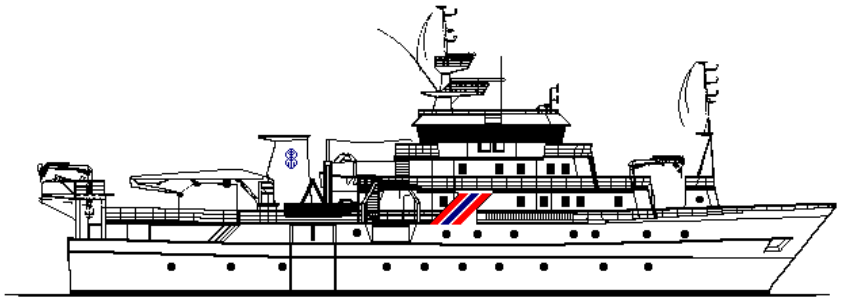
CRUISE REPORTS "DR. FRIDTJOF NANSEN"



Selectivity Cruise

Cruise Report No 5/2000

Estimation of grid selectivity for Namibian Hake using Sort-V and Ex-it sorting grids

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Introduction

At the end of 1997 a project was started to see if the size selectivity of hake trawls used in Namibia can be improved. Initially experiments with square mesh panels were done but after realizing that this gave no satisfactory results the due to the passive behaviour of hake in the trawl, it was then decided to test sorting grids.
Since then four cruises have been conducted in Namibian waters to assess the selectivity of ridged sorting grids. Three of these experiments were conducted on commercial vessels and one on the Namibian research vessel RV'Welwitchia'. Two different types of grids have so far been tested. The Sort-V single grid as well as the Ex-it grid. Only on bar distance (40mm) was tested for the Ex-it grid. Three different bar spacings were tested with the Sort-V grid: 45mm, 40mm and 37mm.
On the previous cruise on RV'Welwitchia' the aim was to compare the Sort-V and the Ex-it grids with 40mm bar spacing as well as compare two different types of lifting panels in front of the grid. Due to technical problems the Sort-V grid did not function properly and the results obtained for this grid were thus inconclusive.

Aims

The aims of this cruise were to:

- In part repeat experiments from the previous cruise so as to obtain better results for the 40mm Sort-v grid
- Use a grid angle sensor to study the effects of the grid angle as well as the waterflow through the grid
- Use an underwater video camera to study the behaviour of hake when it comes into contact with the grid.

Participants

Scientists:

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Technical Assistants:

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Materials and Methods

The RV'Dr,Fridtjof Nansen' is a ship of 56.75m length and a gross tonnage of 1450 tonnes. It is powered by a 2700 HP main engine. The trawl used was a 'Carmen', high

opening, bottom trawl (Fig ?) as used by the commercial hake fishing fleet operating in Namibian waters. The approximate vertical opening of the trawl was 7 meters. It had a 41.6 m headline, 56.8 m footrope and 80 m sweeplines. The trawl door used were Tyborøn of 7.8 m² size, weighing 1670 Kg each. An extension piece, containing the grid, was fitted between the front part and the codend of the trawl. The main codend of the trawl had an 80 mm mesh size with a 140 mm net cover over it.
From haul 10 to haul 25, done with the Sort-V grid, a collecting bag was installed over the grid opening in order to retain escaped fish. The collecting bag had a 50 mm mesh inside blinder. During the hauls when the collecting bag was used, a 50 mm mesh blinder was also installed inside the main codened in order to avoid mesh selection in the codend, which could lead to a bias in the results.

The Sort-V grid

The extension piece for this grid was 99½ meshes long and consisted of two panels that where sown together. Each of these panels was 70 meshes wide, from which 4 meshes were used on each side to fasten the two panels together (Fig), leaving 62 free meshes from each panel. The extension piece was made from 5 mm Magnet (PE) twine and had an average, knot to knot, mesh size of 128 mm. The extension piece was fasted on each side to a 28 mm lastridge rope.
The grid itself was made from stainless steel and had a length of 179 cm and a width of 122 cm, weighing 59 Kg (Fig). The bolt thickness of the outer frame of the grid was 16 mm while the inner bars of the grid were made of 12 mm thick bolt. 20 eight inch floats were attached to the grid and the net panel next to the grid, in order to compensate for the weight of the grid.
The grid was installed inside the extension piece at a theoretical angle of 30° (Fig). A 50 mm guiding panel was installed just aft of the grid from to bottom of the grid diagonally up to the roof of the extension piece (Fig). Two approximately 5 m long chain were attached to the top corners of the grid, on one end, and to the lastridge rope aft of the grid, on the other end. These supporting chains are meant to help keep the grid at a steady angle and also make it easier to adjust the angle of the grid when necessary (Fig).
For the first 20 hauls, a 50 mm meshed lifting panel (Fig) had been installed in front of the grid in order to guide fish to the roof of the extension piece and thus increase their chances of getting into contact with the grid. The lifting panel was the removed and one hauls was done without any further alteration. Thereafter 4 hauls were done where 5 eight inch floats were attached underneath the bottom panel under the grid so the bottom panel would serve as the lifting panel.
The grid sensor was used in all except two hauls with this grid. The sensor was not used in the two hauls since the camera had been mounted on top of the grid and the sensor would have blocked the view.

EX-it grid

Since the Ex-it grid is patented it was installed by ‘Walvis Trawl’ in Walvis bay. Because of the patent they were reluctant to hand out specifics about the mounting of the grid. This grid is made up of eight pieces that are hinged together (Fig) and installed in an hour glass shaped extension piece (Fig)

Initially four hauls were done without a collecting bag attached in order to make video observation of the grid as it would be used on a commercial vessel. There after ? hauls were done with a collecting bag attached.

Grid sensor

A SCANMAR grid sensor was mounted onto the grid for most hauls and the data from this was logged automatically every 5 seconds. The data collected from this was, grid angle and water flow through the grid. Other SCANMAR sensor were also attached to the trawl during hauling giving data on the opening height, door spread and ground clearance of the trawl. This data was logged together with the data obtained from the grid sensor.

Video equipment

A underwater SIT camera was mounted in various places of the extension piece during some hauls in order to make direct observations of fish behaviour as well to make observations on how various parts of the grid assembly functioned while towing. Artificial light was used in all cases.

For the Sort-V grid the camera was installed:

- in front of the lifting panel
- in front of the grid inside the net during hauls when the lifting panel was used and when it was not used
- on top of the grid facing the escape opening of the grid

For the Ex-it grid:

- behind the grid on the guiding panel face forward towards the grid
- Inside to extension piece in front of the grid, mounted onto the lower panel. This setting was used when the was not collecting bag installed and when there was one installed.

Narrative

The data obtained from the sensor mounted on the grid showed that there was no substantial difference between the water flow through the grid when there was a collecting bag installed or not. The angle readings were fairly low for the first haul (around 22°) but increased in later hauls to an average angle of around 25.5° when no collecting bag was mounted. The angle data varied quite a bit though and it was discovered after viewing the video observations from haul 9 that there was some slack in the chain that was meant to keep the grid at a steady angle. The chain was thus shortened a bit to make it more taught. After the collecting bag was mounted over the escape opening the angle of the grid dropped a bit to around 22.4° on average. After initial video observations of the Ex-it grid, it was decided that the data from the grid sensor would not tell us much because the grid folded downwards at the hinges giving it a v-shape appearance along it's longitudinal axis. It was uncertain how this would effect the grid sensor if it was tilted sideways. It was also clear from the video observations that the mounting angle played a fairly little role in how the grid performed.

The data obtained from the sensors for each haul are summarized in table ? (Appendix ?)

Very good video footage was taken with the underwater video camera. After placement problems for the light in the first haul no more problems were encountered with the video equipment. The video footage confirmed the previous assumptions that hake does not show typical escape behaviour when coming into contact with the grid. Their behaviour was observed to be very sluggish and mostly they just drift around in the net not swimming actively. In the few cases when escape behaviour was observed the fish always tried to escape downwards. If future experiments are done on hake a good starting point would be to test a grid the is installed upside down to the setting that was used on this cruise thus having the escape opening at the bottom and the opening to the codend at the top.

Video observations of the Ex-it grid showed that the grid did not look under water as was previously assumed from flume tank observation (see figures in previous hake and monk selectivity cruise reports). The grid folded downward along the hinged middle section of the grid giving it an overall v-shape. This caused the grid the press quite firmly against the bottom panel making it difficult for fish to pass underneath it into the codend. A large number of fish would thus aggregate underneath the grid clogging it. Catch rates were fairly low during the cruise so no observations could be made of what would happen when catches are large. It might have an effect on the grid causing it to ‘open up’ more.