

RESPONSE OF AN AVIAN HERBIVORE TO SEVERE HABITAT
DEGRADATION REVEALED USING NATURAL ABUNDANCES
OF STABLE ISOTOPES

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ABSTRACT

We used natural abundances of stable isotopes in combination with gut content analysis to determine foraging behavior of lesser snow goose (*Chen caerulescens* L.) (LSG) goslings in freshwater marsh and tidal marsh at La Pérouse Bay (LPB). In southern Hudson Bay, the two dominant tidal marsh graminoid species, *Puccinellia phryganodes* and *Carex subspathacea*, are easily digestible and contain more protein and important minerals for skeletal growth than alternative forage species that are common in the surrounding freshwater marsh. We tested the hypothesis that goslings require high quality tidal marsh plants early in growth and evaluated the prediction that goslings switch from foraging in degraded tidal marsh to foraging in freshwater marsh only after they have reached a certain threshold size. Sulfur and nitrogen isotopes were used as tracers in our study because plants eaten by goslings that were collected in tidal marsh habitat were enriched in both ^{34}S and ^{15}N ($10.89 \pm 3.27\text{‰}$, $2.28 \pm 1.17\text{‰}$, respectively) compared with plants eaten by goslings that were collected in freshwater marsh habitat ($6.89 \pm 2.83\text{‰}$, $1.09 \pm 1.37\text{‰}$, respectively). We detected significant intra- and inter-specific variation in isotope values from plants we collected that was quite different than that found in the same plant species eaten by goslings. Sulfur and nitrogen values of tissues from goslings collected in freshwater marsh habitat clearly indicated that these goslings fed in freshwater marsh habitat throughout growth. Gut content analysis confirmed that goslings collected in freshwater marsh habitat mostly ate lower quality sedges and some grasses just after peak hatch, and then mostly ate a variety of sedges and *Equisetum variegatum* when older. Sulfur and nitrogen isotope values of tissues from goslings collected in tidal

marsh habitat indicated that goslings switched habitats during growth, although isotopic variation within plant species and variation in plant species in gut contents through growth, made interpretation difficult. Goslings collected ca. 1 week after peak hatch in tidal marsh habitat mostly ate easily digestible and highly nutritious tidal marsh graminoids, whereas older goslings collected in tidal marsh habitat usually ate these plants plus a variety of lower nutritional quality grasses and sedges. Gosling body size measurements indicated that a combination of freshwater marsh plant species may be adequate to meet the nutritional needs of growing LSG goslings. However, goslings sampled from both freshwater and tidal marsh habitats at LPB in 2005 were significantly smaller in size and lighter than goslings measured in the early 1980s. Future research and monitoring is needed at LPB to focus on the impact of brood rearing by LSG families on the freshwater marsh habitat, which is important habitat for many Arctic species.