



Reported and Edited by
Linda Moulton Howe

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Amphibians Dying Out At Alarming Rate

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"This recent and massive decline in amphibian populations, that have been on Earth for millions of years, is one of the greatest extinction events in history." - Andrew Blaustein, Ph.D., Oregon State University



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Amphibian Ark's Disturbing Statistics:

50% of some 6,000 described amphibian species, are threatened with extinction.

165 amphibian species believed to have already gone extinct, including 34 known to be extinct and 130 not found in recent years and possibly extinct.

500 amphibian species whose threats currently cannot be mitigated quickly enough to stave off extinction.



Harlequin Frog - 67% of Central and South America's 110 harlequin frog species are believed to have vanished during the 1980s and 1990s. A new study says the primary culprit is the pathogenic chytrid fungus *Batrachochytrium dendrobatidis*, which has been spurred by global warming. Photograph by Forrest Brem, NatureServ.



January 18, 2008 Corvallis, Oregon - Can you imagine what the Earth would be like without frogs, toads and salamanders? Mosquitoes, flies and other insect populations eaten by amphibians would soar. Until now, the possibility that frogs, toads and salamanders that have been living on this planet for millions of years could ever disappear was unthinkable. 2008 has been declared the Year of the Frog by Amphibian Ark.org, which is trying to let the world know that amphibians are dying out in ever-increasing numbers. Scientists say that without immediate public, zoo and government efforts to conserve them, this century could see the extinction of nearly *half* of all the world's 6,000 amphibian species.

How many amphibian species are already declining so rapidly that extinction seems inevitable? 500

How many amphibian species have already disappeared from Earth? Estimates are 165.

Why are so many amphibians dying out? The answer is complex and sounds like the same 21st Century recipe that is wiping out honey bees, butterflies, fireflies and so much other earth life. The ingredients in that recipe: global warming, loss of habitat, new diseases, more pesticides and increased ultraviolet light exposure due to thinning ozone.

Along with habitat destruction, one of the current biggest disease killers of amphibians is a fungus called Chytrid. It's a deadly and infectious fungal disease not discovered until 1998 in Australia and Panama and is now spreading everywhere, linked to global warming and rising numbers of amphibian extinctions.



Left: Chytrid fungus infection shows in the pink underbelly of green tree frog.

Right: Great barred frog has a severe Chytrid fungus infection that is causing its skin to peel off.
Images by Australia National Parks and Wildlife Service.

Researchers don't know where the chytrid fungus came from, but it's highly transmissible and spreading fast: the fungus is now found on at least four continents and was recently reported for the first time in Japan.



Recent studies show the Earth's warming climate is contributing to the increase of chytrid disease, a fungus infection that is responsible for the extinction of many tropical frog species. The fungus, *Batrachochytrium dendrobatidis*, infects tadpoles and eventually attacks the skin of adults and kills them. Scientists know the spore stage can swim through water to infect other frogs, but there is



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still much to know about how the disease spreads, and if it can survive in other animals.
Graphic illustration by Nicolle Rager Fuller, National Science Foundation.

This week I talked with amphibian expert, Andrew Blaustein, Ph.D., who is a Professor of Zoology and Director of the Environmental Sciences Graduate Program at Oregon State University in Corvallis, Oregon.

Interview:

Andrew Blaustein, Ph.D., Professor of Zoology and Director, Environmental Sciences Graduate Program, Oregon State University, Corvallis, Oregon: “I used to study the ecology and behavior of frogs and toads and salamanders in the Pacific Northwest. And in the early 1980s, they were pretty abundant. Then they got to be harder and harder to find and then by the mid-1990s we saw whole populations disappear and we saw eggs dying in the field, we saw animals with multiple limbs (legs), we saw all these new things that people have talked about for the past few years. But we didn’t see any of that in the 1980s.

So, I’ve seen robust, excellent populations decline to no populations in certain areas – or to very poor populations – and even lots of mortality at the egg stage and increasing numbers of multiple legged and malformed frogs.

The consensus opinion of people throughout the world that study amphibians is that we are looking at a massive decline in amphibian populations and a massive extinction event. And this event, when you couple it with all the other extinction event of other animals, is probably going to be the greatest extinction event in history.

Amphibians, of all the vertebrate groups – and I’m talking about amphibians compared with mammals, birds, reptiles, and fishes – seem to be hit more than those other groups. And statistics show there are about 6,000 species of amphibians and nearly half – 45% - are in decline; 30% of them are threatened.

Extinctions of Amphibians

Some people consider about 170 species to have gone extinct since 1980. [No accurate data for about 25% species] But this is worse than birds and worse than mammals if you compare them. So, amphibians are hurting!

WHAT IS LARGELY RESPONSIBLE FOR THE DECLINE AND EXTINCTION?

The major reason for the declines and extinctions is habitat destruction and habitat alterations. There is absolutely no controversy about that. However, the problem arises when you get these animals in relatively undisturbed habitat without overt habitat destruction and the amphibians are *still* declining. Now we have a couple of problems. One of the major problems is the disease called chytrid fungus. It’s a fungus that spreads from amphibian to amphibian. We don’t even know a lot about this fungus, but we know it’s prevalent in a lot of species.

RIGHT NOW, AS WE SPEAK IN JANUARY 2008, HOW MANY AMPHIBIAN SPECIES ARE ALREADY EXTINCT ON THE PLANET THAT WERE ALIVE TEN OR 20 YEARS AGO?

Some people think that since 1980, there are at least 125 to 170 – depending upon who you are talking to.

IS THERE ANY PARTICULAR SPECIES THAT IS SUFFERING MORE THAN OTHERS?

OK, these are frogs, toads and salamanders. Most of the information we have is from frogs and toads, but salamanders are declining, too.

Frogs



The Corroboree Frog is Australia's most endangered frog.

Pesticide water pollution and 4-wheel-drive vehicles destroy nesting grounds. Global warming is causing climate change and increases in diseases such as the Chytrid fungus. Corroboree Frogs adapted to cold winters, which now might not be cold and long enough to breed. Thin ozone lets in too much ultraviolet radiation, which damages amphibian eggs that produce multiple leg and other mutations. Photo by Wikipedia.

Toads



The Golden Toad (*Bufo periglenes*) was a small, shiny, bright-orange toad that was once abundant in a small region of high-altitude cloud-covered tropical forests, about 30 square kilometers in area, above the city of Monteverde, Costa Rica. Since 1989, not a single Golden Toad has been seen anywhere in the world, and it is classified by the World Conservation Union as an extinct species. Photo by Charles H. Smith, U. S. Fish and Wildlife Service.

Salamander



Disjunct Green Salamander (*Aneides aeneus*).

Once abundant salamanders in the Appalachian and Allegheny Plateaus and Blue Ridge Province, the disjunct green salamanders are also declining. Photo © by Eric Soehren.

[Editor's Note: *Wikipedia* - "Salamander is the common name applied to approximately 500 species of amphibians typically with slender bodies, short legs, and long tails. The moist skin of these amphibians usually makes them reliant on habitats in or near water or under some protection on moist ground, often in a swamp. Some species are aquatic throughout life, some take to the water intermittently, and some are entirely terrestrial as adults. They lay shellless eggs in water. They are capable of regenerating lost limbs. Salamanders split off from the other amphibians during the Mesozoic, and initially were similar to modern members of the Cryptobranchioidea. Any resemblance to lizards is the result of the basic tetrapod body plan, as they are no more closely related to lizards than they are to mammals. Their

nearest relatives are the caecilians, little known legless amphibians.”]

ENDANGERED AND EXTINCTION THREATS ARE AROUND THE WORLD IN BOTH HEMISPHERES?

Yes, it’s worldwide.

WHAT ARE THE IMPLICATIONS IN THIS 21ST CENTURY IF WE KEEP SEEING EXTINCTIONS IN FROGS, TOADS AND SALAMANDERS?

Frogs, toads and salamanders are very important components in most ecosystems. In some ecosystems, they are the major proportion of vertebrates and they eat lots of things. They eat lots of insects, they eat mosquitoes, flies, the insects that cause diseases to humans. If you took away all the frogs and toads tomorrow, I would expect to see huge numbers of flies and mosquitoes and insect pests. And a lot of animals eat amphibians! Fishes eat them, snakes eat them, birds eat them; other amphibians eat them. Reptiles eat them and mammals eat them. Therefore, a staple food source for a lot of these animals would be disappearing (in accelerating extinctions) and those animal populations (who feed off amphibians) might be affected. Even insects eat amphibians. They eat the tadpoles, the young ones. So it would be a major impact if we lost all the amphibians.

WHAT WOULD BE THE WORST CASE?

If we lose amphibians, not only are we losing an important component of ecosystems from a predator/prey point of view – what eats them and what they eat – but we’re also losing potential sources for pharmaceutical products because we’ve actually found in recent years that these things carry peptides on their skins that can be used as medicines for people. For example, recently they have discovered peptides on the skin of some frog species in the tropics that can actually slow the growth of the HIV/AIDS virus – and peptides that can destroy *herpes simplex*. And these are just two examples.

DO YOU, OR ANY AMPHIBIAN RESEARCHERS, HAVE A TIMELINE IN WHICH YOU HAVE EXPECTED PROJECTIONS OF TOTAL EXTINCTIONS AS THIS CENTURY UNFOLDS?

I don’t know of any timeline that has been published yet, but people are working on models to show that. It does not look good because the extinction rate is faster than we’ve seen before for amphibians, it looks like. And the fact of the matter is that these things can’t recover very rapidly, either. So, I don’t really know of any published timelines at this point, but if you look at what is going on here – since 1980, we lost at least 100 species, probably up to 170 species. That’s very alarming – like the dinosaurs. Extinction means ‘They’re gone!’

IS THERE ANYTHING IN 2008 GOING FORWARD THAT HUMANS CAN DO TO HELP REVERSE THE DECLINES AND EXTINCTIONS OF MORE AMPHIBIANS?

There is a project now going on called the ‘Amphibian Ark,’ where people are trying to save these animals by rearing them in captivity, growing up their populations and then potentially releasing them into the field later on.

But you know, it’s going to be tough because we don’t even know how to rear a lot of these species in captivity; we don’t know what kinds of food they eat or how they behave. It’s just going to be very difficult. Then, once we put them back into the field, they are still going to face the same problems – disease is still going to be there, the habitat destruction is still going to be there, the pollution is still going to be there. So, we have to face the fact that we’re going to lose a lot of these species. I mean, the desperation point is taking these animals into captivity and trying to grow them up. That’s where we’ve come (to).

WHAT DO YOU EXPECT IN THE REST OF THIS CENTURY GOING FORWARD – AND WE’RE ALREADY AT 2008 – WHAT DO YOU EXPECT TO HAPPEN?

Well, right now, I’m pretty pessimistic about many of the vertebrates on the planet because the habitat is declining; there is less of it. We’re chopping down rainforests at unprecedented rates. We are doing some bad things to the environment that still persists.

But then, there are some really good efforts that are going on like the Amphibian Conservation group. There's also one for reptiles, too, and the bird people are really good at pushing conservation. People have also identified mammals to save such as large African mammals. There is much more awareness now than there was 30 years ago about saving these. So, I'm optimistic in that sense that people are more aware about these things. But I'm very pessimistic that it's going to be very difficult to stop the declining populations of all these types of animals.

I think people should realize there is not just one reason for these extinctions – habitat destruction and alteration are the major causes. Diseases are a very important cause, but there is more than one disease. The chytrid fungus is just one. There are other fungi. There are parasitic worms. There are viruses and bacteria that all play a role. And obviously, pollution plays a role. There is ozone depletion with increasing ultraviolet radiation that plays a role. So, all these things acting together add up to a number of insults on the amphibian populations that keeps knocking them down, knocking them down. Amphibians persisted for millions of years. They were here before the dinosaurs and here after the dinosaurs, but now they are starting to hurt. They are starting to hurt because of all these insults, which are usually human-induced.

AND WHAT YOU MEAN IS THAT AFTER MULTIPLE MILLIONS OF YEARS OF SURVIVING ON THIS EARTH, IN ONLY A CENTURY OR TWO, HUMANITY WILL END UP DRIVING SO MUCH OF THE AMPHIBIAN AND OTHER POPULATIONS TO EXTINCTION.

That's exactly what I mean. You got it right. I think they have been here for millions of years and we can knock them out in a couple of hundred."

In 2008, Amphibian Ark will lead global zoos, botanical gardens and aquariums in "The Year of the Frog." The goal is to raise \$50-60 million as part of a 5-year \$400 million Amphibian Conservation Action Plan to establish captive breeding programs in zoos, botanical gardens and aquariums for the 500 most threatened species.

It was only a year ago in March 2007 that researchers of dying salamanders confirmed that one of the most widely used pesticides in the U.S. is now linked to the increasing deaths of salamanders. That pesticide is: Atrazine. And to the scientists' surprise, even the lowest levels of atrazine "significantly increased salamander mortality." Atrazine has also been detected in more than 1 million Americans' drinking water at levels higher than EPA's maximum drinking water standard.

Amphibian Ark says about the 2008 Year of the Frog: "Amphibians have been likened to canaries in the coal mine, just as miners used sensitive canaries to warn them of toxic gases in the mines. Now, amphibians might be warning us of unsafe environmental conditions that could seriously impact our own human health."

More Information:

For further reports about Earth life extinction events, please see related reports in the **Earthfiles Archive:**

- 08/08/2007 — 2007's Warm, Erratic Global Weather
- 07/11/2007 — Mystery of Night Shining Clouds - Another Global Warming Change?
- 06/28/2007 — Hackenberg Apiary, Pennsylvania - 75-80% Honey Bee Loss in 2007. What Happens If Colony Collapse Disorder Returns?
- 06/21/2007 — Large Lake in Southern Chile Has Disappeared
- 06/01/2007 — Is Earth Close to Dangerous Tipping Point in Global Warming?
- 05/29/2007 — Deadly VHS Fish Virus Has Spread to Lake Michigan
- 04/12/2007 — First 2007 Crop Pattern in United States
- 03/17/2007 — Honey Bee Disappearances Continue: Could Pesticides Play A Role?
- 02/23/2007 — Scientists Hope "Amphibian Arks" Can Save Frogs and Toads
- 02/23/2007 — Part 1: Earth Life Threats - Alarming Disappearance of Honey Bees
- 02/02/2007 — Updated: New U. N. Global Climate Change Report: Earth Could Warm Up 3.2 to 11.52 Degrees Fahrenheit by 2100
- 01/10/2007 — 2006: USA's Warmest Year On Record
- 12/16/2006 — Updated: Unprecedented Die-Off of 2,500 Mallard Ducks in Idaho

- 12/08/2006 — NASA Wants Permanent Moon Base by 2024
- 12/07/2006 — Earth Headed for Warmest Period in 55 Million Years?
- 09/23/2006 — E. coli O157:H7 - Why Can't It Be Washed Off Contaminated Spinach?
- 09/09/2006 — Methane - Another Threat in Global Warming
- 08/19/2006 — Repair of Earth's Ozone Layer Has Slowed
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- 06/22/2006 — Horse Suspended in Mid-Air Near Milan, Italy, Apartment
- 02/20/2006 — Mysterious Deaths of Whales in Mexico
- 09/23/2005 — Phenomenon of "Instant" Hurricanes in 2005
- 08/26/2005 — What Is Killing Amphibians Around the World?
- 08/05/2005 — Scientists Puzzled by "Bizarre" Pacific Coast Die-offs in 2005
- 05/07/2005 — Did Milky Way Gas and Dust Turn Earth Into Icy Snowball Four Times?
- 04/20/2005 — Outer Space Impact At Serpent Mound, Ohio, 256 Million Years Ago
- 04/01/2005 — What's Killing Off Marine Life Every 62 Million Years?
- 03/20/2005 — Astronaut John Young: "The Moon Can Save Earth's Civilization."
- 02/26/2005 — Collapse of Societies: From Easter Island to Iraq - to Western World?
- 02/03/2005 — Kyoto Protocol Goes Into Effect February 16, 2005. British Scientists Warn Global Temperatures Could Climb Higher Than Earlier Estimates.
- 08/27/2004 — Global Warming Impact On Birds - More Extinctions Expected
- 09/02/2003 — Updated - Astronomers Don't Think Asteroid Will Hit Earth in 2014
- 07/19/2003 — Update - Defiance, Missouri T-Pattern Cut in Saplings
- 11/14/2002 — What Happened 12,000 Years Ago That Killed So Many Animals?
- 07/20/2002 — Extinctions of Earth Life Are Accelerating Rapidly
- 04/27/2002 — Earth's Magnetic Anomalies - Could the Poles Flip?
- 01/05/2002 — Global Warming Update - Could Increasing Carbon Dioxide Gas Be Transformed Into Limestone?
- 12/22/2001 — Scientists Warn That Climate and Earth Life Can Change Rapidly
- 06/09/2001 — Environmental Updates and Colt Mutilated in Leitchfield, Kentucky
- 02/25/2001 — Environmental Updates
- 02/07/2001 — 94% Decline In Aleutian Islands Sea Otter Population
- 01/07/2001 — Dinosaur-Killing Asteroid Punched 22 Miles Through Earth's Entire Crust
- 10/25/1999 — A Mysterious "Perturber" at the Edges of Our Solar System

Websites:

Amphibian Ark: <http://www.amphibianark.org/statistics.htm>

OSU Blaustein Lab: <http://oregonstate.edu/~blaustea/>

CDC Emerging Infectious Diseases:

<http://www.cdc.gov/ncidod/EID/vol10no12/03-0804.htm>

National Science Foundation:

http://www.nsf.gov/news/news_summ.jsp?cntn_id=105707

World Conservation Union (IUCN): <http://www.iucn.org/>

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