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## No Refuge for Dwindling Amphibian Populations

Even in lowland, protected areas frogs, amphibians and related species are suffering from calamitous population declines, possibly as a result of climate change

By David Biello

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Frogs and their fellow amphibians are disappearing worldwide and no one knows exactly why. In some areas, encroaching human activity has caused habitat changes or loss. In mountainous regions, a vicious fungal infection—chytridiomycosis—has wiped out entire populations. But scientists had assumed that amphibian populations in protected, lowland areas were fine, continuing much as they have for millions of years. According to a new paper, though, they were wrong. "I assumed that the lowlands in terms of these sorts of issues were okay," says Joseph Mendelson, an amphibian biologist at Zoo Atlanta. "This clearly indicates, by my estimation, a long-term decline in a fully protected area. It's a disturbing pattern we are seeing over and over."

Biologist Steven Whitfield of Florida International University in Miami and his colleagues collected long-term data from the La Selva Biological Station in the Caribbean lowlands of Costa Rica. Surveys of amphibian and reptile populations stretch back to 1970 and, by compiling this data, Whitfield and his colleagues detected a calamitous decline that no one had noticed: a 75 percent drop in the total amount of amphibians over that 35-year period. "The slow changes that we detected—about 4 percent less frogs and lizards each year—would be difficult to notice," Whitfield says.

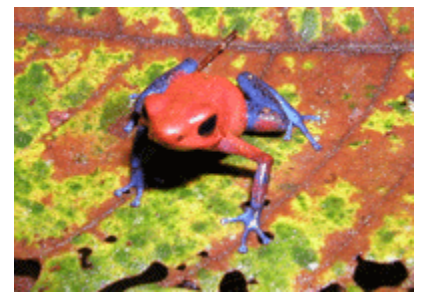


Image: COURTESY OF STEVEN WHITFIELD

**STEEP DECLINE:** Populations of frogs, like this strawberry poison frog, declined by 75 percent over the last 35 years, even in a protected reserve.

That kind of steep decline has an outsized impact on an ecosystem, says Mendelson, who was not involved with the research. "There's a whole lot of things that aren't being eaten, mostly insects," he says. "And there are a whole lot of other creatures that don't have prey." And, although this is one of the few places with long-term records to prove it, it is unlikely to be the only place where such declines are occurring. "Think about all of Amazonia and the Congo basin," he adds. "They are just as low."



Image: COURTESY OF STEVEN WHITFIELD

**GENERAL DECLINE:** Not only frogs but also other amphibians, such as this toad (*Rhaebo haematiticus*), and lizards suffered calamitous losses as well.

The decline is all the more ominous for not having a precise cause, the researchers reveal in the current *Proceedings of the National Academy of Sciences USA*. No sign of fungal infection was found and no habitat loss has taken place. Whitfield and his colleagues can only surmise that perhaps climate change has reduced leaf litter, the cover the declining amphibians and reptiles rely on to survive. "It appears that climate here is getting warmer and more consistently wet," Whitfield says. "This may impact leaf litter by increasing rates of decomposition or decreasing rates of litter fall."

Whitfield is currently researching the cause and impact of the disappearance, which also raises questions about other ecosystems and species that may have been considered relatively safe until now. "Traditional conservation practices, putting a fence around a biological reserve and controlling things like logging, that's not sufficient. It's effectively disarmed us," Mendelson says. "There is not going to be a simple fix to this. Ultimately, what you need to do is reverse climate change."