As the northern elephant seal Mirounga angustirostris population increases, new rookeries are being established in unexpected locations, posing a number of threats for humans, the elephant seals, and other animals. The goal of this study is to model rookery placement evaluating the hypothesis that rookeries are correlated with major bathymetric features. Logistic regression analyses were done using distance from rookeries to combinations of bathymetric variables including seamounts, banks, isobaths, and escarpments. Using Akaike Information Criterion (AIC) weights, our analyses suggest that rookeries are most likely to occur near seamounts/banks and the 400 m isobath. Akaike weight averages (importance values) indicate that the distance to seamounts and banks are the most important factors. Future studies can utilize our models to assess new rookery locations. This predictive ability may help guide local development policies and mitigate future conflicts.

Results: AIC Weights

The best model (AIC weight 0.196) included the 400 m isobath and seamounts & banks (Table 1). Standardized coefficient values were -13.741 (400 m isobath) and -4.796 (seamounts & banks). The second best fit model (AIC weight 0.182) included the 200 m isobath and seamounts & banks (Table 1). The model with no relationship between rookery location and bathymetric features had a weight value of zero. Importance values for each variable were: seamounts/banks= 0.871, 400 m isobath= 0.572, 200 m isobath= 0.554, escarpments & ridges= 0.342, and Northings= 0.262.

Future Work

Future models could be refined by including rookeries on several islands off Baja, they were not assessed due to lack of bathymetry data. A more complete model could also include beach characters, degree of protection from waves, upwelling zones, and currents.

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Literature Cited


Conclusions and Policy Implications

The model comparisons suggest that elephant seal rookery placement is not random; a short distance to seamounts, banks, the 200 m isobath, and the 400 m isobath are important factors for rookery location. Seamounts and banks were the most important variables, which highlights their ecological significance and provides support for their protection.

We imply that rookeries located near seamounts and banks may thrive because they provide rich food sources for naïve weaned pups. Adult elephant seals forage in the pelagic zone at depths below 400 m, and over the continental shelf, and at the continental shelf break at depths less than 200 m (Le Boeuf and Laws 1994). Rookery location close to these depths would ensure nearby feeding areas.

In summary, the data strongly support models where proximity to a seamount and/or bank and the 400 m isobath is important to rookery location. Small rookeries should be assessed using this methodology to determine their likely success, allowing managers to preemptively implement measures to keep humans and seals safe and apart before problems arise.

Future Work

Future models could be refined by including rookeries on several islands off Baja, they were not assessed due to lack of bathymetry data. A more complete model could also include beach characters, degree of protection from waves, upwelling zones, and currents.

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