

The Kermode bear (*Ursus americanus kermodei*) is a white variety of black bear that is found only in small island populations and in populations on the coastal mainland of British Columbia. Known to local Aboriginal peoples as the spirit bear, the Kermode is rare and people are unclear about how best to ensure its survival. Scientists know that its white coat colour is due to a recessive allele. They rely on bear counts and DNA testing of hair samples to estimate the frequency and distribution of this allele.



Estimated Frequency of White Kermode Bears on Two British Columbia Islands		
Location	Gribbell Island	Princess Royal Island
Frequency of White Bears	0.3	0.1

Use the information and preceding table to answer the following Analysis questions.

Analysis

- 1.) What is the frequency of the white coat genotype in the Kermode bear **population** of Gribbell Island?

- 2.) What is the frequency of the white coat genotype in the Kermode bear **population** of Princess Royal Island?

- 3.) What is the frequency of the heterozygous genotype for coat colour in the Kermode bear population of Gribbell Island?

- 4.) What is the frequency of the heterozygous genotype for coat colour in the Kermode bear population of Princess Royal Island?

- 5.) Why do you think the frequency of the white coat allele is different on Gribbell Island and Princess Royal Island?

- 6.) Why do you think some conservationists are concerned about inland black bears having access to the coastal bears' territories?

- 7.) Scientists are unsure if Kermode bears select mates based on coat colour. Do you think this form of non-random mating might affect coastal black bear populations?

The largest duck in the northern hemisphere is the common eider (*Somateria mollissima*), which can live for 20 years. Four common eider varieties breed in Canada, and some of these migrate. Hunting and egg harvesting have put pressure on their populations. On the island of Newfoundland and in southern Labrador, the common eider population is especially low.



In an effort to turn around a major dip in the province's common eider populations, in the 1990s volunteers were issued special permits to act as surrogate mothers to common eider eggs—and the chicks that followed. After the eggs were hatched in incubators, the volunteers banded the maturing chicks (so that biologists would be able to keep track of them), and then released the maturing chicks at sea. Nesting shelters were also set up in natural areas to make it safer for the mothers to look after their small clutches of eggs.



In contrast to the common eider, the Newfoundland pine marten (*Martes americana atrata*) is found only on the island of Newfoundland. It cannot interbreed with other members of its species on the mainland. The island pine marten population has been separated for nearly 10 000 years. Once listed as endangered, its status improved to threatened in 2007; by 2017, its numbers were increasing. Key reasons for the rebound likely include more prey to eat and changes to trapping practices so that fewer pine martens were captured by accident.

Analysis

- 1.) Sources disagree about how much recovery there has been in the common eider populations of Newfoundland and Labrador. What would you need to find out in order to decide? How could the evidence be collected?

- 2.) In some common eider populations, mates stay together for several years. Do you think this will help or hinder a captive breeding program? Explain your answer.

- 3.) How does genetic diversity differ between migratory and non-migratory populations of common eider?

- 4.) Some scientists suggest that it would be better to protect networks of islands where the sea ducks breed than to focus conservation efforts on a single group of common eiders. What do you think is their reasoning?

- 5.) The Newfoundland pine marten's gene pool is distinct from that of mainland pine martens. Why are biologists concerned about the lack of diversity in the island pine marten's gene pool?

- 6.) Would a Newfoundland Pine Marten population achieve Hardy-Weinberg equilibrium? Explain.
