

Marine Mammals and Sea Ice Loss in the Pacific Arctic

Stomach content analysis reveals temporal changes in spotted seal (*Phoca largha*) diet composition in Alaska, 1966-2008

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Stomach content analysis as a method to study the feeding ecology of pinnipeds has largely been replaced by newer approaches, such as the analysis of stable isotopes and fatty acids, in part because few long-term datasets are available to determine whether temporal changes in diet can be detected. We analyzed the stomach contents of spotted seals (*Phoca largha*) harvested in the Bering and Chukchi seas of Alaska (1966–2008) and used logistic regression to test for temporal changes in the frequency of occurrence of prey items. Stomach contents from 175 spotted seals collected in the 1960s and 1970s were compared with 291 collected in the 2000s. Spotted seals are believed to be largely piscivorous, however, we found that a large percentage of stomachs contained invertebrates (40%). Although fishes were commonly consumed during both time periods, fish consumption was both significantly and consistently higher in the 2000s (99%; range: 95-100%) than in the 1960s and 1970s (82%; range 38-100%). Four fish species were consumed more frequently in the 2000s than in the 1960s and 1970s and at occurrences >30%: Pacific herring (*Clupea pallasii*), smelt (*Osmerus mordax*), arctic cod (*Boreogadus saida*), and saffron cod (*Eleginus glacialis*). Sculpins (Cottidae), however, were consumed less frequently during the 2000s (6%). Changes in the consumption of invertebrates were generally less consistent than changes identified in fish. The increase in fish consumption in the 2000s, however corresponded with a decrease in crustaceans consumption (32%) compared to the 1960s and 1970s (47%; $p < 0.01$). Our analysis showed that significant changes in diet can be detected using stomach content analysis. Given recent concerns regarding the status of ice associated pinnipeds due to climate change, loss of habitat, and the relative time scale of these changes, long-term stomach content datasets will be an increasingly valuable tool necessary to assess changes in pinniped feeding ecology.

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