

ICES-FAO Working Group on Fishing Technology and Fish Behaviour (WGFTFB)

New Bedford, May 04-09.

USA

The effect of lifting panel on grid-based selectivity

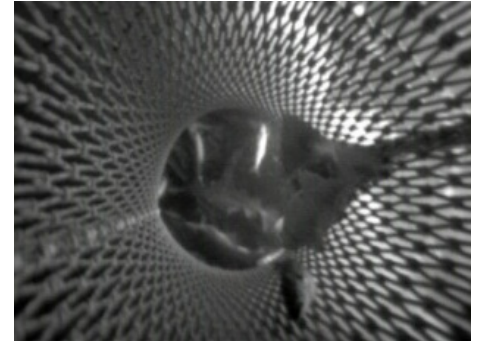
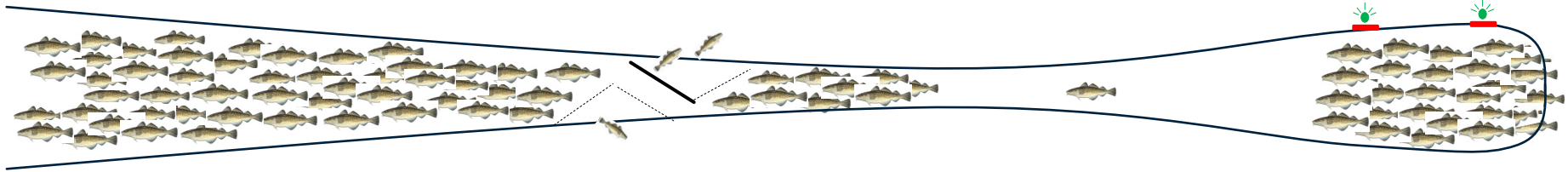
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Problems associated with sorting grids

1) Saturation of the grid

2) Fish does not fall back to the codend

3) Catch sensors fail to give right information of catch size



And as a consequence of this...

Unwanted big catches



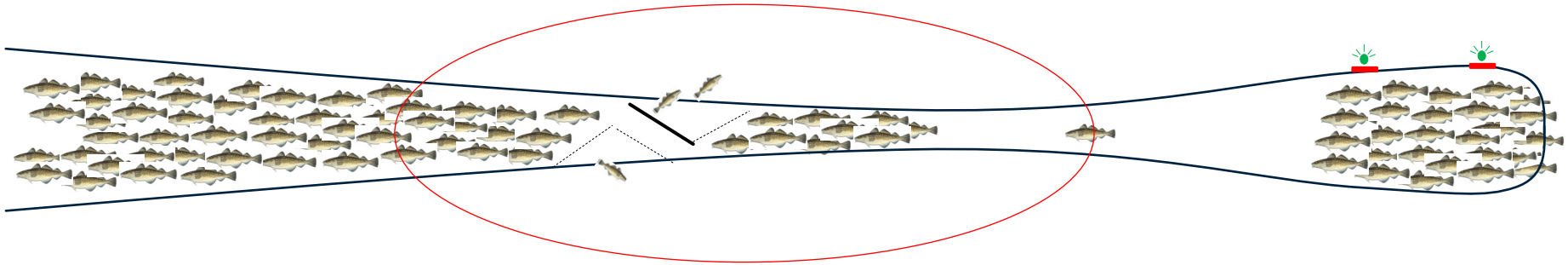
- 34 tons of fish in a 10-min tow
- Catch sensors set to 10 tons

Grid fails to sort out fish at fishing depth



Video from the Institute of Marine research of Norway

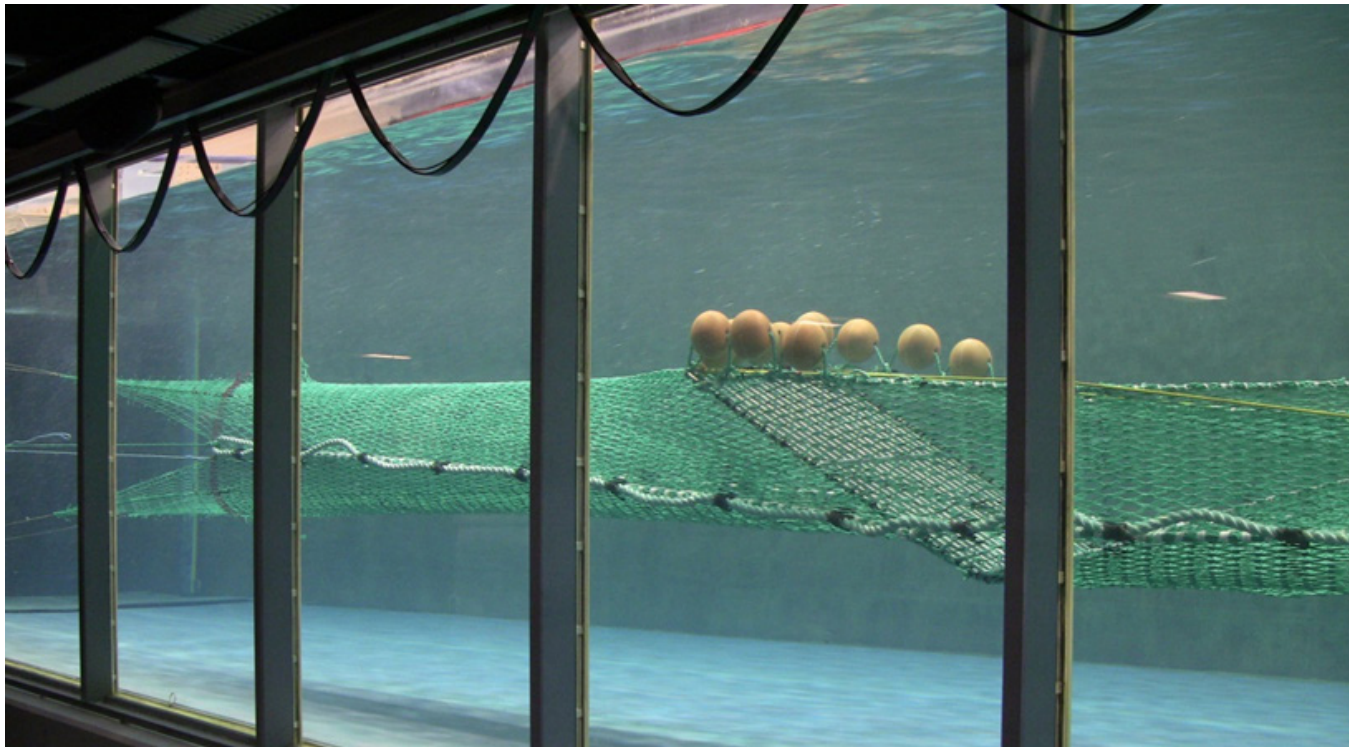
Problems associated with sorting grids



?

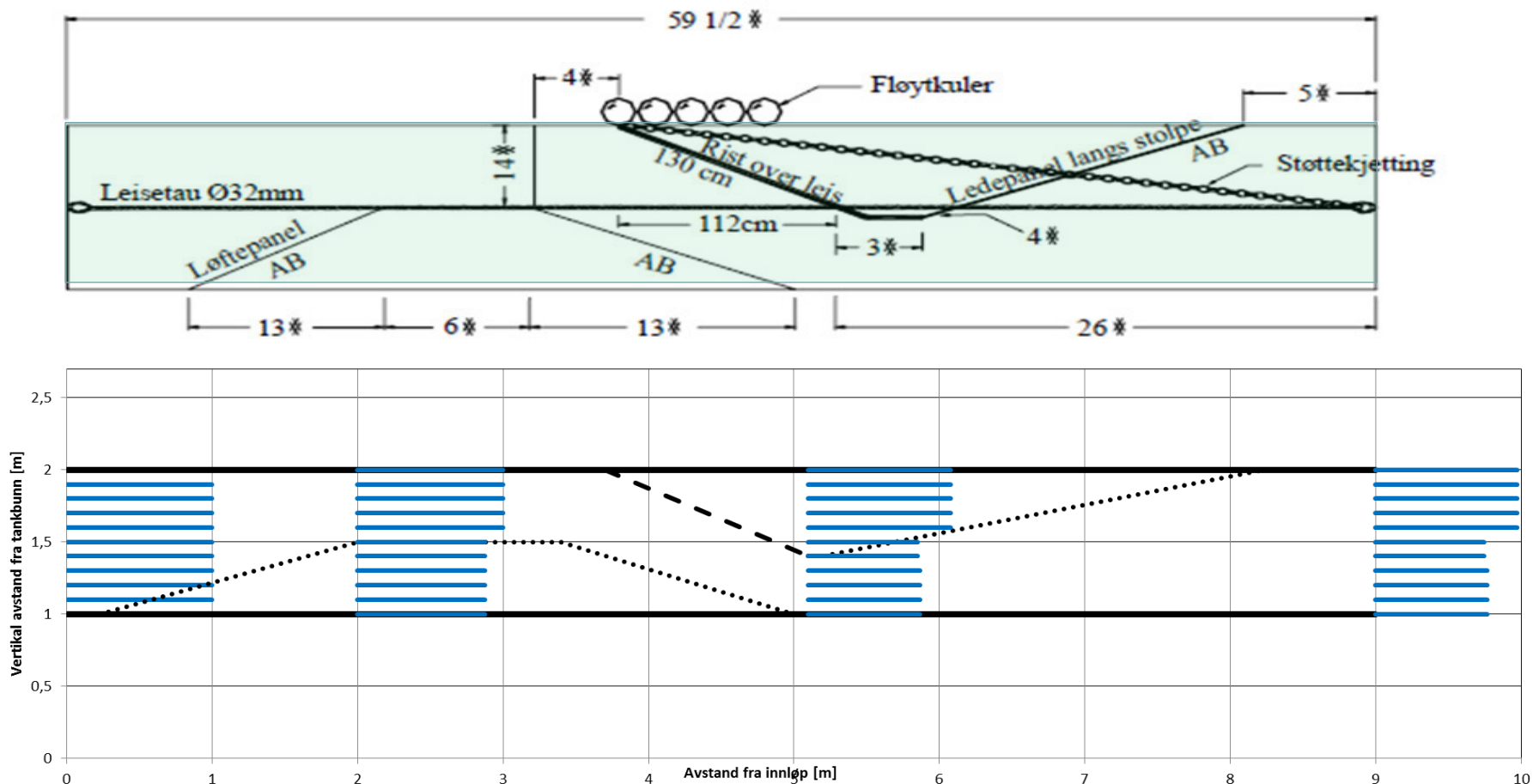
- Sorting grids were developed in the early 90s
- Currently the trawls are much larger than those use in the 90s – the grid section is the same.
- Currently the biomass of cod in the Barents Sea is considerably larger than in the 90s.

Assessment of geometry and the water flow of sorting grid sections.



Measurements of water flow in a full scale sorting grid section

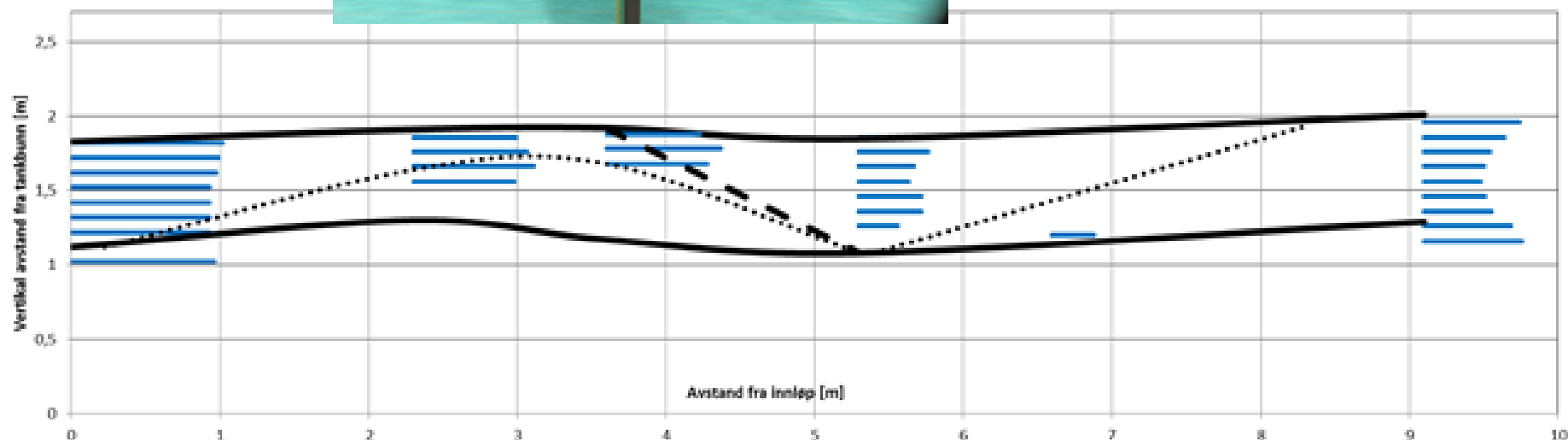
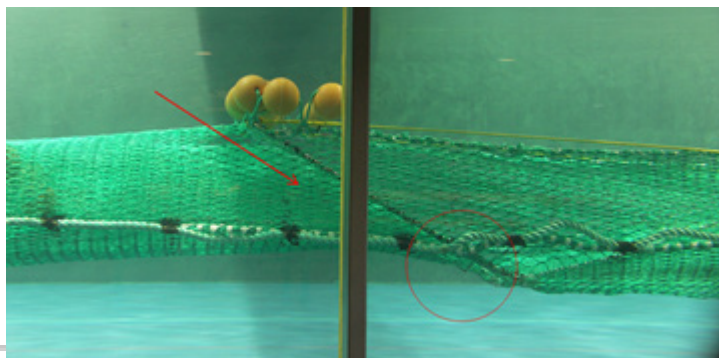
2-panel sorting grid (sort-V) with lifting panel



The blue lines indicate the water flow speed. 1 square is equivalent to 0,95 m/s.

2-panel sorting grid (sort-V) with lifting panel

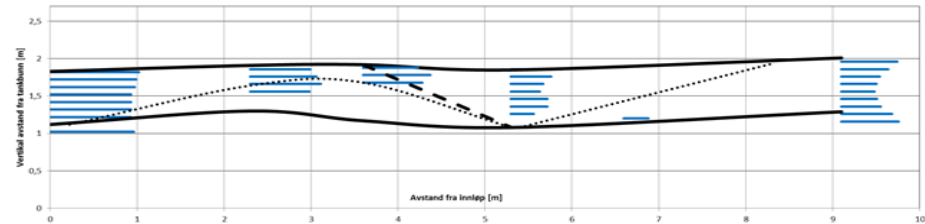
Lifting panel
blocked all the
section



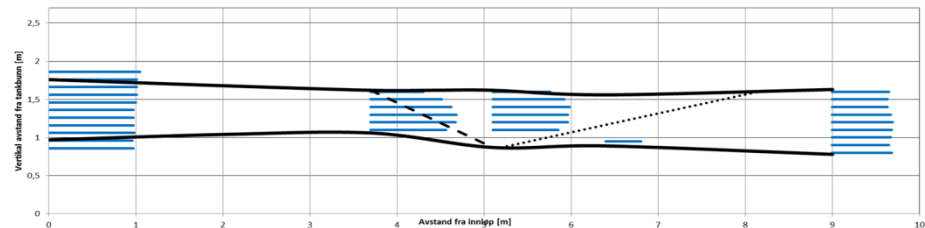
The blue lines indicate the water flow speed reductions. 1 square is equivalent to 0,95 m/s.

2- and 4-panel sorting grid (sort-V) with/without lifting panel

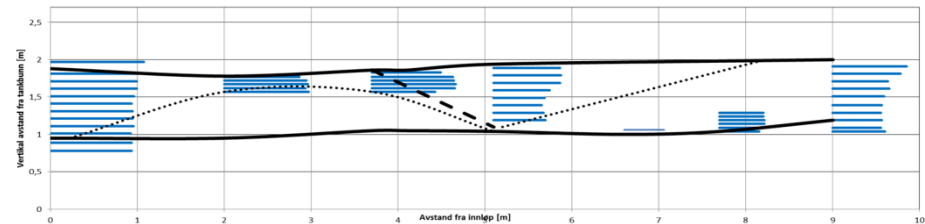
2-panel section with lifting panel



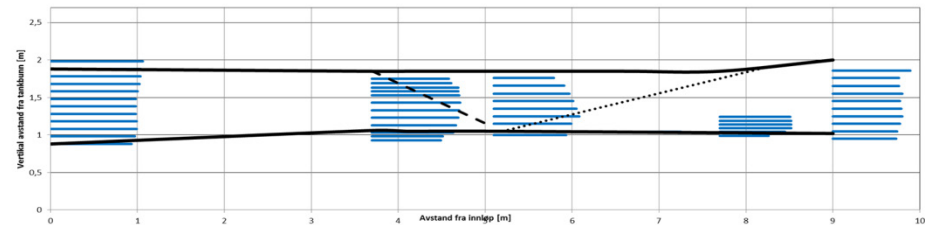
2-panel section without lifting panel



4-panel section with modified lifting panel

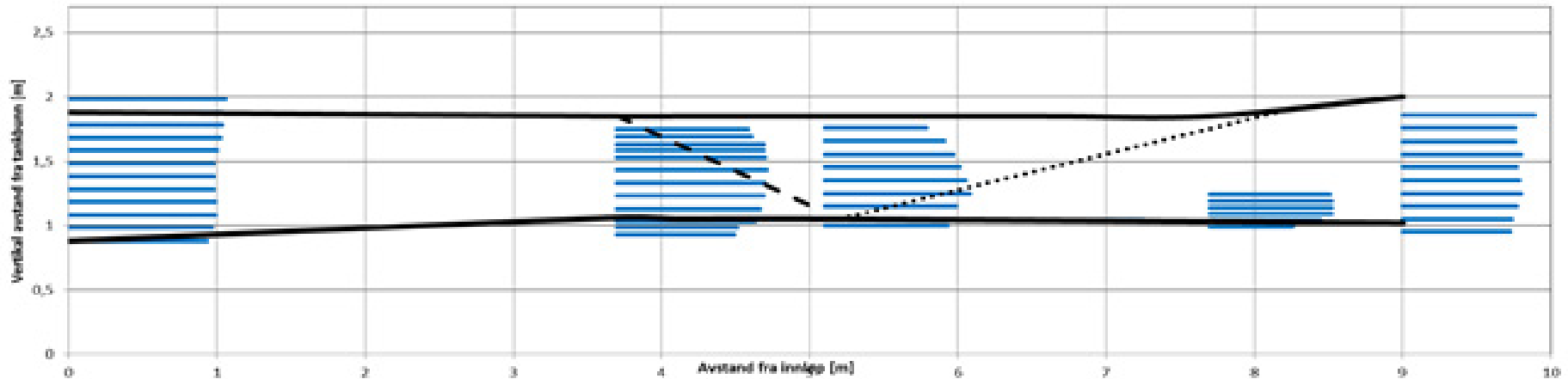


4-panel section without lifting panel



The blue lines indicate the water flow speed reductions. 1 square is equivalent to 0,95 m/s.

4-panel sorting grid (sort-V) without lifting panel



The blue lines indicate the water flow speed reductions. 1 square is equivalent to 0,95 m/s.

A 4-panel single grid section without lifting panel has:

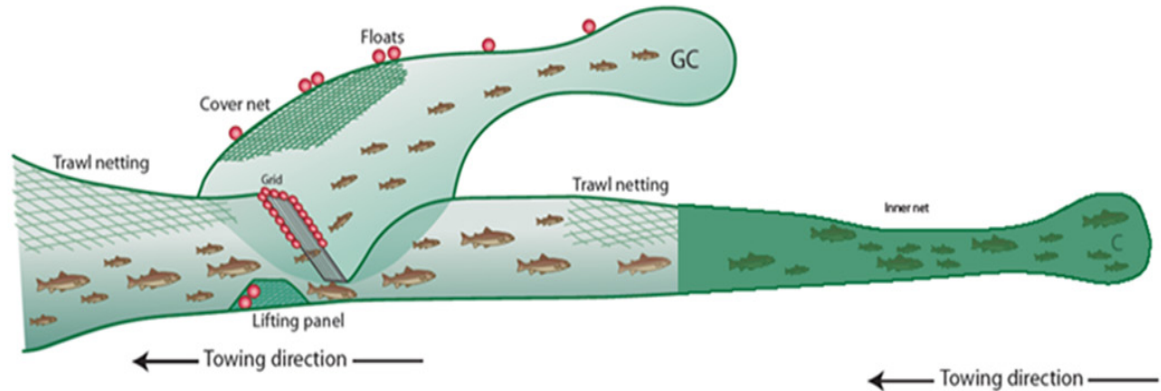
- **Larger cross-section area.**
- **Better stability.**
- **Better water flow**
- **...but what about its selectivity ??????**

Full scale testing under commercial conditions



Port trawl:
Grid section
With modified lifting panel

Starboard trawl:
Grid section
without lifting panel



Grid-covered method + blinded codend



- A total of 31 hauls were carried out.
- 15 hauls with the lifting panel
- 16 hauls without the lifting panel.
- Catch rates > 3000 kg/h in 27 hauls, up to a maximum of 15759 kg/h.

Modelling size selectivity

***cLogit* model:**

$$r(l, v) = clogit(l, L50_{grid}, SR_{grid}, C_{grid}) \equiv 1.0 - C_{grid} \times \left(1.0 - logit(l, L50_{grid}, SR_{grid})\right)$$

Where C_{grid} represents the probability that fish entering the grid section will in fact contact the grid.

***cRichard* model:**

Asymmetric model, containing also the C_{grid} . This model includes the asymmetry parameter, δ , and is described by:

$$r(l, v) = cRichard(l, L50_{grid}, SR_{grid}, C_{grid}, \delta) \equiv 1.0 - C_{grid} \times \left(1.0 - \left(logit(l, L50_{grid}, SR_{grid})\right)^{\frac{1}{\delta}}\right)$$

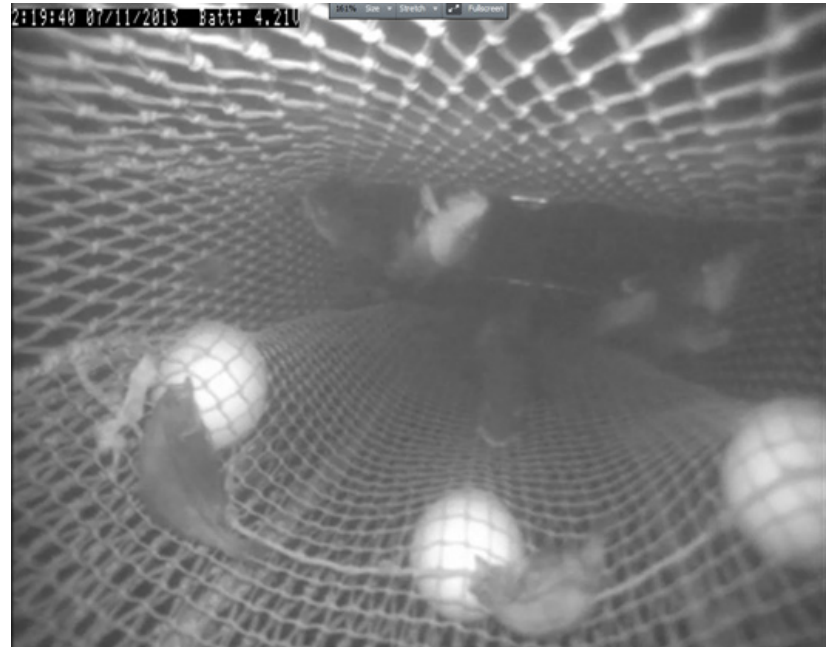
Results

Regarding saturation of the grid and that fish does not fall back to the codend

Before

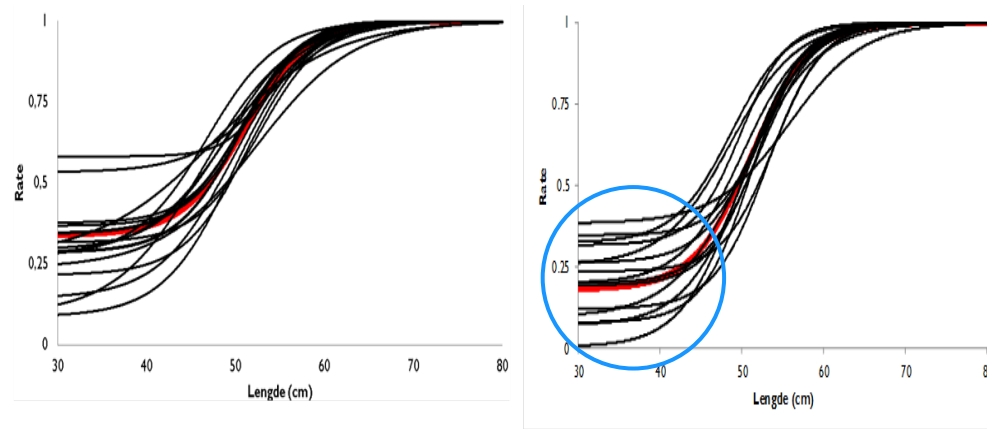


Now



Very few fish stopped in front/behind the grid section

Results: Mean selectivity parameters



Selection parameter	Without lifting panel	With lifting panel
$L_{50_{grid}}$ (cm)	50.85 (49.70 – 52.00)	51.46 (50.43 – 52.49)
SR_{grid} (cm)	7.91 (7.23 – 8.57)	7.19 (6.67 – 7.71)
C_{grid}	0.66 (0.60 – 0.72)	0.82 (0.76 – 0.88)

The presence of the lifting panel increases the contact probability (C_{grid}) in 0.16. It represents a improvement of 24% (from 0.66 to 0.82) in the C_{grid} .

Conclusions

A 4-panel grid section has

- ~ 50% larger cross-section area than 2-panel grid sections
- Better stability than 2-panel grid sections.
- Better water flow
- No effect of the lifting panel on the selection parameters L50 and SR.
- A significant effect of the lifting panel on the grid contact parameter. The lifting panel improve the grid contact by 24%

Acknowledgment

Thanks to the Research Council of Norway for funding the project

Thanks to our research partners:

- University of Tromsø,
- Institute of Marine Research of Norway
- Norwegian Directorate of Fisheries