Merluccius paradoxus and *M. capensis* length frequency distributions from *Nansen* surveys

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Background

A strong argument for the single *M. paradoxus* stock hypothesis (Burmeister, 2005) is that the major (perhaps effectively the only) spawning ground for the species is on the Agulhas Bank slope. Linked to this, one might then expect greater proportions of smaller *M. paradoxus* closer to this region, and Burmeister (2005, Fig. 2) shows plots that seemingly corroborate this, reflecting mean lengths of *M. paradoxus* collected on research survey that generally increase with movement from the Agulhas Bank north-westwards to the Kunene river (Namibian-Angolan border).

However, a potential problem with the plots in Burmeister Fig. 2 is that the South African and Namibian surveys were carried out by different vessels (the *Africana* and the *Nansen* respectively), which are known to show different selectivity patterns (Rademeyer and Butterworth, 2006, Fig. 5). This brief paper attempts comparisons that avoid this potential confounding. (The Namibian survey data are presented by kind permission of Dr. B van Zyl, Director, NatMIRC.)

Results

Length frequency distributions, stratified by latitude from 36°S to 29°S (see Fig. 1), obtained during the 2000 and 2001 *Nansen* surveys on the South African west coast are presented for *M. paradoxus* and *M. capensis* (Figs 2 and 3 respectively). Only the surveys in South African waters conducted by the *Nansen* (in contrast to the *Africana* which has a different selectivity pattern) have been used to allow for unconfounded comparison with the Namibian results.

The median length (with distribution 95%-iles) by latitude is plotted in Figs 4 and 5 for *M. paradoxus* and *M. capensis* respectively.

Average length frequency distributions for the South African west coast are compared to the Namibian results (roughly latitudes 29°S to 18°S) in Figs 6 and 7 for *M. paradoxus* and *M. capensis* respectively.

Discussion

Peaks at small length in the distributions for *M. paradoxus* for the South African west coast surveys are evident over latitudes 33°-35°S (see Fig. 2), broadly consistent with expectations for a single spawning area in that location (the western Agulhas Bank and extending somewhat to the north). There is though some indication of an increase in the relative abundance of smaller fish in the vicinity of the Orange River (the SA-Namibian border).

In contrast, small *M. capensis* appear abundant (relative to their elders) for the whole South African west coast (Fig. 3).

Strangely, the median length of *M. paradoxus* seems to decline with movement northwards (Fig. 4), in contrast to the Burmeister (2005) plots which suggest the reverse trend. No strong trend is evident for *M. capensis* (Fig. 5).

When South African and Namibian distributions are compared, there is a notable paucity of small *M. paradoxus* in the Namibian compared to the South African *Nansen* survey catches (Fig. 6). This is consistent with the single *M. paradoxus* stock hypothesis. However, this is also the case for the *M. capensis* length distribution (Fig. 7), which seems strange given the conventional wisdom of separate South African and Namibian *M. capensis* stocks.

Viewed overall, support for the single *M. paradoxus* stock hypothesis in these length distribution data seems equivocal. However the limitations placed on making inferences given samples from surveys for two years only need to be recognised. Furthermore relative abundances in the latitudinal strata need to be considered in interpreting these results, but limited time did not allow their computation.

Postscript

C. Kirchner (pers. commn) advises that in surveys by the *Nansen* off Namibia there was a practice (the extent which varied from year to year) of tending not to include smaller fish in the length distribution data. Clearly this potentially confounds the interpretation of Figs 6 and 7.

References

Burmeister L. 2005. Is there a single stock of *Merluccius paradoxus* in the Benguela Ecosystem? *Afr. J. mar. Sci*. 27: 23-32.

Rademeyer RA and Butterworth DS. 2006. Summary of the most recent South African hake assessments. Submitted to this workshop.

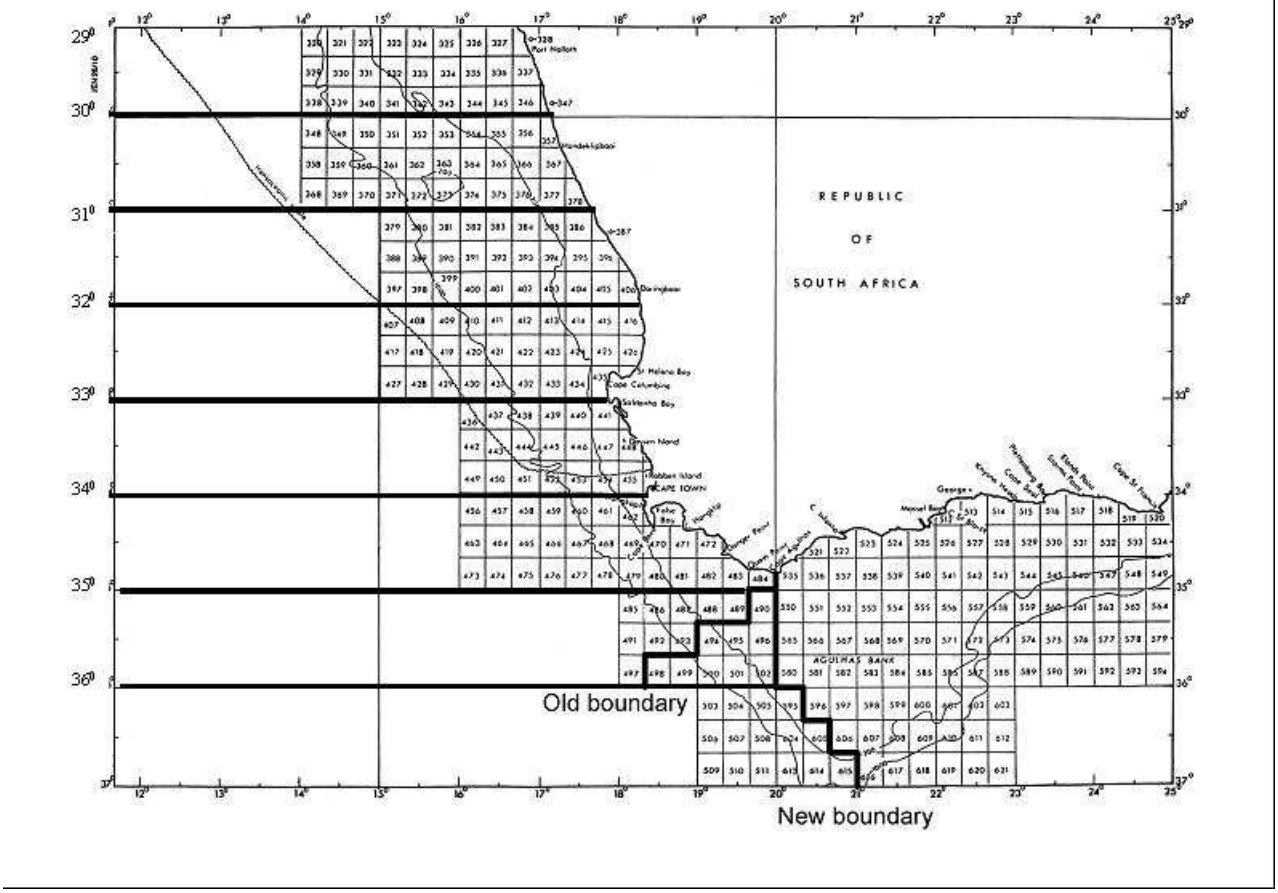

Fig. 1: Map of South Africa, showing trawl location grids together with the 200m and 500m depth contours.

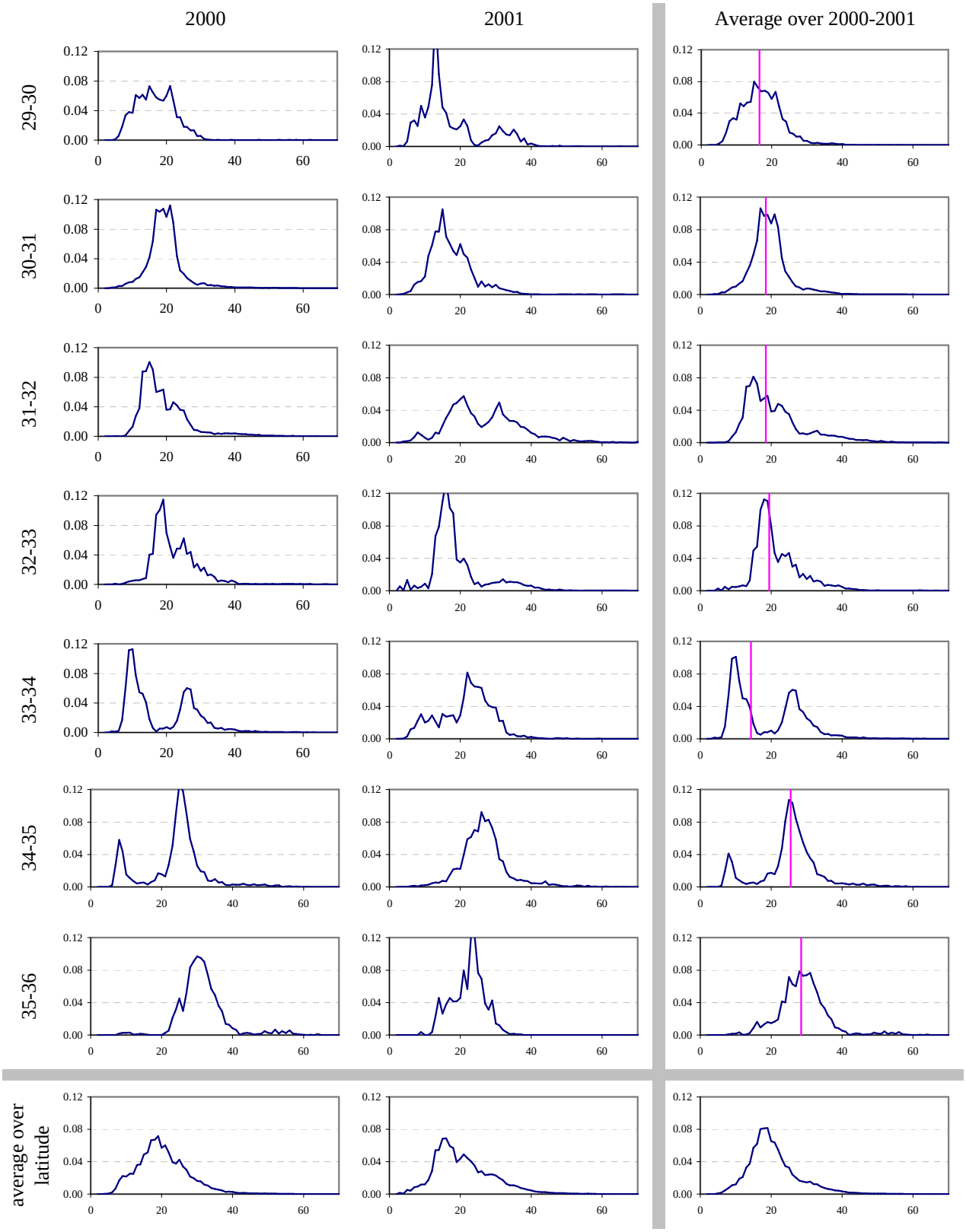

Fig. 2: Length frequency distributions by latitude for ***M. paradoxus*** from the 2000 and 2001 *Nansen* South African west coast summer surveys. In the last column (average over 2000-2001), the vertical lines show the medians of the distributions.

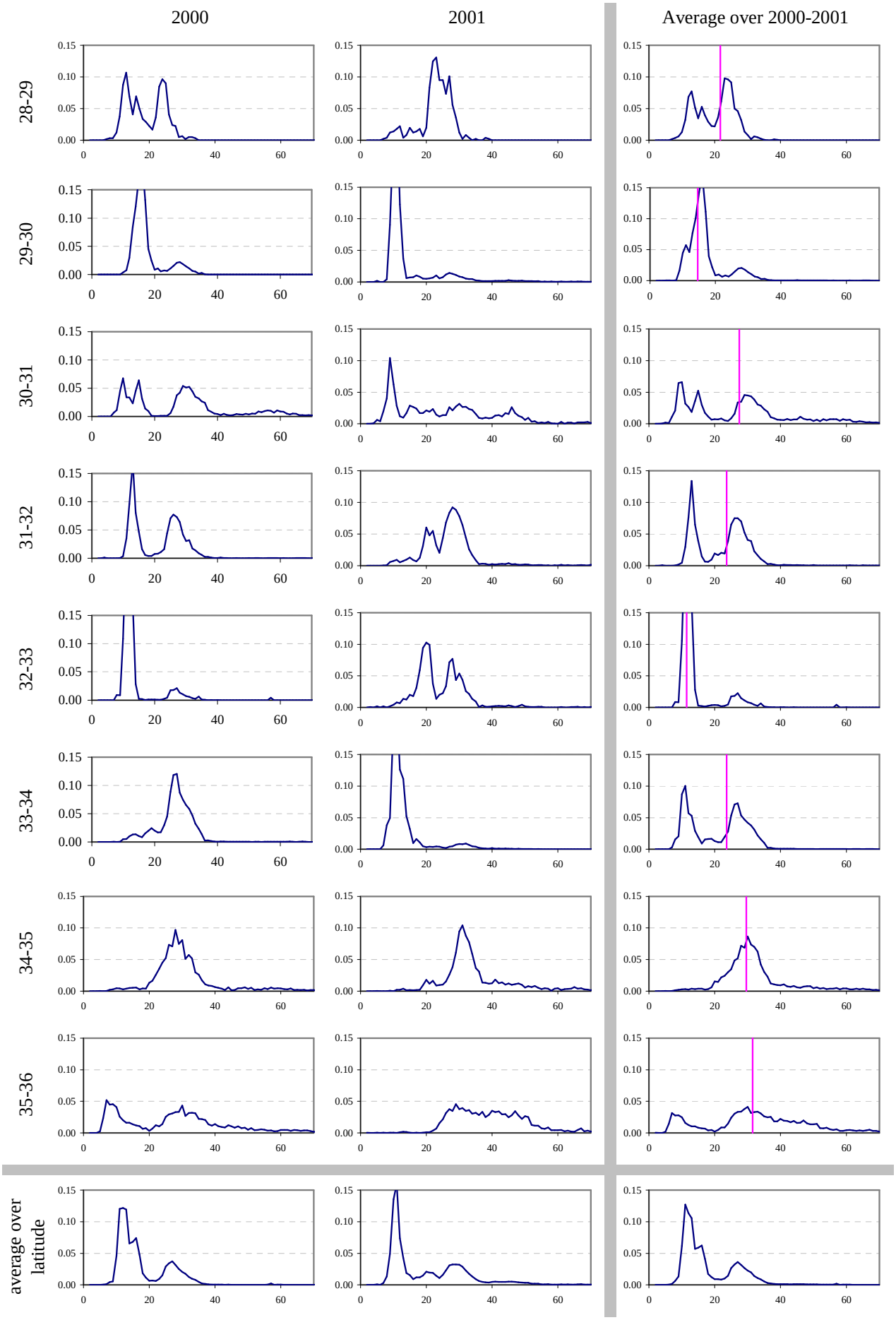

Fig. 3: Length frequency distributions by latitude for ***M. capensis*** from the 2000 and 2001 *Nansen* South African west coast summer surveys. In the last column (average over 2000-2001), the vertical lines show the medians of the distributions.

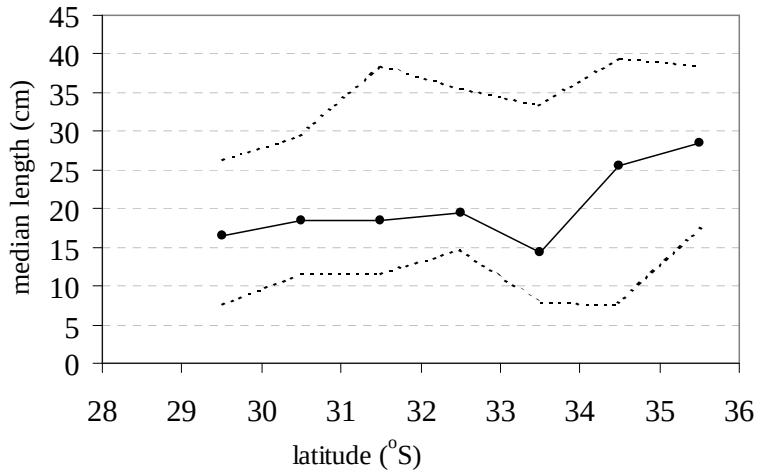

Fig. 4: Median length for ***M. paradoxus*** by degree latitude from the 2000 and 2001 *Nansen* South African west coast summer surveys. The dashed lines show the 95%-iles.

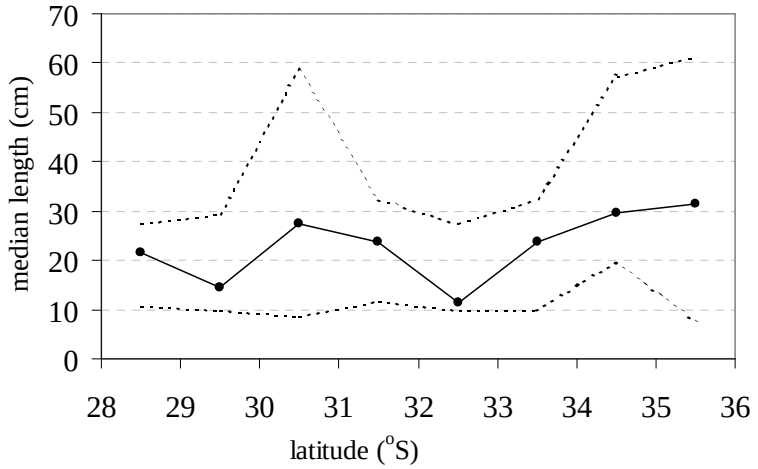

Fig. 5: Median length for ***M. capensis*** by degree latitude from the 2000 and 2001 *Nansen* South African west coast summer surveys. The dashed lines show the 95%-iles.

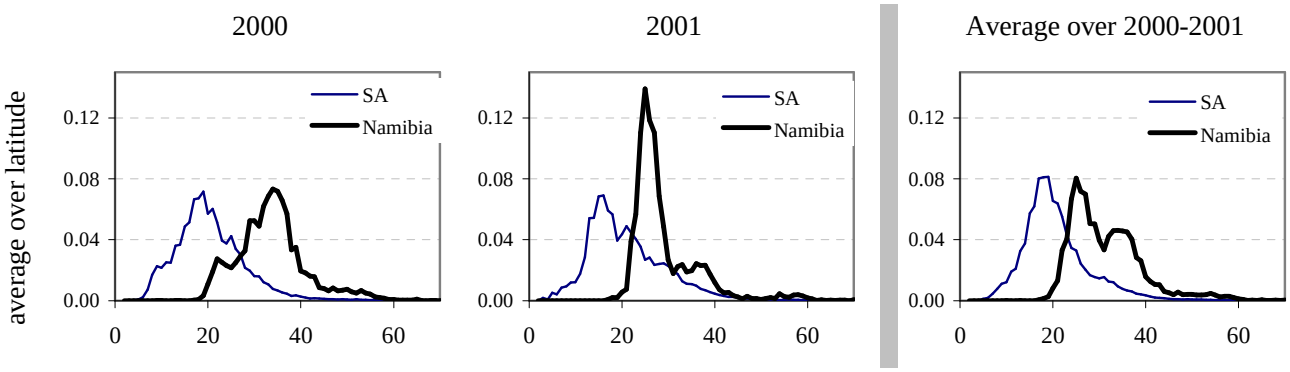

Fig. 6: Length frequency distributions for ***M. paradoxus*** from the 2000 and 2001 *Nansen* Namibian and South African west coast summer surveys.

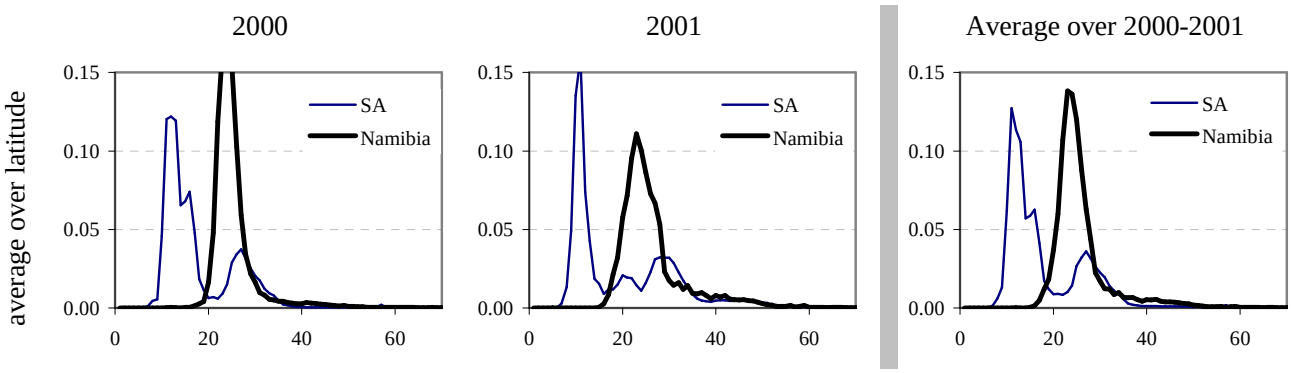

Fig. 7: Length frequency distributions for ***M. capensis*** from the 2000 and 2001 *Nansen* Namibian and South African west coast summer surveys.