Tracking data show how the quiet of pandemic-era lockdowns allowed pumas to venture closer to urban areas

June 24 2021, by Allison Arteaga Soergel

Images like this one, captured by a home-security camera in 2019, are rare. But new research shows local pumas relaxed their fear of urban areas when human mobility declined during the pandemic. Credit: Santa Cruz Puma Project

New research from the University of California, Santa Cruz shows how regional shelter-in-place orders during the coronavirus pandemic emboldened local pumas to use habitats they would normally avoid due to their fear of humans. This study, published in the journal *Current Biology*, is part of a growing wave of research working to formally

document the types of unusual changes to wildlife movements and behaviors that people around the world reported during pandemic lockdowns.

Golden jackals, for example, were spotted foraging in broad daylight in urban Tel Aviv, Israel, and mountain lions were seen strolling through downtown Santiago, Chile. Urban environments had suddenly become quiet and empty as shelter-in-place orders brought human movement to a grinding halt—an effect some researchers have called the "anthropause." Wildlife seemed to be taking advantage. The new study shows this was certainly true for pumas in the Santa Cruz Mountains. Researchers were able to clearly connect changes in the cats' habitat use with reduced human mobility during shelter-in-place orders.

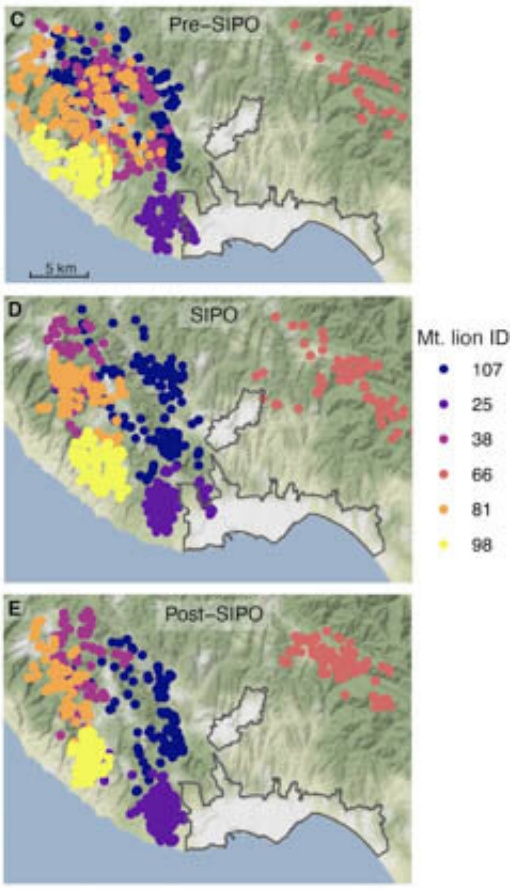
Chris Wilmers, an environmental studies professor at UC Santa Cruz, led this research. Wilmers is the principal investigator for the Santa Cruz Puma Project, and he has been studying local mountain lion populations for over a decade. In particular, his research uses data from GPS tracking collars placed on wild pumas to show how fear of humans affects mountain lion behavior and ecology. When the pandemic hit, his team was already tracking data from several collared cats, and he recognized a unique research opportunity.

"When the shelter in place orders started, it was immediately clear that things were very different," Wilmers said. "You'd go outside and there were very few cars. Entire neighborhoods were completely quiet. So we wondered how this might affect the mountain lion population. Would they respond this quickly to reduced human presence?"

To answer that question, the team analyzed about two years worth of mountain lion tracking data for a set of six collared cats to see where the pumas roamed and what types of habitats they used. Researchers compared these tracks with the distribution of housing density and the

geographic boundaries of the "urban edge," which indicates where vehicle and pedestrian traffic is heightened. During regional shelter-in-place orders, they found that cats were significantly more likely to move into or closer to the urban edge. And these changes happened rapidly: within days or weeks of the beginning of COVID-19 lockdowns.

In an effort to hone in on the cause of this change, the team ruled out any influence of natural factors—like topography, vegetation cover, or distance to the nearest water source—that might affect the cats' choice of habitats. They also compared year-over-year tracking data to show that seasonal variability wasn't affecting the results. Pumas do have a strong preference for habitats with lower housing density, but this factor did not change significantly during the study period. The key difference that appeared to be driving the trend of mountain lions moving into urban areas was reduced human mobility during the pandemic.



Tracking data from GPS collars showed pumas were more likely to move into or closer to the boundaries of urban areas during shelter-in-place orders. Credit: Wilmers et al., 2021, *Current Biology*

After regional shelter-in-place orders went into effect on March 17, 2020, local human mobility declined more than 50 percent, according to Apple mobility data, which show the number of navigation requests for driving and walking trips received through Apple Maps. During this time period, when people confined themselves in their homes, the data showed a strong relationship between declining levels of human mobility and pumas' increased willingness to venture closer to or into urban areas.

"We found that they totally relaxed their fear of the urban edge,"

Wilmers said. "It's not that they weren't scared of cities; they were still scared, but only of high housing density, not the extra impact of human mobility. If you take all the car trips and pedestrian trips and human mobility out of it, then, all of a sudden, mountain lions don't fear the city as much."

Wilmers says this finding helps to build understanding of the unique impacts of human mobility on wildlife. Conservation efforts often focus on the ways that humans are destroying habitats—through development and pollution, for example—but the mere presence of people moving across a landscape also takes a toll on animals that fear humans. And this too is a conservation challenge.

"It's important because our mobility just keeps increasing," Wilmers explained. "In the early part of the 20th century, we got cars, and that really increased our mobility. Now we have things like ride-sharing apps, mountain bikes, and electric bikes, and these are all ways that we're becoming more and more mobile across more types of landscapes. It's an important thing to think about as we try to conserve and manage ecosystems."

Another key point this research illustrates is that fear, or the removal of a source of fear, can bring about rapid changes in animal behavior that ripple out through ecosystems. Ecologists call this concept the "landscape of fear." And the pandemic showed just how integrated into this landscape humans really are. People are usually the ones exerting the influence of fear upon other animals, but there are some things that even we fear.

"Humans have always been the top dog in landscapes of fear, but this study shows that those influences of humans can be reversed relatively quickly by a pathogen, particularly a pandemic-causing pathogen," Wilmers said. "It's interesting from a theoretical perspective, and it's also

important in a practical sense because it shows that, not only are pandemics going to have major health consequences for people, but there are also going to be important ecological impacts."

More information: COVID-19 suppression of human mobility releases mountain lions from a landscape of fear, *Current Biology*, doi.org/10.1016/j.cub.2021.06.050

Provided by University of California - Santa Cruz