

The quality of commercial fish species in Steller sea lion habitat units

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The western stock of Steller sea lions (*Eumetopias jubatus*) in the North Pacific has declined by about 81% since the mid-1960s (Loughlin et al. 1992) and was listed as "endangered" in 1995. One hypothesis regarding the decline is that Steller sea lions are nutritionally stressed and their recovery may be limited by the availability, quality, and/or diversity of their prey (Alaska Sea Grant 1993, Calkins et al. 1998, Sease and Merrick 1997, Merrick et al. 1997). The juvenile stage may be most impacted due to diving inexperience and subsequent feeding depth restrictions (Merrick et al. 1995) and offshore foraging range (Merrick et al. 1994, Merrick and Loughlin 1997). Variability in the nutritional quality of prey species has been considered as a possible explanation for variation in the success of marine mammals (Martensson et al. 1996; Croll and Tershy 1998). Criticisms of marine mammal consumption estimates have been the lack of seasonal energy density data of prey (Lawson et al. 1998; Martensson et al. 1996). We quantified the seasonal proximate composition of fish species around Steller sea lion habitat to understand the level of trophic interaction with commercial resources.

The importance of seasonal, spatial and ontogenetic variability in the energetic content of sea lion prey species has been noted but not well studied. In particular, marked species-specific seasonal and size variation in energy density has been observed in fish preyed on by seabirds and marine mammals (Hislop et al. 1991, Martensson et al. 1996). Knowledge of seasonal energetic differences is important to understanding the food requirements of Steller sea lions. It is expected that the energy density of fishes is highest in the fall and lowest prior to increases in spring plankton assemblages. Therefore, fish samples were collected in the fall near the potential maximum energy density and in early March when the accumulated effects of low food availability during the winter could be monitored.

This study targeted demersal and pelagic fishes within the foraging range of Steller sea lion haulouts. Several demersal fish species are both prey of sea lions and targets of important commercial groundfish fisheries in Alaskan waters (walleye pollock, Pacific cod, flatfishes etc.). Knowledge of the quality of prey around Steller sea lion haulouts will allow us to understand the relative importance of particular prey that are also key commercial fisheries so that the importance of protected Steller sea lion habitat can be evaluated.

The goal of this project was to determine the quality of fish species with the following objectives:

1. Quantify the quality of pelagic and ground fishes around Steller sea lion haulouts.
2. Estimate energetic availability of key Steller sea lion prey species around haulout areas based on biomass and energetic composition of fish species.
3. Compare seasonal quality of multiple commercially important fish species.
4. Make ontogenetic comparisons of the quality of multiple commercially important fish species.
5. Spatial and temporal comparisons of overall energetic densities of the fish community around the eastern side of Kodiak Island.

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