



### Bats Need Friends

Animals that make their homes in caves, but return to the surface to feed—including bats, raccoons, swallows, bears, moths, packrats, snakes, and foxes—are troglodytes. Among these, bats play an important role in the balance of nature. Most North American bats eat insects, and a single small bat can eat 1,200 mosquito-sized insects an hour. Other bats feed on fruit and nectar, pollinating flowers and dispersing seeds. Underground, bat droppings often are the foundation of a cave's food web.

Photo by Ann Froschauer, USFWS



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Unfortunately, more than half of American bat species are in severe decline or endangered. This is due to pesticides and land development severely reducing their food supply, and to a fungal disease called white-nose syndrome (WNS), which has killed millions of bats since 2006. Moreover, cave habitats are being destroyed and cave entrances closed, and people are disrupting bat nurseries and hibernating colonies. Worst of all, people who fear or misunderstand the value of bats are deliberately killing them.

### You Can Help Protect the Fragile Underground

- Stay out of caves where bats hibernate in the winter.
- Do not disturb or touch bats you find in caves, or anywhere else.
- Learn about WNS and follow prescribed protocols. Visit [caves.org](http://caves.org).
- Keep sinkholes free of garbage, sewage, oil, and other contaminants. Keep streams in karst areas clean.
- Do not damage formations, and do not deface or write on the cave walls. Oppose the sale of cave formations.
- Report vandalism and unauthorized entry to proper authorities. The NSS offers a reward for information leading to the successful prosecution of cave vandals.
- Respect cave-dwelling animals, and leave their habitats undamaged.
- Leave nothing but footprints in the cave, and stay on established paths.
- Play an important role in conservation and education by donating to the NSS **Save the Caves Fund** or a cave conservancy in your state.



Photo by Kelly Smallwood

### Cave Safely

Venture safely underground by visiting a “show” cave developed privately or by the National Park Service. Only enter undeveloped, “wild” caves with experienced cavers, and with the proper training and equipment. Join a chapter (“grotto”) of the NSS to learn to cave responsibly.



To learn more and join, visit [www.caves.org](http://www.caves.org).

## Find Out More

### Suggested Reading

*Living with Karst*  
by George Veni, Harvey DuChene, Nicholas Crawford, et. al.  
American Geological Institute

*A Guide to Responsible Caving*  
(available at no cost through the NSS Web site.)

Visit [www.NSSBookstore.org](http://www.NSSBookstore.org)  
for the largest selection of books on caves.

### On the Internet

*The National Speleological Society (NSS)*  
[www.caves.org](http://www.caves.org)

*The National Caves Association*  
[www.cavern.com](http://www.cavern.com)

*Bat Conservation International (BCI)*  
[www.batcon.org](http://www.batcon.org)

*National Park Service Cave and Karst Program*  
[www.nature.nps.gov/geology/caves/education.cfm](http://www.nature.nps.gov/geology/caves/education.cfm)



The National Speleological Society (NSS) is the largest organization in the world dedicated to exploring, studying, and protecting caves. The **Save the Caves Fund**, supported solely through donations, provides essential funding for cave conservation and restoration, karst resource management training, and educational programs. For more information visit the NSS Web site or contact the NSS office.

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## Discovering Caves

# Fragile Underground



Photo by Jim Loftin

[www.caves.org](http://www.caves.org)

## Fragile Underground

Caves are the world's most remote and fragile wilderness, and they need your help to endure. They offer irreplaceable habitats for rare plants and animals, many of which spend their entire lives in complete darkness. Often extending for miles, a cave's intricate passageways contain crystalline formations that may have taken many thousands of years to form.

Many caves also preserve fragile prehistoric and historic relics. Moreover, much of our drinking water travels through caves before reaching wells, springs, and aquifers.

However, caves are threatened by human activities above and below ground. Carelessness and ignorance, as well as intentional vandalism, can quickly—and permanently—damage a cave, its formations, its environment, and the plants and animals that live there.

## Karst Matters

Karst landscapes include caves, sinkholes, underground streams, and other features formed when bedrock is dissolved by water. Lava tube caves are pseudo-karstic features, created by volcanic activity. One-fifth of the nation's land area is karst, and nearly every state has caves, as do most countries in the world.

Karst terrains contain the largest springs and most productive groundwater supplies on Earth, and these provide drinking water to millions of people. However, karst landscapes are the most vulnerable to environmental damage and must be managed carefully. This requires conscientious efforts by citizens and land-use decision makers, often working closely with speleologists who explore, map, and study caves.

## Protecting Our Water

Caves play a vital role in the quality of our drinking water. In karst and pseudo-karst areas, surface water flows into and through caves quickly, receiving little filtration. This water often travels great distances underground, and the impurities it carries—such as human and animal waste, pesticides, fertilizers, and petroleum products—contaminate wells, springs, and aquifers. Only by wisely and carefully managing karst and water, and keeping pollutants from entering caves, can we protect the quality of our drinking water.

## Nature's Masterpieces

Drop by drop, crystal by crystal, a solution of surface water and minerals seeps through cracks in the rock and deposits formations (speleothems) on floors, ceilings, and walls of caves. Sadly, a careless touch or malicious gesture can ruin what took centuries to form. Once damaged or destroyed, cave formations are ruined forever.

Recognizing the value of caves, Congress passed the Federal Cave Resources Protection Act in 1988 to "secure, protect, and preserve significant caves on Federal lands for perpetual use, enjoyment, and benefit of all people." Additionally, many states have laws protecting caves and their contents.

## Keepers of Our Past

Caves offer valuable clues to ancient life as well as to our own past. Since prehistoric time, caves have served as homes, burial grounds, and sites for religious practices, and the near-constant conditions in those caves have preserved sensitive artifacts. Additionally, caves offer scientists a treasure-trove of fossils of extinct plants and animals.

## Fragile Habitats

Cave-dwelling animals—trogllobites—are unique species of organisms, which include insects, crustaceans, and fish, that spend their entire lives underground. They are specially adapted to living in total darkness, and offer scientists insight into biological processes. Remarkably, biologists have discovered cave-dwelling extremophiles whose food web is based on chemosynthetic, or "mineral-eating" bacteria. They provide clues about the earliest forms of life on Earth, and are being studied by scientists to learn about the potential for life on Mars.

Because trogllobites cannot live outside a cave, their survival is endangered if the cave environment is damaged or altered. Water pollution, visitor traffic, trash, flooding, and a change in air patterns or temperature can disturb a cave's fragile food web and ecosystem. Once destroyed, these isolated environments have little chance of regenerating, and unique trogllobites could be gone forever.

# Protecting the Last Wilderness

Photo by Alan Grosse

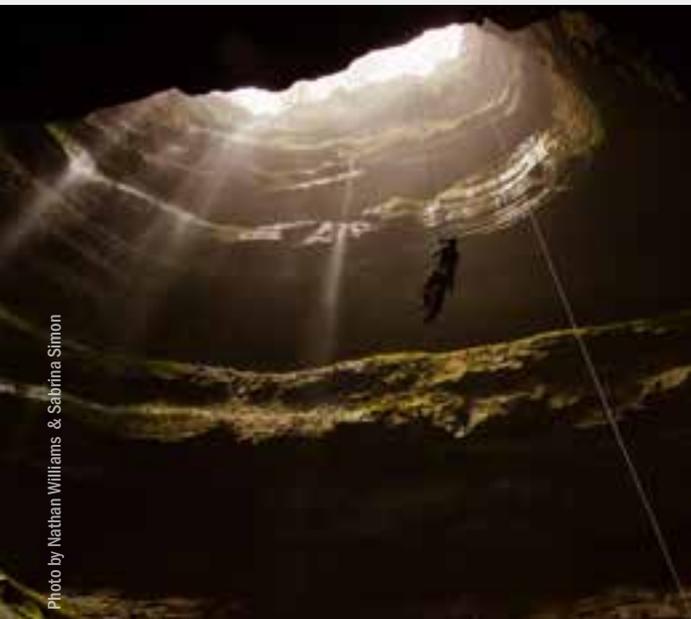


Photo by Nathan Williams & Sabrina Simon



Photo by Alan Grosse



Photo by Roy Gold



Photo by Bob Biddix



Photo by Ryan Maurer

We explore, we study, we protect. Visit [www.caves.org](http://www.caves.org).