

Study shows which North American mammals live most successfully alongside people

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Raccoons are one example of a species that is more likely to hang out in areas with human development. Credit: Carolyn Lagattuta

Scientists at UC Santa Cruz led a team of researchers from 30 institutions across North America in analyzing data from 3,212 camera traps to show how human disturbance could be shifting the makeup of mammal communities.

The new study, published in the journal *Global Change Biology*, builds upon the team's prior work observing how wildlife in the Santa Cruz Mountains respond to human disturbance. Local observations, for

example, have shown that species like pumas and bobcats are less likely to be active in areas where humans are present, while deer and wood rats become bolder and more active. But it's difficult to generalize findings like these across larger [geographic areas](#) because human-wildlife interactions are often regionally unique.

So, to get a continent-wide sense for which species of mammals might be best equipped to live alongside humans, the team combined their local camera trap data with that of researchers throughout the U.S., Canada, and Mexico. This allowed them to track 24 species across 61 regionally diverse camera trap projects to see which larger trends emerged.

"We've been very interested for a long time in how human disturbance influences wildlife, and we thought it would be interesting to see how wildlife in general are responding to similar anthropogenic pressures across North America," said Chris Wilmers, an environmental studies professor and director of the Santa Cruz Puma Project, who is the paper's senior author alongside lead author Justin Suraci.

The team was especially interested in understanding how mammals respond to different types of human disturbance and whether these responses were related to species' traits, like body size, diet, and the number of young they have. Overall, the paper found that 33 percent of mammal species responded negatively to humans, meaning they were less likely to occur in places with higher disturbance and were less active when present, while 58 percent of species were actually positively associated with disturbance.

To get a closer look at these trends, the team broke their results down by two different types of human disturbance. One was the footprint of human development: the things that people build, like roads, houses, and agricultural fields. Another was the mere presence of people, including activities like recreation and hunting, since fear of humans can change

an animal's behavior and use of space.

In comparing continent-wide data from camera trap locations with varying levels of human development, researchers found that grizzly bears, lynx, wolves, and wolverines were generally less likely to be found in more developed areas and were less active when they did visit. Moose and martens were also less active in areas with a higher development footprint.

Meanwhile, raccoons and white-tailed deer were actually more likely to hang out in more developed areas and were more active in these spaces. Elk, [mule deer](#), striped skunks, red foxes, bobcats, coyotes, and pumas weren't more likely to be found in developed landscapes, but they did tend to be more active in these areas.



Moose were generally less active near people or development. Credit: University of California - Santa Cruz

Some of the species that frequent more developed areas may actually benefit from living in these places, but the study's lead author, Justin

Suraci, a lead scientist at Conservation Science Partners and former postdoctoral researcher at UC Santa Cruz, says that's not necessarily the case. While raccoons can thrive in developed areas by finding food in our garbage cans and avoiding predators, higher levels of puma activity in these same places could mean something very different.

"It's not because these developed areas are really good for puma activity," Suraci said. "It's probably because the [camera traps](#) happened to be set in the one pathway that the poor puma can use when it's navigating its way through an otherwise very heavily developed landscape."

In other words, some animals in the study may be increasingly active or present on cameras near human development simply because there's such little remaining [natural habitat](#).

Still, there were certain traits that emerged across species as clear advantages for making a living within the footprint of development. Overall, mammals that were smaller and faster-reproducing, with generalist diets, were the most positively associated with development. Researchers expected they might find similar results in comparing camera trap data by levels of human presence, but in fact, both positive and negative responses to human presence were observed for species across the spectrum of body sizes and diets.

Elk were less likely to stick around in places frequented by humans, and moose, mountain goats, and wolverines were less active in these habitats. On the other hand, bighorn sheep, black bears, and wolverines were more likely to be found in areas frequented by humans, while mule deer, bobcats, grey foxes, pumas, and wolves were more active.

One trend that may be influencing these findings is the growth of outdoor recreation, which increases levels of human presence in

otherwise remote and wild landscapes. The study's results may indicate that most mammals are willing to tolerate some level of human recreation in order to remain in high quality habitats, and they could instead be increasing their nocturnal activity in order to avoid humans. Some animals may even take advantage of hiking trails and fire roads as easy movement pathways.

But the study also clearly identified that there's a limit to how much human impact animals can withstand. Even among species that were either more active or more likely to be present around humans or in developed areas, those effects peaked at low to intermediate levels of human disturbance then began to decline beyond those thresholds. Red foxes were the only animals in the study that seemed to continue to be more active or present at medium to high levels of human disturbance.

Ultimately, most species have both something to lose and something to gain from being around humans, and understanding the cutoff at which the costs outweigh the benefits for each species will be important to maintaining suitable habitats that support diversity in mammal populations for the future. Suraci says this may prove to be the new paper's most important contribution.

"From a management perspective, I think the thresholds that we've started to identify are going to be really relevant," he said. "This can help us get a sense of how much available habitat is actually out there for recolonizing or reintroduced [species](#) and hopefully allow us to more effectively coexist with wildlife in human-dominated landscapes."

More information: Justin P. Suraci et al, Disturbance type and species life history predict mammal responses to humans, *Global Change Biology* (2021). [DOI: 10.1111/gcb.15650](https://doi.org/10.1111/gcb.15650)

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