

“RIVER” MODEL OF THE IMPACT OF PELAGIC FISHING ON PREDATOR BREEDING COLONIES ON THE SOUTH AFRICAN WEST COAST

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The dominant feature of the distributional dynamics of sardine and anchovy in the near-shore region of the South African west coast is the annual southward movement (“run” or “river”) of the recruits of the year. Aided by the coastal counter-current, these fish move from the more northern regions to which they were carried as larvae, to join concentrations of adult fish on the Agulhas Bank where spawning takes place.

This “run” usually commences about March and continues to about September. Breeding seabirds at colonies off the west coast rely on the fish in this run for food. These include the penguins at Dassen and Robben islands which lie in the path of this river of recruits at the time the adults are feeding their chicks.

Fishing in the vicinity of breeding colonies acts to reduce the local abundance of sardine and anchovy, but the question arises of whether such a reduction is partially or even fully offset by the replacements provided by the flow of the recruit river from the north. Equally it is also important to consider whether the timing of such replacements is too slow to offset local decreases in pelagic fish density that are needed by foraging seabirds.

Assessment models, based on the annual May recruitment and November biomass surveys, provide estimates of the annual integrated flux of recruits in this river. The basic idea underlying the analyses envisaged is to link this information to oceanographic data on current movements so as to model the flux of anchovy and sardine recruits down the west coast (and past the Dassen and Robben island penguin colonies). Data on past pelagic catches provides information on the typical extent and timing of catches in the neighbourhood of these colonies, and the model would be used to infer the extent to which such catches reduced the average density of fish in these regions, given the rate of replenishment of fish from the recruit river flowing past from the north. The extent of such a reduction would throw light on the likelihood that fishing at various levels might have a detrimental impact on penguin reproductive success. A summary of the technical details of a possible preliminary model are given in Appendix 1 of Plagányi and Butterworth 2005.

Plagányi, É.E. and D.S. Butterworth. 2005. Modelling the impact of krill fishing on seal and penguin colonies. Workshop document presented to WG-EMM subgroup of CCAMLR (Commission for the Conservation of Antarctic Marine Living Resources), WG-EMM-05/14. (14 pp.)