

Surprising demographic shifts in endangered monkey population challenge conservation expectations

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A new study reports increasing use of the ground among a population of the otherwise arboreal northern muriqui monkeys in Brazil. Researchers led by University of Wisconsin–Madison anthropologist Karen Strier believe the behavioral innovation may underlie demographic changes in the population over the past 30 years, including unexpected increases in both fertility and mortality. Credit: Karen Strier, University of Wisconsin–Madison

(Phys.org)—At first glance, the northern muriqui monkey is a prime conservation success story.

These Brazilian [primates](#) are critically endangered, but in the past 30 years a population on a private reserve has grown from just 60 individuals to some 300, now comprising almost a third of the total remaining animals.

As the population grows, though, it is offering researchers a glimpse into a new phase of recovery as it begins to face the limitations of its habitat. A recent analysis of the factors contributing to this population's tremendous growth reveals surprising trends that raise new questions about conservation, recovery and what constitutes a healthy population.

University of Wisconsin–Madison [anthropologist](#) Karen Strier has led observational field studies of this murrelet population for 30 years, meticulously charting demographics and life history of hundreds of individual monkeys. An analysis, published Sept. 17 in the journal [PLOS ONE](#) with UW–Madison mathematical [ecologist](#) Anthony Ives, provides the most comprehensive, quantitative look to date at long-term [demographic trends](#) and the role of individual features such as fertility, mortality, and [sex ratios](#).

The researchers used statistical models designed to handle multiple levels of data so they could construct a comprehensive view of the population while still accounting for variation among individual animals. The approach allowed them to identify specific demographic trends and their effects on the overall population size.

"By separating out these components we were able to see the patterns in the data," Strier says, many of which were unexpected. For example, the analyses revealed increases in both fertility and mortality – a surprising combination, especially in a population that is still growing. In addition, they documented a remarkable and unexplained shift in infant birth sex ratios from about one-third male to two-thirds male in just 28 years.

"It is an analysis that leads to more questions than answers," Ives says. A birth rate that continues to grow as the population expands flies in the face of most ecological thinking, he says, since demand for resources by larger populations usually reduces fertility. But without the observed fertility increases, the murrelet population would likely have plateaued around 200 individuals; instead, it has reached 300 and is still growing.

Strier believes the trends may be driven by behavioral changes. Though murrelets are typically arboreal animals, her field team has observed increased use of the ground – first for drinking and eating, then gradually for traveling, playing, and even mating. These data are still qualitative, but she suspects this behavioral innovation could help explain the rises in both fertility and mortality. The ground expands the monkeys' pool of available habitat and food resources but exposes them to additional dangers as well.

"On the ground, there are risks. We suspect there may be more pathogenic risks, and we know there are more predators," she says. Supporting a connection, mortality increased primarily in prime-aged males, who spend more time on the ground than females. "I've always thought it was increasing [population size](#) that was driving this increasing use of the ground, but never thought about what the potential consequences of the use of the ground might be for the population's rate of growth," she adds.

The apparent interactions between demography and behavior emphasize the need for ongoing population monitoring, Strier says. Her long-term study, in collaboration with Brazilian colleagues including biologist Sergio Mendes of the Universidade Federal do Espírito Santo, is showing that assumptions about population dynamics based on past observations may not hold true in the future.

Ives views the results as a cautionary tale for other threatened and

endangered species, the vast majority of which are not monitored anywhere near as closely as Strier's muriquis.

"From the conservation standpoint I think a main message is, don't presume that the demographics will respond in a 'normal' way," he says. "Even if an area is protected you need to have a close gauge on what's going on. Protecting an area is not necessarily protecting a species."

Strier agrees that the analysis raises important questions about environmental carrying capacity – basically, how large of a population a habitat can support. "How long will it be able to grow, and if it does continue to grow, is it in danger of crashing?" she asks.

These are critical questions when considering management decisions, she adds, especially given that her study population represents a third of the entire muriqui species. On paper, population growth alone can look like success, but their demographic analysis reveals early indications of stress even as the [population](#) continues to expand.

At the same time, Strier says, their studies suggest a solution. "We know exactly what we need to do to alleviate it – expand the area, and there is area to expand the forest into. In a world with so many unsolvable problems, this seems like a solvable one."

Provided by University of Wisconsin-Madison

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