

Informing best practices for field body condition assessments of wild Arctic seals

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Due to rapidly warming conditions in the Arctic, empirical demographic and physiological data are needed for marine mammals to support predictions of population-level responses. Specifically, the ongoing Unusual Mortality Event of Alaskan ice seals declared by NOAA since June 2018 highlights the urgent need to accurately monitor the health status and body condition of these species. In seals, body condition is commonly evaluated via morphometrics and blubber content, which provide important metrics of individual health; however, comprehensive assessments of ice seal body condition are difficult to conduct in the field. We evaluated the efficacy and accuracy of various simple metrics of body condition by working with captive seals to help inform field sampling methods for wild individuals. We used fine-scale and longitudinal morphometric data to calculate total blubber content for one bearded (*Erignathus barbatus*), three ringed (*Pusa hispida*), and four spotted (*Phoca largha*) seals over three years. We then performed regression analyses to evaluate how well seven different body condition metrics correlated with our comprehensive assessments of blubber content. Metrics that utilized measures of blubber depth worked well across all species, while those relying on length-girth relationships were either species-specific or poor indicators of body condition. Length-girth relationships are common metrics for assessing body condition of marine mammals using Unmanned Aerial Vehicles (UAVs), which can evaluate a large number of individuals in a short period of time using aerial images. Our data support the use of UAVs as a promising new technology for body condition assessments in Alaskan seals. Continued work with captive seals of known body condition could help to refine and establish best practices for use of UAVs with wild seals. The results presented here should aid in improving field sampling efforts and provide valuable information for conservation decision-making as climate change continues to threaten Arctic seal populations.