Study shows how glaciers affected deer evolution

March 26 2009, by Brian Wallheimer

(PhysOrg.com) -- A 10-year study of mule and black-tailed deer has found unique subspecies created by the animals' responses to climate change thousands of years ago.

Gene Rhodes, Purdue University professor of forestry and natural resources, said DNA analysis of more than 1,700 deer throughout North America shows how the movement of glaciers segregated certain groups of deer and how that affected their genetic makeup. Glacial movement about 18,000 years ago isolated mule deer and black-tailed deer to areas that were suitable for their survival, sometimes cutting them off from each other. Those groups -- located in Alaska and Canada, and south along the U.S. West Coast to Mexico -- evolved genetically to deal with those conditions, creating several subspecies.

"From a conservation standpoint, it's important to know if you have unique or rare subspecies," Rhodes said. "We uncovered a tremendous diversity of unique groups of mule deer that could need management attention. You can't protect them if you don't know they are there."

Rhodes worked with Jim Heffelfinger, a regional game specialist with the Arizona Game and Fish Department who coordinated the collection of DNA samples, and Emily Latch, an assistant professor at the University of Wisconsin-Milwaukee, who was a post-doctoral researcher under Rhodes. Their work was published in the early online version of *Molecular Ecology* this past week.

The DNA database created through the project is one of the most extensive for any wildlife species in North America, Rhodes said.

Conservation officials can use the information to protect deer in specific areas and conserve genetic diversity contained in unique subspecies. Heffelfinger said conservation officials also could use the data to ensure there isn't too much co-mingling between subspecies.

"We can identify black-tailed and mule deer hybrid zones and areas where they are interbreeding and figure out what it is about that area that is bringing them together," Heffelfinger said. "Maybe there are things we can do with the habitat to maintain the integrity of the species."

Rhodes' research shows how mule deer and black-tailed deer reintegrated into some areas around the Rocky Mountains and, in some cases, interbred. He said that information could be valuable to hunting organizations that keep records of trophy deer to ensure a black-tailed deer isn't actually a hybrid of a black-tail with a mule deer, which could look like a very large black-tail.

"They want a way to confirm that a particular animal is what they think it is," Rhodes said. "By mapping these deer, we're taking the first step in helping clarify their records and achievements."

Several wildlife non-governmental groups funded Rhodes' research. His next step is to get a better understanding of where black-tailed and mule deer interact and find ways to better manage rare subspecies.

Provided by Purdue University (news : web)