

How many golden eagles are there?

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A new method is making it easier for scientist to estimate population sizes of hard-to-count Golden Eagles. Credit: D. Brandes

For conservation efforts to be effective, wildlife managers need to know how many individuals of a species are out there. When species are spread out over large areas and occur at low densities, as is the case with the Golden Eagle, figuring this out can be tricky. However, a new study

from *The Condor: Ornithological Applications* applies an old technique called "mark-recapture" in a novel way, eliminating the need to actually capture and mark eagles but instead, using math that allows scientists to turn individual observations into population estimates.

West Virginia University's Andrew Dennhardt, Adam Duerr, and Todd Katzner and Lafayette College's David Brandes used observations made by volunteer "citizen-scientists" of Golden Eagles migrating along a single, long mountain ridgeline in Pennsylvania to estimate the total number of eagles passing through the area each year. To do this, they developed a new way to apply a classic ecology tool called mark-recapture analysis—capturing and marking a portion of a population, and then counting the number of marked individuals in another group captured later. Helped by the fact that observers were often able to categorize individual eagles as either immature or adult birds, the scientists were able to identify instances of individual eagles being sighted at more than one location as they made their way south along the ridge over the course of a day, treating these subsequent sightings as "recaptures."

Volunteers reported more than 3,000 sightings of Golden Eagles at five count sites along the ridge from 2002 to 2011. The analysis used in the study, which lets researchers estimate how many birds were missed as well as how many were seen more than once, suggests that these sightings represented between 2,592 and 2,775 individual eagles over the ten year period, with approximately 1,300 passing through the area on average in a given year. Past studies indicate that the total population of eagles breeding in Quebec and migrating through Pennsylvania is around 5,000, making this about a quarter of the larger population. Because the eagles are difficult to count on their breeding grounds, however, better methods for tracking their numbers during migration represent a significant advance.

"Conservation of Golden Eagles in eastern North America is a really important goal for lots of reasons—it is a small, historically declining population, at risk from anthropogenic threats and habitat loss. A central part of that conservation goal is figuring out how many of the darn things there are. Andrew's work is the first empirical estimate of golden [eagle population size](#)," says Katzner, now a Research Wildlife Biologist at the US Geological Survey. "Nothing quite like this has ever been done. We've taken a standard tool, mark-recapture, and turned it on its head to give us a new way to estimate population size."

"For me, this was a dream come true, because I got to work on a project relevant to the conservation of the species that originally inspired me to enter the field of wildlife ecology and management," says Dennhardt, now at Michigan State University. "Partnerships between researchers and citizen-scientists can help improve wildlife management decisions to address threats to migratory Golden Eagles and other species. I hope this work inspires future researchers to evaluate the populations of other migratory species, and that it encourages the greater scientific community to consider new and existing citizen-science programs and think about how such programs' data might be used in their own research toward improving resource management and decision making."

More information: "Applying citizen-science data and mark-recapture models to estimate numbers of migrant Golden Eagles in an Important Bird Area in eastern North America"

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