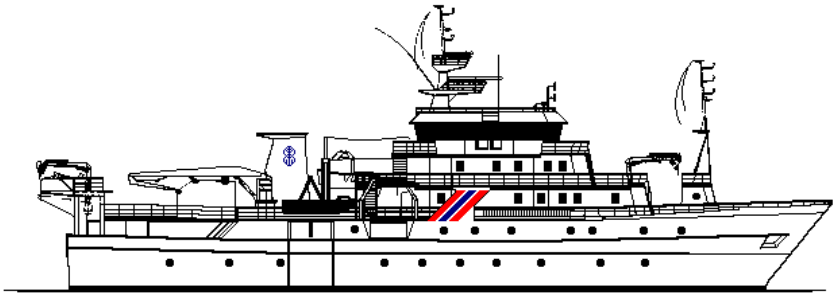

REGIONAL COORDINATED SURVEYS 2001-2003

A BENEFIT PROJECT

INTERCALIBRATIONS AND EXPERIMENTS WITH SURVEY DESIGN

Leg 1: 17 January-12 February 2001, South Africa West Coast

Leg 2: 17-25 February 2001, Namibia

Marine and Coastal Management
Cape Town, South Africa

National Marine Information and Research Centre
Swakopmund, Namibia

Institute of Marine Research
Bergen, Norway

CRUISE REPORT "DR FRIDTJOF NANSEN"

INTERCALIBRATIONS AND EXPERIMENTS WITH SURVEY DESIGN

Leg 1: 17 January-12 February 2001, South Africa West Coast

Leg 2: 17-25 February 2001, Namibia

by

Tore Strømme*
Marek Lipinski**
Titus Iilende*
and
Oddgeir Alvheim*

* Institute of Marine Research
P.O.Box 1870 Nordnes
N-5817 Bergen, Norway

** Institut National de Recherche Halieutique
Casablanca, Morocco

Institute of Marine Research
Bergen, 2002

TABLE OF CONTENTS

CHAPTER 1 INTRODUCTION

1.1 Survey objectives

The specific objectives for the survey were:

- To carry out intercalibrations with the R/V Africana in South Africa and the commercial trawler Blue Sea, carrying out a trawl survey in Namibian waters, in order to facilitate integrated regional analysis and a standardization of the survey time series.
- To carry out a mini survey with two design strategies to be able to investigate the design's impact on perceived abundance, distribution patterns and gradients.
- To sample standard hydrographical depth profiles at trawl locations with temperature, salinity and ADCP (currents)

The time allocated for this part of the survey was 25 working days.

1.2 Participation

Members of the scientific teams were:

First leg South Africa 17 Jan.-12 Feb.
Marine and Coastal Management, Cape Town:
Marek R. LIPINSKI(team leader), Ro(bert) COOPER (until 30 Jan.), J. DE GODE, Clifford HART , Shannon JOHNSON (until 30 Jan.), Robin W. LESLIE, J. MATSHILI, Robyn SCOTT from 1 Feb.), D. SMITH (from 1 Feb.), G. TUTT

Second leg Namibia 17-25 Feb.
From NATMIRC, Swakopmund:
Titus IILENDE(team leader), Kobus ALBERT, George MUNYAZA, Hikka NDJAULA, Peter SCHNEIDER, Ignatius SHANINGNA, Malakia SHIMANDA, Sean WELLS

Institute of Marine Research, Norway(IMR), both legs:

Tore STRØMME, Oddgeir ALVHEIM, Tore MØRK, and Jarle Wangensten.

1.3 Narrative

Figures 1a-c show the cruise track and the stations worked during the survey. The vessel departed from Cape Town on January 17, steaming north to St. Helena Bay where the intercalibration work was carried out between 31 and 33° S. *Africana* was doing the standard West Coast Hake Survey, and some of the paired stations were pre-selected and part of the random stratified survey while some where chosen on the site for pure intercalibration purpose. Cruise track and trawl stations with reference to Nansen station numbers are show in Figure 1a. The intercalibration work was finalized on the evening of Jan.29 and the vessel called 30-31 Jan. on Cape Town for crew change. The vessel returned then to the working area of St. Helena Bay where a sampling grid for transect sampling was carried out, Figure 1b. Five transects were carried out, spending about two days on each transect. During night-hours, transects was resurveyed in order to record off-bottom registrations of hake by the acoustic system. The vessel called on Cape Town 12 February for disembarkment of South African team and formed the end of the first part of the regional survey work. SE gales in two short periods put some constraints on the sample work and a few stations had to be abandoned. Except for this the weather gave good working conditions. XX trawl stations were completed, of which xx are combined intercalibrations and pre allocated Africana trawl survey stations, xx are extra intercalibration hauls , xx are from the transect sampling programme (Nansen only), and xx are additional random stations (Nansen only).

The vessel steamed north to Walvis Bay and embarked the Namibian scientific team on 17 February and then joined the Namibian freezer trawler *Blue Sea* for intercalibration work the next morning off Palgrave Point. In the period 18-22 February the two vessels worked in tandem while Blue Sea was finalizing the Namibian standard trawl survey 2002. The intercalibration was finalized with two days of work on two oblique transects respectively NE and SE of Walvis Bay. These transects were laid out to cross through relatively dense fish densities as recorded from the standard survey route. The vessel finally called on Walvis Bay on 25 February Cruise track and stations worked are shown in Figure 1c. The weather was very favourable on the last leg, and did not put any constrains on the survey work. The two vessels completed xx pairs of hauls of which xx also formed part of the Namibian trawl survey.

Figure 1a South Africa. Course track with fishing stations in the period 18-30. January. Depth contours at 20 m, 50 m, 100 m, 200 m and 500 m are indicated.

Figure 1b South Africa. Course track with fishing and hydrographic stations in the period 2-12January, Depth

contours as in Fig. 1a.

Figure 1c Namibia. Course track with fishing and hydrographic stations in the period 17-25 February , Depth contours as in Fig. 1a.

1.4 Methods

Environmental Data

Meteorological observations including wind direction and speed, air temperature, global radiation and sea surface temperature (SST) were automatically logged and recorded with position and bottom depth every nautical mile sailed using an Aanderaa meteorological station. CTD-stations were recorded at the standard hydrographic transects. On some locations Seabird 911+ CTD probe was used to obtain vertical profiles of temperature, salinity oxygen and *in situ* light. Real time plotting and logging was done using the customised Seabird Seasave software installed on a PC. The profiles were in general taken down to a few meters above the bottom. Niskin bottles were triggered for water samples, one near the surface and one near the bottom, in order to calibrate the oxygen and salinity sensors. The water samples were analysed for dissolved oxygen using the Winkler method, and for salinity using a Guildline Portasal salinometer mod. 8410. During trawling, current profiles were logged using an acoustic doppler current profiler (ADCP).

Biological Sampling, equipment and methods

Biological sampling of the fish was carried out with a 'Gisund Super' fish-cum-shrimp trawl, the standard bottom trawl of *Dr. Fridtjof Nansen*. Trawl performance were monitored by Scanmar sensors, giving information on trawl height, clearance off bottom and door spread. All parameters of the system were logged on files, with resolution 10sec or better. A constraining rope was used on the warp 140m in front of the trawl doors to keep door distance independent of trawl depth. Width between the wings of the trawl is earlier recorded to be 21m. Annex II gives a fuller description of the fishing gear used.

All catches were sampled for composition by weight and numbers of each species caught. Length frequency distributions, by total fish length in cm, were taken for all commercial species and some indicator species in all stations where present. The complete records of fishing stations are shown in Annex I. No further biological sampling was carried out (sex, maturity, otoliths).

Acoustic Sampling

A SIMRAD EK500 Echosounder was used and the echograms were stored on both paper and files. The acoustic biomass estimates were based on the integration technique. The Bergen Integrator (BEI) was used for analysis and allocation of the integrated s_A- values (average area back scattering coefficient in m^2/NM) to the individual specified target groups by 1 NM intervals. Time constraints did not allow sampling of the pelagic zone. During the scrutinizing process registrations of hake off

bottom were generally subjectively classified by the characteristics of traces based on experience from similar work earlier in Namibia. All registrations not considered as hake was filtered away using zero-content-channels, school boxes and thresh-holding. This was done in order to get a finer resolution on the hake registrations than the usual 5nm resolution, and thus be able to detect possible gradients in the hake distribution.

All data on fishing stations and fish length sampling were made available to the participants from the local research institutes on diskettes.

Analysis of intercalibrations

Various methods were applied on the paired data, such a simple correlation plots, log log plots and calculation of similarity indices (SI) (Strømme and Iilende 2001). The SI is a ratio that show the relative deviation of one vessel from the pairs mean value and is calculated as:

The SI is independent of catch level, linear and symmetrical around 0, which is the 1/1 ratio between the two vessels. For the target species SI means are calculated by depths, by time of day or by length groups. The SI is also used in density plots to check for normality or for hidden underlying patterns. When the SI is not normally distributed the two gears in comparison are not linear and the catch rates are disproportionally influenced by additional factors to the *in situ* density.

CHAPTER 2 SURVEY RESULTS

2.1 Hydrographic conditions

Temperature at bottom

Figure 2a and 2b shows temperature and dissolved oxygen respectively near bottom in the experimental area off St. Helena Bay, while Figure 2c and 2d shows features of the temperature and oxygen gradients near bottom in the area where the intercalibrations in Namibia took place.

Vertical structure of temperature, salinity and oxygen

Vertical sections of temperature, salinity and oxygen in the experimental area in South Africa are shown in Figure 4a-c.

Figure 4 Hydrographic sections with distribution of temperature, salinity and oxygen.

2.1 Fish distribution

The distribution of Cape hake and deep water hake in the experimental area are shown in Figure 5a and 5b respectively.

Figure 5a Distribution of Cape hake off St Helena Bay. Depth contours as in Fig. 1a.

Figure 5a Distribution of deep water hake off St Helena Bay. Depth contours as in Fig. 1a.

Figure 9 Length frequency distributions a) Cape hake and b) Deep water hake off St. Helena Bay.

2.3 Results from the intercalibration

to be completed

CHAPTER 3 CONCLUDING REMARKS

The survey was conducted successfully in the period with XX fishing stations. The weather conditions did not put any constraints on the survey work.

To be completed

Annex III Instruments and fishing gear used

The Simrad EK-500, 38kHz echo scientific sounder was used during the survey for fish abundance estimation. The Bergen Echo Integrator system (BEI) logging the echogram raw data from the sounder, was used to scrutinize the acoustic records, and to allocate integrator data to fish species. All raw data was stored to tape, and a backup of the database of scrutinized data, stored. The details of the settings of the 38kHz where as follows:

Transceiver-1 menu	Transducer depth	5.5 - 7.5 m
	Absorbtion coeff.	10 dB/km
	Pulse length	medium (1ms)
	Bandwidth	wide
	Max power	2000 Watt
	2-way beam angle	-21.0 dB
	SV transducer gain	27.45 dB
	TS transducer gain	27.65 dB
	Angle sensitivity	21.9
	3 dB beamwidth	6.8°
	Alongship offset	-0.03°
	Athwardship offset	0.06°
Display menu	Echogram	1
	Bottom range	10 m
	Bottom range start	10 m
	TVG	20 log R
	Sv colour min	-67 dB
	TS Colour minimum	-60 dB
Printer- menu	Range	0 - 50 or 0 -100 m and 100 - 350m
	TVG	20 log R
	Sv colour min	-63 dB
Bottom detection menu	Minimum level	-40 dB

A calibration experiment using a standard copper sphere, performed off Langstrand, Walvis Bay 19 April 2001 gave the following results:

Sv Transducer gain 27.37 dB
Ts Transducer gain 27.49 dB

Fishing gear

The vessel has two different sized "Åkrahamn" pelagic trawls and one "Gisund super" bottom trawl. For all trawls, the Tyborøn, 7.8m² (1670 kg) trawl doors were used. Complete drawings of the trawls used are included.