Vulnerability to fluctuations in prey and predation landscape in a central place foraging marine predator

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Résumé

Human-induced environmental change is driving a global redistribution of biodiversity, resulting in shifting prey and predation landscapes. These shifting landscapes can lead to changes in behavior, health, and vital rates, with potential implications for population dynamics. In the present study, a state-dependent life-history theory model was developed to investigate the individual- and population-level responses of Australian fur seals (*Arctocephalus pusillus doriferus*) to changes in prey availability and at-sea mortality risk. Rates of pregnancy, pup nursing, and abortion were unaffected by prey availability in the simulated population. Likewise, on-land and at-sea durations were largely unaffected by prey availability, with more pronounced affects for nonreproductive and pregnant females than for lactating females. There was a strong influence of prey availability on the proportion of females that were concurrently pregnant and lactating, largely due to an increase in pup abandonments under low prey availability scenarios. This effect on pup abandonments also had flow on effects for pup recruitment. Increasing at-sea mortality risk resulted in greater offspring losses due to maternal death. The combined impact of prey availability and at-sea mortality risk on the number of simulated female offspring reaching sexual maturity was substantial. Consequently, our results suggest high vulnerability of the Australian fur seal population to shifting prey and predation landscapes. These results indicate a need for continued monitoring of Australian fur seal pup production and population dynamics in the face of rapid environmental change.

Mots-Clés: Predator, bioenergetic modelling, dynamic state variable modelling, pinniped, population dynamics, state, dependent life, history theory, stochastic dynamic programming

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