

Humans still the leading cause of death for California mountain lions

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This research project tracked almost 600 mountain lions in 23 areas of California, assembling separate studies into a single, statewide study, a significant methodological advance for strengthening such scientific work.
Credit: National Park Service

Mountain lions are protected from hunting in California by a law passed

by popular vote in 1990. However, a team of researchers working across the state found that human-caused mortality, primarily involving conflict with humans over livestock and collisions with vehicles, was more common than natural mortality for this protected large carnivore. Their findings were published March 20 in the *Proceedings of the National Academy of Sciences*.

Most research on mountain lions is conducted at relatively small scales, which has limited understanding of mortality caused by humans across the large areas they roam. To address this, scientists from multiple universities, [government agencies](#), and private organizations teamed up to better understand human-caused mortality for mountain lions across the entire state of California. The team tracked almost 600 mountain lions in 23 different study areas ranging from the Sierra Nevada Mountains, the northern redwoods, wine country north of San Francisco, the city of Los Angeles, and many other areas in the golden state.

"Population dynamics of large carnivores operate at large scales, making it critical for researchers to collaborate across broad geographic regions that go beyond typical study areas to better understand [population](#) processes and connectivity," said John Benson, Associate Professor at the University of Nebraska-Lincoln and co-lead author of the study.

Benson and his colleagues found that mountain lions were at greater risk of mortality from humans when they were closer to rural development. Interestingly, they also found that mountain lions were less likely to die in areas where there were higher proportions of voters in favor of pro-environmental initiatives.



Wildlife ecologist John Benson, an associate professor at the University of Nebraska-Lincoln, poses with a coyote pup. Credit: University of Nebraska-Lincoln

"Ecologists believe that human tolerance is critical to conserving large carnivores in landscapes shared with humans. However, it is rare that data on tolerance are included in the models we use to understand mortality risk," said Benson. "Of course, we acknowledge that voting

records on environmental issues are not a direct reflection of this tolerance, but the strength of this result suggests that human mindset may be an important driver of mortality risk for mountain lions."

A long-standing question in wildlife management is whether mortality of animals caused by humans adds to natural mortality, and therefore results in higher overall mortality. Managers often assume that some animals in [wild populations](#) exist as a "doomed surplus" that will die of [natural causes](#) if humans do not kill them first. If true, human-caused mortality should have minimal effects. However, the new study showed that populations of mountain lions in California experiencing greater human-caused mortality also had lower population-level survival rates, suggesting that humans do indeed increase overall mortality.

Concerns about reduced landscape connectivity and local extinction of small, isolated populations in portions of the central coast and southern California led to the current consideration of mountain lions as a possible "threatened" species under the California Endangered Species Act in those regions. In contrast, large tracts of natural habitat in undeveloped public lands in the Sierra Nevada Mountains and northern California are occupied by large, healthy populations of mountain lions. The new research highlights the importance of understanding interrelationships between different populations across the state for long-term conservation of the species throughout California.

"Young male mountain lions often move and breed long distances from where they were born, and are largely responsible for maintaining [gene flow](#) between populations," said Kyle Dougherty, a Ph.D. student at the University of Nebraska-Lincoln, and co-lead author of the study.

"Immigration of mountain lions from adjacent or more distant populations can also help compensate for high rates of human-caused mortality and maintain population persistence through a process known as 'source-sink' dynamics."



To strengthen the understanding of factors that affect mountain lion survival, the research project incorporated a social sciences component by using a general gauge of human attitudes toward environmental concerns. Credit: National Park Service

The new study of survival and mortality of [mountain lions](#) across most of California paves the way for a better understanding of these "source-sink" dynamics.

"We tend to focus on survival of adult females because of their strong influence on growth or decline of individual populations," said Justin Dellinger, a carnivore biologist formerly at the University of California-Davis and co-author of the new study.

"However, [young males](#) are the ones that move between populations meaning that their [mortality](#), combined with barriers to movement imposed by roads and development, could limit the utility of seemingly healthy populations to act as 'sources' of new animals and genes for small, isolated populations."

More information: Benson, John F., The ecology of human-caused mortality for a protected large carnivore, *Proceedings of the National Academy of Sciences* (2023). [DOI: 10.1073/pnas.2220030120](https://doi.org/10.1073/pnas.2220030120).
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