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# Unprecedented Northeast Bat Die-off Spreading Rapidly

## Insects Expected to Increase. Could Ohio, Kentucky and Tennessee Be Next?



*"People are starting to comb through old historic records to see, but there is no evidence that I know of anywhere in the fossil record, or in recent recorded history, of a die-off of this nature in bats."*
– DeeAnn Reeder, Ph.D., Bucknell University

Little Brown Bat hibernating in West Virginia cave has white ring of the fungal genus *Geomyces* around its nose and on its ears. Image © 2009 by Craig W. Stihler, Ph.D., West Virginia Dept. of Natural Resources.


**Click for podcast.**

**February 26, 2009 Vicksburg, Mississippi and Lewisburg, Pennsylvania -** One year ago in February 2008, I reported at my news website, Earthfiles.com, about thousands of sick and dead cave-dwelling bats in New York, Vermont and Massachusetts. [ See **022908 Earthfiles.**]

Now, one year later in February 2009, the deaths have spread to at least eight states and the exact cause is still not proved. But the one persistent symptom on the sick and dead bats is a white substance around the noses and faces of the sick and dead bats. Only four months ago in October 2008, lab analysis confirmed the white stuff is a fungus in the genus, *Geomyces*. That fungus loves cold temperatures in the Arctic and apparently in Northeastern winter caves. However, no one had ever heard of the fungus killing bats before now. The mortality rate is nearly 100% and there is nothing in the global scientific literature about bats dying with white fungus rings around their noses.

[ Editor's Note: *Wikipedia* - "*Geomyces* is a genus of filamentous fungus in the family *Myxotrichaceae*. Members of the genus are widespread in distribution, especially in northern temperate regions. Known to be pscychrotolerant and associated with Arctic permafrost soils, they are equally prevalent in the air of domestic dwellings, and children's sandpits. The *Geomyces* are keratinophilic fungi, able to degrade hairs and nails. They have

been investigated for possible use in the biodecomposition of waste poultry feathers.

A 2008 study of 'white-nose syndrome' in bats implicates the *Geomyces* genus of fungi found on the muzzles, wings and ears of infected cave-dwelling bats, now spread to eight states in the Northeast. It is not yet certain if the fungus is a causative agent in the bat deaths, or merely an opportunistic pathogen. It is known, however, that *Geomyces* species are found in caves and bat hibernacula." ]

But that's exactly what was first discovered in the winter of 2006-2007 in two caves west of Albany, New York. Other physical anomalies common to each dead bat carcass is little or no fat. Winter is when bats hibernate in caves and mines. To survive cold winter temperatures, the bats eat as much as possible to build up fat reserves before spending a few months in hibernation hanging upside down close together to share body heat. Bats get so close to each other during hibernation that in the case of Little Brown Bats, *300 of them pack into a square-foot space*. Hibernating so closely together, also means that bats can spread disease quickly.

Hibernating Little Brown Bats crowded together to keep warm, about 300 animals per square foot. Image © 2007 by Alan Hicks.

Now, by February 2009, the white-nose syndrome has expanded beyond New York, Vermont and Massachusetts to five more Northeastern states: Pennsylvania, West Virginia, New Jersey, Connecticut, and New Hampshire. There are four cave-dwelling bat species currently dying off in this mystery:

1) Little Brown Bat (*Myotis lucifugus)*

Little Brown Bat hibernating winter of 2008-2009 in West Virginia cave and infected with fungal genus, *Geomyces*. Image © 2009 by Craig W. Stihler, Ph.D., West Virginia Dept. of Natural Resources.

2) Northern Long-Eared Bat (*Myotis septentrionalis*)

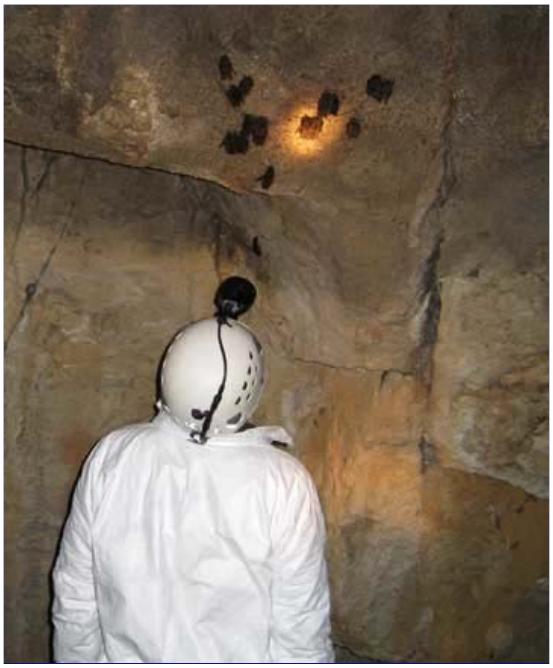
Northern Long-Eared Bat hibernating winter of 2008-2009 in West Virginia cave and infected with fungal genus, *Geomyces*. Image © 2009 by Craig W. Stihler, Ph.D., West Virginia Dept. of Natural Resources.

3) Indiana Bat (*Myotis sodalis*)

Indiana Bats hibernating winter of 2008-2009 in West Virginia cave in tight cluster.
Image © 2009 by Craig W. Stihler, Ph.D., West Virginia Dept. of Natural Resources.

4) Eastern Pipistrelle (*Perimyotis subflavus*)

Indiana Bats hibernating winter of 2008-2009 in West Virginia cave.
Image © 2009 by Craig W. Stihler, Ph.D., West Virginia Dept. of Natural Resources.



West Virginia Dept. of Natural Resources biologist in Tykek suit

examining bats in a cave to search for white-nose fungus syndrome in February 2008. Image © 2008 by Craig W. Stihler, Ph.D., West Virginia Dept. of Natural Resources.

On February 20, 2009, a group of scientists trying to figure out what exactly is killing all the cave-dwelling bats and how to stop the killer, gathered in a web meeting to talk about their latest research data. One of the scientists is Eric Britzke, Ph.D., Research Wildlife Biologist for the U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi. He has coordinated a research project to put temperature-sensitive transmitters on bats in hibernation to determine how often and for how long the bats with white-nosed syndrome are waking up from hibernation compared with normal, unaffected bats.

Eric Britzke, Ph.D., Research Wildlife Biologist for U. S. Army Engineer Research and Development Center in Vicksburg, Mississippi, placed a temperature-sensitive transmitter on a healthy Little Brown Bat to monitor how often it wakes up in its normal hibernation to compare to Little Brown Bats that show the white-nose fungus syndrome. Image courtesy Eric Britzke.

Dr. Britzke's preliminary conclusion is that the sick bats are waking up more often and leaving their hibernation caves, perhaps in desperation before death. But what is causing the sick bats to wake up and move prematurely, using up their precious fat supplies?

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## Interview:

**Eric Britzke, Ph.D., Research Wildlife Biologist, U.S. Army Engineer Research and Development Center, Vicksburg, Mississippi:** "The main thought is that the fungal genus, *Geomyces*, is probably the primary pathogen just because we have nothing else to go on. So, the hope is that fungus *is* the primary pathogen because really what we need to do first is locate that primary pathogen and then go from there. If the fungus is a secondary pathogen, then we basically know nothing about the white-nose syndrome and we are starting over from scratch again. Meanwhile, thousands and thousands of bats are dying.

IF YOU ALL ARE STILL AT THE STATE WHERE YOU'RE NOT CERTAIN WHAT IS KILLING ALL THESE BATS, THEN EVEN IF IT COMES OUT TO BE THIS FUNGUS, IT'S GOING TO TAKE WHAT? – A YEAR, OR TWO, OR THREE TO FIGURE OUT HOW TO ATTACK THE FUNGUS?

You're right - we don't know that we can stop it, even if we know what it is. So, there might be nothing we can do. Most bat researchers are very pessimistic that we're going to be able to contain this in the short term.

These bats ate millions of tons of insects each year and now these bats aren't going to be out on the landscape controlling insect populations. Instead of the white-nose fungus affecting only bats, the fungus is really affecting the whole ecosystem in the Northeast and it will just continue to get worse and worse as this progresses."

A bat zoologist also participated in the white nose fungus and bat death meeting on February 20. She is DeeAnn Reeder, Ph.D., Asst. Prof. of Biology from Bucknell University in Lewisburg, Pennsylvania. As a bat expert, she is very surprised by the rapid spread of the mysterious bat deaths throughout the Northeast.

## Interview:

**DeeAnn Reeder, Ph.D., Asst. Prof. of Biology, Dept. of Biology, Bucknell University, Lewisburg, Pennsylvania:** "It's spread faster than anyone thought that it would. The bats are starving to death. We do know now they have less body fat. There is some evidence – even though everything yesterday was pretty preliminary – evidence that the bat immune systems – in my lab, we know their immune systems in the winter are compromised anyway and that the white nose-infected bats are mounting some kind of immune response to an attack. So, the bats are clearly challenged at this point.

One of the things that might be coming out of it is that some of the detriment to the animals – particularly those that make it through the winter and then are dying in the summer – is that the fungus is damaging their wing membranes pretty significantly, so that we have bats flying in April and May that might not be able to get enough to eat because their flying is hampered. Their wing membrane is only a cell or two thick – it's very thin.

The fungal genus, *Geomyces*, looks like white powder on the very thin wing of an infected bat in February 2008. Image © 2008 by Craig W. Stihler, Ph.D., West Virginia Dept. of Natural Resources.

When the fungus gets in there, it can destroy that tissue. So, we're seeing bats in the summers with wings that look pretty bad and we think that might be contributing to mortality. So, even those bats that survive the winter are having lingering effects.

The *Geomyces* fungus looks very strongly like it might be the pathogen, but we want to make sure that we're not ignoring other possibilities. So, people talk about continued diagnostic work and the need to continue to look for bacteria or viruses or whatever else might be happening. The risk is that if we focus on the fungus too much and it's not it, then we've lost valuable time thinking about what else it could be.

## Is *Geomyces* Fungus the Primary or Secondary Infection?

BATS HAVE BEEN ON THIS PLANET FOR MILLIONS OF YEARS. FUNGI HAVE BEEN ON THIS PLANET FOR MILLIONS OF YEARS. WHY IS IT THAT SUDDENLY IN 2007 THAT A FUNGUS WOULD BE ABLE TO START DECIMATING HUNDREDS OF THOUSANDS OF BATS IN THE NORTHEASTERN UNITED STATES?

Almost all of my talks start with bats have been here for millions of years. They have evolved an ability to not only survive, but to thrive in really harsh environments. They are really tough little critters. And now I have to stop saying that. They're a couple of possibilities: one is that this is something truly new that they don't have any capacity to deal with. It could be an invasive species. It could have come here from Europe. It could have come here from anywhere and our bats don't have the capacity to fight it off. That's one possibility.

The other possibility is that the fungus is just a secondary infection – that these animals (bats) are sick from something else because fungal infections don't typically kill organisms. The Chytrid fungus now killing amphibians is a unique exception to that.

CHYTRID FUNGUS IS TAKING OUT THE AMPHIBIANS NOW.

[ Editor's Note: *Wikipedia* – "The chytrids are the most primitive of the fungi and are mostly saprobic, which means the fungus eats chitin and keratin. Many chytrids are aquatic and found in fresh water. There are approximately 1,000 chytrid species, in 127 genera, distributed among five orders. The chytrid fungus, *Batrachchytrium dendrobatidisis* responsible for a recently discovered disease of amphibians known as chytridiomycosis. Discovered in 1998 in Australia and Panama, this disease is known to kill amphibians in large numbers, and might be the principal cause for the worldwide amphibian decline since the 1990s. However, the precise cause and process of the amphibian deaths is still unknown. ]

Yes, but normally fungi tend to be infections on animals that are already immune-compromised for some reason. So, it could be that these bats have a novel bacteria or virus or something else that's making them sick and their weakened immune systems allow the fungus to grow.

So, there are a couple of different ideas, but that has been one of the biggest questions: Why now? Why now and why here?

Is the fungus truly novel? Or is the fungus found in all of these caves anyway and now for some reason, something else has happened to the bats?

## Bats, Honey Bees and Amphibian Die-Offs All At Same Time

THAT SIGNALS THE QUESTION: WHAT COULD BE GOING ON IN THE ENVIRONMENT OF THE U. S. AND THE PLANET THAT THERE IS COLONY COLLAPSE DISORDER OF THE BEES, THE BATS ARE DYING OUT AND THE CHYTRID FUNGUS IS TAKING OUT THE AMPHIBIANS? ALL OF THIS IS HAPPENING AT THE SAME TIME.

Yes, absolutely. I expect it in Ohio next year, maybe Kentucky, maybe Tennessee. Yeah, if it follows the pattern that it did this year in which it spread more than we thought it would, I expect we'll have it in those other states next year.

IF IT SPREADS ACROSS THE WHOLE UNITED STATES, WHAT ARE THE IMPLICATIONS?

Insect populations are going to go crazy! These cave-dwelling bats that are affected by white-nose fungus are insectivores. So, the service that they play, the role that they play in the ecosystem is to remove insects from the environment. So, when you look at the millions of bats in the U. S., you're talking about each bat eating up to 100% of its body weight every night in insects in the summer. So, you're talking about massive numbers of insects that are removed and the impact on the ecosystem is going to be huge.

## Without Bat Decline, Will Insect Populations Explode?

WHAT WOULD HAPPEN WITH THE INSECT POPULATION?

It's going to go sky high! It's going to explode. We're talking about agricultural pests. We're talking about mosquitoes. And that's going to ripple through the ecosystem. And I said this to my colleague, Greg Turner, the other day, 'You know, I'm not usually a 'sky is falling' kind of person.' And Greg said, 'But you know the sky is falling.' And I said, 'Yeah, I agree.' It's really tragic and I, quite frankly, don't see it being stopped at the moment. Then it might start dominoing or rippling through the ecosystem at multiple levels. It's really almost hard to predict. But the sky is kind of falling.

HAS ANYBODY EVER SEEN A DIE-OFF OF BATS LIKE THIS BEFORE?

No. No, and in fact, people are starting to comb through old historic records to see, but there is no evidence that I know of anywhere in the fossil record, or in recent recorded history, of a die-off of this nature in bats.

SO, THIS IS UNPRECEDENTED?

Yes, absolutely.

BATS ARE ONE IN FIVE OF ALL MAMMAL SPECIES?

Yeah, one in five of all mammal species, so there are a little over 1,200 species of bats [ about 5,500 species of mammals].

BATS HAVE BEEN AROUND FOR MILLIONS OF YEARS AND SUDDENLY, THEY START DYING MYSTERIOUSLY AND IT'S SPREADING THROUGHOUT THE EAST COAST.

Yeah, like wildfire! It's just at a level that is unprecedented and it's disheartening. I hope that somewhere along the way, there are some epiphanies – you know, some 'Aha!' moments and we say, 'Maybe we can hit it with this.' We need to figure out how we can control it right now, even before we understand it. How can we begin to control it?

## How Is Fungus Spreading?

IF THE FUNGUS IN ALL EIGHT STATES SAMPLED SO FAR IS IDENTICAL, HOW IS THE FUNGUS SPREADING AND WHY IS IT KILLING THE BATS?

The fungus is spread by spores into the environment. Fungal spores are meant to be sort of puffed out into the air and then they would be picked up by another animal and then it could start to grow and get into the skin of the animal and makes more spores. So, the spores are aerosolized. They go through the air and land on another animal.

You know, these bats cluster together. They cluster in groups of hundreds together really tightly [ for winter hibernation].

YOU ALL HAVE NEVER SEEN THIS HAPPEN BEFORE, SO HOW IS THE FUNGUS DOING THIS?

If it's the fungus, the fungus has undergone some sort of change. There has been a mutation somewhere along this fungal lineage that now gives it the characteristic that it would need to be a pathogen. That jump from something that's not a pathogen to a pathogen – that happens. We know that happens in infectious diseases. Natural selection works on mutations in DNA. And so as those mutations happen, sometimes you get organisms that are able to do something better – like invade a host and make an animal sick. Then that fungus would be more successful, and so that fungal lineage continues. But it's basically evolution by natural selection is what is responsible for infectious diseases.

## Global Travel Spreads Diseases

Another thing that I think contributes is the globalization of our societies. Cavers travel around the world. So, this is something that could be bats in Europe, for example, are resistant to and was brought here to the United States and our bats have no resistance. It's like when the Europeans brought small pox to the Native Americans. You know, you have something that a certain population of animals can deal with just fine because they co-evolved with it and know how to fight it off. And then you transplant that pathogen to a new place where those animals have no resistance. That would explain why this just came out of nowhere and is hitting hard and fast. This could be an invasive species of some sort.

## Will Bat Die-Offs Spread to Canada, Mid-West and West?

AS A BAT ZOOLOGIST, WHAT IS YOUR GUT INSTINCT ABOUT HOW THIS IS GOING TO PLAY OUT FOR THE NEXT TWO TO FIVE YEARS?

I think we are going to see mass mortality across most of the Northeast. And I think we will begin to see resistance. I think we will see some sites (caves) where animals are doing just fine. And then it will take decades to rebuild populations. But I think we are going to be behind the 8 ball for a few years. We're going to be just counting the dead bats and doing our best to figure it out and then hopefully in a few years, we'll have a bit better sense of it. There are a lot of people working real hard on it, but it's not an easy question.

SO, THE PROGNOSIS IS THAT FOR AT LEAST THE NEXT FEW YEARS, BAT DIE-OFFS ARE GOING TO CONTINUE ALONG THE EAST COAST IN WAVES INTO THE CENTRAL UNITED STATES AND MAYBE EVEN AS FAR AS THE WEST?

Yes, this has that potential. Absolutely! I'm hoping that if it's (cause) truly the cold-loving fungus that that will keep the fungus spread out of the South because the bats there don't go into prolong hibernation like they do here. So, the hope is that the die-offs will be confined to the longer hibernating bats.

BUT IT'S HARD TO IMAGINE THE NORTHEAST WITH ALL OF ITS HUMIDITY WITHOUT BATS CONTROLLING INSECTS.

Absolutely! And it's probably going to be in Canada – wherever bats hibernate.

HAS THERE BEEN ANY INFORMATION FROM CANADA?

I don't believe they have it yet. We do have several Canadian colleagues in the group – yeah, and as far as I know, it's not yet documented in any of the Canadian sites.

## Worst Case: 90% Mortality in Northeast Cave-Dwelling Bats and Westward Spread

WHAT IS YOUR BOTTOM LINE ON THE WORST CASE THAT COULD EVOLVE OUT OF THE SITUATION FROM NOW GOING FORWARD?

I think the worst case is that in the next five years, we might have up to 90% mortality in the cave-dwelling bats in the Northeast and that it will continue to spread to the South and the West where ever bats are hibernating. I'm sure hoping I'm wrong!

LOSING 90% OF THE BATS!

Yes. Tons and tons and tons of insects that are going to be in the environment that did not use to be because the bats are not eating them.

IT ALMOST SOUNDS BIBLICAL! (LAUGHS)

Yes, like the locust. Yeah, it is – it's huge!

WHAT DOES YOUR GUT TELL YOU IS THE ANSWER TO THIS?

My gut all along has said fungi don't kill animals, but I'm moving towards changing that. I think the fact that we keep getting all these genetic isolates of the same fungus – it's pretty darn suggestive (that the fungus is the culprit.)

UP UNTIL NOW AND THIS UNPRECEDENTED DIE-OFF OF BATS, A FUNGUS WAS LOOKED AT MORE OF AN OPPORTUNIST ON THINGS THAT WERE ALREADY SICK.

Absolutely. That's what fungi typically do. Fungi rarely kill animals.

IF THIS WHITE-NOSE FUNGUS IS THE SMOKING GUN IN THIS UNPRECEDENTED BAT DIE-OFF, IT MEANS THAT SOMETHING FUNDAMENTALLY HAS CHANGED IN THE FUNGUS'S ABILITY TO ATTACK CREATURES THAT ARE OTHERWISE HEALTHY.

Yes. We know so very little about fungi. Only about 10% are actually classified or can be studied, so I'm not sure about that. But what I think is that other things are happening such that fungi are being able to take a better hold.

THAT THERE IS ENVIRONMENTAL DETERIORATION.

Something. Something else is happening and it could be environmental things. It could be the fact that we are such a global society now. We all travel all around the world."

Since the Indiana Bat is on the Endangered Species list, the mammal specialist in New York's Endangered Species Program in the Department of Environmental Conservation is deeply involved in trying to find out what is causing the rapidly spreading bat deaths. He is Alan Hicks, who has a Masters of Science degree in Wildlife Management and has worked for New York's Endangered Species Program since 1979. In his 30-year-career, Alan Hicks has never seen white fungus rings around the noses of sick and dying bats. This week I talked with him about how the mystery began and what he has learned so far.

Mr. Hicks told me, "I think global warming is throwing Nature so far out of balance that

we're going to see more and more Earth creatures unable to cope with all the rapid changes. More and more extinctions are going to occur – and only then will humans see for themselves what happens when the coral reefs are dead, most amphibians are gone and maybe even bats aren't around to help control insects."

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## More Information:

For further information about sick, dying and disappearing Earth life, please see related Earthfiles reports in the **Earthfiles Archives**:

- 12/21/2008 — Mystery of Missing East Coast Acorns
- 09/26/2008 — NRDC Sues EPA for Honey Bee Lab Data and EPA Approves Another Bee-Killing Pesticide
- 08/31/2008 — Honey Bees Not Healthy in U. S. or U. K.
- 08/15/2008 — Amphibian Warning Bell of Mass Extinctions
- 05/06/2008 — Viewer Comments on Decatur, Alabama, White Sphere Incident
- 05/06/2008 — What Are the Strange "Pearls" in Google Map Images?
- 05/02/2008 — 3-Foot-Diameter Sphere Retrieved By Ambulance in Decatur, Alabama
- 04/10/2008 — Honey Bee Collapse Now Worse on West Coast
- 02/29/2008 — Mysterious Bat Deaths in New York, Vermont and Massachusetts
- 02/05/2008 — Federal Court Rejects Bush Navy Sonar Exemption
- 01/18/2008 — Amphibians Dying Out At Alarming Rate
- 10/05/2007 — Earlier, Faster and Deeper Arctic Ice Melt Down
- 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
- 07/18/2006 — 2006 - Hottest Year So Far in U. S. History
- 06/24/2006 — "High Confidence" Earth Is Warmest in 400 Years - Maybe Even 2,000 Years
- 06/22/2006 — Horse Suspended in Mid-Air Near Milan, Italy, Apartment
- 02/20/2006 — Mysterious Deaths of Whales in Mexico
- 09/29/2005 — 2005 Arctic Summer Ice Melt - Largest On Record
- 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?
- 04/27/2005 — Updated - More Than 1,000 Cane Toads Explode to Death in Germany and Denmark
- 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.
- 01/22/2005 — From U. S. to Arctic - A Sea Change in the Weather
- 11/02/2004 — North Pole Summers Without Ice?
- 08/27/2004 — Global Warming Impact On Birds - More Extinctions Expected
- 02/27/2004 — Abrupt Climate Change: Scenario from A Pentagon-Commissioned Report
- 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
- 03/22/2003 — Medical Experts Are Worried About the New SARS Pneumonia
- 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?
- 03/21/2002 — Antarctic Peninsula Is Melting - And So Is Arctic Ice
- 02/13/2002 — January 2002 Warmest On Record For Whole World
- 01/05/2002 — Global Warming Update - Could Increasing Carbon Dioxide Gas Be Transformed Into Limestone?
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- 06/09/2001 — Environmental Updates and Colt Mutilated in Leitchfield, Kentucky
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- 02/18/2001 — Environmental Updates and Mysterious Deaths of 2000 Atlantic Brant Geese
- 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
- 09/10/2000 — Arctic Ice Melt Threatens Polar Bears
- 09/24/2000 — Infectious Diseases - A Global Threat
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- 01/28/1999 — Army Sgt. Clifford Stone's and Triangle Craft in Germany, 1989

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**The Nature Conservancy: http://www.nature.org/**

**Global Warming Awareness: http://www.global-warming-awareness2007.org/Plant-and-Animal-Extinction.html**

**Animal Extinctions: http://www.independent.co.uk/environment/animal-extinction--the-greatest-threat-to-mankind-397939.html**

**Sierra Club Global Warming & Energy: http://www.sierraclub.org/globalwarming/**

**Greenpeace Ocean Crisis: http://www.greenpeace.org/usa/news/sustainable-seafood**

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