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EXAMINING THE POTENTIAL CONSEQUENCES OF CLIMATE-INDUCED PREY SHIFTS ON BELUGA WHALES IN THE BEAUFORT SEA

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Beluga whales (*Delphinapterus leucas*) are a sea-ice associated marine mammal and potential indicator species for Arctic climate change. The Beaufort Sea beluga population is one of Canada' largest and is an important traditional harvest to the people of the Inuvialuit Settlement Region. During the summer, belugas migrate from the Bering to the Beaufort Sea and segregate by sex, reproductive status, and size into different habitats based on sea ice concentration. Changes in sea ice due to climate change may have indirect effects on the primary production of Arctic food webs and affect the availability of important lipid-rich prey, such as Arctic cod, to belugas. The resilience of Beaufort Sea beluga whales to climate change will depend on their ability to adapt to changes in prey dynamics. In this study, we established a baseline for health and physical condition of Beaufort Sea belugas and investigated dietary linkages using fatty acid signatures. Blubber was divided equally into three sections, the inner, middle, and outer layers for fatty acid analysis, under the hypothesis that fatty acids in important prey will be similar to those in the inner blubber layers. A prey species were obtained from the Beaufort Regional Environmental Assessment (BREA) program, the first comprehensive baseline study of marine fish diversity in the Canadian Beaufort Sea. In order to examine potential behavioural and physiological vulnerabilities of belugas, we examined oxygen storage capacity in belugas, by measuring hemoglobin, hematocrit, myoglobin concentrations, and spleen size as indicators of diving ability. Fatty acids in beluga blubber were stratified with blubber depth, with the proportion of monounsaturated fatty acids lowest in the inner blubber layers and highest in the outer layers. On the other hand, polyunsaturated fatty acids increased with increasing blubber depth, and were found predominately in the inner blubber layers. Fatty acid signatures of potential prey species will be analyzed in comparison to the fatty acid signatures of the inner blubber layers of beluga. Physiological differences in oxygen storage capacity were found between adult male and female belugas, which may reflect differences in diving ability. The relationships between specialized diving physiology, behaviour, and diet will be used to predict vulnerabilities and responses of belugas to changing environmental conditions. Using my data, I plan to develop a bioenergetic model to calculate consumption rates of the beluga population in order to predict potential changes in prey dynamics on energetic requirements.