

Migration, distribution and population (stock) structure of shallow-water hake (*Merluccius capensis*) in the Benguela Current Large Marine Ecosystem inferred using a geostatistical population model - DTU Orbit (08/11/2017)

Migration, distribution and population (stock) structure of shallow-water hake (*Merluccius capensis*) in the Benguela Current Large Marine Ecosystem inferred using a geostatistical population model

Shallow-water hake (*Merluccius capensis*) is of considerable ecological and economic importance in the Benguela Current Large Marine Ecosystem in South Africa and Namibia. Optimal management of the resource is currently constrained by the limited understanding of migration patterns and population (stock) structure. We combined data from multiple demersal trawl surveys from the entire distribution area to estimate growth rate, mortality and spatial and temporal patterns of *M. capensis*. Analyses were conducted using the geostatistical model GeoPop. The complexity of the model and the amount of data required a new level of soft- and hardware performance. This was achieved by utilizing Template Model Builder and high-end computational hardware (Amazon Elastic Compute Cloud, EC2). The data and the model enabled us to follow the distribution and infer movements of *M. capensis* from the recruitment/nursery areas, through the juvenile phase and the adults' migration to the spawning areas outside/upstream of the nursery areas. This revealed some previously unknown migration patterns and indicated natal homing and the existence of three primary population components in the region, namely the Walvis (central and northern Namibia), the Orange (Southern Namibia-Northern SA) and the Agulhas (Southern part of SA) components. Our results also indicated substantial regional differences in mortality. We recommend that fisheries assessment, advice and management take consideration of these aspects of the distribution and population (stock) structure of *M. capensis* in the Benguela Current Large Marine Ecosystem.

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Authors: Jansen, T. (Intern), Kristensen, K. (Intern), Kainge, P. I. (Intern), Durholtz, D. (Ekstern), Strømme, T. (Ekstern), Thygesen, U. H. (Intern), Wilhelm, M. R. (Ekstern), Kathena, J. (Ekstern), Fairweather, T. P. (Ekstern), Paulus, S. (Ekstern), Degel, H. (Intern), Lipinski, M. R. (Ekstern), Beyer, J. (Intern)

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