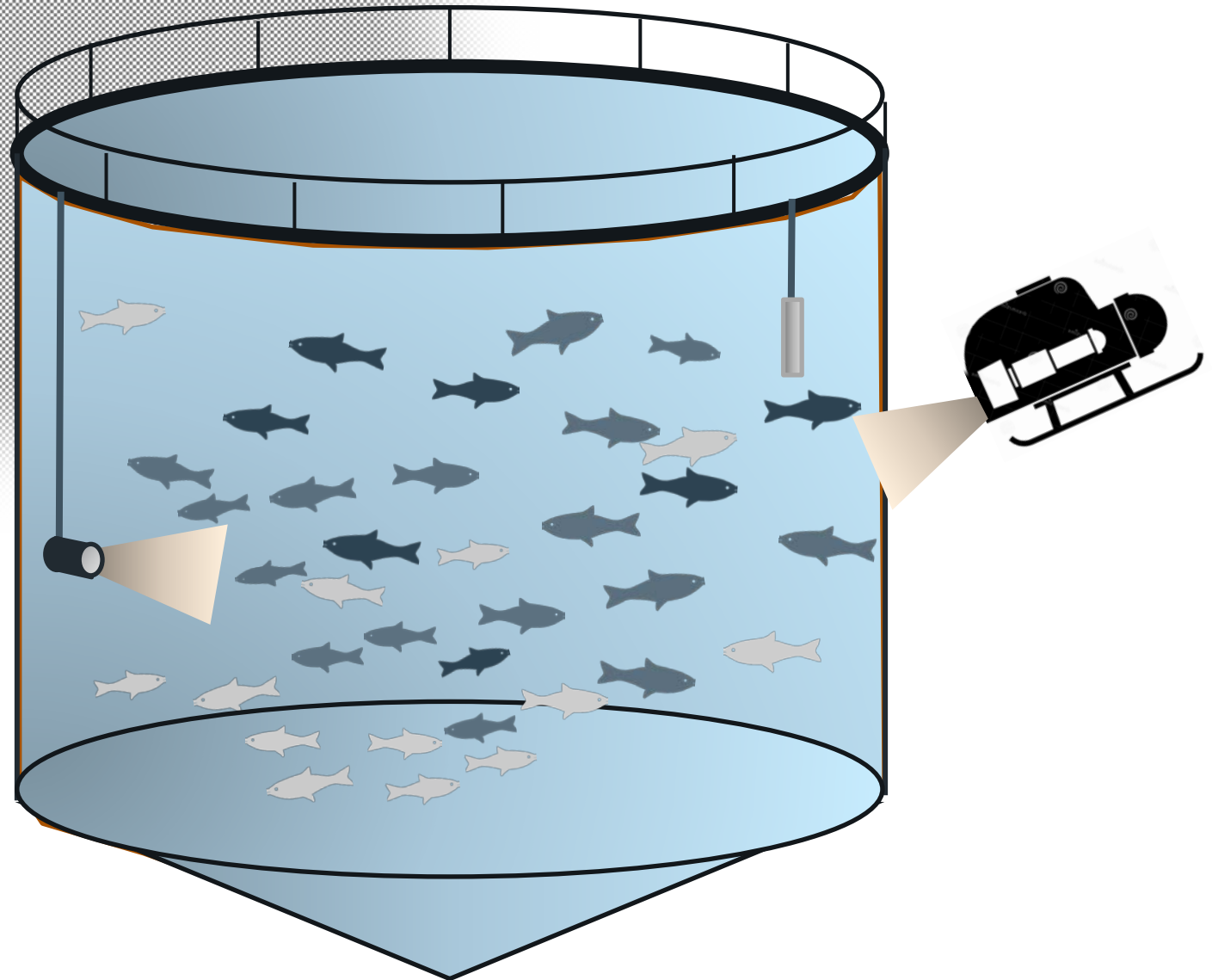
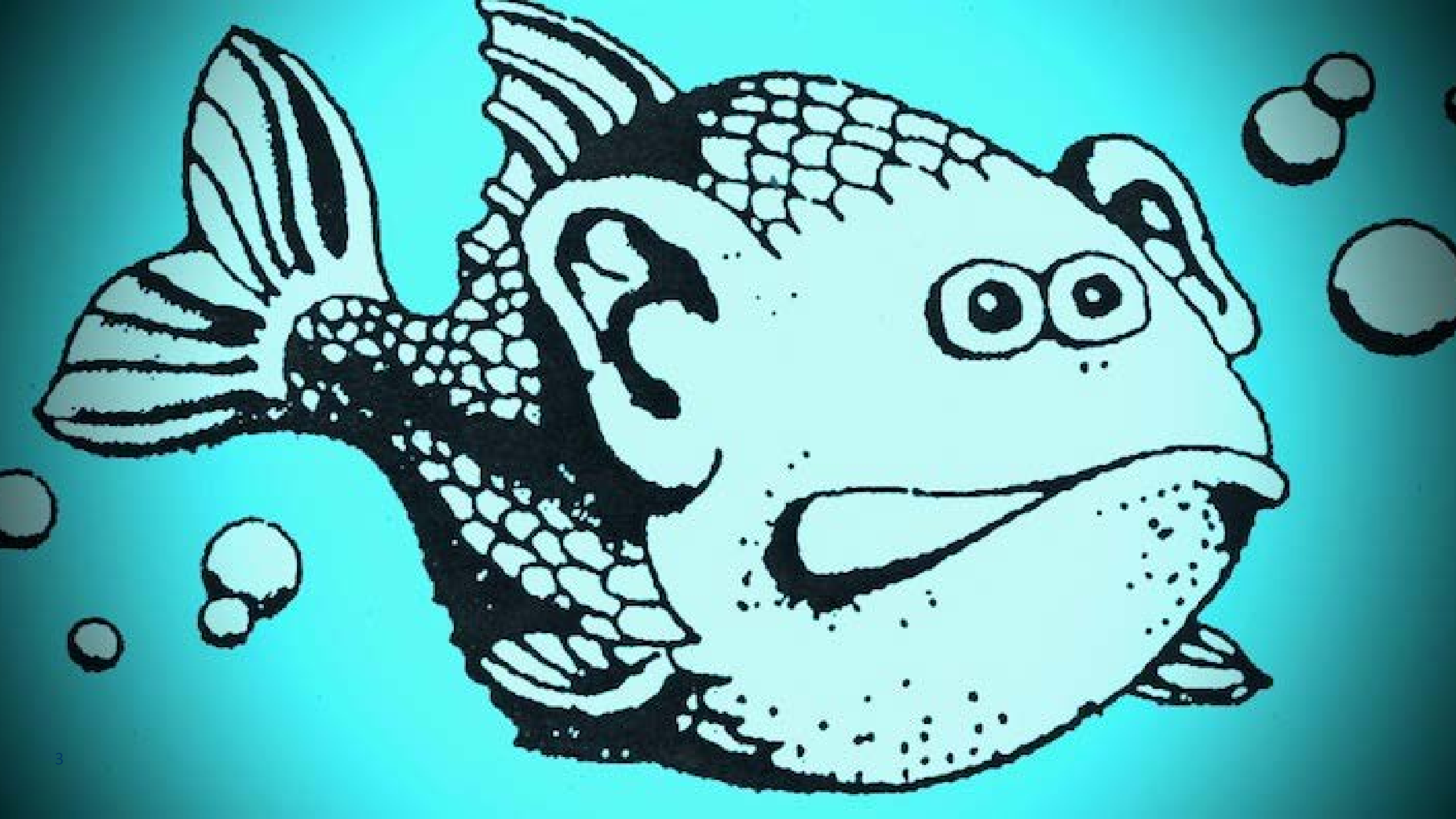


# Lyd i merd

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









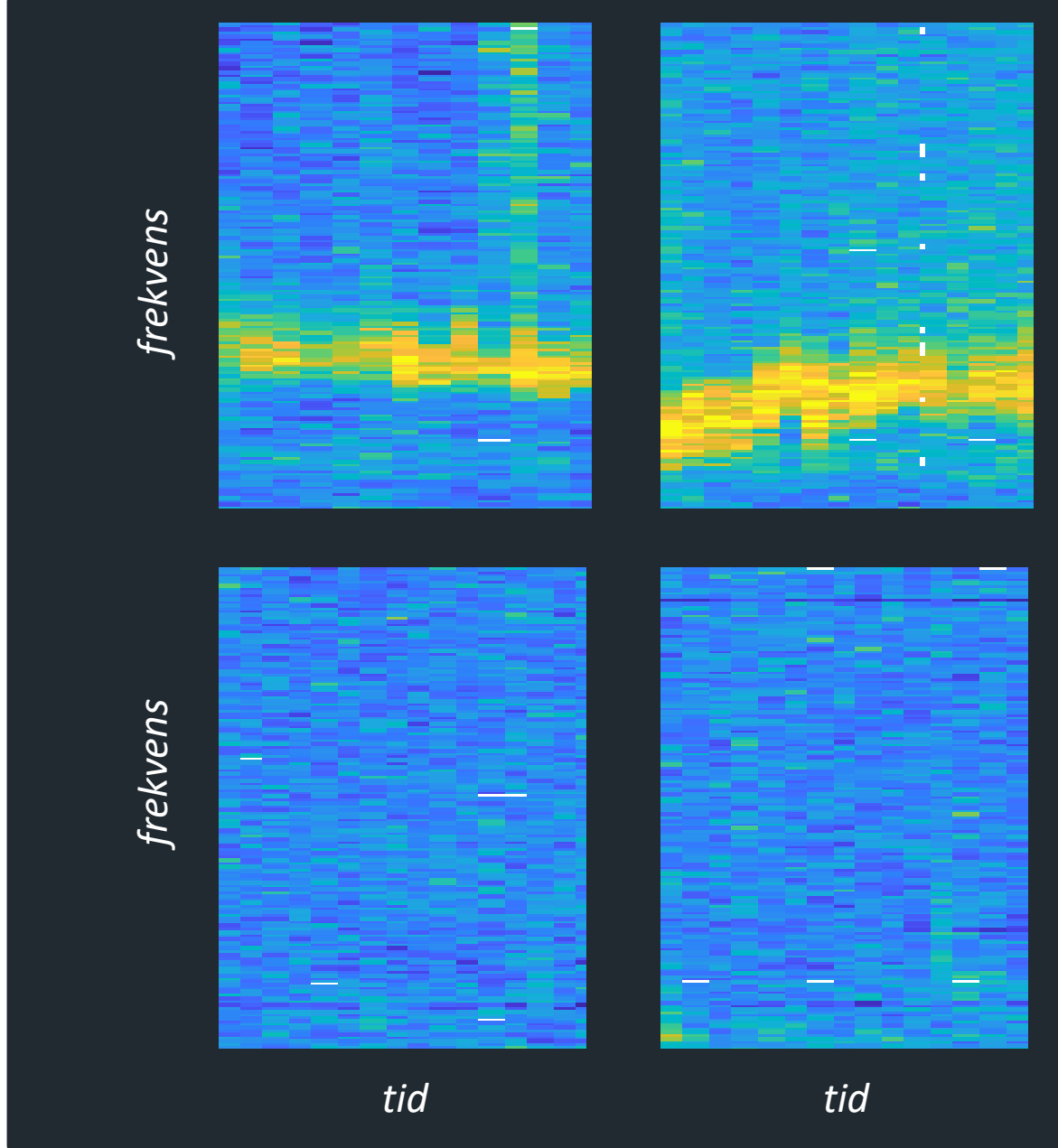


Lydbildet i merd  
med/uten fisk

*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

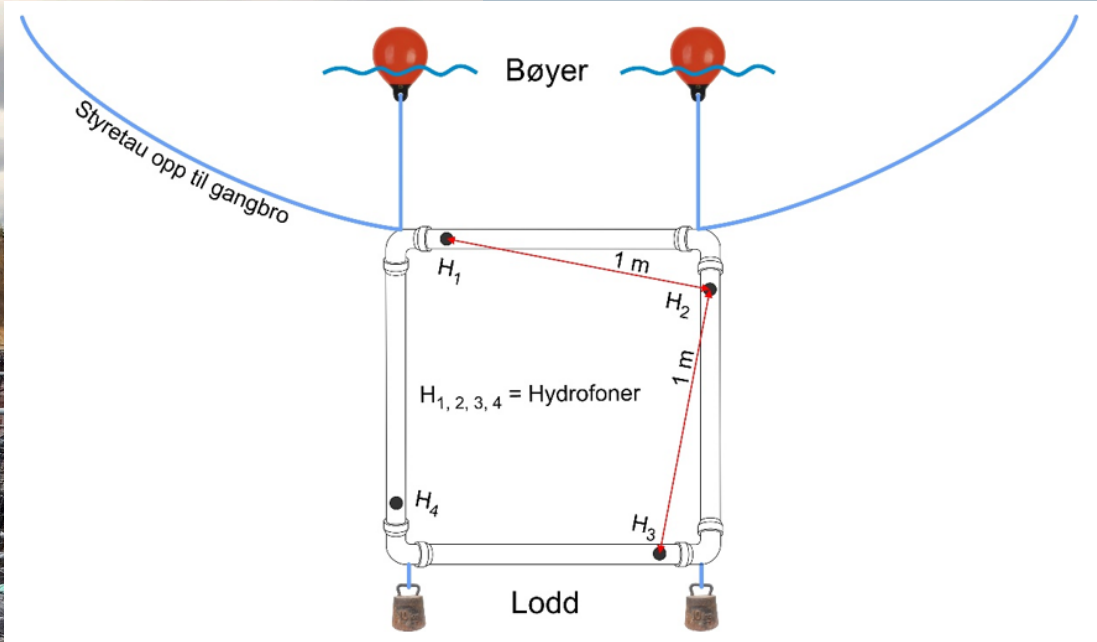
# LetSea Forsøk

Dag 15  
Trenning

Dag 1  
Merking/  
flytting

Dag 29  
Avslutning





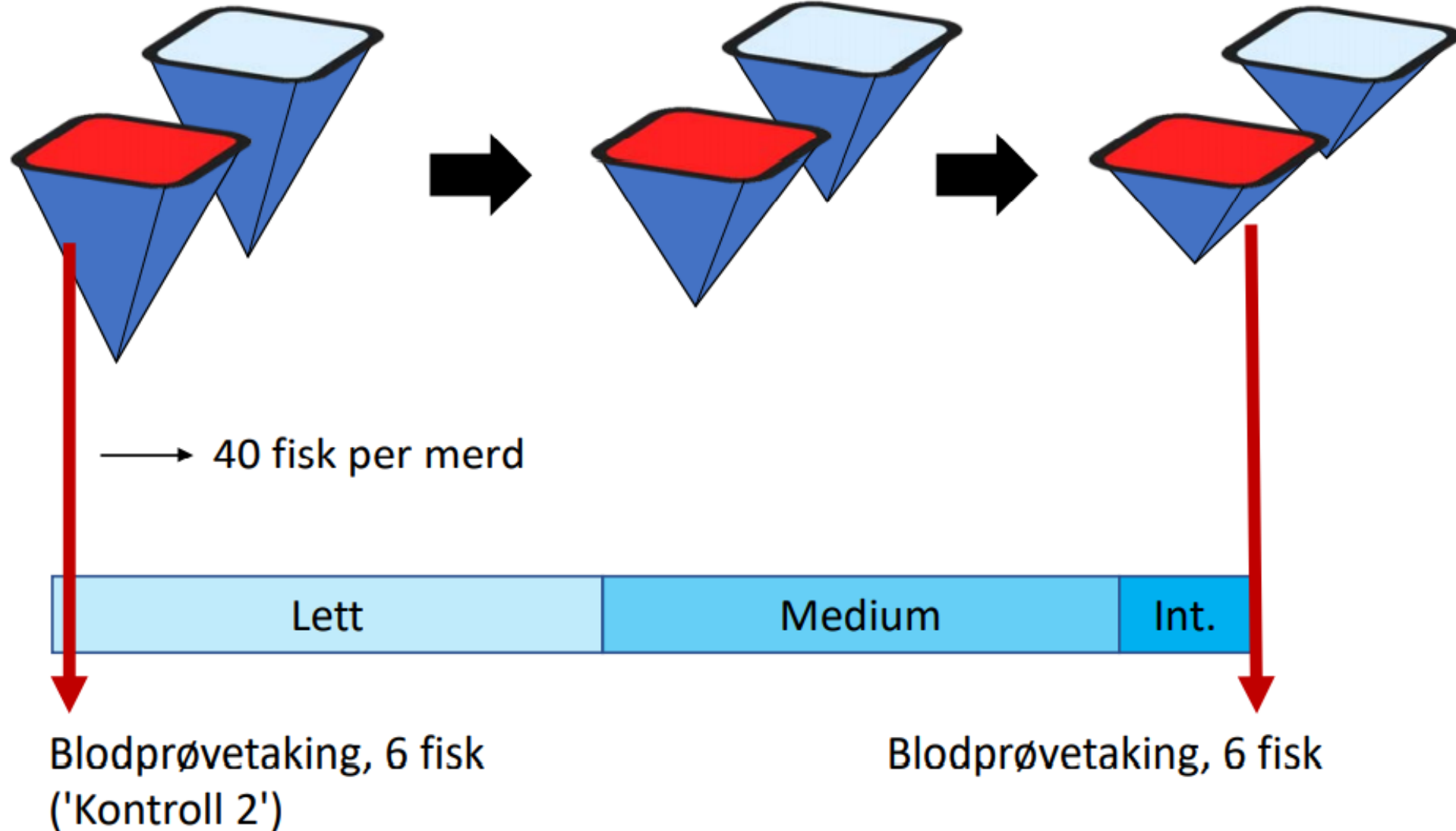
# DAG 15



**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

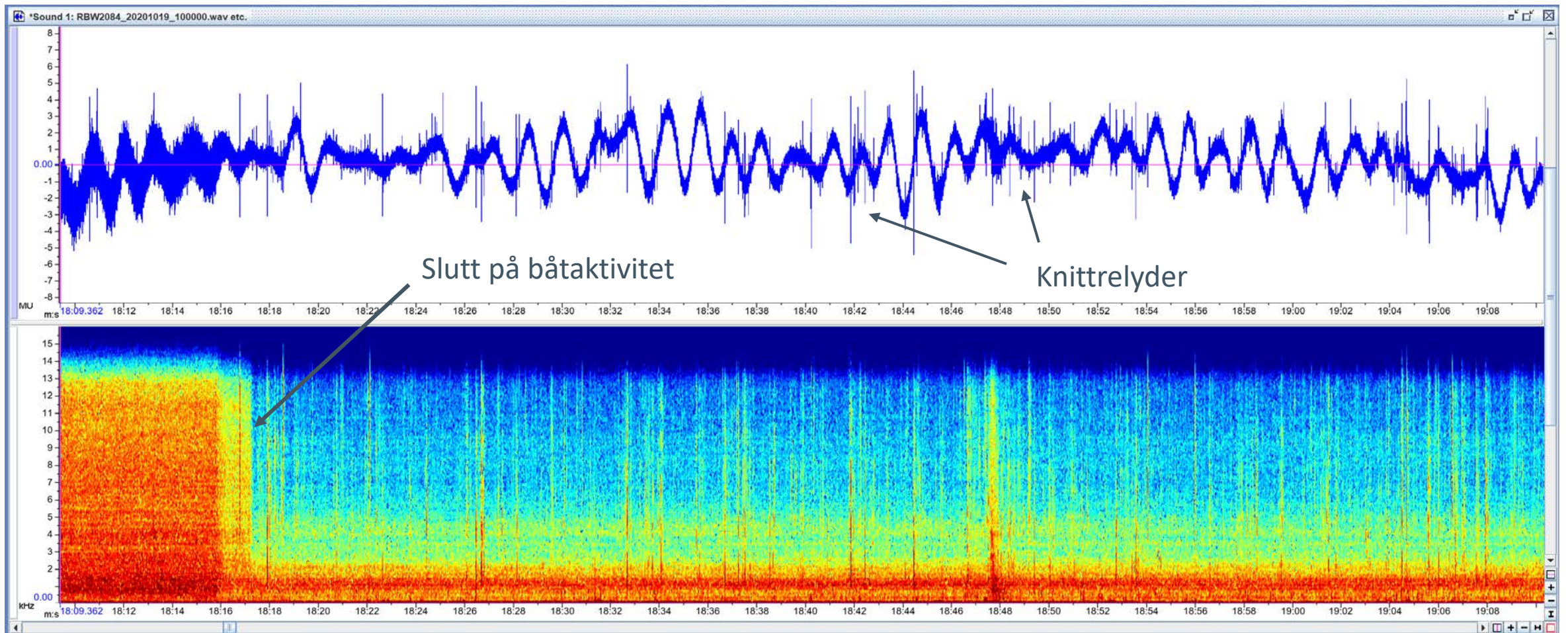


**5. Unacceptable: extreme overcrowding**

- 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*

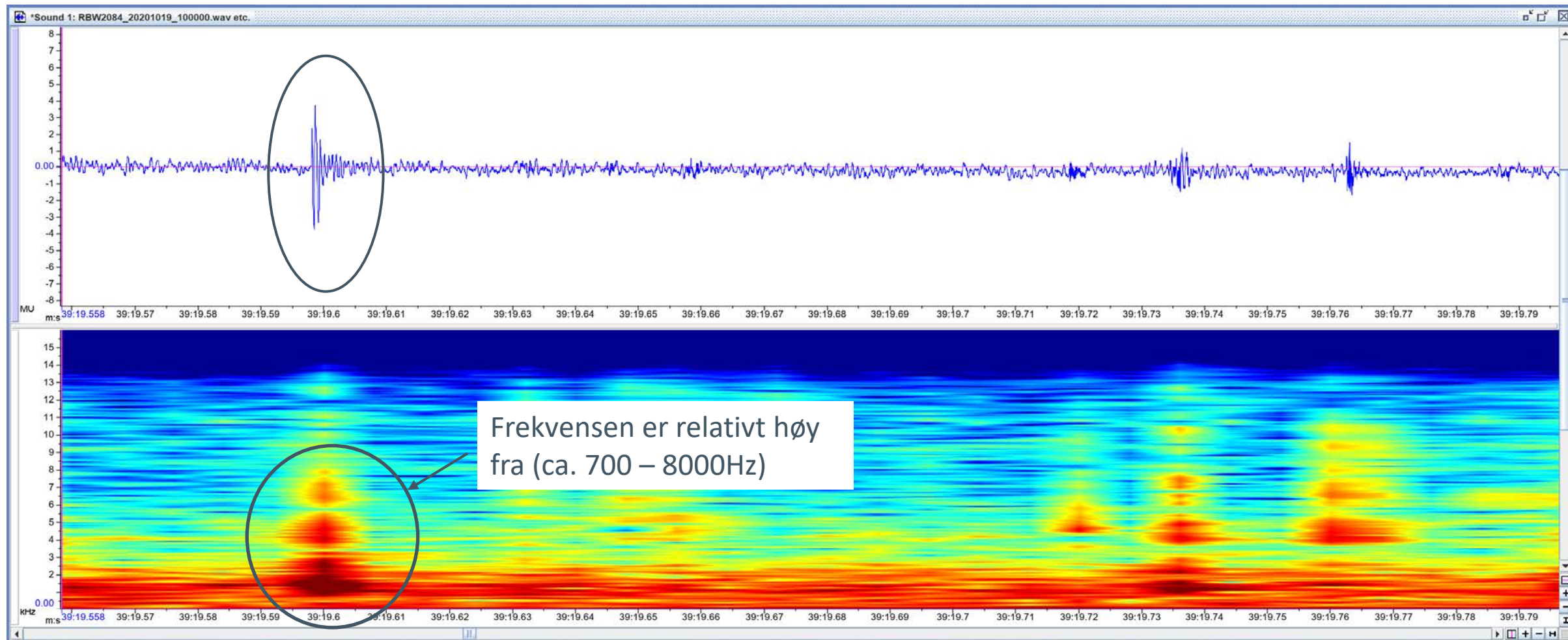
# LetSea data fra 19.10.2021 kl. 10:00 – 12:00 UTC, rett etter trengeoperasjon

- Spektrogram med knittrelyd



# Lakselyd

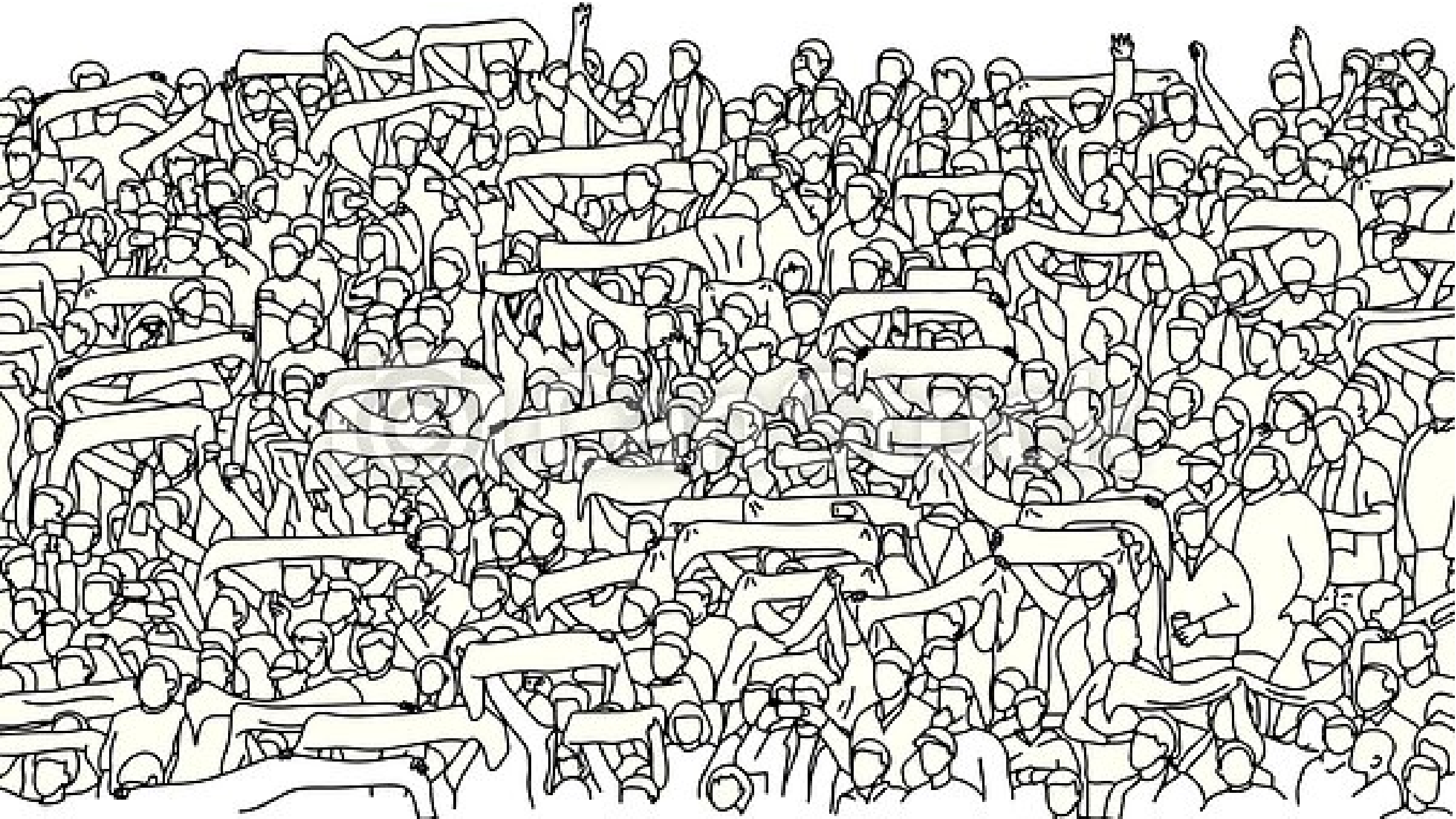
Karakteristisk signalform på lakselyd





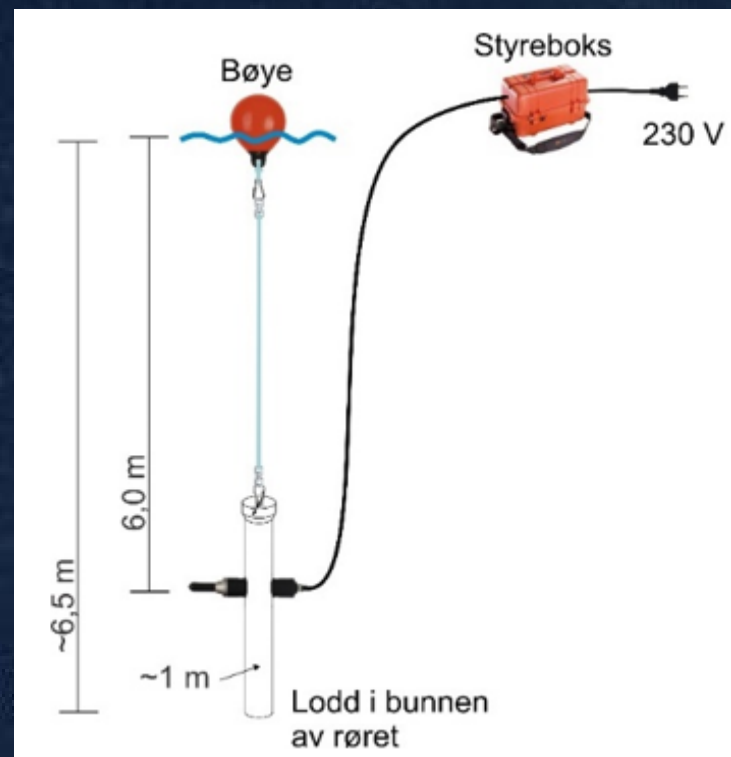


# Storskala forsøk



# SINTEF ACE Rataren

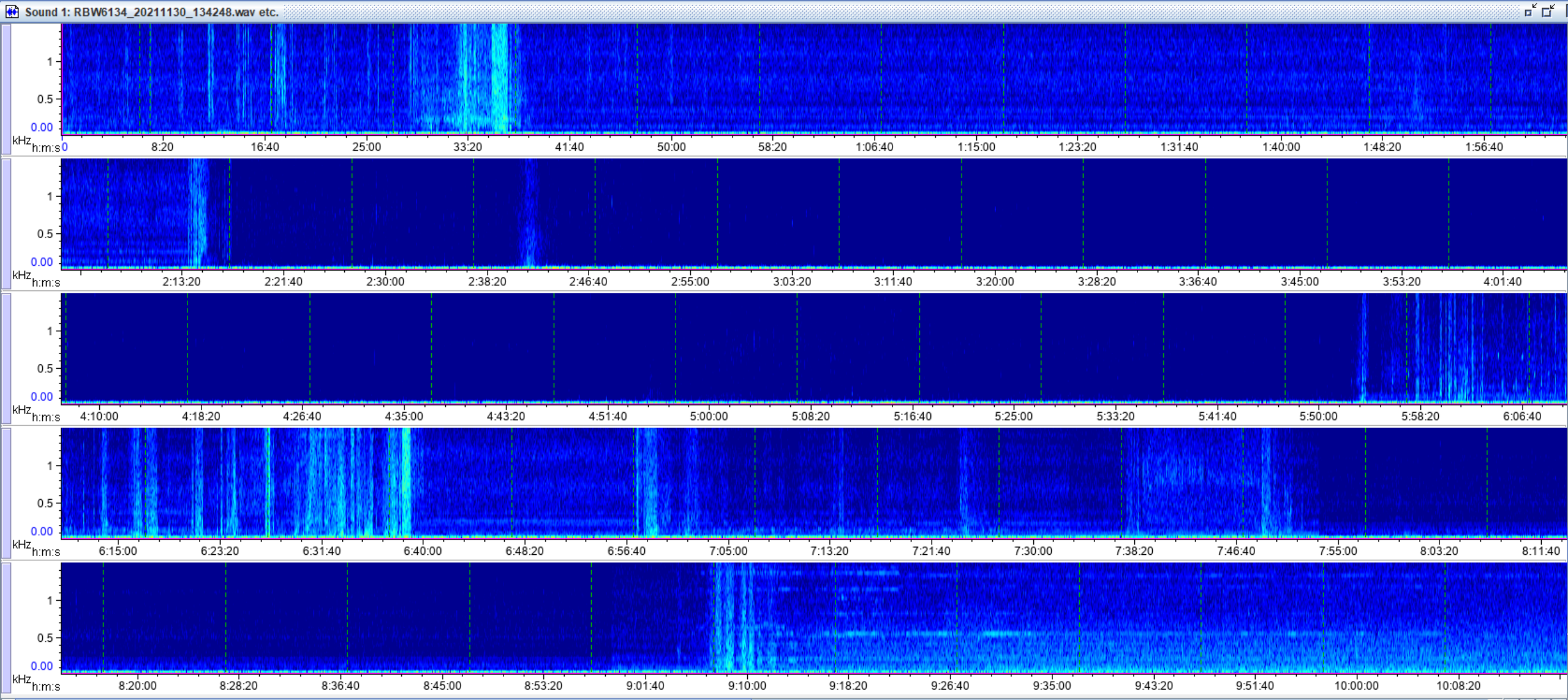




# Fullskala trenging

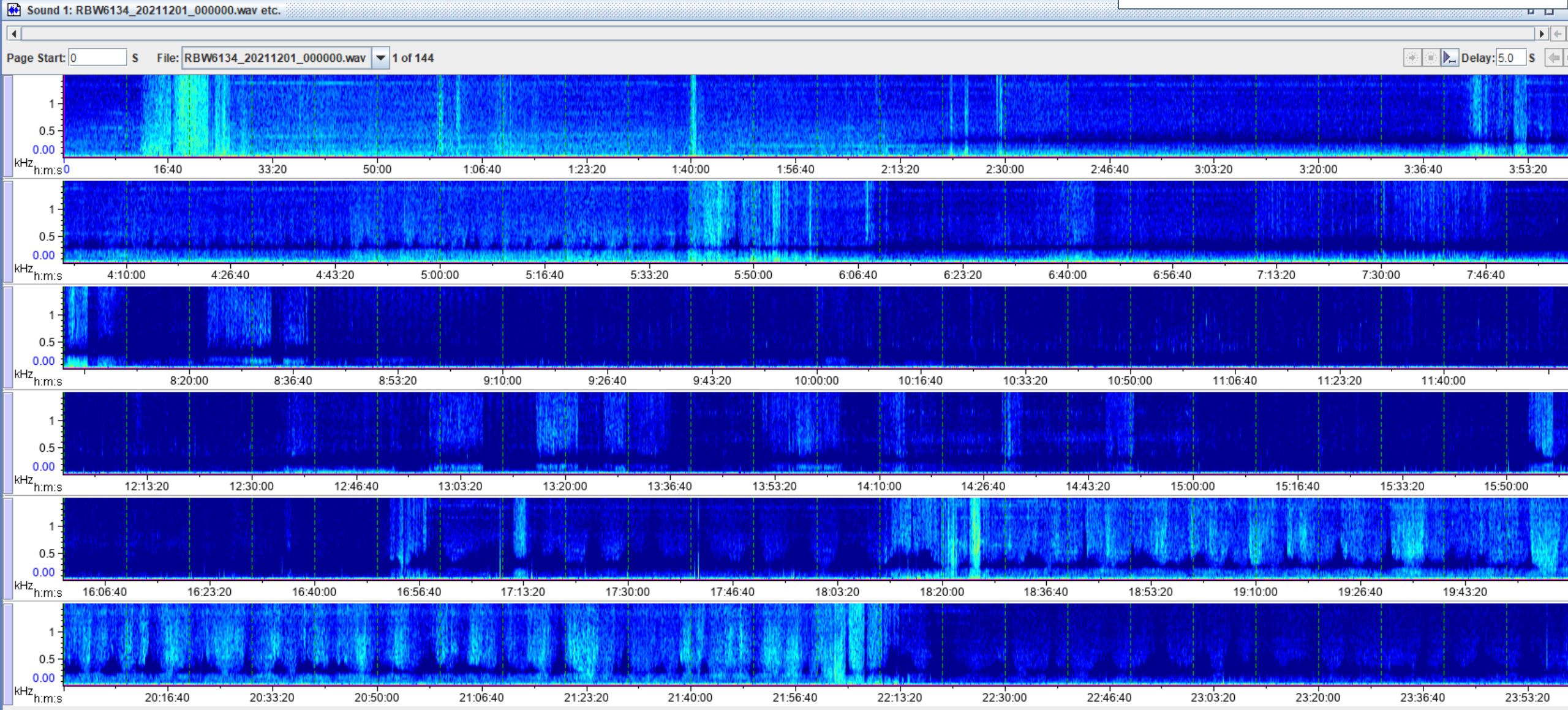
# Rataren resultater (merd 3)

Start:30.11.2021 – 13:42:33 UTC

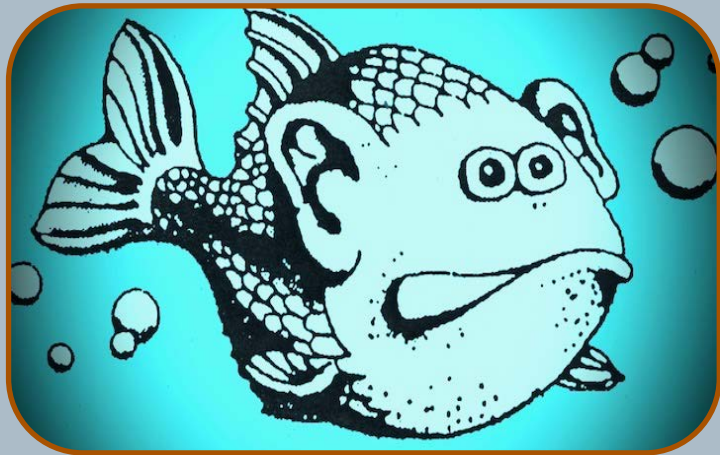


# Rataren resultater (merd 3)

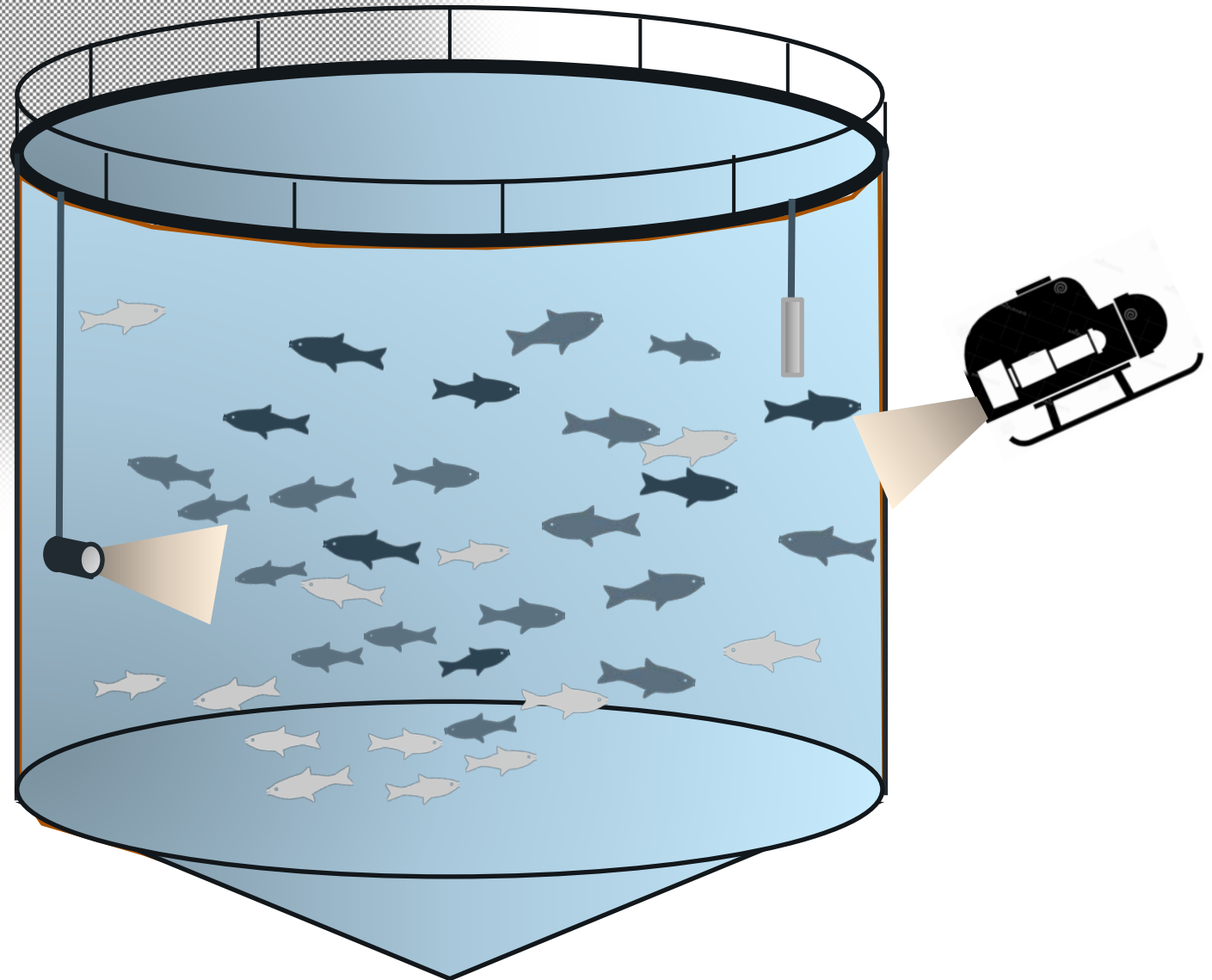
Start:01.12.2021 – 00:00:00 UTC



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 teeming with salmon. The fish are swimming in clear, blue-green water, with sunlight filtering through from above, creating a shimmering effect. The bottom of the stream is covered in rocks and lush green aquatic plants. A semi-transparent dark blue rectangular box is overlaid in the center of the image, containing the text.

Samarbeid og kunnskap  
for framtidens miljøløsninger

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