

Modeling diet composition of free-ranging Steller sea lions using quantitative fatty acid signature analysis

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Since the mid 1970's there has been a continuous decline in populations of Steller sea lions (*Eumetopias jubatus*), in the Gulf of Alaska, Aleutian Islands and the Bering Sea. Three hypotheses invoke food limitation as the cause of reduced reproduction and juvenile survival. To evaluate the food limitation hypothesis we must be able to determine which prey species are important to the diet of Steller sea lions in these areas on a seasonal basis.

Quantitative fatty acid signature analysis (QFASA), allows the diet of a predator to be inferred based on its fatty acid composition and the distinct fatty acid composition patterns in the lipids of prey species. Ongoing studies at the Alaska Department of Fish and Game (ADF&G) and the National Marine Mammal Laboratory (NMML) collect blubber, blood and ingested milk samples from free-ranging juvenile Steller sea lions to compare the FAS of individual sea lions based on age, season and geographical area. Studies undertaken by ADF&G, Dalhousie University, NMML, University of Alaska Kodiak Gulf Apex Predator program, NMFS Auke Bay Laboratory, University of British Columbia, and University of Washington are measuring the FAS of prey species to determine the seasonal and geographic variability of fatty acid composition of prey throughout the inhabited range of Steller sea lions in Alaska.

The primary objective of this project is to facilitate the collaborative analyses and publication of these otherwise separate data sets to identify those prey species that contribute significantly to the diet of juvenile Steller sea lions during their first 2 years of life. Using QFASA and other multivariate statistical analyses, the diet of Steller sea lions within Southeast Alaska, the Gulf of Alaska and the Bering Sea ecosystems will be examined and will provide valuable information required for management and conservation decisions regarding this species.

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