

Separate and distinct

Kelly Foss

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A genetic study has given Memorial researchers new insight into the origin and evolution of the Island of Newfoundland's caribou population and has won recognition from Canada's leading genetics journal.

Their findings are available in a recently published [paper](#) based on Corinne Wilkerson's (M.Sc.'10) thesis and co-authored with Dr. [Steve Carr](#), Department of Biology, Faculty of Science, and [Shane Mahoney](#) (B.Sc.(Hons.'77), M.Sc.'80), a conservationist/wildlife manager.



Caribou on the Island of Newfoundland.

Photo: Isabelle Schmelzer

Genetic testing has shown Newfoundland caribou are distinct from mainland caribou. Their study was the first extensive genetic analysis of caribou in Newfoundland. It aimed to understand the genetic relationships of Newfoundland caribou among themselves and in relation to those on the mainland.

The first question the researchers were interested in was whether Newfoundland caribou could be considered a distinct subspecies.

“From the DNA sequence data, we were able to identify four genetic groups,” said Ms. Wilkerson. “Three of them, which represented the majority of samples, are distinct from mainland caribou. That supported our hypothesis that Newfoundland caribou are indeed a separate subspecies, *Rangifer tarandus terranova*.”

Closely related

While distinct, they did prove to be most closely related to caribou in Labrador and Quebec, suggesting an answer to a second question: How did caribou repopulate the island after the last glaciation 10,000 years ago?

“We know the Grand Banks of Newfoundland were above water at the time, and the accepted theory was that they retreated to a refugium [an area in which a population can survive during a period of unfavourable conditions] there,” said Dr. Carr. “This is known to be the case for other species. However, the pattern of diversity we found suggested the opposite.”

The northwestern and central populations show a great deal of genetic variation, whereas the Avalon population shows almost none.



A herd of Newfoundland caribou.

Photo: Isabelle Schmelzer

“If they first got back from the Grand Banks via the Avalon Peninsula and then spread northwestward, you would expect the opposite pattern, a lot of variation on the Avalon declining northward,” he explained.

The relatively recent ancestral connection to mainland caribou suggests instead the island animals came from Labrador and Quebec, crossing the Strait of Belle Isle and spreading northwest to southeast.

Ongoing movement

The smallest group, just three individuals, all came from the Great Northern Peninsula.

“Those individuals are more closely related to Labrador caribou and were distinct from the other island groups,” said Ms. Wilkerson. “They likely arrived in Newfoundland later and may indicate that movement across the Strait of Belle Isle is ongoing.”

The team also hoped to understand genetic structure across herds and regions on the island portion of the province.

“If a herd doesn’t have a lot of genetic variability, they are at risk from environmental disturbances, changes, or stress.” — Corinne Wilkerson

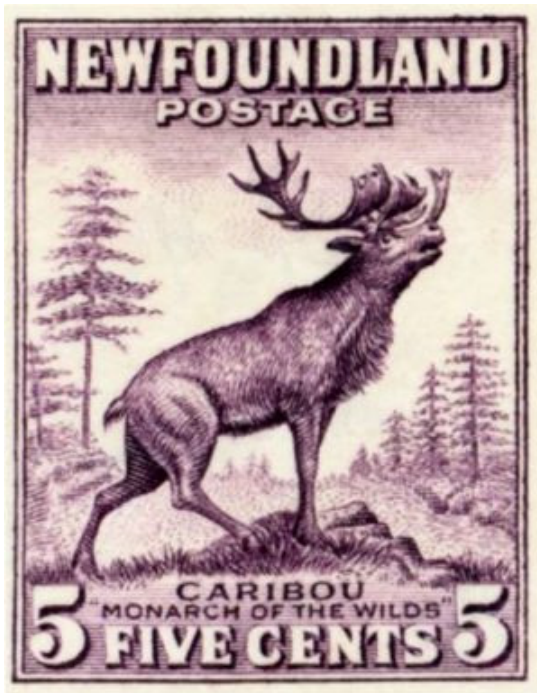
Over the years, several populations were introduced by provincial wildlife staff to regions that previously had no caribou, specifically Merasheen Island, the Cape Shore and St. Anthony.

“Because they transplanted only a small number of animals, those animals carry only a small fraction of the original genetic variation,” Ms. Wilkerson said. “If the population remains small, they continue to lose variation over time. Also, if a herd doesn’t have a lot of genetic variability, they are at risk from environmental disturbances, changes, or stress.”

The low diversity in the Avalon herd, including the introduced Cape Shore herd, is due, in part, to long-term isolation and genetic drift. There may have been no movement between the Avalon and the rest of the island for many decades, as indicated by undisturbed lichen growth on either side of the Trans-Canada Highway across the Avalon Peninsula isthmus.

Eurasian reindeer

The final question the group wanted to answer was whether reindeer, introduced to the island in the early 20th century as a source of food, interbred with native caribou. Historical records indicate that all the Eurasian reindeer had been removed or killed.



N.L. postage stamp

Photo: Submitted

The reindeer brought with them a parasitic brain worm that caused many caribou deaths, especially on the Avalon Peninsula.

“Caribou suffered significant declines from brain worms. When you have a huge population loss, you are going to lose a lot of genetic diversity,” said Ms. Wilkerson.

“We did not find any reindeer genomes among more than 200 caribou examined. If they had bred with local animals, we would have seen some evidence of persistence.”

Species at risk?

Although many questions remain, the researchers hope their findings will help the provincial government improve management of the island herds.

The population has gone through a lot of fluctuations over the years, from high numbers when

the study began to a massive decline of around 66 per cent more recently.

“Previously, the Newfoundland population was not treated differently because there was no evidence that it was genetically different. Now, we have that evidence,” said Dr. Carr. “This makes a much stronger case for assessment as At Risk by the [Committee on the Status of Endangered Wildlife in Canada](#) under the federal [Species At Risk Act](#).”

Genome journal

The paper appeared in August in [Genome](#).

Shortly after it appeared, the editor contacted Dr. Carr to say it had been selected for the editor’s choice award.

“We are very pleased with the award,” he said. “It’s recognition by the scientific community that this paper was scientifically significant, topical and of broad interest. It also means the journal will make it available free of charge to everyone.”

“It’s a huge honour,” added Ms. Wilkerson. “It’s wonderful to see the work recognized as important as it ultimately adds to our understanding of Newfoundland caribou and how they fit into the broader context of North America caribou populations.”

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