

Can population surveys show if the Mediterranean monk seal colony at Cap Blanc is declining in abundance?

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Summary

1. The Mediterranean monk seal is an endangered marine mammal with only a few populations thought to be viable. The largest aggregation of this species is found at the Peninsula of Cap Blanc, on the western Sahara, where a colonial structure is maintained. The size of this colony is estimated by annual capture-recapture surveys, but it is unclear if the attained level of precision is enough to detect changes in numbers in the short term.

2. In this study, simulated capture-recapture experiments were used to investigate the relationship between population estimates and abundance. The statistical power necessary to detect a population decline with ongoing surveys was estimated, and the requirements for an improvement in precision were evaluated. Additionally, changes in abundance over consecutive surveys were examined for comparison with an alternative method of Bayesian inference.

3. Results indicate that the power to detect trends from the actual surveys is lower than should be required for the conservation of a small population, such as the colony at Cap Blanc. A 5% annual rate of decline in abundance would only be detected with high power after 12 years, with a population of 317 seals being reduced to 172. If the annual rate of decline was 10%, 8 years would be required to detect a reduction of 317 to 136 seals.

4. Capture-recapture surveys can produce reliable data but do not identify moderate or low population declines. The increase in precision of surveys is costly and time consuming, and other monitoring methods are needed to detect early signs of a decline. Bayesian methods cannot provide a better result because they are not robust to small sample size and heterogeneity in capture probabilities. Despite the need for alternative methods for earlier detection, capture-recapture surveys are still required to estimate the size of the colony, and precision in population estimates can be evaluated in relation to cost effectiveness.

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