Do stomach contents, fatty acids, and stable isotopes yield the same dietary results?

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Stomach contents, stable carbon and nitrogen isotope ratios, and fatty acid signatures are commonly used to infer the diet of marine mammals. How these methods compliment or contradict each other, however, is poorly understood. Stomach contents provide information on prey items recently consumed and are easily interpreted. Stable isotope analysis of tissues provides information on prey consumed over a longer time frame but taxonomic resolution of prey is low. Fatty acids identified in marine mammal blubber are used to determine prey items consumed and assimilated. However, modification of ingested fatty acids as well as differential use of fatty acids within the blubber layer can confound interpretation. Quantitative analysis of both stable isotopes and fatty acids require complete, regionally specific prey libraries to identify individual prey items. We applied all three methods to 36 adult bearded seals (*Erignathus barbatus*) harvested for subsistence use near Point Hope and Little Diomede, Alaska between 2004 and 2009. Fishes identified from hard parts in stomachs included sculpin (66% frequency of occurrence), cod (50%), flatfish (43%), and sand lance (30%). Invertebrate prey included crab (56%), shrimp (53%), echiurids (43%), mollusks (40%), and sponges (20%). When analyzed with a Bayesian mixing model, isotope results indicate that on average seals consumed 39% pelagic fishes, 24% crabs/flatfish, 23% shrimp/benthic fishes, and less than 10% of both echiurid/octopus and bivalve/sponges. Although a regionally specific prey library does not exist for quantitative fatty acid analysis, fatty acid data from the literature indicate that shrimp, sculpin, pelagic fishes, and benthic invertebrates were consumed. The three methods yielded different but not necessarily contradictory results. However, until prey libraries and more specific mixing models are developed, analysis of stomach contents will provide the most reliable description of bearded seal diet in Alaska.

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