Rattlesnakes sound warning on biodiversity and habitat fragmentation

April 21 2010

Like the canary in the coal mine, the timber rattlesnake may be telling us something about the environment we share.

Cornell University researchers - using cutting-edge tools including fine-scale molecular genetics and microsatellite markers - tracked the rattlesnakes to understand how wildlife habitats are affected by even modest human encroachment.

"We used this species as a model to investigate general processes underlying population-level responses to habitat fragmentation," said the authors, led by Cornell post-doctoral researcher Rulon Clark, in the paper "Roads, Interrupted Dispersal and Genetic Diversity in Timber Rattlesnakes," currently available online and to be published in the journal *Conservation Biology* (August 2010).

Researchers discovered that fragmentation of natural habitats by roads - even smaller, low-traffic highways - has had a significant effect over the past 80 years on genetic structure of timber rattlesnakes in four separate regions of upstate New York. Less genetic diversity means populations become more susceptible to illness or environmental changes that threaten their survival.

"Our study adds to a growing body of literature indicating that even anthropogenic habitat modifications that does not destroy a large amount of habitat can create significant barriers to gene flow," said researchers.

While the rattlesnakes shorter lifespan and method of travel may help make the impact of roadways relatively quick and dramatic, the new findings reinforce earlier work on other terrestrial animals - from grizzly bears to frogs - and provides a fresh warning about habitat fragmentation that all plans for future human development must consider.

Researchers used fine-scale molecular genetics as well as behavioral and ecological data to look at timber rattlesnakes from 19 different hibernacula - shared wintering quarters - in four regions in New York: the Adirondacks, Sterling Forest, Bear Mountain and Chemung County. In each case they used microsatellite markers to track how populations dispersed from their winter dens, their subsequent reproductive patterns, and how roads in these areas altered that gene flow. The roads themselves - all paved roadways built in the late 1920s to early 19030s for motorized traffic - were examined for use and relationship to natural barriers. Tissue samples were examined from more than 500 individual snakes.

"Over all four regions and 19 hibernacula, none of the genetic clusters … spanned either major or minor roads; hibernacula belonging to the same genetic deme were always on the same side of the road," the paper states. "This fine-scaled analysis, repeated over four geographic regions, underscores the significance of roads as barrier to dispersal and natural population processes for timber rattlesnakes and perhaps other species."

Provided by Cornell University