

# Sensorteknologi for styring av trengeprosessen

Løst og fast om eksiterende teknologi – inspirasjon til debatt

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SIMRAD



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# KONGSBERG Maritime Subsea

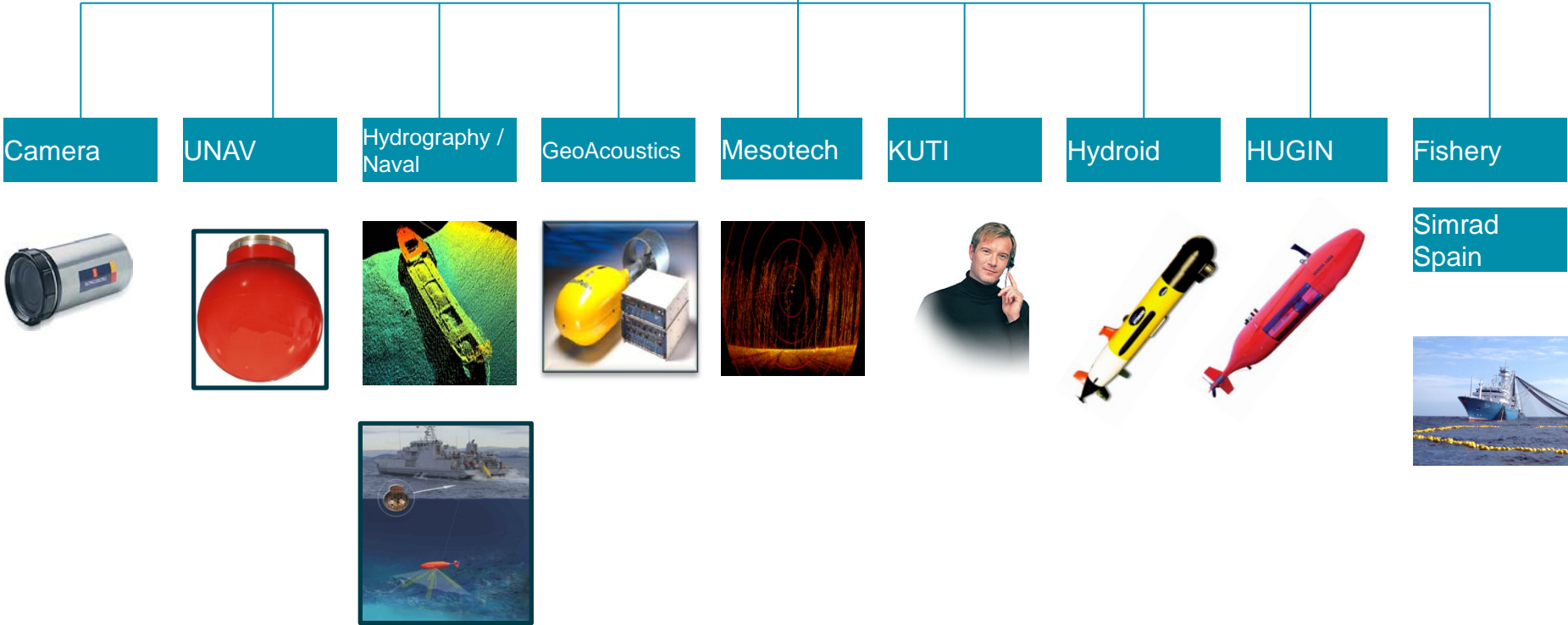




# KONGSBERG Maritime Subsea Division

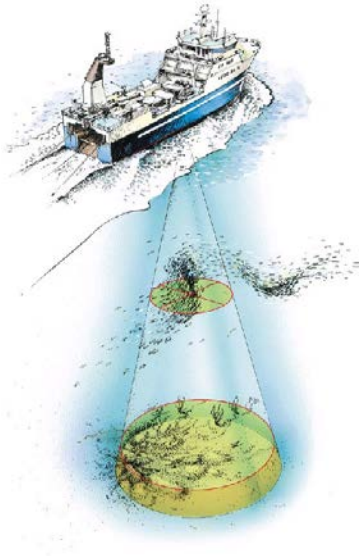


## Kongsberg Maritime Subsea



# KM SIMRAD fishery

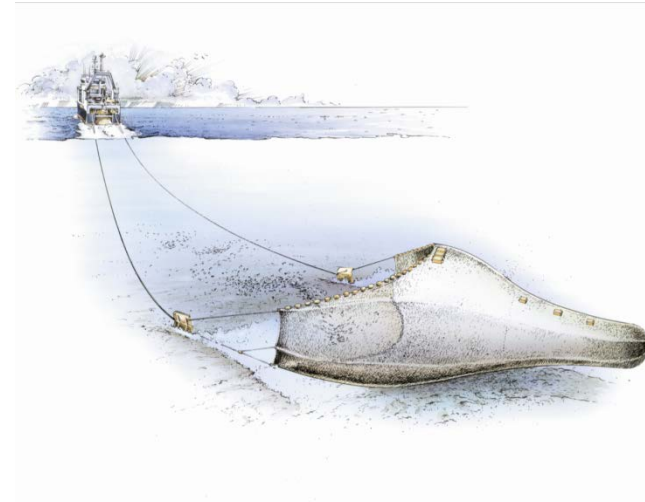
Echosounders



Sonar



Trawl instruments

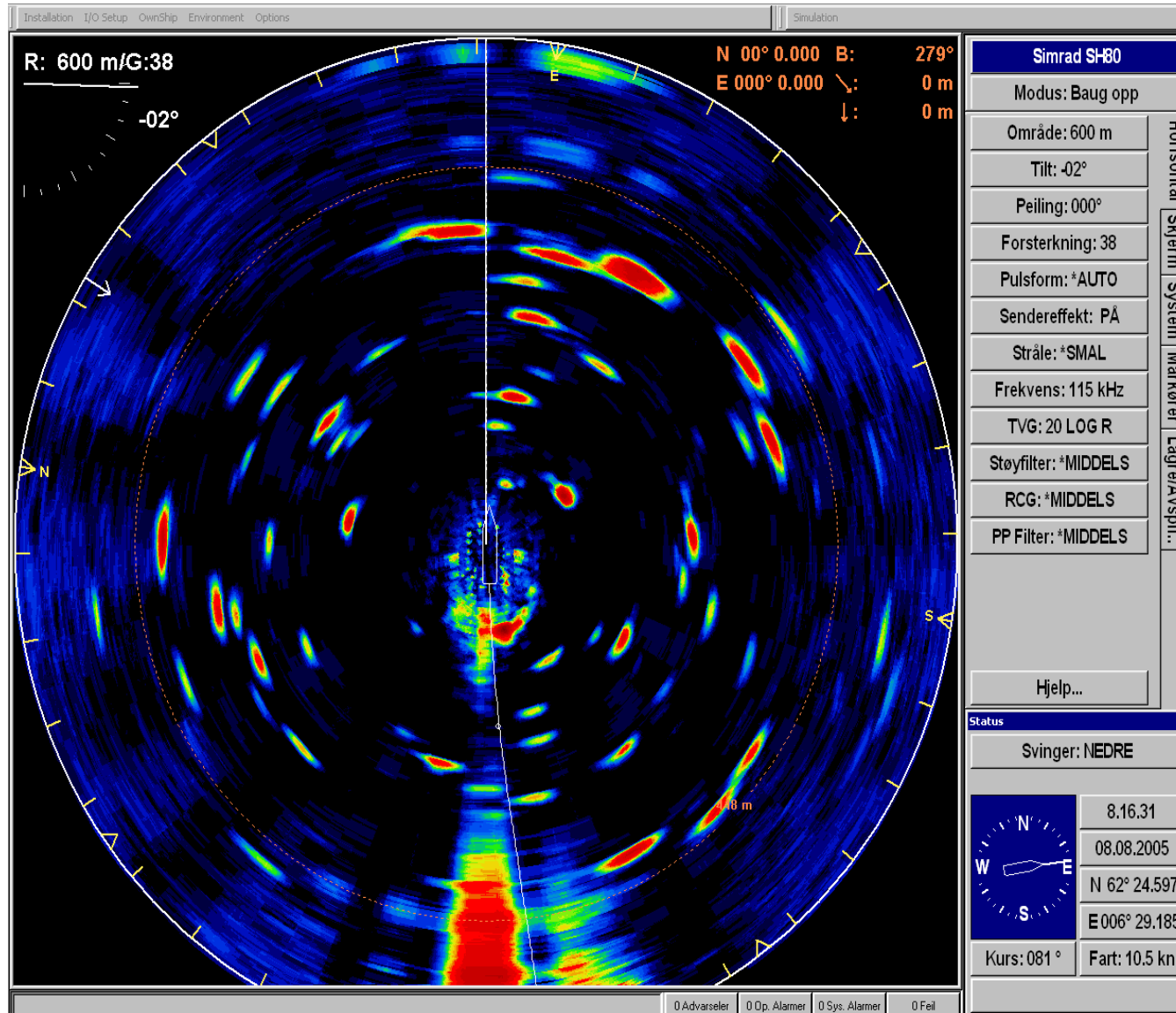


Established 1947

World leading manufacturer of acoustic instrumentation for fisheries and fisheries research



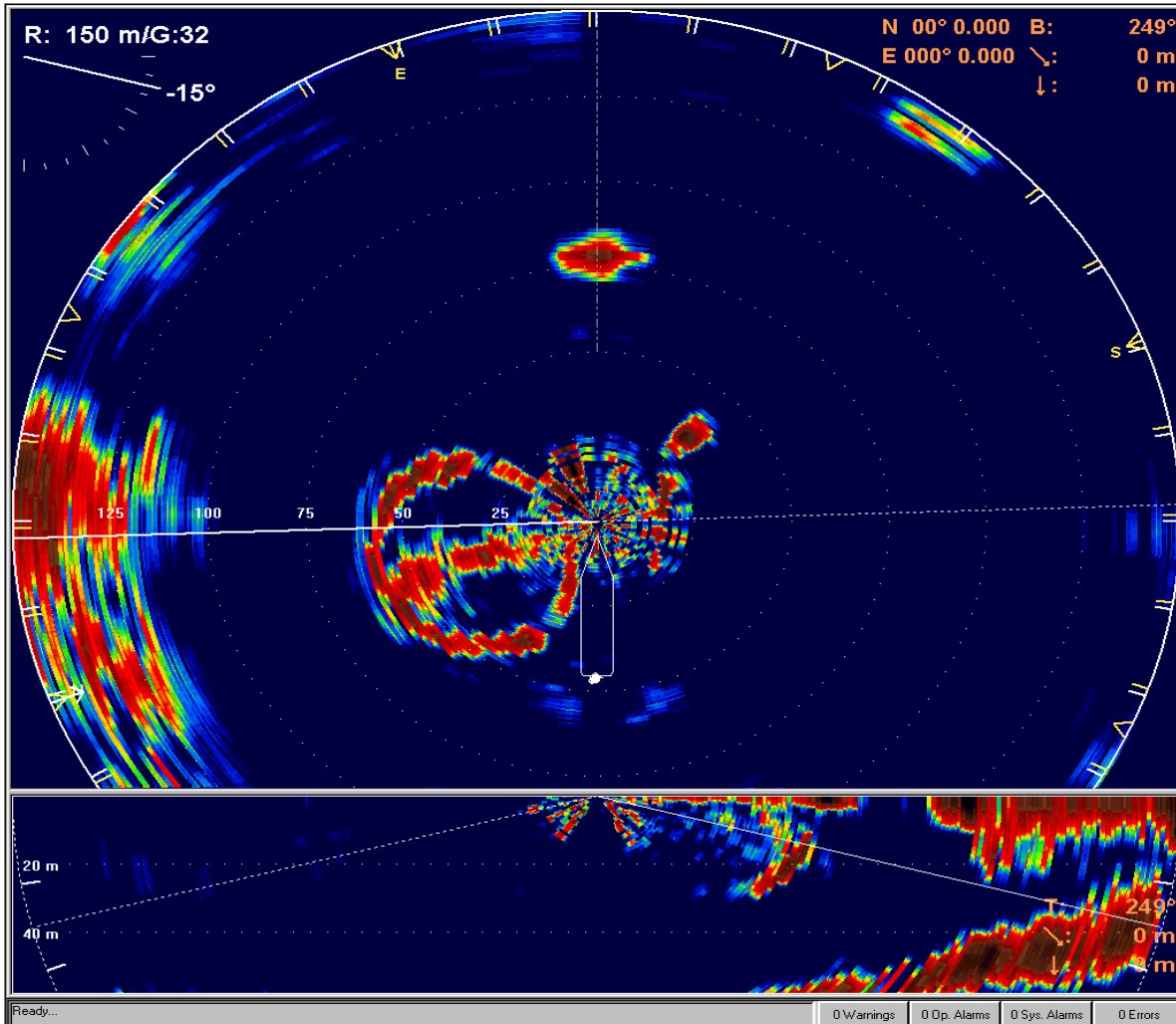
# Sonar image of herring schools



# Tuna in cage



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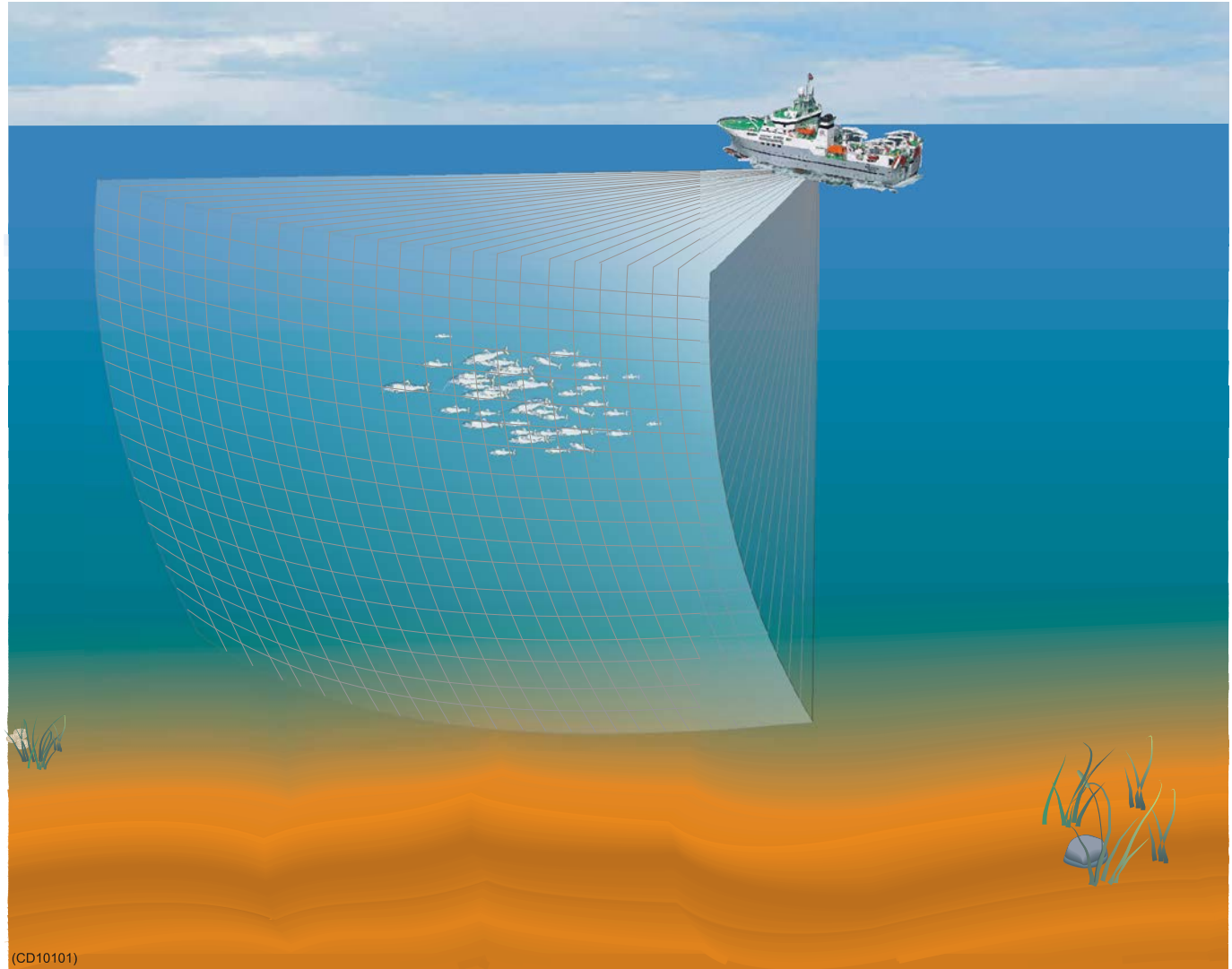


# Multibeam sonar (MS70)



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IMR  
Norway

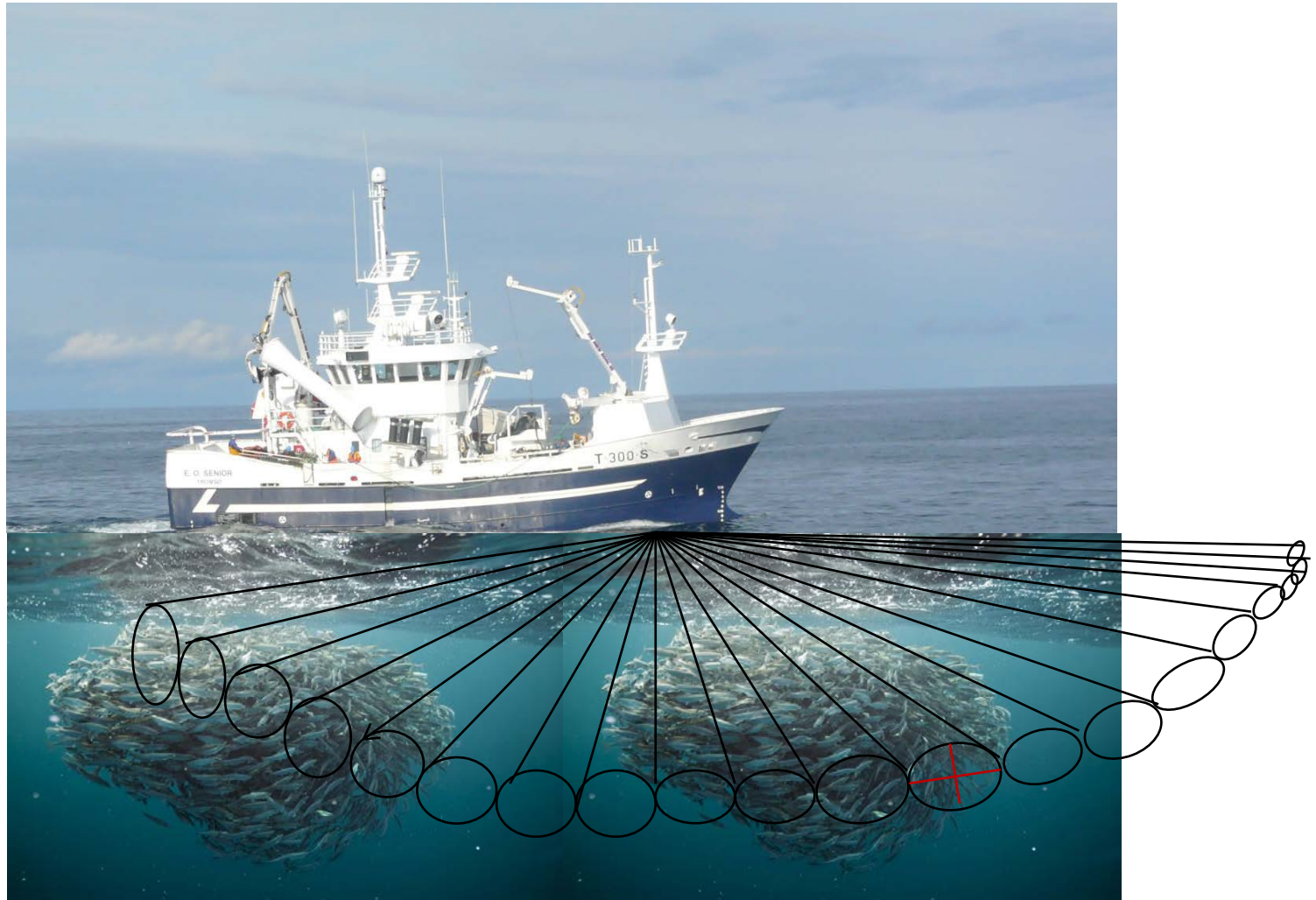




# SN90 horizontal coverage sector



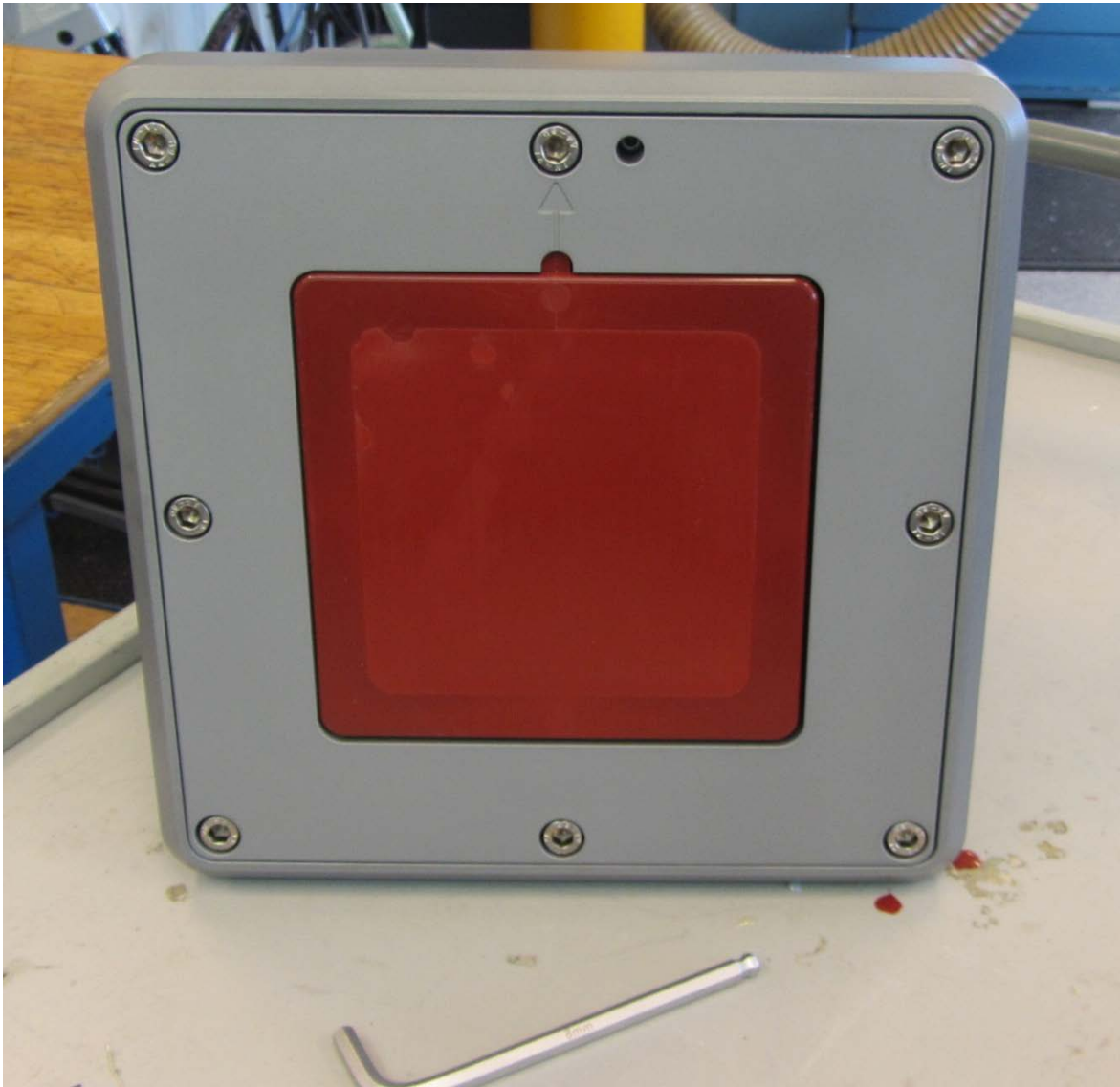
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# SN90 transducer



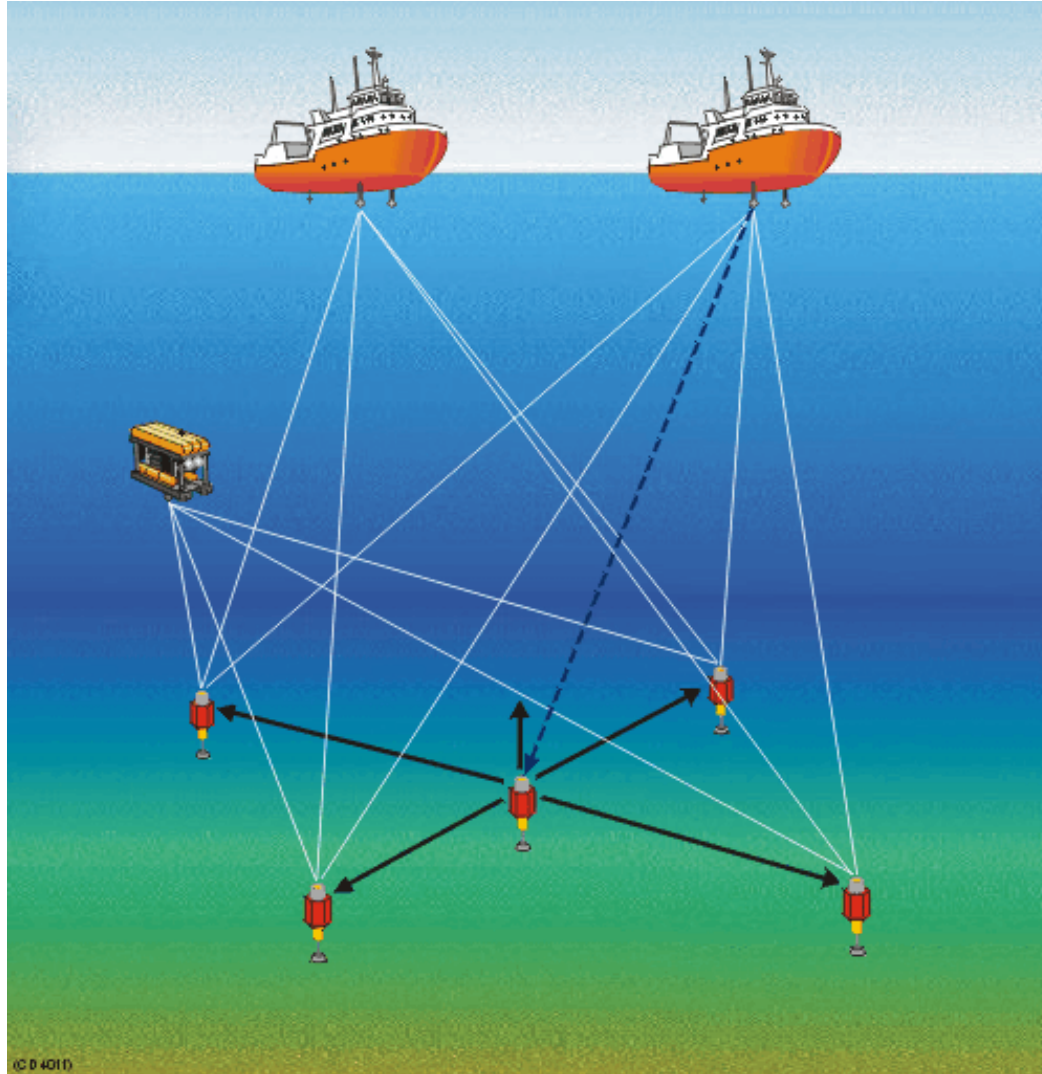
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# Underwater positioning



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# EK15 – a small low power echosounder

- Low power (1.2 W)
- Both 12V and AC
- Small
- Splash proof (IP66)
- Raw data storage
- Calibration
- Ethernet based
- Third party software support
- Up to 15 units simultaneously
- Simultaneous or sequential transmission
- 200 kHz operating frequency
- Standard transducer beam width 26°
- Other transducers are optional (9 and 5°)
- Wireless



# Sea cage monitoring – Ewos Innovation



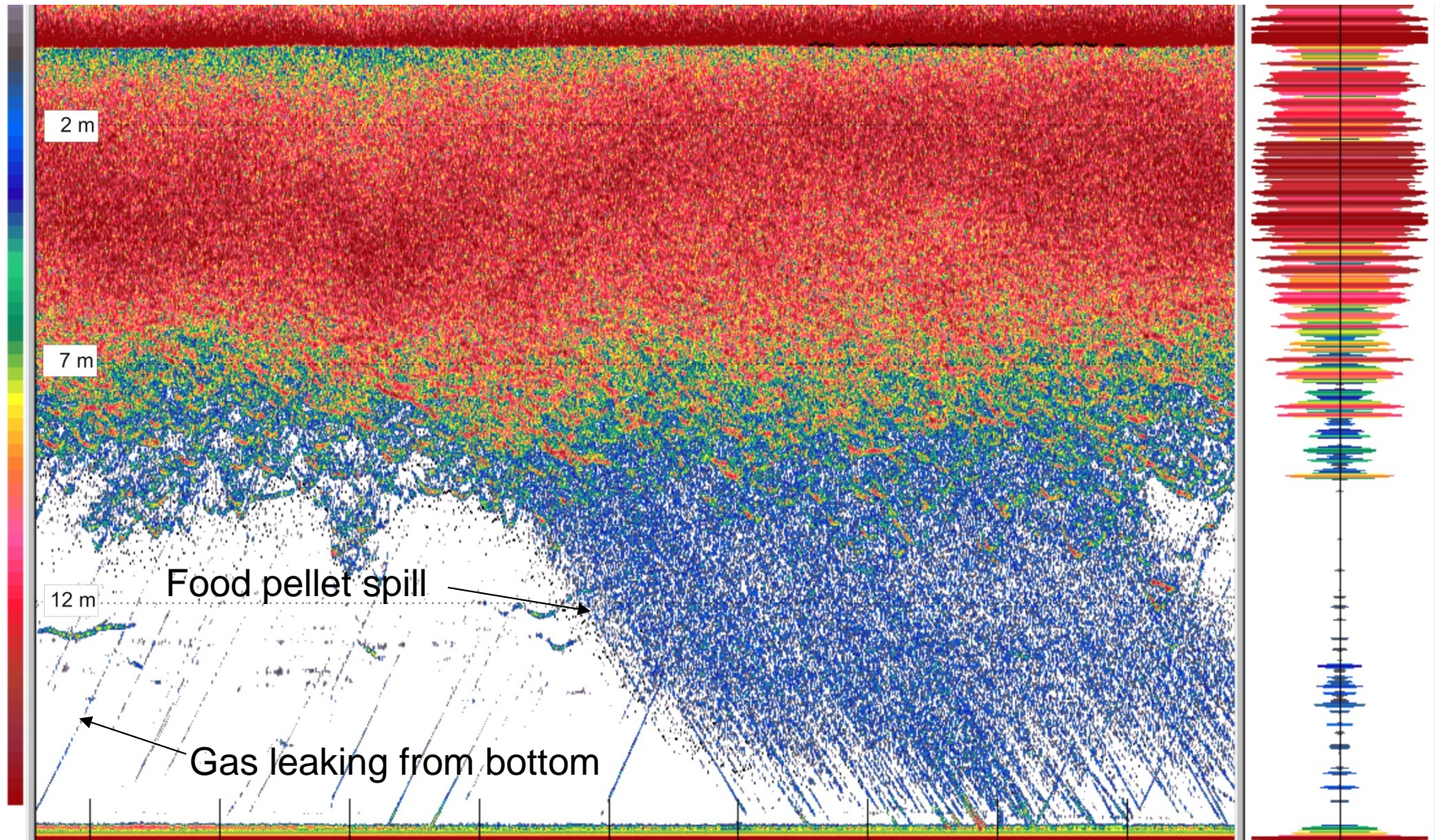
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# Echogram from cage

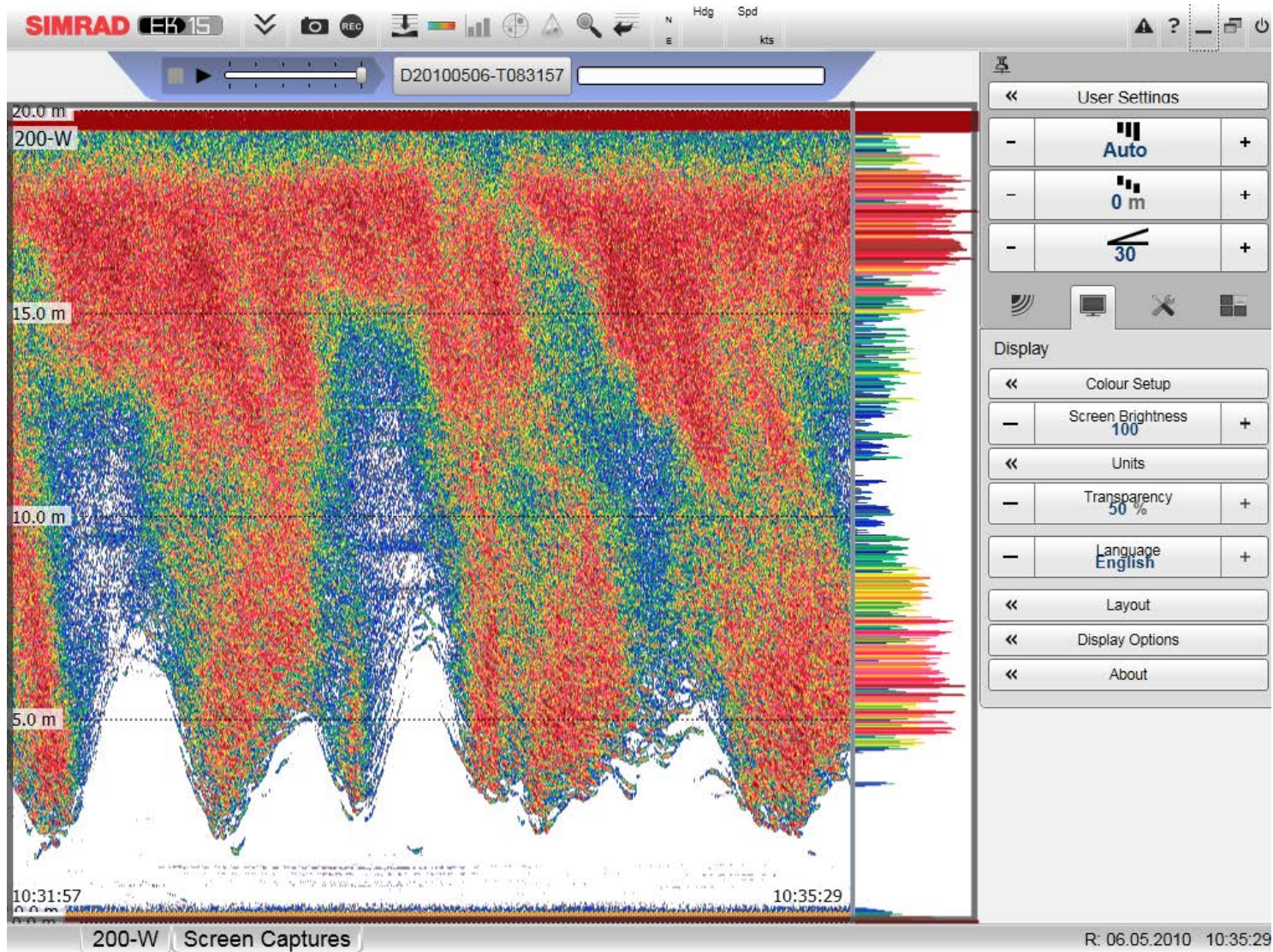




# Echogram from cage

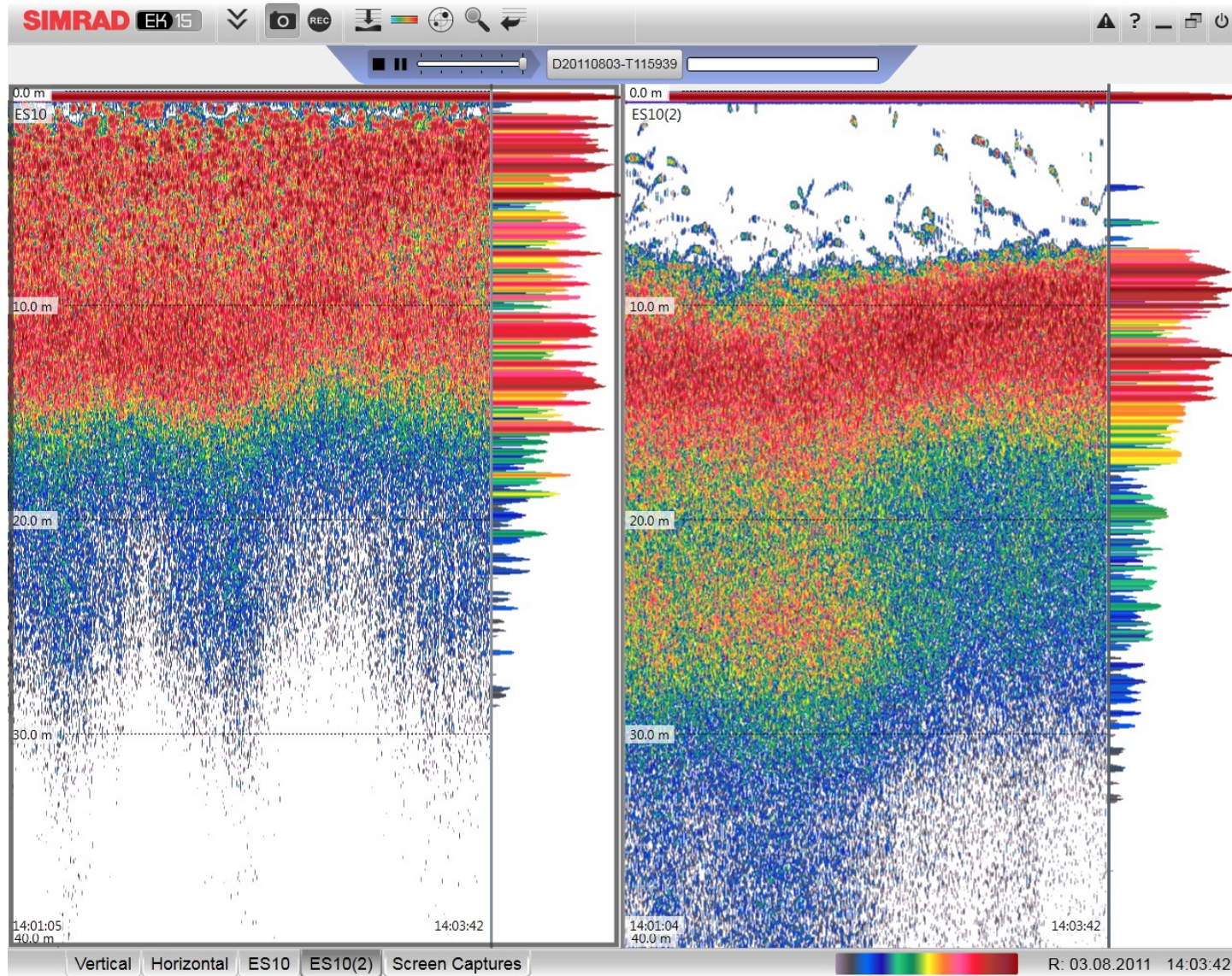


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# Echogram from cage



# Trengning i not, slipping og dødelighet

## Maria Tenningen, Havforskningsinstituttet

*Siste tillate tidspunkt for slipping av makrell er når 7/8 av nota er halt inn. Imidlertid; fangststørrelse, form og volum på nota betyr vel så mye for fiskens overlevelse.*





# One of the main problems in Norwegian purse seine fisheries is mortality related to slipping



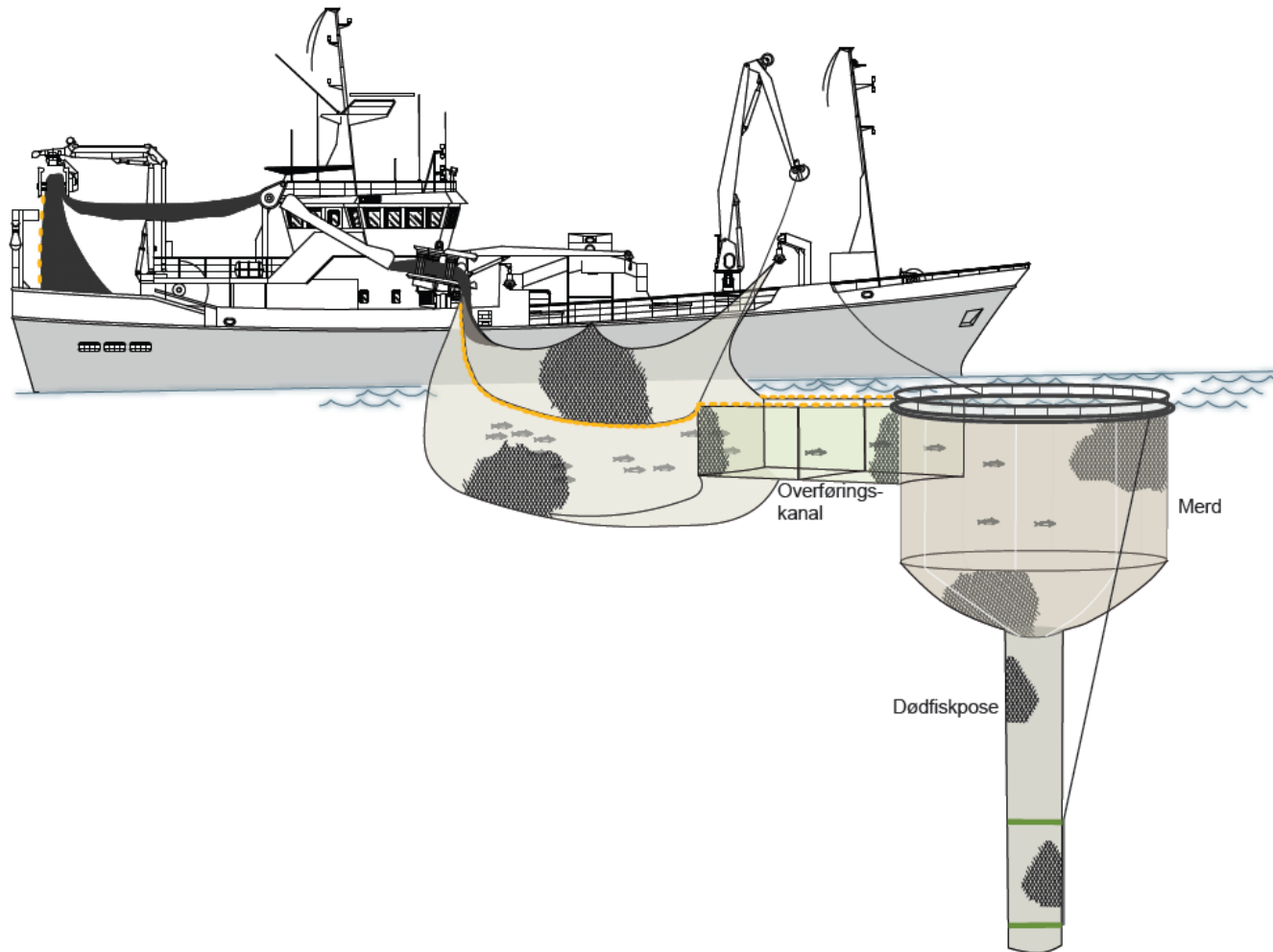
Reasons for slipping: too large catches or unwanted size, quality or species

Illegal to slip dead or dying fish, but how can this be defined?

In addition to being a waste and causing unaccounted mortality it is controversial because discarding is illegal in Norway

→ If slipping is allowed we have to make sure the fish survive!

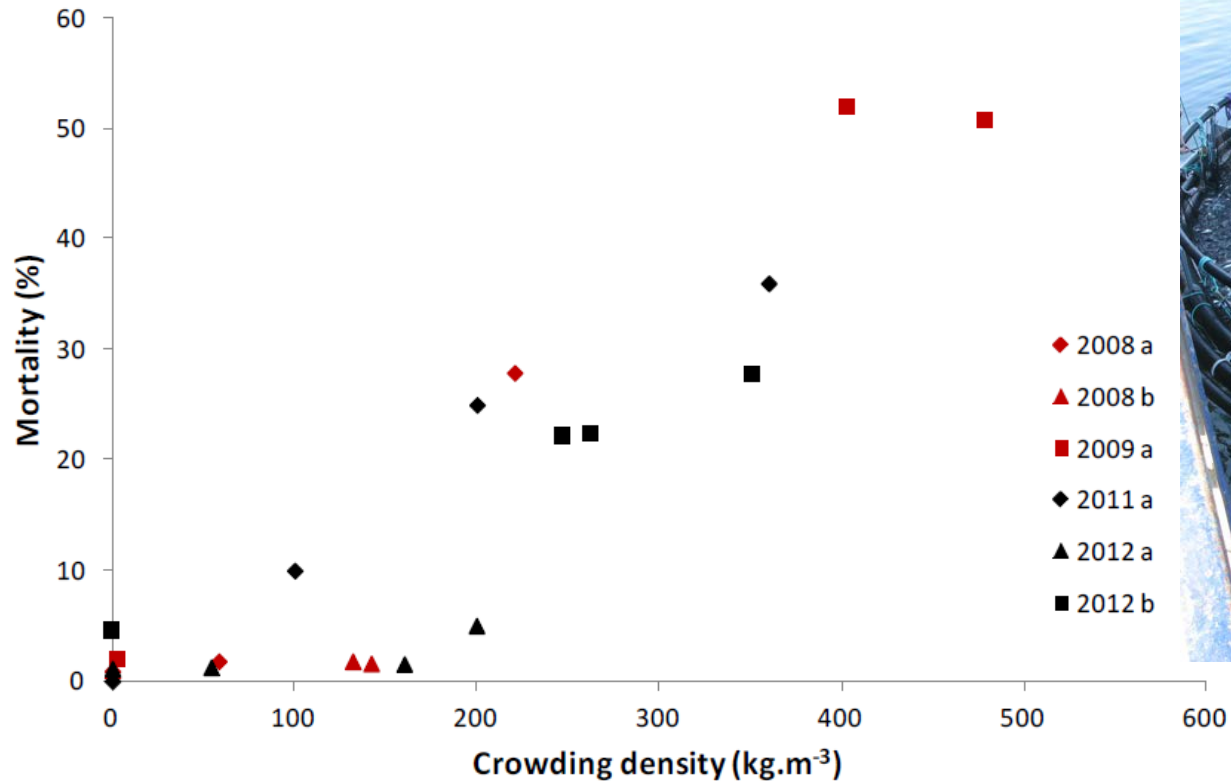
# Survival experiments on mackerel and herring crowded in the purse seine (Field experiments)





# Results from the herring crowding experiments

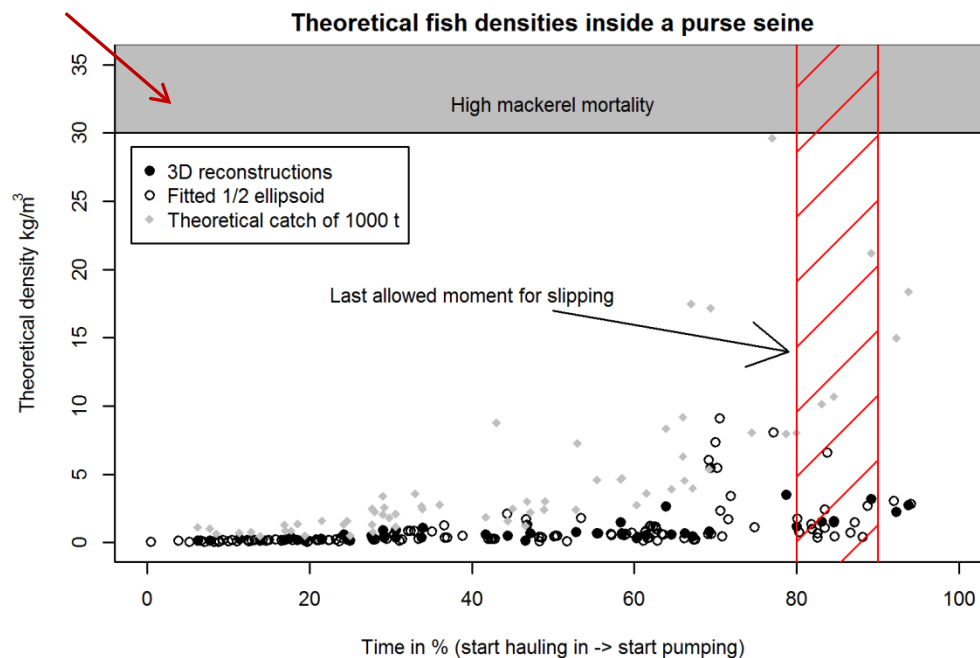
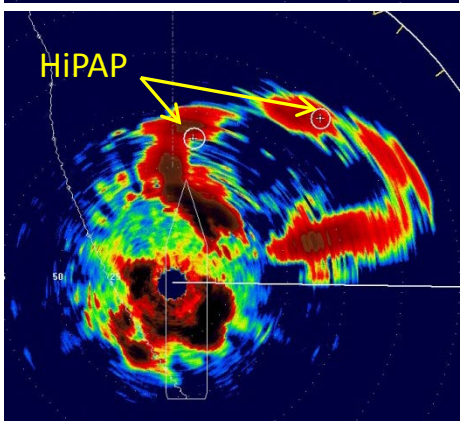
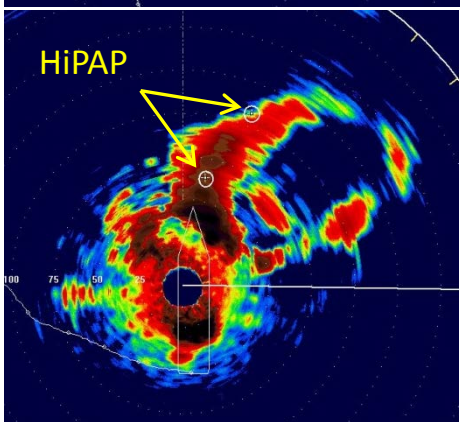
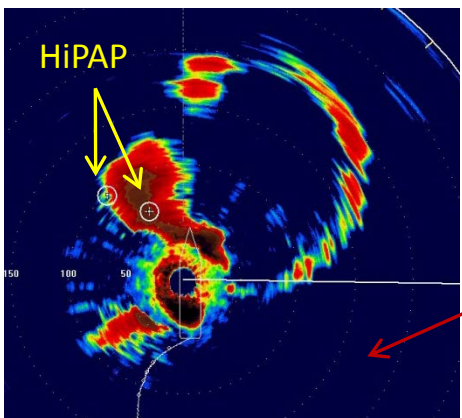
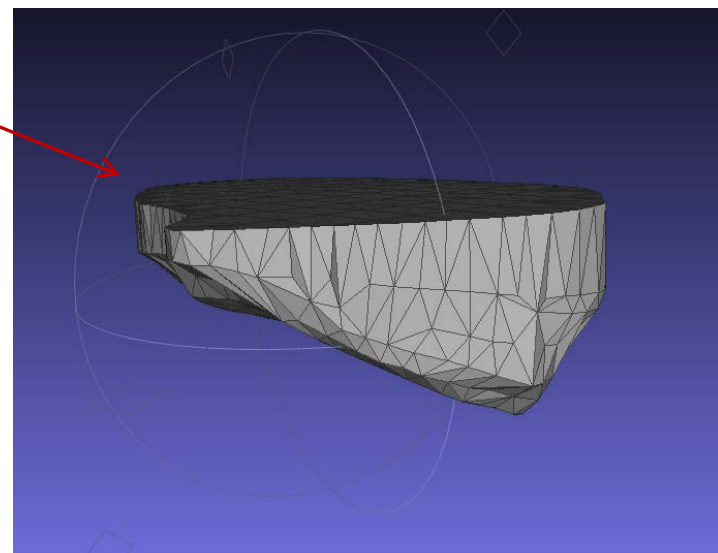
(10 minute crowding phase and mortality after a 4-5 days monitoring period)



Low mortality up to densities of about 150 kg m<sup>-3</sup>

# Rough 3D reconstructions of the net

- 3D reconstructions based on horizontal sonar slices of the net
- Compare how well the sonar data correspond to the HiPAP positions (uncertainty)
- Theoretical fish densities  $\rightarrow$  Catch / Available volume

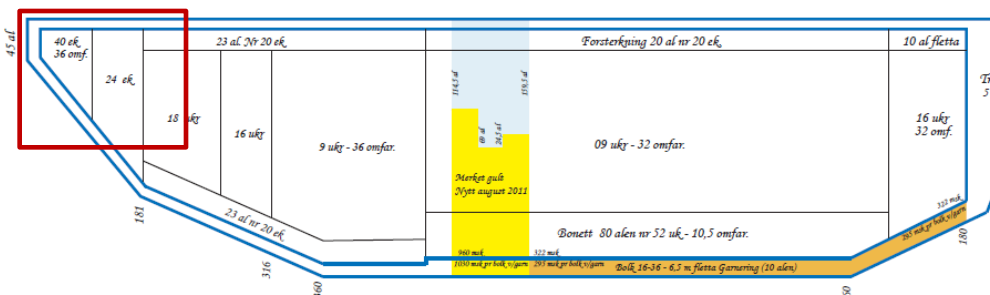




# Using HiPAP for net monitoring

- HiPAP – provides 3d positions of the transponders about every 1 sec
- May provide data where sonar data is not usable
- Up to 6 transponders mounted on the last 150 meters net

Challenge to use the transponders in the purse seine while fishing



# Takk for oppmerksomheten!

[kongsberg.com](https://kongsberg.com)



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