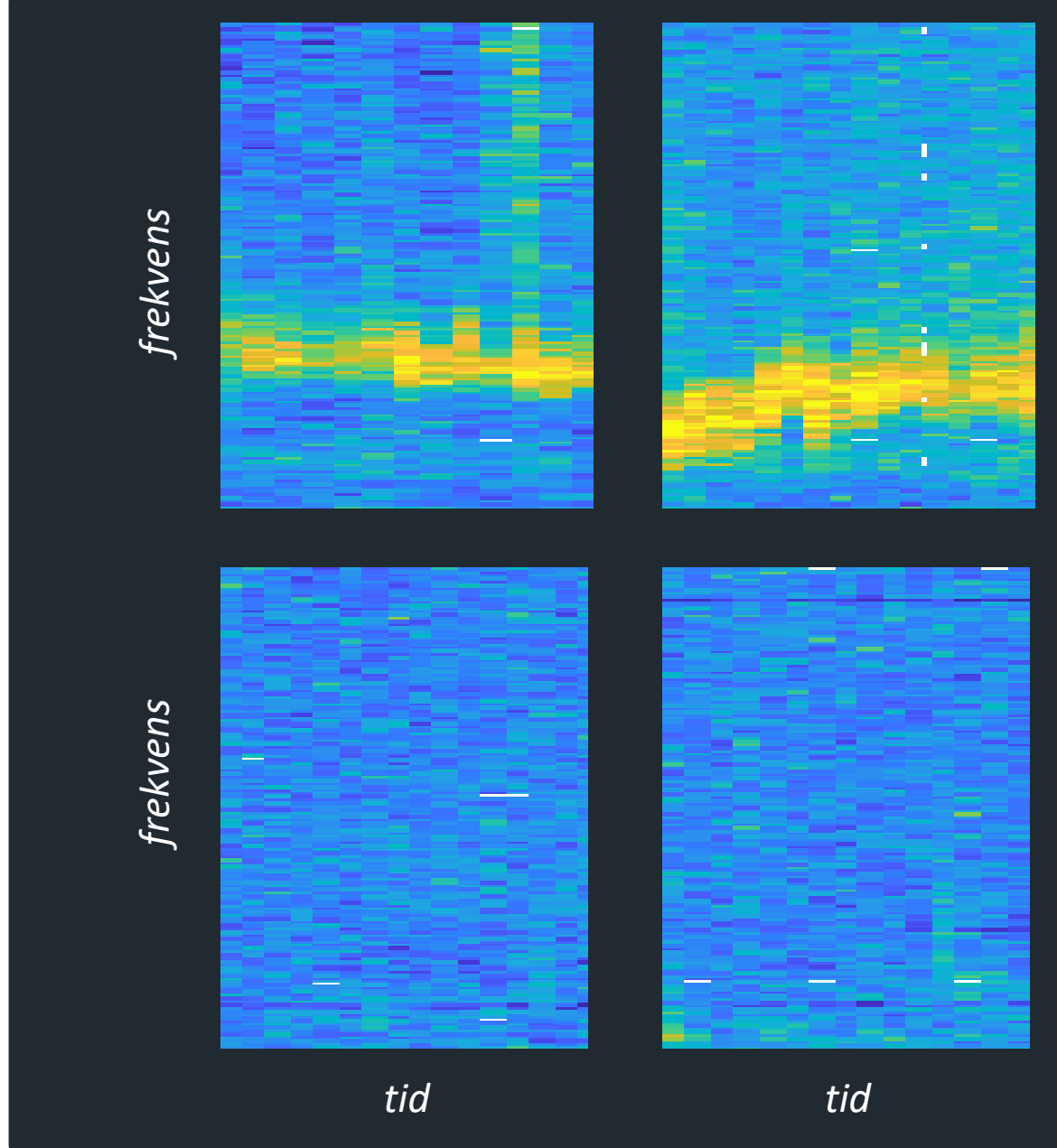
Lydbildet i merd  
med/uten fisk

*Kilde: NFR prosjekt SoundWell II /  
FHF prosjekt OWITOOLS*



DAG

NATT



I MERD

UTENFOR

MERD

*Å utvikle teknologiske verktøy og validere biologisk betydning* av tekniske målinger for å sikre objektiv dokumentasjon av **fiskevelferd ved håndteringsoperasjoner** av laksefisk







Labforsøk



# LetSea Forsøk

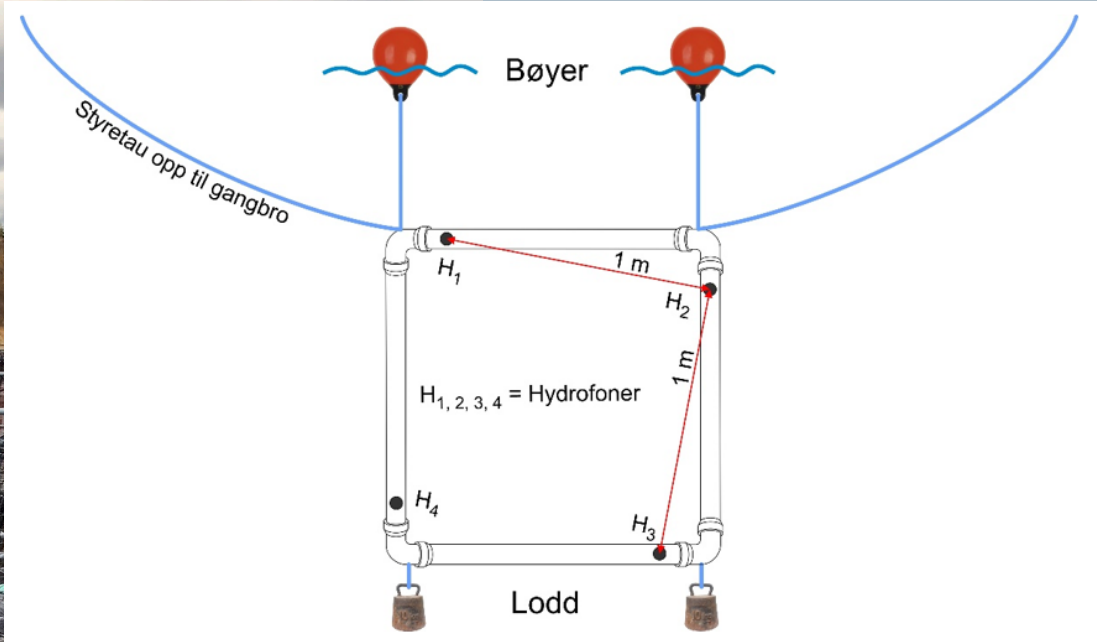
Dag 15  
Trenning

Dag 1  
Merking/  
flytting

Dag 29  
Avslutning









# DAG 15

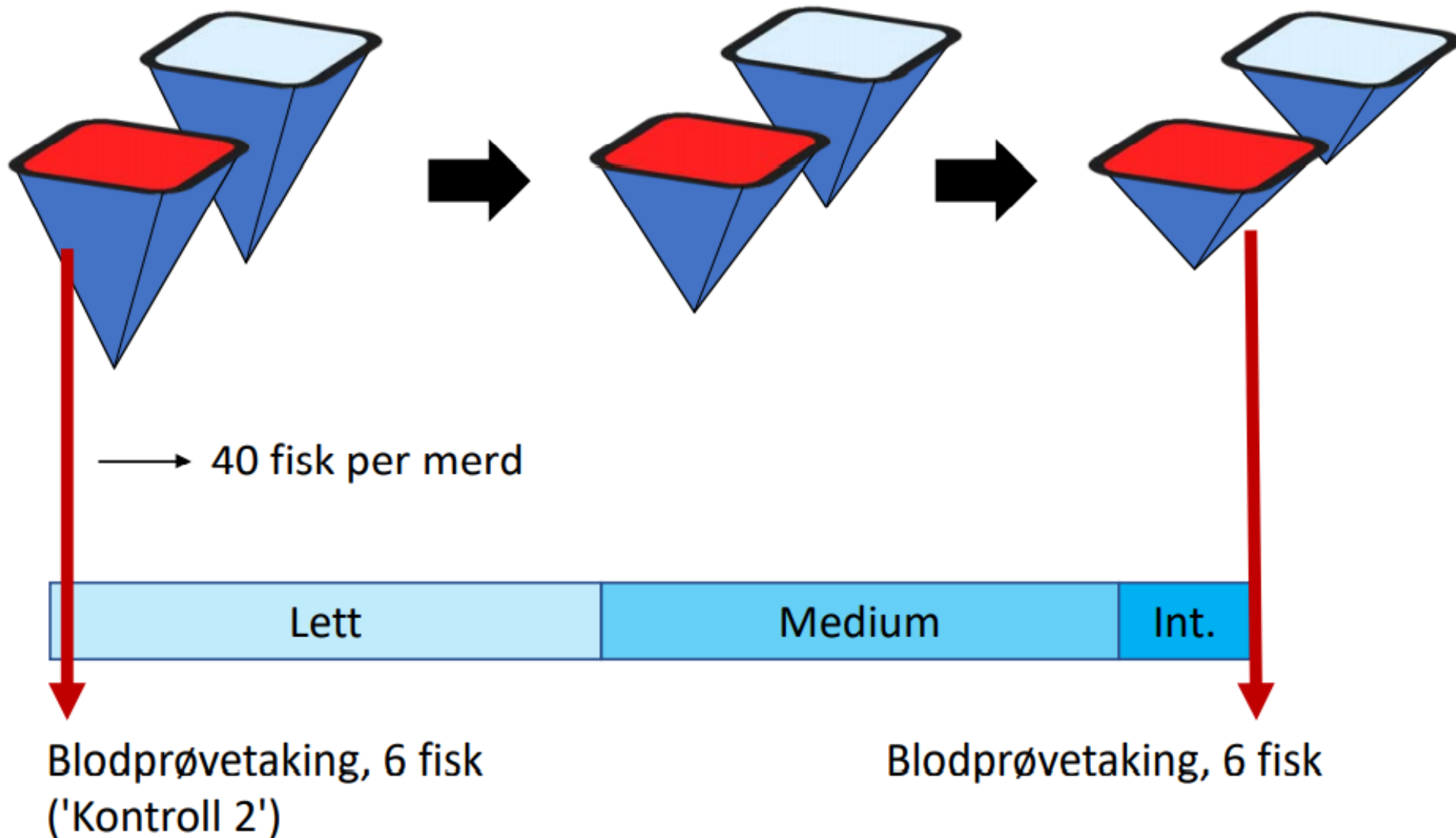




**Lett trening  
(50 min)**

**Medium trening,  
(50 min)**

**Intens trening,  
(10 min)**







Noble et al. 2018 FishWell report:



**1. Goal: low stress, no vigorous activity**

- ✓ Fish in the sides of the crowd swimming slowly
- ✓ Normal swimming behaviour, but not all in the same direction
- ✓ No dorsal fins on surface
- ✓ No white sides on surface



**2. Acceptable: some fins on surface**

- ✓ Normal swimming behaviour at suction point, low stress
- ✓ Few dorsal fins on surface
- ✓ No white sides on surface



**3. Undesirable:**

- Over-excited swimming behaviour (different directions)
- More than 20 dorsal fins on surface
- Some white sides constantly on surface



**4. Unacceptable: overcrowding**

- Over-excited swimming behaviour (different directions). Some fish decreasing activity
- Pumping rate: Not possible to keep a constant rate
- Many fish stuck up against the crowd net
- Many dorsal fins on surface and numerous white sides on surface
- A few very lethargic fish



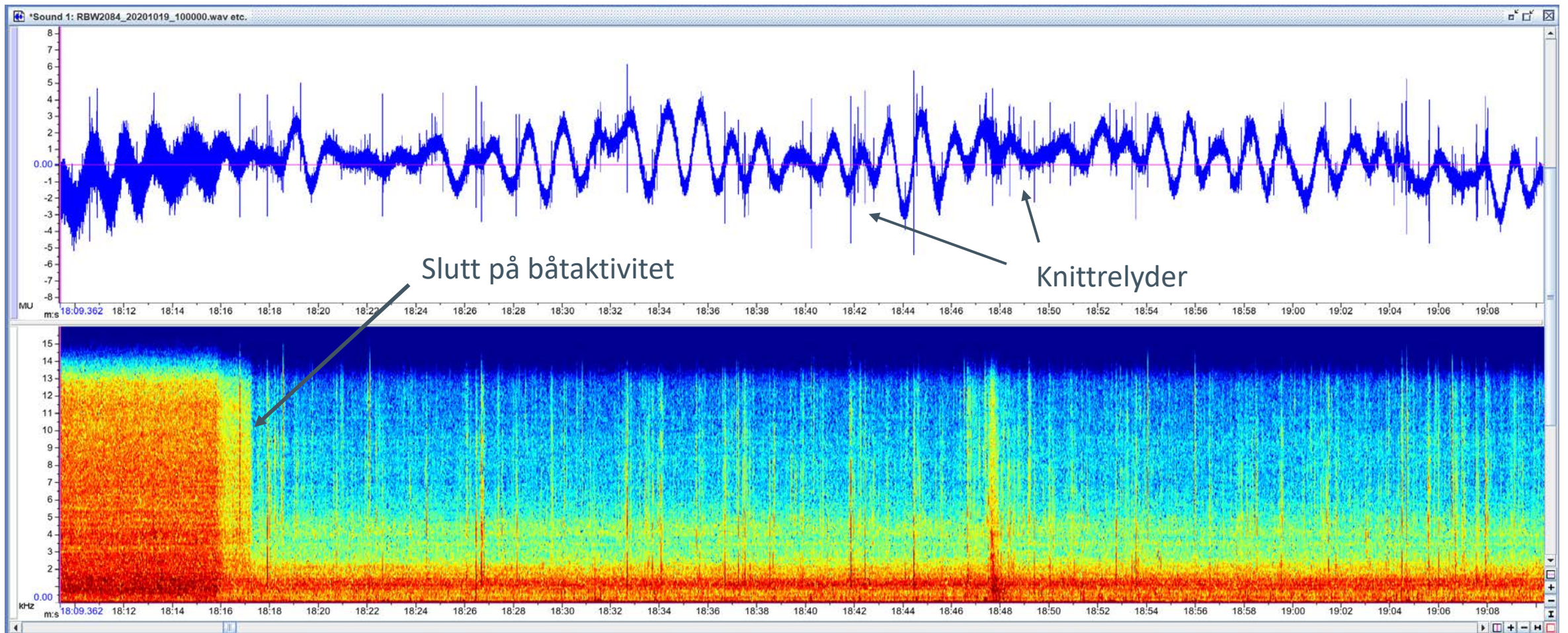
**5. Unacceptable: extreme overcrowding**

- Whole crowd boiling
- Potential for large fish kill without rapid release
- *Panic in the population, the fish are exhausted*
- *Many fish floating on their side*



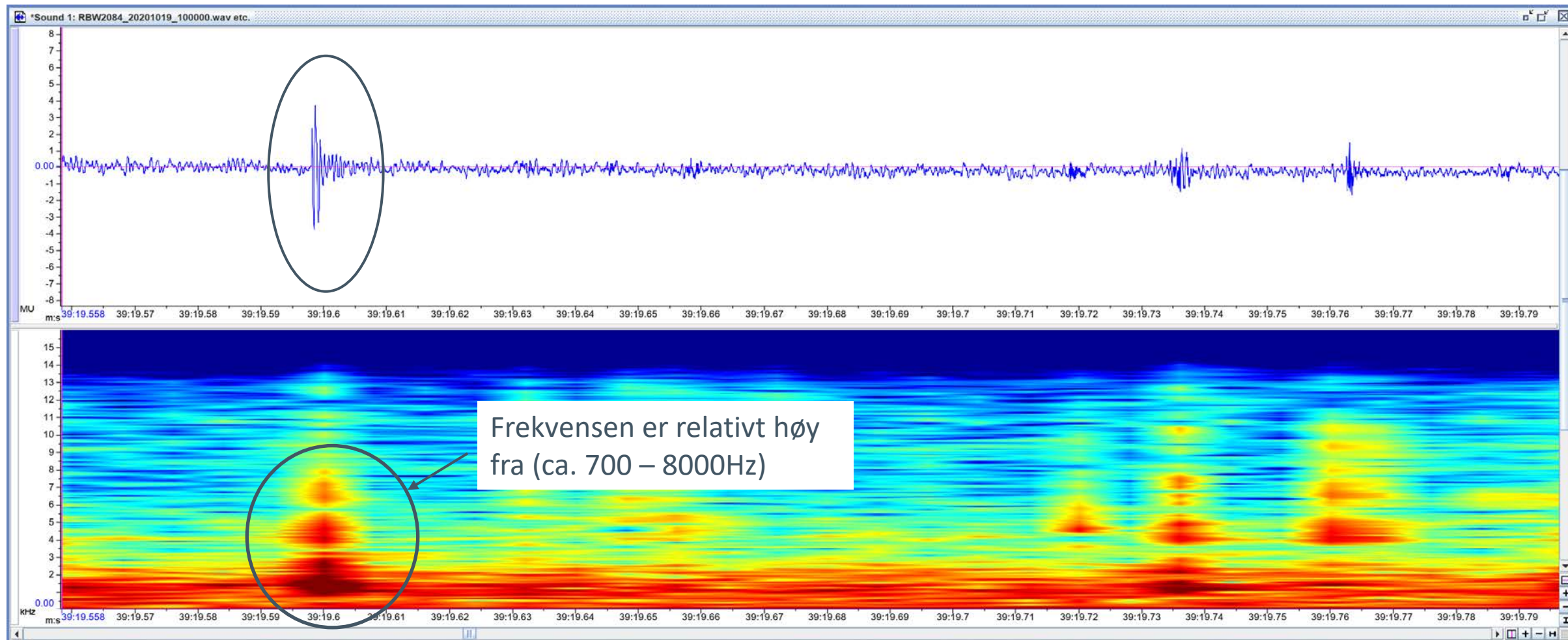
# LetSea data fra 19.10.2021 kl. 10:00 – 12:00 UTC, rett etter trengeoperasjon

- Spektrogram med knittrelyd



# Lakselyd

Karakteristisk signalform på lakselyd

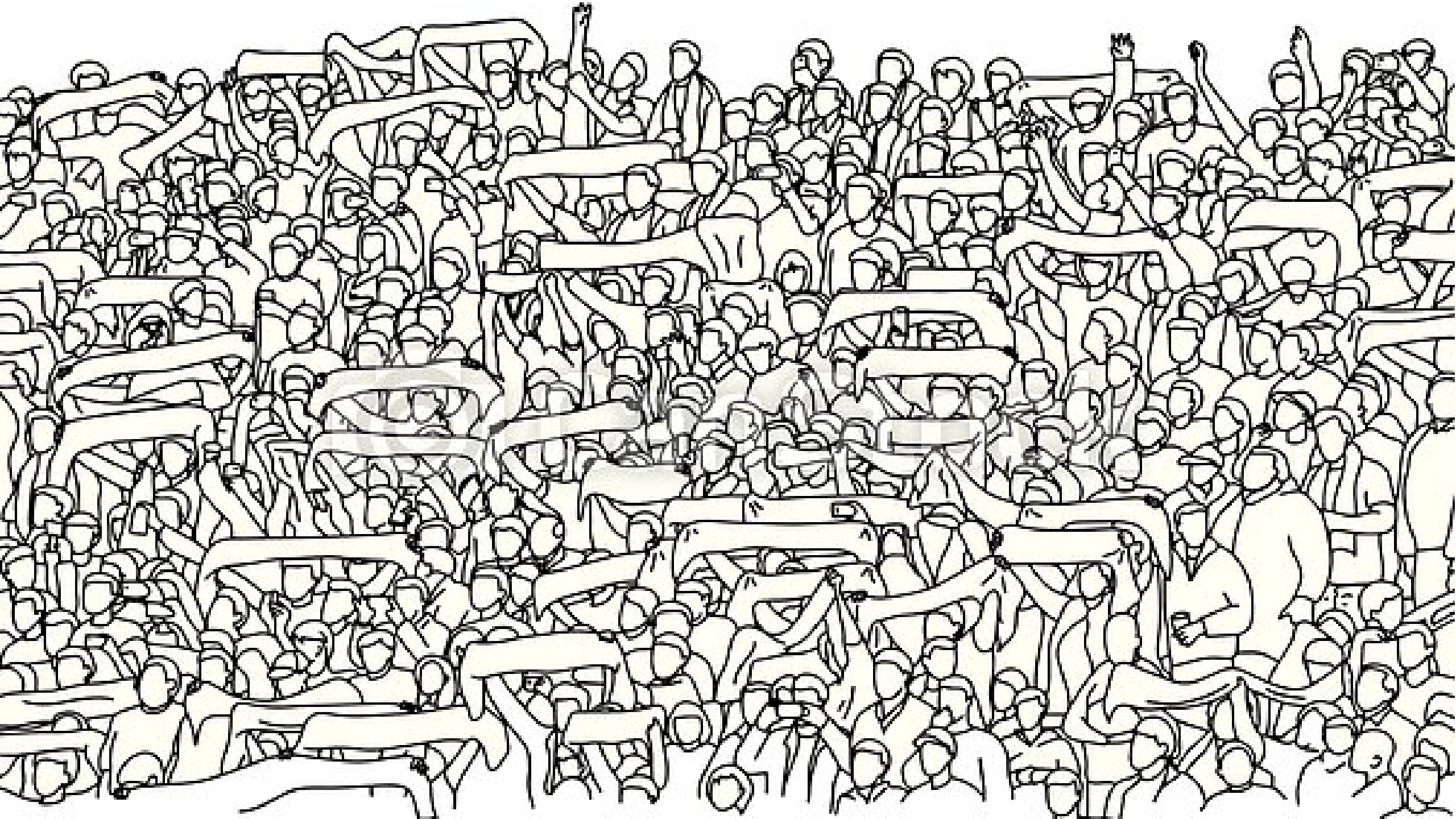






# Storskala forsøk

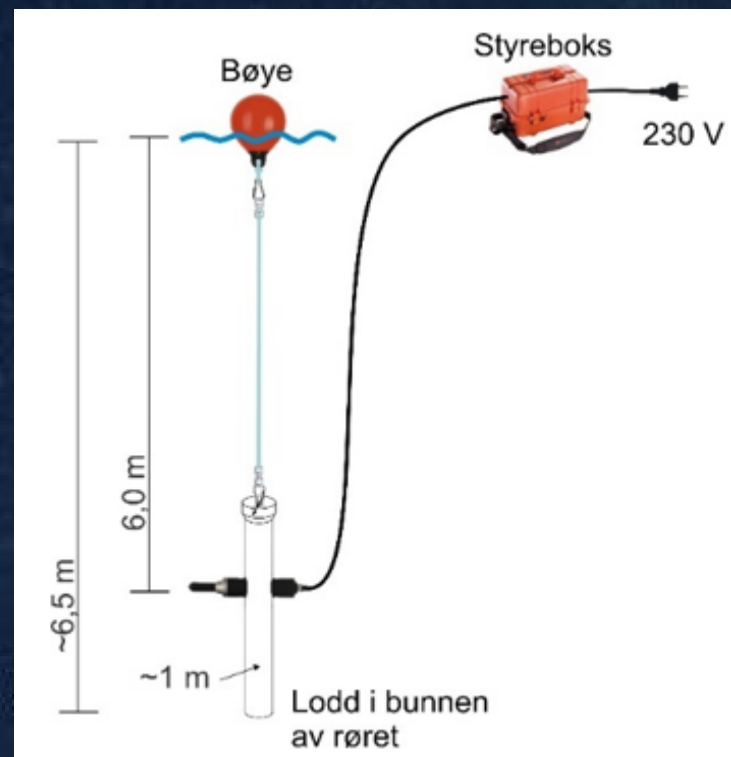




# SINTEF ACE Rataren



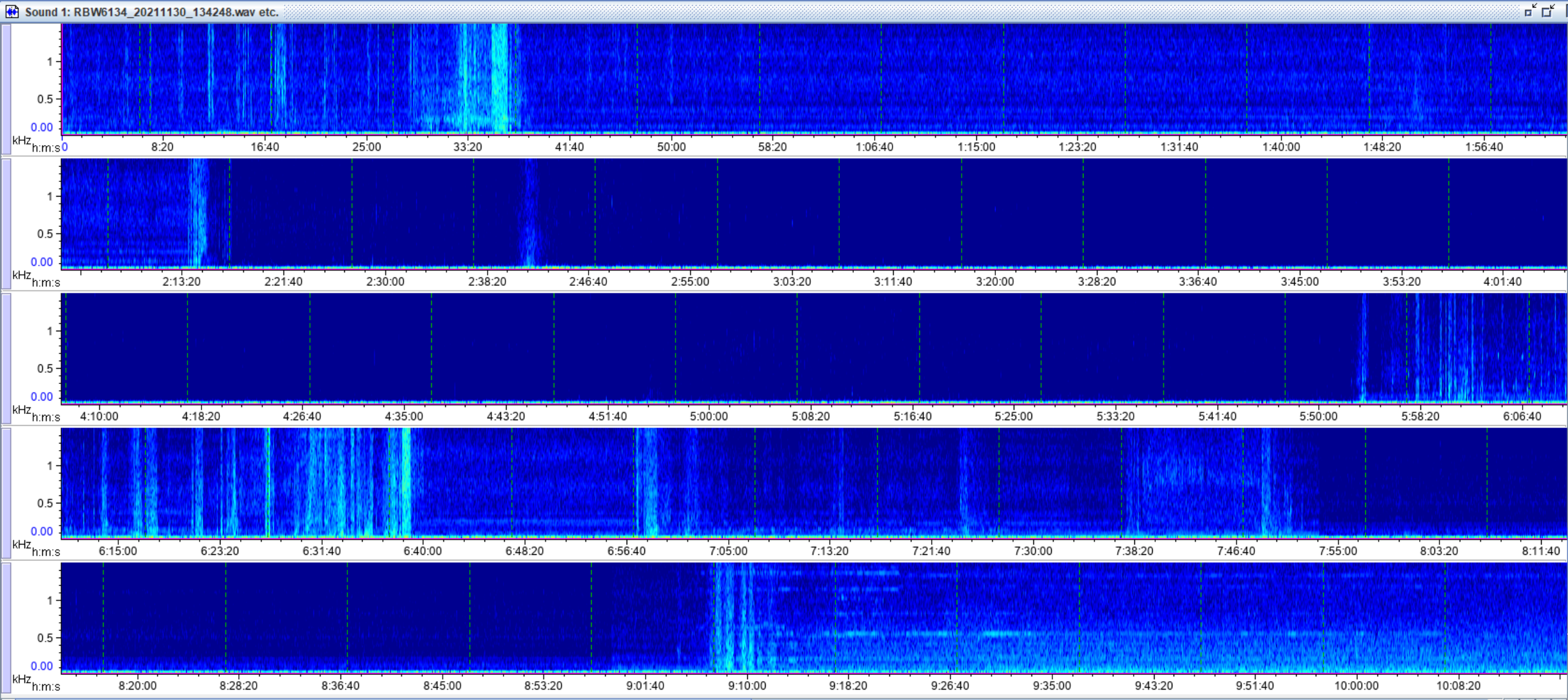




Fullskala trening

# Rataren resultater (merd 3)

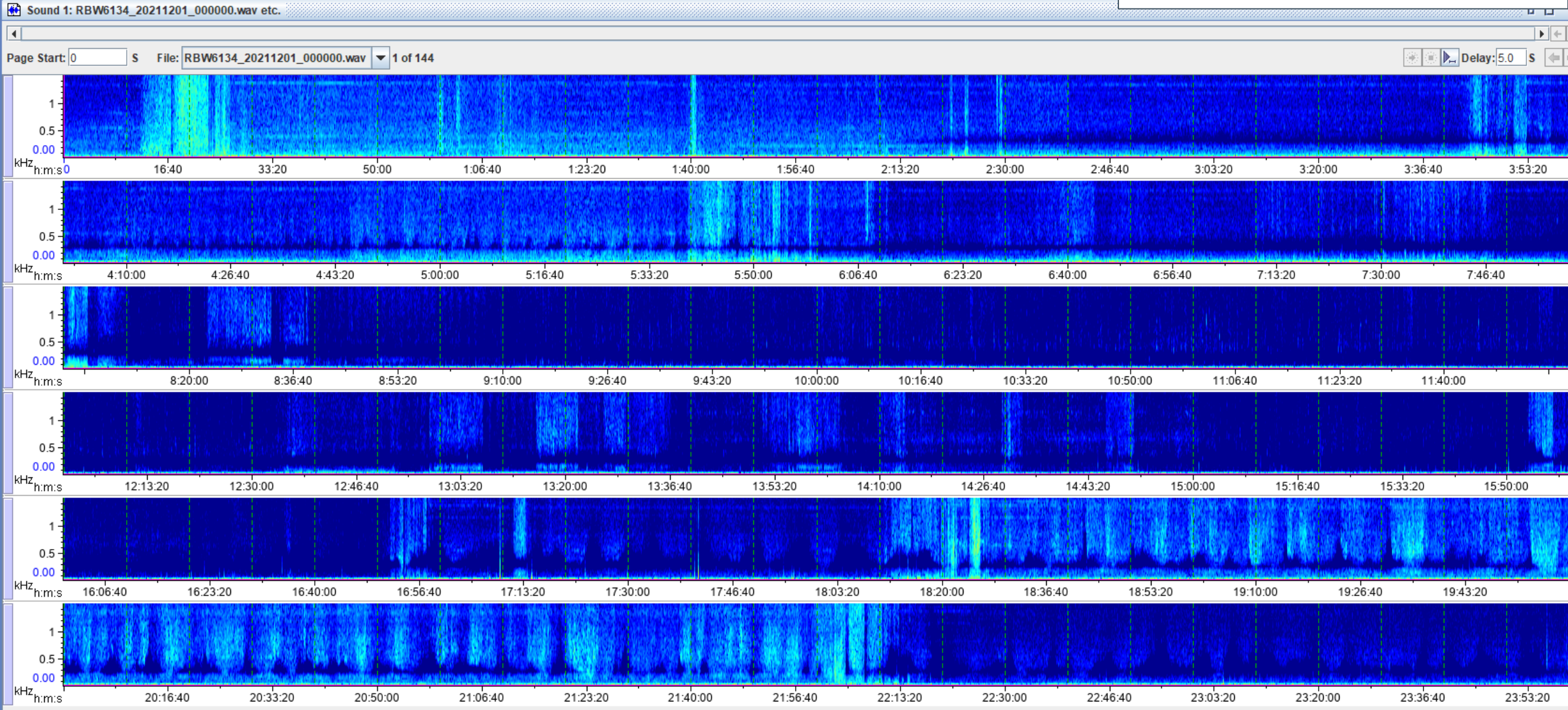
Start:30.11.2021 – 13:42:33 UTC



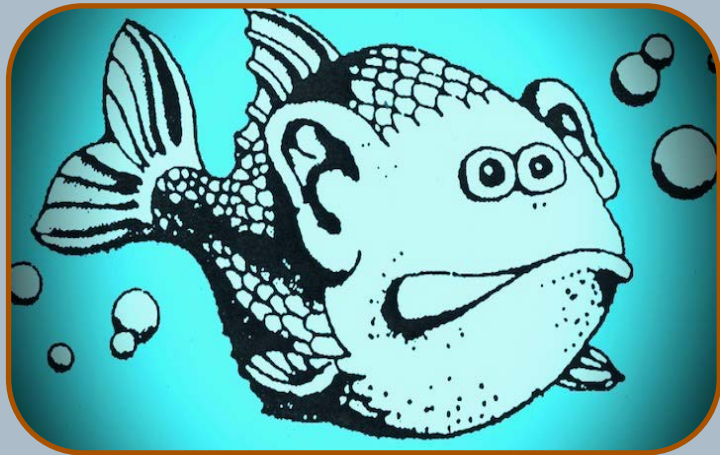


# Rataren resultater (merd 3)

Start:01.12.2021 – 00:00:00 UTC

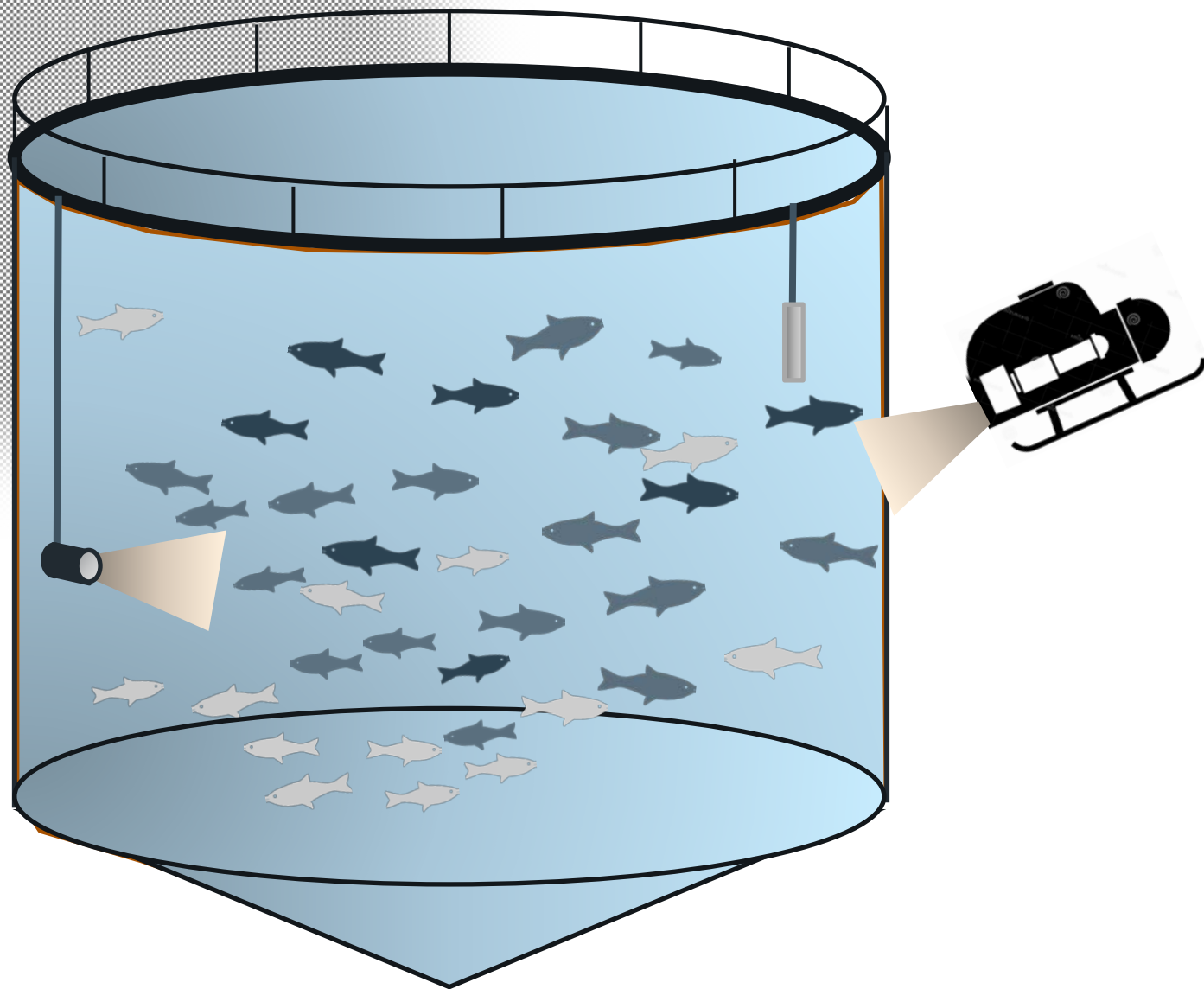


Å *utvikle teknologiske verktøy* og *validere biologisk betydning* av tekniske målinger for å sikre objektiv dokumentasjon av fiskevelferd ved **håndteringsoperasjoner av laksefisk**



- Detekterer endringer med akustikk
- Endringer reflekterer biologisk respons
  - Generert lyd, reflekterer "stress" ved trenging
  - Dempet lyd, reflekterer tetthet, svømmemønster







An underwater photograph of a stream filled with salmon. The fish are swimming in clear, blue-green water, with sunlight filtering through from above, creating rays of light. The bottom of the stream is covered in green algae and rocks. The salmon have silvery scales and some show iridescent colors on their fins.

Samarbeid og kunnskap  
for framtidens miljøløsninger

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