A ~1,200 year record of common eider population trends from the Eastern Canadian Arctic

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Abstract

Long-term monitoring data for seabird populations are often lacking, limiting the ability to set effective conservation goals. To address this, lake sediments and thick peat deposits receiving bird guano inputs can be used to track past changes in population size and dynamics. Here, we compare both archives for reconstructing population trends in a common eider (*Somateria mollissima borealis*) colony in Digges Sound in northeastern Hudson Bay, Canada. Seaduck nesting history was tracked using stable nitrogen isotopes ($\delta^{15}N$) and metal(loid)s, and these data were compared to climate reconstructions for the North Atlantic Oscillation, spring air temperature and sea surface temperature. Peat accumulation began around ca. 950 CE, along with high $\delta^{15}N$ values, suggesting the establishment of the eider colony. We found local eider population on the island was greatest during the Little Ice Age (~1600-1800 CE). We suggest that the island's high elevation (18 m asl) offered more ice-free nesting area and lower predator access during colder periods. Both records capture declines in eider populations during the post-industrial era (after ~ca.1850 CE), with the peat record indicating the lowest guano input of the past 1200 years. This confirms that the 20th century population decline was unprecedented within the eider nesting history.

Keywords: paleoecology, seaducks, sub-Arctic Canada, peat archive