Study confirms US amphibian populations declining at rapid rate (Update)

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Spotted salamanders are an amphibian whose population, while not endangered in Pennsylvania, is in decline. Researchers aren't sure why amphibian numbers are falling across the country, but they suspect it is due to a number of reasons, such as diseases, contaminants, drought and invasive species. Credit: USGS

(Phys.org) —The first-ever estimate of how fast frogs, toads and salamanders in the United States are disappearing from their habitats

reveals they are vanishing at an alarming and rapid rate.

The landmark study indicates that the amphibian declines first recognized by researchers in the 1990s are ongoing and that things have not stabilized, noted David Miller, assistant professor of wildlife population ecology in Penn State's College of Agricultural Sciences, who contributed to the research.

"The paper points to some startling declines," Miller said. "What is most disconcerting is that these declines are occurring for not only the species that we already knew were threatened or endangered but also for the species that were considered low concern."

According to the study, published May 22 in the scientific journal *PLOS ONE*, even the species of amphibians presumed to be relatively stable and widespread are declining. And these declines are occurring in amphibian populations everywhere, from the swamps in Florida to the high mountains of the Rockies to the Appalachian Plateau in Pennsylvania.

The study, conducted over the last decade by U.S. Geological Survey scientists and collaborators, concluded that U.S. amphibian declines may be more widespread and severe than previously realized, and that significant declines notably are occurring even in protected national parks and wildlife refuges.

Amphibians have been a constant presence in our planet's ponds, streams, lakes and rivers for 350 million years or so, surviving countless changes that caused many other groups of animals to go extinct, pointed out USGS Director Suzette Kimball.

"This is why the findings of this study are so noteworthy," she said. "They demonstrate that the pressures amphibians now face exceed the

ability of many of these survivors to cope."

On average, populations of all amphibians examined vanished from habitats at a rate of 3.7 percent each year. If the rate observed is representative and remains unchanged, these species would disappear from half of the habitats they currently occupy in about 20 years.

The more threatened species, included on the Red List of Threatened Species maintained by the International Union for Conservation of Nature, disappeared from their studied habitats at a rate of 11.6 percent each year. If the rate observed is representative and remains unchanged, these "red-listed" species would disappear from half of the habitats they currently occupy in about six years.

"Even though these declines seem small on the surface, they are not," said USGS ecologist Michael Adams, the lead author of the study. "Small numbers build up to dramatic declines with time. We knew there was a big problem with amphibians, but these numbers are both surprising and of significant concern."

For nine years, researchers looked at the rate of change in the number of ponds, lakes and other habitat features that amphibians occupied. In lay terms, this means that scientists documented how fast clusters of amphibians are disappearing across the landscape.

In all, scientists analyzed data from 34 sites spanning 48 species. The analysis did not evaluate causes of declines.

The research was done under the auspices of the USGS Amphibian Research and Monitoring Initiative, which studies amphibian trends and causes of decline. This unique program, known as ARMI, conducts research to address local information needs in a way that can be compared across studies to provide analyses of regional and national

trends.

Penn State's Miller spent three years working as a post-doctoral researcher for USGS's Amphibian Research and Monitoring Initiative after he finished his doctoral degree in Ecology and Evolutionary Biology at Iowa State University in 2009. An applied population ecologist, he was hired to provide the program quantitative support in analyzing data sets collected over the past decade.

"We summarized the results of more than 100 studies to make inferences about what was happening across the different monitoring regions," he said. "There is very little organized large-scale monitoring of amphibians. Much of the historic information pointing to large declines is based on small-scale studies and expert opinion.

"The evidence has been pretty strong that declines have occurred, but it has been hard to make systematic inferences," Miller added. "This paper quantifies population patterns across the United States, providing a representative picture of what is occurring with amphibians."

Brian Gratwicke, amphibian conservation biologist with the Smithsonian Conservation Biology Institute, said, "This is the culmination of an incredible sampling effort and cutting-edge analysis pioneered by the USGS, but it is very bad news for amphibians. Now, more than ever, we need to confront amphibian declines in the U.S. and take actions to conserve our incredible frog and salamander biodiversity."

The study offered other surprising insights. For example, declines occurred even in lands managed for conservation of natural resources, such as national parks and national wildlife refuges.

"The declines of amphibians in these protected areas are particularly worrisome because they suggest that some stressors—such as diseases,

contaminants, and drought—transcend all landscapes," Adams said. "The fact that amphibian declines are occurring in our most protected areas adds weight to the hypothesis that this is a global phenomenon with implications for managers of all kinds of landscapes, even protected ones."

Amphibians seem to be experiencing the worst declines documented among vertebrates, but all major groups of animals associated with freshwater are having problems, Adams explained. While habitat loss is a factor in some areas, other research suggests that things like disease, invasive species, contaminants and perhaps other unknown factors are related to declines in protected areas.

"This study gives us a point of reference that will enable us to track what's happening in a way that wasn't possible before," said Adams.

Read the publication, "The Rate of Decline in Amphibian Occupancy in the United States."

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