

Sex-specific diet differences in harbor seals (*Phoca vitulina*) via spatial assortment

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Abstract

The lack of recovery of Chinook salmon (*Oncorhynchus tshawytscha*) in the Pacific Northwest has been blamed in part on predation by pinnipeds, particularly the harbor seal (*Phoca vitulina*). Previous work at a limited number of locations has shown that male seal diet contains more salmon than that of female seals and that sex ratios at haul-out sites differ spatiotemporally. This intrapopulation variation in predation may result in greater effects on salmon than suggested by models assuming equal spatial distribution and diet proportion. To address the generality of these patterns, we examined the sex ratios and diet of male and female harbor seals from 13 haul-out sites in the inland waters of Washington State and the province of British Columbia during 2012-2018. DNA metabarcoding was conducted to determine prey species proportions of individual scat samples. The sex of harbor seals was then determined from each scat matrix sample with the use of quantitative polymerase chain reaction. We analyzed 2,045 harbor seal scat samples using Generalized Linear Mixed Models (GLMMs) to examine the factors influencing harbor seal sex ratio at haul-out sites and permutational multivariate analysis of variance (PERMANOVA) to examine the influence of sex and haul-out site on harbor seal diet composition. We found that the overall sex ratio was 1:1.02 (female:male) with notable spatiotemporal variation. Salmoniformes were about 2.6 times more abundant in the diet of males than females, and Chinook salmon comprised ca. three times more of the average male harbor seal's diet than the average female's diet. Based on site-specific sex ratios and diet data, we identified three haul-out sites where Chinook salmon appear to be under high predation pressure by male harbor seals. Our study indicates that combining sex-specific pinniped diet data with the sex ratio of haul-out sites can help identify priority sites of conservation concern.

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