Researchers examine population dynamics and disease in mountain lions

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A puma caught by a motion-activated camera on the Uncompahgre Plateau in Colorado. Credit: Jesse Lewis, Colorado State University

A Colorado State University research team is examining how illnesses are transmitted in mountain lion populations in an effort to manage future outbreaks of diseases, such as feline leukemia virus, that could threaten the species.

Susan VandeWoude, a research veterinarian and associate dean for research in the CSU College of Veterinary Medicine and Biomedical Sciences, is leading a team that recently received $2 million from the National Science Foundation for a five-year study of the big cats.

The project is expected to shed light on the complex outcomes of human impact – both wildlife-management practices and land development – for a particularly sensitive species of wild cats in the United States. These interwoven consequences, which the scientists have identified through earlier research, include changes in puma populations, population movement and disease dynamics that could have implications for pumas and other cat species, including housecats.

The new research is designed to further understand how people affect puma movements in the wild and the way that disease travels through populations, providing insight about wildlife management used from Florida to California.

For example, when an endangered subspecies called the Florida panther was nearing extinction in the Everglades in the mid-1990s, wildlife managers imported Texas cougars to breed with their cousins. Managers hoped to rebuild the population. For the most part, it worked: Officials estimated last year that this cat population is about five times larger than it was two decades ago.

Other states have used different tactics to deal with the species referred to interchangeably as pumas, cougars or mountain lions. California has banned the hunting of pumas for decades. Hunters on Colorado 's Western Slope are asked to avoid killing female lions in places with low population.

Joining VandeWoude in the interdisciplinary research at CSU are Kevin Crooks, a professor in the Warner College of Natural Resources, and

Chris Funk, an associate professor in the College of Natural Sciences.

Each researcher brings distinctive expertise to the project: VandeWoude is an authority on feline diseases; her discoveries include uncovering a new family of feline herpesviruses that infects housecats, pumas and bobcats. Crooks, a wildlife ecologist, specializes in the effects of manmade disturbances on the natural world, so he is focusing on how puma habitat and travel corridors have been affected by urban and housing development.

"Large carnivores like pumas tend to be especially sensitive to human impacts," Crooks said. "They're often the first to feel the effects, like a canary in the coal mine."

Funk will use cutting-edge techniques to compare the genetics of various puma populations so that scientists may assess the degree to which they have interbred – providing evidence about their travel patterns.

"It's hard to track how they move, so we use genetics to infer where they've gone," Funk said. "If you have two groups with similar genes, you can infer that they have interacted."

Two faculty members from other institutions, Meggan Craft of the University of Minnesota and Scott Carver of the University of Tasmania, will perform the mathematical and statistical analyses needed to create models of how disease is expected to spread geographically through puma populations.

Other collaborators include Dr. Holly Ernest and colleagues from the University of California Davis and a large number of wildlife managers, field biologists, and veterinarians working for state and federal agencies.

The team will examine how wildlife management approaches influence

disease transmission. In the case of the Florida panther, for instance, did the imported Texas cougars bring pathogens with them that affected the panthers?

"We're studying the effects of that intervention, and the intersection of that with landscape dynamics," VandeWoude said, citing rivers, highways and cities as possible barriers to puma movement and factors in disease transmission.

She explained that researchers can track the speed and direction of virus movement by testing various puma populations and comparing results. For example, the team will try to predict what pathways diseases like the feline leukemia virus will take when spreading through a population, and which groups of pumas are particularly susceptible to outbreaks. The models the team generates will also inform predictions about how disease could spread to pets and humans.

As an outreach project, one of Crooks' former postdoctoral students will create a video game that simulates disease movements and lets players manipulate puma populations to help them avoid infection.

The new study is a continuation of a project that VandeWoude and Crooks recently completed on disease transfer within three cat species, in which they compiled a database of puma blood samples and pathogens.

"We now have data on a high percentage of the puma population in our study areas, partly because they are so limited in number," VandeWoude said.

Provided by Colorado State University