

Fearing cougars more than wolves, Yellowstone elk manage threats from both predators

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Wolves are often implicated as the top predator affecting prey populations. New research from Utah State University indicates that cougars are actually the main predator influencing the movement of elk across the winter range of northern Yellowstone National Park. Credit: National Park Service

Wolves are charismatic, conspicuous, and easy to single out as the top predator affecting populations of elk, deer, and other prey animals. However, a new study has found that the secretive cougar is actually the main predator influencing the movement of elk across the winter range of northern Yellowstone National Park.

The study highlights that where prey live with more than one [predator species](#), attention to one predator that ignores the role of another may lead to misunderstandings about the impact of predators on prey populations and ecosystems. It also offers new insight into how prey can use differences in hunting behavior among predators to maintain safety from all predators simultaneously.

Utah State University researchers Michel Kohl and Dan MacNulty co-lead the study, published in *Ecology Letters*, with Toni Ruth (Hornocker Wildlife Institute and Wildlife Conservation Society), Matt Metz (University of Montana), Dan Stahler, Doug Smith, and P.J. White (Yellowstone National Park). Their work was supported, in part, by the National Science Foundation, Ford Foundation, and Utah State University as part of Kohl's doctoral research. The study was based on long-term data from the Park's wolf and elk monitoring programs and Ruth's cougar research, which is detailed in a forthcoming book from the University Press of Colorado.



Utah State University researchers and their colleagues have found that cougars have more influence than wolves on the movement of elk across the winter range of northern Yellowstone National Park. Credit: Yellowstone Cougar Project/National Park Service

The team revisited global positioning system (GPS) data from 27 radio-collared elk that had been collected in 2001-2004 when numbers of wolves and cougars were highest. Kohl and MacNulty combined the elk GPS data with information on the daily activity patterns of GPS-collared cougars and wolves and the locations of cougar- and wolf-killed elk to test if elk avoided these predators by selecting for 'vacant hunting domains', places and times where and when neither predator was likely to kill elk.

"Cougars hunted mainly in forested, rugged areas at night, whereas wolves hunted mainly in grassy, flat areas during morning and at dusk" said Kohl, lead author of the paper and now an assistant professor at the Warnell School of Forestry and Natural Resources at the University of Georgia in Athens. "Elk sidestepped both cougars and wolves by selecting for areas outside these high-risk domains, namely forested, rugged areas during daylight when cougars were resting, and grassy, flat areas at night when wolves were snoozing".

Recognizing that cougars and wolves hunted in [different places](#) and at different times allowed the researchers to see how elk could simultaneously minimize threats from both predators. "Had we ignored the fact that these predators were on different schedules, we would have concluded, incorrectly, that avoiding one predator necessarily increased exposure to the other," said MacNulty, who is an associate professor in USU's Department of Wildland Resources and Ecology Center.

"Movement out of the grassy, flat areas and into the forested, rugged areas to avoid wolves did not result in greater risk from cougars and vice versa because these predators were active at different times of the day".

Despite the compatibility of elk spatial responses to cougars and wolves, Ruth, who is now executive director of the Salmon Valley Stewardship in Salmon, Idaho, cautioned that "some adult elk still end up on the cougar and wolf menu, with those in poor condition during winter being most at risk".



Fearing cougars more than wolves, adult female elk in northern Yellowstone National Park avoid threats from both predators by occupying 'vacant hunting domains', places and times where and when neither predator hunts, according to a new study illustrating how elk can tolerate living in close proximity to both large predators. Credit: Bonnie McDonald

Nevertheless, "the findings help explain why we observe wolves, cougars, and elk all coexisting and thriving on the Yellowstone landscape" said Stahler, who leads the [current study of cougars in the Park](#). He notes that the ability of elk to coexist with wolves and cougars is consistent with their "long, shared evolutionary history".

More surprising, however, was that cougars, not wolves, exerted the most pressure on elk habitat selection. "Wolves are often the presumed or blamed predator for any change in a prey population, numerical or behavioral," said Smith, who leads the Park's wolf program. "Our research shows that this is not necessarily true, and that other large predators in addition to [wolves](#) need to be considered."

"Despite the fact that most prey species live in habitats with multiple predators, the majority of research on predator-prey interactions focuses on a single predator species," added Betsy von Holle, program director for the National Science Foundation's Division of Environmental Biology. "The novelty of this research is the simultaneous study of multiple predator species, revealing the complexity of [predator](#) avoidance behavior by the prey."

More information: Michel T. Kohl et al, Do prey select for vacant hunting domains to minimize a multi-predator threat?, *Ecology Letters* (2019). [DOI: 10.1111/ele.13319](https://doi.org/10.1111/ele.13319)

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