

Where Have All the Frogs Gone? *Research May Solve the Puzzle*

An entire species of golden toad, observed breeding on a Costa Rican mountainside, vanished two years later and has not been seen since. Frogs examined during a middle-school science outing in Minnesota are found to have astonishingly high rates of physical deformities. At least three species of amphibians have apparently vanished from their former range in Yosemite National Park. What is happening to amphibians? Why?

Q: Why should we care about these dramatic declines, deformities, and disappearances plaguing many amphibian populations around the world?

A: Amphibians are good indicators of significant environmental changes. Amphibians, unlike people, breathe at least partly through their skin, which is constantly exposed to everything in their environment. Consequently, their bodies are much more sensitive to environmental factors such as disease, pollution, toxic chemicals, ultraviolet radiation, and habitat destruction. The worldwide occurrences of amphibian declines and deformities could be an early warning that some of our ecosystems – even seemingly pristine ones – are seriously out of balance.

Q: What kinds of malformations have been noticed, and how widespread is the problem?

A: Multiple limbs, missing limbs, and facial abnormalities are the main

developmental malformations seen. Malformed amphibians are now documented in 44 states, in 38 species of frogs and 19 species of toads, with estimates of deformities as high as 60 percent in some local populations. Scientists now agree that current numbers of reported malformations significantly exceed the normal statistical variation.

Q: Where have amphibian declines been noted?

A: Scientists have documented four major “hot spots” for amphibian declines: western North America, Central America, northeast Australia, and Puerto Rico. Researchers believe that all of these

declines – most in seemingly pristine areas – have occurred since around 1980. Other areas of the world may also be affected by such declines, but until research is conducted in other continents and regions, the extent of possible declines is unknown.

In the United States and its territories, major declines of frog populations have been noted in California, in the Rocky Mountains, in Puerto Rico, and in areas of the Southwest. Some of these declines have occurred in some of our Nation’s largest parks and wilderness areas, where we would expect wildlife to be most protected. Northern leopard frogs, for example, have disappeared or become



Deformed Leopard Frog

rare over much of their known range in western North America. Boreal toads have undergone an 80 percent decline in the southern Rocky Mountains. In parts of the Sierra Nevada and adjacent foothills, several amphibian species – including mountain and foothill yellow-legged frogs and red-legged frogs – have declined over areas of 100 square miles or so. And in Puerto Rico, almost two-thirds of the native amphibians are declining; some species have not been found for several years.

Q: Are there any worldwide patterns of amphibian declines?

A: The worldwide pattern of amphibian declines includes both loss of populations from parts of species' ranges – the pattern seen in Australia and Central American tropics with stream frogs – and declines of entire species, such as ranid frogs in California and the Southwest, and the “poster frogs” for amphibian declines, the golden toad in Costa Rica and an Australian frog that broods its young in its stomach.

Q: How many amphibian species are there in the United States?

A: There are about 230 species of amphibians, including about 140 species of salamanders and 90 species of frogs and toads, that occur in the continental United States. Amphibians have two major patterns of distribution: confined to one location – that is, endemic – or widespread. Scientists estimate that the number of endemic species that have suffered losses has increased from 33 species in 1980 to 52 species in 1994.

Q: What are the leading causes of frog declines and deformities?

A: There does not appear to be one “smoking gun”; numerous environmental



Red-legged Frog

factors are probably responsible for the declines and deformities. Limited research findings and anecdotal information suggest several possible causes, including habitat loss, introduction of non-native predators such as fishes and bullfrogs, disease, and possibly airborne contaminants. Scientists who have studied amphibian declines and deformities agree that the deformities are unlikely to have caused the extensive, well-documented declines of many amphibian species worldwide. Deformities in different localities probably have different causes. Recent USGS research indicates that some malformations may have both site-specific and time-dependent causes.

Q: What is the United States doing about these issues?

A: The Department of the Interior has begun a nationwide program of amphibian monitoring, research, and conservation to ensure a sound scientific foundation for better informed decision-making on amphibian issues. As DOI's science bureau, the USGS has developed a framework for amphibian studies in

cooperation with a network of federal and state agencies. The study will consider habitat loss and degradation, invasive species, contaminants, disease outbreaks, climate change and altered patterns of disturbance.

Q: Where can I go for more information?

A: FrogWeb (<http://www.nbii.gov/frogweb>) is an online multi-agency U.S. government site from which you can link to many related websites.

The North American Reporting Center for Amphibian Malformations (NARCAM) (<http://www.npwrc.usgs.gov/narcam/>) website contains information on the occurrence of amphibian malformations including maps showing locations of observed malformed frogs. The site also enables scientists and the general public to report any findings of frog abnormalities either through the website or through a toll-free phone number (800-238-9801).

As the Nation's science agency for natural resources, hazards, and the environment, the USGS is committed to providing science that meets the needs of the changing world.