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Source

Title: Density dependence, prey accessibility and prey depletion by fisheries drive Peruvian seabird population dynamics

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Reference: Barbraud, C., Bertrand, A., Bouchón, M., Chaigneau, A., Delord, K., Demarcq, H., Gimenez, O., Gutiérrez Torero, M., Gutiérrez, D., Oliveros-Ramos, R., Passuni, G., Tremblay, Y., Bertrand, S. (2018). Density dependence, prey accesibility and prey depletion by fisheries drive Peruvian seabird population dynamics. Ecography, 41: 1092-1102. DOI

Summary

This study focused on how climate, population density, prey accessibility and removal of prey by fisheries influence the population dynamics of three seabird species. The authors found evidence for density dependence in the three species. And, after accounting for density dependence, sea surface temperature, prey accessibility and prey removal by fisheries were retained as the best predictors of annual population size across species. These factors affected abundances the current year and with time lags, suggesting effects on different demographic parameters.

System description

System type: Marine

Location: Peruvian coast

Latitude: -10 **Longitude:** -78

Country: Perú **Region:** South America

Study description

Methods

Data on species abundance were collected at 29 islands and headlands of coastal Peru, where most of the populations of these three species occur. Estimates of abundance were derived from maps showing the areas occupied by breeding and non-breeding birds and estimates of densities of these birds. Abundance estimates were available for each month for the three species between January 1961 and December 1982, between January 1984 and December 1989, and between January 1997 and December 2008. The mean abundance of the three species per year was taken to be an estimate of annual population size. For 1983 and 1990-1996, estimates were available only for some months. Means were also calculated for these years and taken to be estimates of annual population sizes, but the authors performed the analyses with and without these years to test for the robustness of their results. SST and ULOMZ were obtained from in situ vertical profiles acquired by Instituto del Mar del Perú and from the World Ocean Database. Anchovy biomass removed was estimated from annual time series of landings of anchovies and from anchovy secondary production. This second data source was estimated from acoustic surveys of biomass and length structure data from scientific surveys and fishery landings.

Community type: Non-trophic

Start year: 1966 **End year:** 2008 **Duration:** 43 years

Number of species: 3

Species	Start	End	Count	Missing	Units
Phalacrocorax bougainvillii	1966	2008	43	0	ln of number of individuals
Sula variegata	1966	2008	43	0	ln of number of individuals
Pelecanus thagus	1966	2008	43	0	ln of number of individuals

Number of environmental variables: 3

Species	Start	End	Count	Missing	Units
Sea surface temperature	1966	2008	43	0	Degrees Celsius
Depth of the ULOMZ	1966	2008	43	0	Meters
Proportion of anchovy biomass fished	1966	2008	43	0	

Comments: