

# Ornithogenic vegetation: how significant has the seabird influence been on the Aleutian Island vegetation during the Holocene?

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April 29, 2021

## Abstract

We have studied the long- and short-term periods of seabird influence on coastal vegetation. In the Aleutian Islands during the Holocene, terrestrial predators were virtually absent; as a result, large seabird colonies thrived along the coasts or across entire islands. Bird guano enriches the soil with nitrogen, which can lead to the formation of highly modified ornithogenic (bird-formed) ecosystems. The vegetation of several Aleutian Islands has been reconstructed; however, only the vegetation on Carlisle Island had noticeable impact from the seabird guano. For more detailed investigation of bird influence, we conducted pollen analysis to reconstruct the 9,300-year-old vegetation dynamics of the coast of Shemya Island. From earlier studies of nitrogen isotopes in peat, we discovered that a large seabird colony existed on Shemya from 4600 to 2400 years ago, and birds also influenced coastal ecosystems between 1470–1160 and 810–360 years ago. In these sequences, the tundra dominated by Ericaceae dwarf shrubs initially spread on the coast. During a period of at least 2200-years nitrogen enrichment led to the development of herb meadows with a high presence of Apiaceae. After a noticeable reduction in seabird colonies due to human hunting, grass-meadows spread. During the late Holocene several hundred years of seabird impact led to an increase in abundance of indicator taxa, ferns and umbelliferous species, as well as in total pollen concentration, but this did not result in a radical change of dominants. In recent decades, due to the extinction of the bird colonies, heather communities have begun to spread on the Shemya coast. Also large ash emissions in the Aleutian Islands can lead to a decrease in pollen concentration even in peat located far from an eruption.

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