

Saving large carnivores in the ecosystem requires multifaceted approach

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Carnivore management is not just a numbers game, Virginia Tech wildlife scientists assert in response to an article in the Jan. 10 issue of the journal *Science* that urged "minimum population densities be maintained for persistence of large carnivores, biodiversity, and ecosystem structure."

"This type of approach may fail in social carnivore species," said Kathleen Alexander, an associate professor of fisheries and wildlife conservation in the College of Natural Resources and Environment.

"Predator management is incredibly complex and we need to be extremely cautious in applying blanket approaches which rely on securing some target number or density of individuals in an ecosystem."

The research-based argument appears in a letter in the March 14 issue of [*Science*](#) and an article abstract in the October 2013 issue of the journal [*Population Ecology*](#).

"Life history strategy, including number of offspring, lifespan, diet, and behavior that evolves from ecological pressures of the species in question should also guide management approaches," wrote Alexander and Claire E. Sanderson, a postdoctoral associate in fisheries and [wildlife conservation](#), in the *Science* letter.

The research published in *Population Ecology* evaluated 45 solitary and social medium and large carnivore species and their key life history attributes, population trends, and identified the presence of factors that

increase the potential for extinction.

Disturbingly, 73 percent of carnivore species—both social and solitary—were declining, observed Sanderson, Sarah Jobbins, also a postdoctoral associate, and Alexander.

"Social carnivores appeared to be particularly vulnerable with 45 percent threatened by infectious disease but only 3 percent of solitary carnivores similarly impacted," they report. "In this, increased contact between individuals, disease-related mortality, and loss of individuals below some critical threshold seems to be the issue, pushing social carnivores closer to the brink of extinction."

Reporting on their research on social carnivores, Sanderson, Jobbins, and Alexander said in the article, "Highly cohesive social species, like African wild dog, require strict participation from all group members ... in all areas of life, including predator avoidance, reproductive success, hunting, and survivorship. This life-history strategy can result in enhanced fitness benefits for the group, but also a higher critical threshold for extinction."

"The number of individuals in the group then becomes the critical factor influencing population persistence," said Sanderson.

For example, rabies and distemper have caused local extinction of African wild dog in regions of Africa. Even in a large population, transmission of an infectious disease from only a few infected individuals can result in sufficient mortality to push groups below a critical threshold, ultimately threatening population persistence, the researchers report.

It has been found in certain ecosystems that when wild dog packs are reduced to less than four individuals, they may be unable to rear pups

because of trade-offs between specialized roles, such as pup guarding and hunting.

"While aggregation of conspecifics may be beneficial for reproduction, hunting, and vigilance, social living is a disadvantage when it comes to transmission of disease," according to Alexander's research.

Also a wildlife veterinarian, she cofounded the Centre for Conservation of African Resources: Animals, Communities and Land Use, in Kasane, Botswana and has been conducting research in Africa since the late 1980s.

"Failure to consider the impacts of group dynamics may result in underestimation of critical threshold population sizes or densities required for [population](#) persistence," Sanderson, Jobbins, and Alexander write.

Alexander and Sanderson conclude in their letter in *Science*, "We urge consideration of life-history strategy and social behavior in the development of carnivore management strategy."

More information: The article in *Science* to which they responded is a review titled, "[Status and ecological effects of the world's largest carnivores](#)," by William Ripple and colleagues.

Provided by Virginia Tech

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