

How Industrialization Brought About the Decline of Vertebrate Species

New research hints that contemporary habitat losses may have initiated population declines of around 95 percent in some species.

By Nathan Collins, *Pacific Standard* 11/21/16

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With climate change and [deforestation](#) threatening biodiversity around the world, it's fair to wonder just how rapidly threatened species have been declining, and when exactly those declines began. The answer is bleak: Among threatened vertebrates, rapid losses began in the late 19th century, and numbers have since declined by about 25 percent per decade, according to a [new study](#).

“Although preservation of biodiversity is vital to a sustainable human society, rapid population decline (RPD) continues to be widespread” across plant and animal populations, Haipeng Li and a team of Chinese and American biologists write in *Proceedings of the National Academy of Sciences*.

Understanding the severity and origins of these population losses could help conservationists protect endangered species and possibly help promote public awareness of the threat, the researchers argue. But there's a problem: Good data on plant and animal population sizes only goes back about four decades, and populations surely declined prior to that.

Fortunately, modern biologists have a way to circumvent that: DNA. Over time, mutations tend to increase genetic diversity, but how much genetic diversity increases depends on factors like the

length of a generation, mutation rates, and population size. Using current estimates of genetic diversity, researchers can therefore reverse engineer a rough history of the population of, for example, giant pandas.

There's a key limitation, however, in that threatened populations are necessarily small populations, meaning there's not a lot of data to use. As a workaround, Li and his colleagues gathered previously published genetic data on 2,764 vertebrates—animals with spinal columns—and assumed that any rapid declines in their numbers had a common cause and began at a common time.

The team estimates rapid population declines began 123 years ago—not long after industrialization went into high gear—and that threatened species' numbers have been dropping by about 25 percent every 10 years. Threatened birds and fish seem to have suffered the most rapid losses, the team writes.

Because they looked at both threatened and non-threatened species, the researchers could also make some suggestive comparisons between the two groups—notably, Li and his colleagues estimate that, when declines began, currently safe species' populations were about 20 percent larger than those of currently threatened vertebrates. This suggests smaller populations may be at more risk when faced with an external threat—like, say, people.

Now, the team's estimates are extremely rough: Based on their model alone, there's a reasonable chance the declines began anywhere between 20 and 260 years ago. Still, Li and his team argue their findings could be valuable for protecting biodiversity in the future.

“[I]f current conservation efforts are generally enacted when population sizes are low, the historical inferences of this study suggest that recovery may be compromised by delaying action as population sizes continue to decline,” they write.