**Bats = Healthy Ecosystems**

There are 45 species of bats in the United States (out of 1,000 worldwide) and they are among the most

beneficial and necessary animals on Earth. These flying mammals comprise nearly a quarter of all mammal species and live in almost every habitat on the planet. They are the primary predators of vast numbers of insect pests, including beetles, moths, leafhoppers, and other insects which, if not for bat predation, would cost farmers, foresters and you billions of dollars annually in lost crops, damage to ornamental plants and private vegetable and flower gardens. Some bats also consume mosquitoes, and other biting flies and gnats which are at best an annoyance to humans, and at worst, disease carriers. Bats also pollinate flowers and disperse seeds in rainforests and deserts. No matter where bats are found, they are critical elements of the ecosystem.

Bats can live up to 30 years of age, and most have only one baby, called a pup, each year. As with all mammals, pups are fed milk by their mothers, which are able to recognize their young by voice and scent. (Contrary to popular belief, bats are not blind; they are able to see as well as most other mammals.) For warmth and protection, females often live together in dense "bat nurseries," roosting in caves or other structures, such as old buildings and abandoned underground mines, during the day. Some species live in hollow “den” trees, in cracks on cliff faces, in narrow rock crevices, and sometimes even under rocks. Roosting bats hang upside down with their wings folded at their sides or around their bodies. While some bat species migrate to southern climes during the winter, many American species hibernate in caves until spring, lowering their metabolism and surviving on stored fat reserves.

Insect-eating bats feed at night, catching pests such as mosquitoes, moths, flying beetles and gnats. They emit high-frequency sound pulses that bounce off objects as echoes. Bats' sensitive ears enable them to use these echoes to avoid objects in their path and locate, identify, and capture moving prey while flying through the darkness. This feeding and navigating mechanism is known as echolocation. It is so effective that bats can even hear the footsteps of walking insects and can detect objects as fine as a human hair. Echolocation also permits bats to navigate through deep caves in total darkness.

America's largest bat colonies are found in caves. For example, Bracken Cave in central Texas is the summer home of 20 million Mexican free-tailed bats. During their annual residency period, thousands of square meters of the cave’s walls are covered in an estimated 240 tons of roosting bats, with a density of more than 5,000 bats per square meter. On each of their nightly forays, these bats eat more than 500,000 pounds of insects over the surrounding towns and farmlands. They spend their days in total darkness more than 2 miles deep inside the cave; how they know when it is time to emerge each evening remains a mystery.

Bats are extremely susceptible to the disturbance of their habitats. For example, thousands die each winter when inadvertently awakened by noise or other disturbance, which forces them to waste precious energy reserves. Many more bat colonies are affected by chemical pollution, cave vandalism, and other habitat destruction. The loss of bats increases our species reliance on chemical pesticides, which can negatively affect human and environmental health.

Populations of native plants, and the animals that depend on those plants, also decline when bat populations drop. The Saguaro, Organ pipe cactus, and Agave are a few such bat-dependent plants. So important is the Long-nosed bat to the Agave's reproductive process, that if its flowers are not visited by the bats, the odds of successful seed production are one three-thousandth of normal. Yet, that bat species is now endangered, with only two nursery colonies known to remain in the United States.

Bat guano (poop) also provides the primary nutrient source for entire ecosystems of cave life. It is so rich in nutrients that a single tablespoonful can contain hundreds of species of bacteria of great value. The Alabama cave fish, for example, lives beneath a bat roost in only one cave. Loss of the bat colony and the guano it produces could lead to the fish's extinction. Recent tests have shown that some of the bacteria in guano also produce enzymes that have potential for use in detoxifying industrial wastes, improving detergents, and producing certain fuels and even new antibiotics.

Many colonies of cave-dwelling bats have already been lost because of the impact of human activities. Of the bat species living in the United States and Canada, more than half are endangered or are candidates for such status. Conservation efforts, including some undertaken jointly by the BLM and Bat Conservation International, have proven successful in halting some bat population declines. For example, several modern bridge designs have incorporated long, vertical crevices to provide habitat for millions of bats. A number of formerly closed abandoned mines in northern California have been reopened and gated to provide new bat habitat for Townsend's big-eared bats. Other successful conservation initiatives include the use of artificial bat houses and the gating of caves essential to the survival of particular bat colonies.

**A new threat to bats**

Since the winter of 2006, a disease known as White-nose Syndrome has killed millions of bats in Eastern North America. White-nose Syndrome (WNS) is a disease caused by a non-native, cold-loving fungus called *Pseudogymnoascus* destructans which can be found in the caves of the affected regions. It was first discovered in New York caves during the winter of 2006-2007, initially killing half of the wintering bat population. The name of the disease refers to the white fungal growth found on the noses of infected bats - although it is also sometimes found on their wings and tail membrane. The fungus is currently affecting hibernating bat species in nearly half of the United States and parts of Canada and it continues to spread across the continent.

Little brown bats, once a common bat in several areas, are sustaining the largest number of deaths. Caves infected with WNS are displaying 90-100% bat mortality — wiping out most of the cave bat populations.

Currently, seven other hibernating bat species are affected by the fungus: Little brown bats, Northern long-eared bats, Big brown bats, Tri-colored bats, Eastern small-footed bats, the endangered Grey bat, and the endangered Indiana bats. The disease is spreading rapidly and has the potential to infect at least half of the bat species found in North America.

The WNS fungus is native to European caves where it evolved with European bats, allowing the bats to acquire immunity to and better coexist with the fungus. The fungus can be transferred cave to cave by cavers on clothing and caving gear if it is not properly decontaminated. It is hypothesized that this method may have been what brought *P. destructans* to the United States. The fungus does not only spread from equipment used in multiple caves, it is also communicable from bat to bat. It is spread by spores, which are released when the bats try to rub the fungus off of their noses and wings. Humans are not susceptible to WNS as the fungus requires a lower body temperature to survive. During the winter the body temperature of hibernating bats drops into the range where *P. destructans* can grow thereby making the bodies of hibernating bats the perfect growing environment.

**Environmental Impacts of WNS**

Bats are the primary predators of night-flying insects. They eat large numbers of moths, beetles, and

mosquitoes. Insect-eating bats are crucial to a healthy ecosystem and all bats help play a fundamental role in maintaining an ecological balance. An individual bat can eat around a thousand mosquito-sized insects every hour they are feeding, and they usually feed about 3-6 hours every night. By controlling insect populations, bats are critical to forestry, human health, and they also save the agricultural industry billions of dollars each year. Without bats the agricultural industry would be forced to use more pesticides and thus food costs and environmental pollution from agricultural run-off would increase.

**How YOU can help bats!**

You should not handle bats. If you come across live or dead bats with visible signs of White-nose Syndrome or acting strangely such as flying during the day or on the ground, contact your state wildlife agency or a nearby U.S Fish and Wildlife Service office. If you are a caver please observe all cave closures and advisories, and avoid caves, mines or passages containing hibernating bats especially during the winter months to minimize disturbance to them. The Service asks that cavers and cave visitors stay out of all caves in the affected states and adjoining states to help slow the potential spread of white-nose syndrome. If you do visit caves you should always follow the proper decontamination protocols immediately after visiting caves, mines, or coming in contact with bats. Never visit one cave then drive to another without decontaminating your cave gear and your body. For the most up to date decontamination protocols please visit this website:

<https://www.whitenosesyndrome.org/static-page/decontamination-information>

You can also help the bats survive when they are active. Plant insect/moth-attracting wildflower gardens to help attract bugs for the bats to eat. Leave dead or dying trees standing to give bats natural shelter areas. Build or buy a bat house to provide adequate roosting for bats in your area. Contact your elected officials and let them know your concerns about WNS. Teach your friends and family about the importance of bats.

Contrary to some things you may have herd – not all bats carry SARS CoV-2 - the virus that causes Coronavirus/COVID-19. The Horseshoe bats - only one family of bat out of the world’s 1000 species of bat – is thought to have a connection to the Coronavirus pandemic that hit the planet in 2020. Therefore, there is very little danger for the average person who does not often interact with bats to contract Covid-19 from the bats living near your home. Bats also carry other diseases such as rabies - so it is never a good idea to seek out, bother, or harass bats of any species. In fact, in many areas of the US and the world - bats of all species are protected by law due to the vital role they play in a healthy ecosystem.

Sources:

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Bats and COVID-19

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