

South African hake resource – collation of some biological information

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1. Length and age-structure

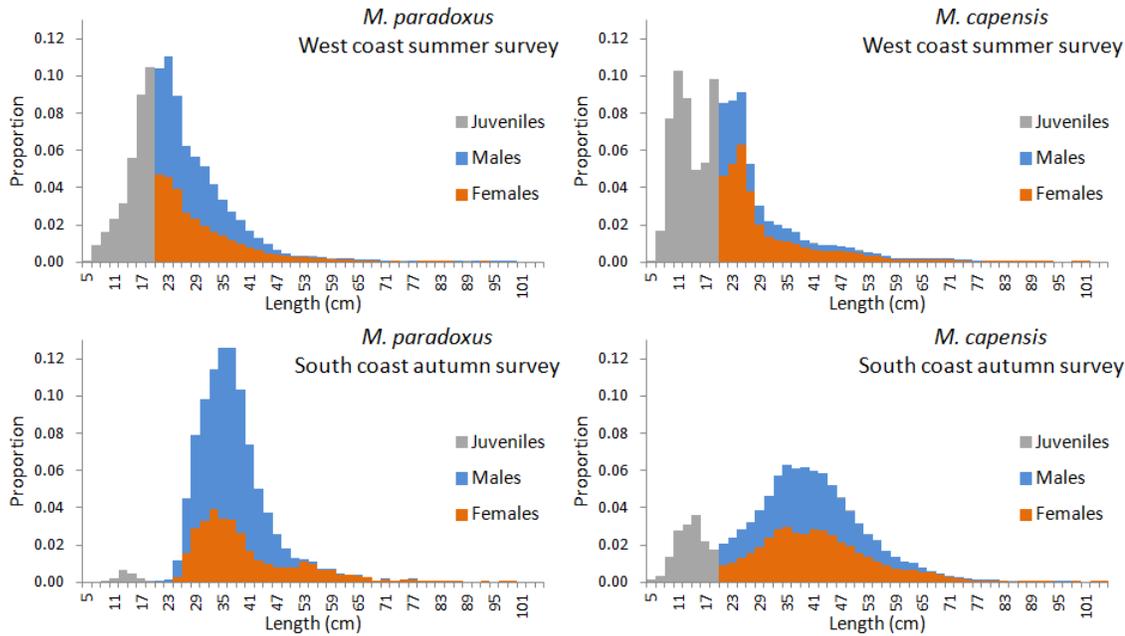


Figure 1: Observed sex-disaggregated length distribution (averaged over the last five year's data) from the west coast summer and south coast autumn surveys for *M. paradoxus* and *M. capensis*.

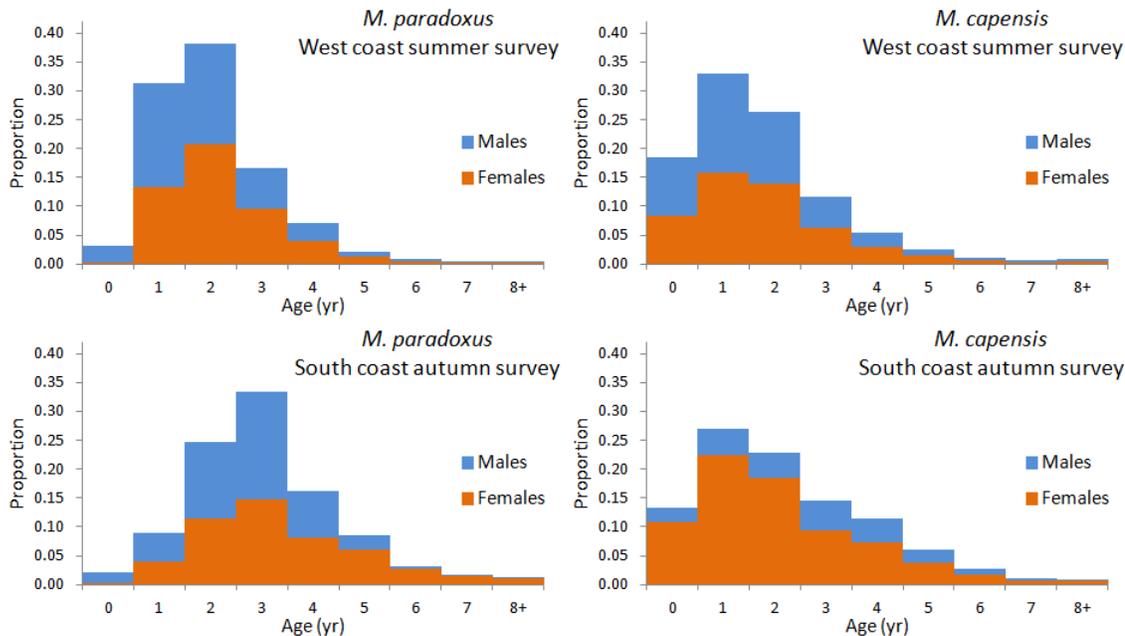


Figure 2: Predicted (RS1 assessment) sex-disaggregated age distribution (averaged over the last five year's data) from the west coast summer and south coast autumn surveys for *M. paradoxus* and *M. capensis*.

2. Growth curves

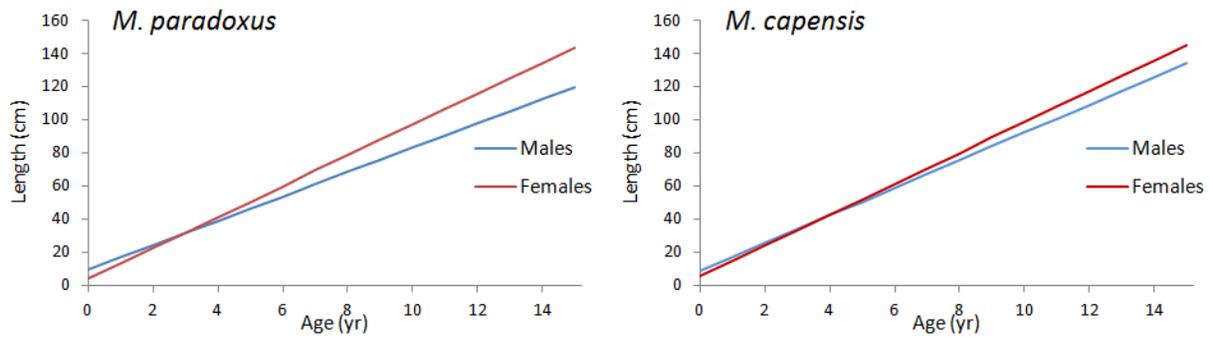


Figure 3: Estimated (RS1 assessment) growth curves by sex for *M. paradoxus* and *M. capensis*.

3. Age-specific survival and fecundity

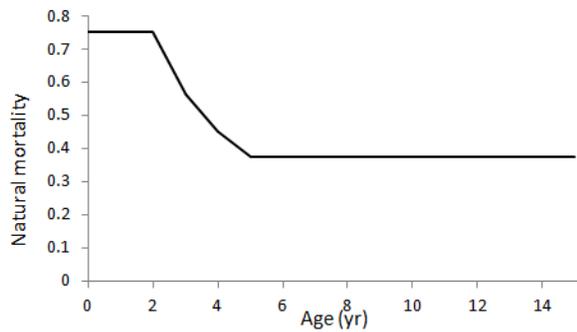


Figure 4: Natural mortality-at-age assumed for the Reference Case (RS1) for both *M. paradoxus* and *M. capensis* and for both sexes.

Fecundity (taken from Osborne *et al* 1999):

M. capensis: 417 205 ± 64 568 (SE) eggs-female⁻¹ (range = 147 600-723 658)

M. paradoxus: 374 375 ± 45 562 (SE) eggs-female⁻¹ (range = 121 731-710 901)

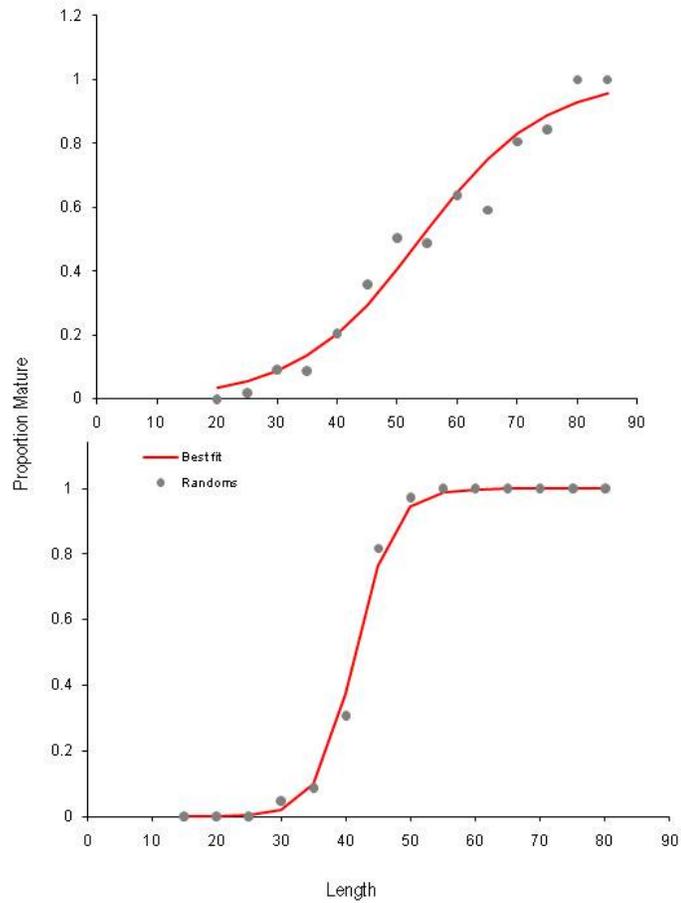


Figure 5: *M. capensis* (a) and *M. paradoxus* (b) length at 50% maturity (dashed line). Taken from Singh *et al* 2011.

4. Generation length

M. paradoxus: 7 years

M. capensis: 6 years

5. Time and location of spawning (taken from Smith and Japp 2009)

Time of spawning:

Both species appear to spawn throughout the year, but most spawning occurs between July and September, with a peak in August. There may be a second peak in March/April for *M. paradoxus*. This timing also seems to apply to hake (*M. capensis*) in Namibia.

Location of spawning:

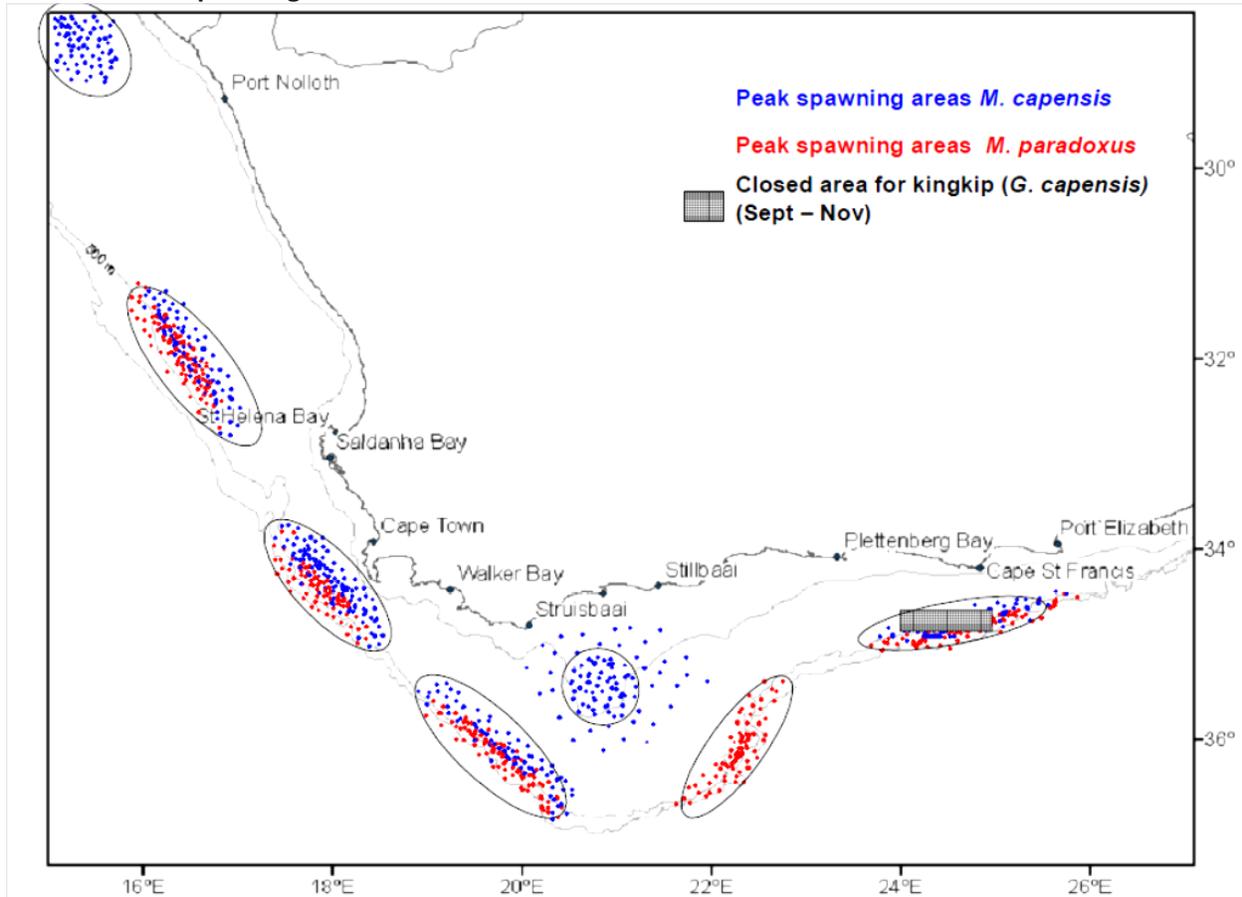


Figure 6: Spawning 'hotspots' for *M. capensis* and *M. paradoxus* redrawn from all the available historic and recent information. Spawning is concentrated off St Helena Bay, along the western and eastern edge of the Agulhas Bank (Crawford *et al* 1987) and in the Cape Town area (O'Toole 1978). Spawning also occurs on the southeast coast (Le Clus *et al.* 2005), on the central part of the Agulhas Bank and north of Port Nolloth, near the Orange Banks (Stenevik *et al.* 2008).

6. Larval biology and length of larval life

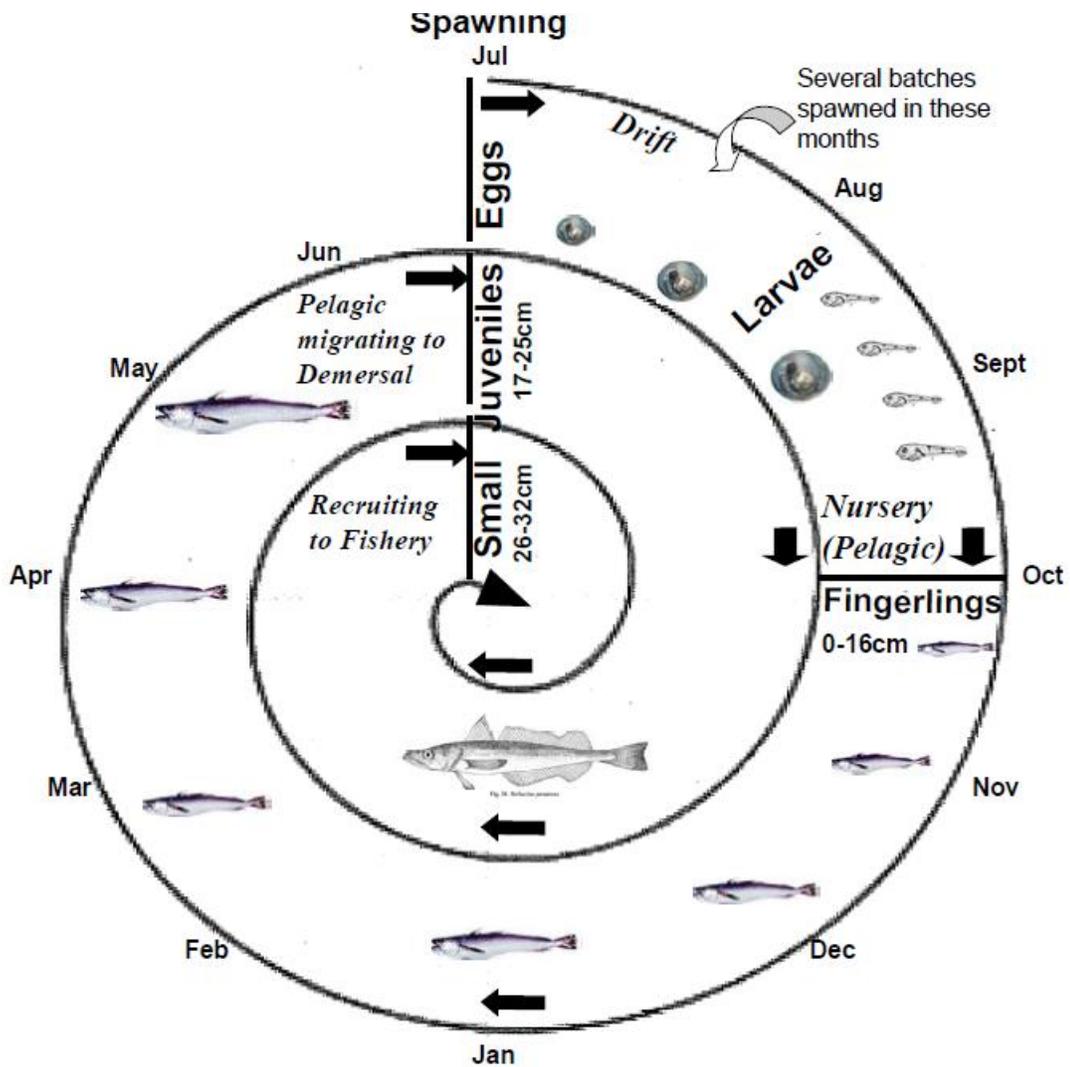


Figure 7: Conceptual illustration of the early life history of South African hake (taken from Smith and Japp 2009).

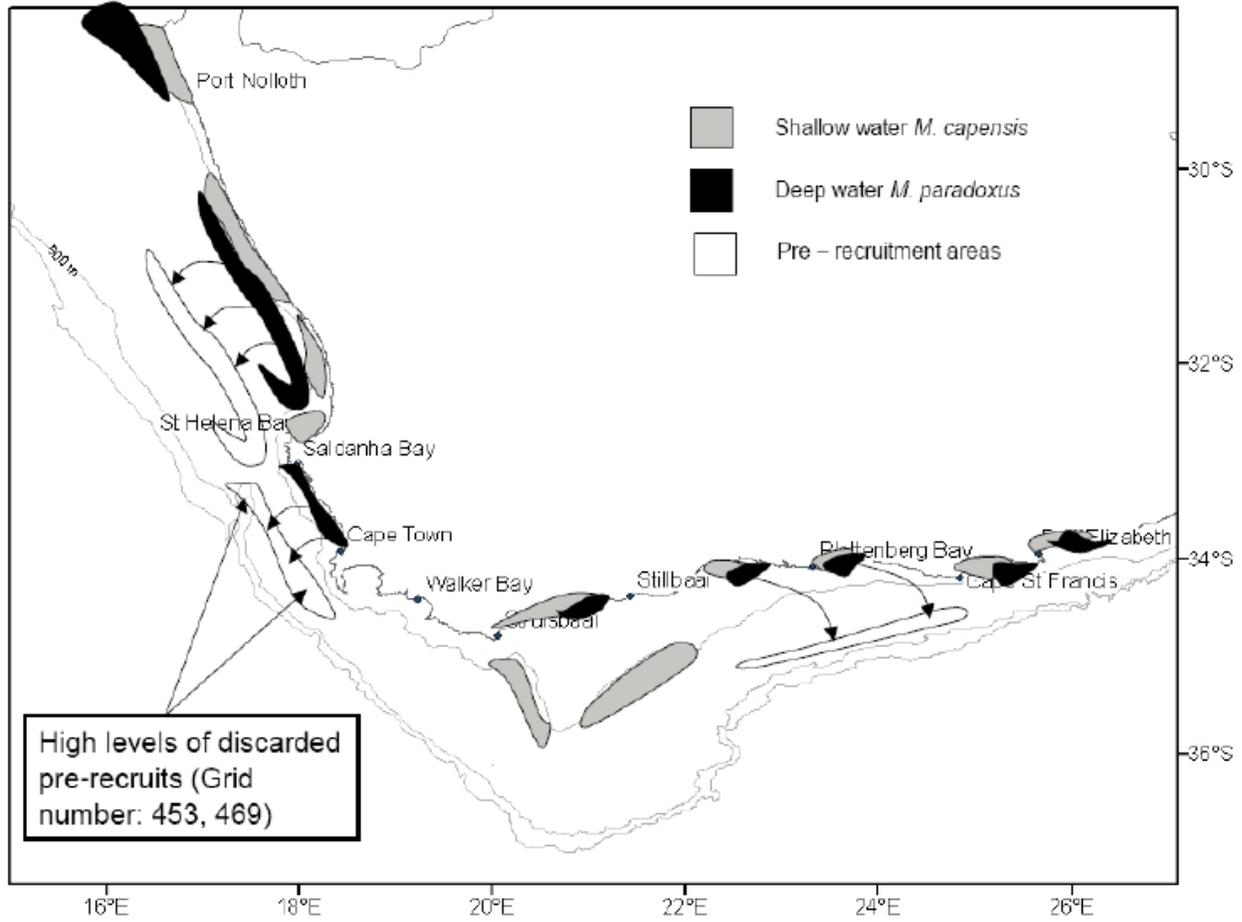


Figure 8: Main nursery grounds and pre-recruitment areas for both species of hake (taken from Smith and Japp 2009)

7. Recruitment

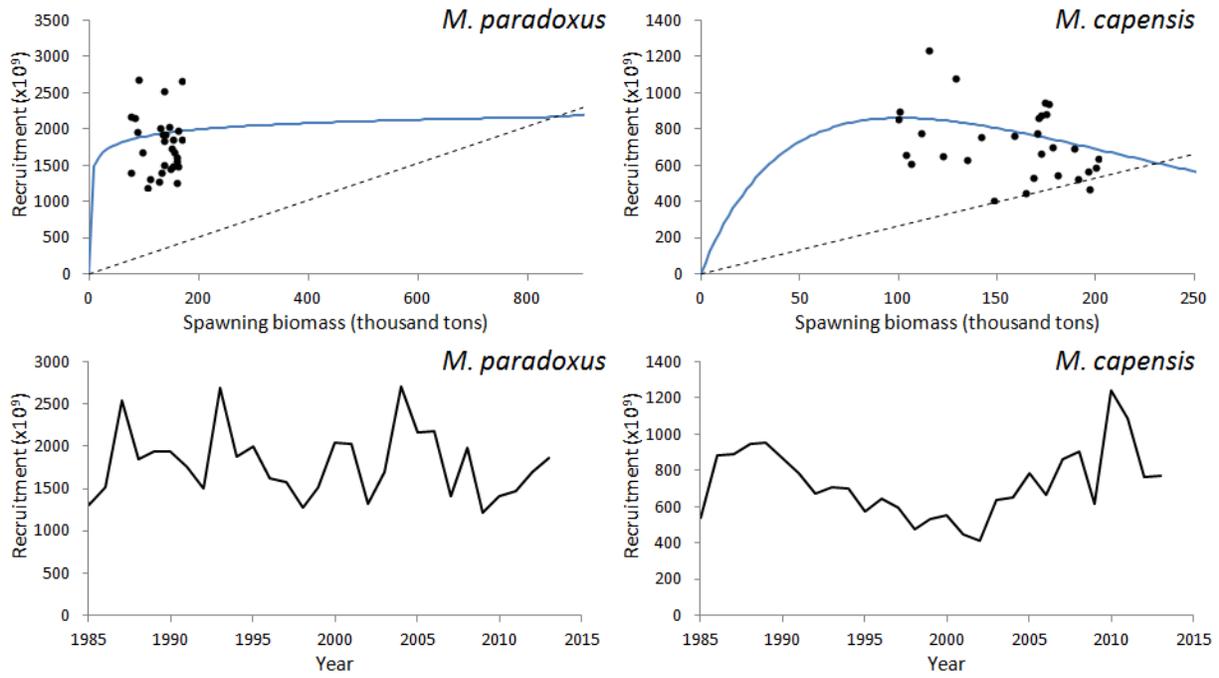


Figure 9: Estimated (RS1 assessment) stock-recruitment curves and recruitment trajectories for *M. paradoxus* and *M. capensis*