

Bird droppings provide clues to environmental change

January 23 2020, by Anne Craig



A sediment core collected from Baccalieu Island. Credit: Matthew Duda

Queen's University researchers John Smol and Matthew Duda have identified concerning trends in a vulnerable seabird.

Led by Queen's researchers, a collaborative research team of Canadian universities (Queen's University, University of Ottawa, Memorial University of Newfoundland) and government scientists have identified concerning trends in the [population](#) size of Leach's Storm-petrels, a vulnerable [seabird](#) that mainly lives on Baccalieu Island, 64 km north of St. John's, Nfld.

The study led by Matthew Duda, and co-authored by John Smol, suggests that marine wildlife, including the Leach's storm-petrel, are not only confronting a range of recent human-induced pressures, but are also responding to longer-term [environmental factors](#).

"The seabirds act as 'environmental engineers' by depositing large volumes of nutrient-rich feces and other refuse, thereby changing the aquatic and terrestrial landscape," says Dr. Smol, a biology professor and the Canada Research Chair in Environmental Change at Queen's University. "By taking [sediment cores](#) from storm-petrel impacted ponds, we can reconstruct past population trends going back centuries or millennia, where many important clues lay hidden."

The researchers took advantage of the fact that storm-petrels build burrow nests on islands, often around freshwater ponds. Therefore, the ponds' sediments preserve the effects of changes in the amounts of seabird fecal matter and provide a "history book" of past changes in the environment.

Using a variety of biological and chemical indicators in dated sediment cores, the researchers could track changes in seabird populations going back more than 1,700 years.

Ongoing observations indicate that the seabird population has been declining in recent decades, but that striking changes have also occurred in the past, prior to [human impacts](#).

"Our approach identified striking changes in the colony size of storm-petrels on Baccalieu Island," says Matthew Duda, Queen's University [doctoral candidate](#) in the Paleoecological Environmental Assessment and Research Laboratory (PEARL). "First, we confirmed that the population has been declining since the 1980s. More surprisingly, however, we determined that the current colony underwent marked changes in the past, including rapid growth in the early-1800s. Furthermore, we identified an earlier colony about 1,500 years ago that declined without the influence of human stressors. So now in response to the ever-increasing pressure imposed by human activity, the situation is likely even more risky for this important oceanic bird."

The authors caution that their paleoecological data further reinforce the fragility of seabird colonies and the critical need for evidence-based management.

The research was published in *Proceedings of the Royal Society B*.

More information: Matthew P. Duda et al. Striking centennial-scale changes in the population size of a threatened seabird, *Proceedings of the Royal Society B: Biological Sciences* (2020). [DOI: 10.1098/rspb.2019.2234](#)

Provided by Queen's University

Citation: Bird droppings provide clues to environmental change (2020, January 23) retrieved 20 April 2024 from <https://phys.org/news/2020-01-bird-clues-environmental.html>

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