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## LIFE ON THE FRINGE: MUSKOXEN IN THE ALASKAN ARCTIC

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The Arctic is experiencing some of the most dramatic temperature changes on the planet. Species at the edge of their range often confront conditions that differ from those in the center—to the extent that the persistence of peripheral populations might be more challenged if bioclimatic factors rule. An indisputable Arctic-adapted species are muskoxen (*Ovibos moschatus*) which occur at their historic southwestern terminus in Arctic Alaska. We instigated a multi-year project to assess sources of variation in demography, attendant life-histories, and vital rates by contrasting populations on National Park Service and adjacent lands at Bering Land Bridge and Cape Krusenstern. A major challenge of Arctic work is expense; in lieu of handling large numbers of animals, we present a simple non-invasive method to predict body mass in young and sub-adults. We used photogrammetry to document head sizes at known distances and angles on more than 300 wild muskoxen from four age cohorts ( 1 to 3 yrs, and older). With head size parameters calibrated on captive individuals, 85 percent of the variance in body mass was explained for animals < 4 yrs of age. Accuracy diminished at > 65 meters and as animals reached puberty, the latter because nutrients allocated for skeletal growth are re-directed to meet reproductive demands. We believe that our ability to associate changes in mass/yr with abiotic and biological factors and survival will enhance opportunities to test hypotheses about causes and correlates of variation in population persistence.