Researchers help shed new light on popular New Zealand parrot

April 2 2014

(Phys.org) —New light has been shed on the history of one of New Zealand's most distinctive and loveable native birds, the kea, and what can be done to protect this threatened species.

Researchers from the University of Otago and the University Fribourg, Switzerland, studying the genetics of the alpine parrot, have found that the genetic variation found in kea populations in New Zealand is not the result of recent human-induced population decline as was initially thought.

Senior Lecturer in Zoology at Otago Dr Bruce Robertson, who is one of the co-authors in the study, just published in the prestigious science journal *Molecular Ecology*, says their current genetic makeup is instead

due to natural re-colonisation of the alpine mountains following the last Ice Age 10,000 years ago.

The kea is the world's only alpine parrot and is renowned for its intelligence and problem-solving abilities. Restricted to New Zealand's South Island, between the 1860s and the 1970s, they were considered a pest for attacking livestock, with some 150,000 birds killed in a government sanctioned cull. The species is now protected, but numbers less than 5,000 birds and is in decline due to introduced mammalian predators.

Dr Nicolas Dussex, who undertook the research for his PhD at Otago's Department of Zoology, Dr Daniel Wegmann and Dr Bruce Robertson, sought to better understand processes that shaped the current genetic variation in the kea, with a view to guiding protection and conservation management of the birds.

The research team sampled genetic variation across the kea's range, sampling genetic material from 473 kea along the Southern Alps. They used advanced population history modeling to tease apart the impacts on the genetic structure of kea of glaciations and of human – impacts since the colonisation of New Zealand by Polynesians.

"We found that human impacts are not responsible for shaping the present-day population structure of kea, which is instead the result of recolonisation of the South Island by the kea at the end of the last ice age some 10, 000 years ago," says Dr Dussex.

The researchers' findings also make an important contribution to kea conservation.

Dr Dussex adds: "Kea populations do not need to be managed separately because this population structure is relatively recent on an evolutionary

time-scale, thus allowing conservation managers to move birds between populations as part of any conservation attempts to reverse the kea's ongoing decline."

Inferring past demography is a central question in evolutionary and conservation biology, but it is often challenging to identify the processes shaping the patterns of genetic variation in endangered species, as they have already lost a lot of variation.

"The genetic structure of populations and limited variation can reflect the natural effect of past geological or glacial events, as well as the artificial effects of human activity, such as culls," Dr Dussex says.

"It is quite likely that the kea's habitat was very different during the last glacial period between 2.5 million years to 10,000 years ago, with birds being restricted to smaller areas by permanent ice and snow."

Dr Robertson adds that with the end of the ice age and the ice receding, kea moved out of their habitat refuges to recolonise the South Island of New Zealand. This, rather than the impacts of human activity, is the likely reason for the patterns seen in the kea's genetic variation.

"Kea used to be everywhere, then the Ice Age limited them to ice-free refuges most likely at the top of the South Island. At the end of this cold period, kea were then able to expand into their previous habitat over a wider range and into the habitat they occupy today", says Dr Robertson.

Provided by University of Otago