GLOSSARY

AMONIA
A colorless alkaline gas that is lighter than air and has a strong, pungent odor. It is used as a fertilizer and refrigerant, in medicine, and in making dyes, textiles, plastics, and explosives. Chemical formula: NH 3

CHIROPTEROLOGIST
One who studies the order Chiroptera.

ECHOLOCATION
The general method of locating objects by determining the time for an echo to return and the direction from which it returns, as by radar or sonar.

GUANO
A substance composed mainly of the dung of sea birds or bats, accumulated along many coastal areas or in caves and used as fertilizer.

PHOSPHORUS
A highly reactive, poisonous nonmetallic element occurring naturally in phosphates, especially in the mineral apatite.

It exists in white (or sometimes yellow), red, and black forms, and is an essential component of protoplasm.

Phosphorus is used to make matches, fireworks, and fertilizers and to protect metal surfaces from corrosion. Atomic number 15.

EMACIATION
Abnormal thinness caused by lack of nutrition or by disease.

HIBERNACULA
A protective case, covering, or structure, in which an organism remains dormant for the winter.

TORPOR
1. Sluggish inactivity or inertia.
2. A state of suspended physical powers and activities.

WHITE NOSE SYNDROME
A condition named for a distinctive fungal growth around the muzzles and on the wings of affected animals. It is a cold-loving fungus that grows at temperatures below 20 °C (68 °F).

It grows on bats when they are hibernating in winter.

The fungus appears to disrupt the normal patterns of hibernation, causing bats to arouse too frequently from torpor and starve to death. The symptoms associated with WNS include loss of body fat, unusual winter behavior, damage and scarring of the wing membranes and death.

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SYNOPSIS:

The Mexican free-tailed bat is one of the most abundant mammals in North America. Outside of San Antonio, Texas there is a cave that is home to over 40 million of these bats. Roosting in large numbers in relatively few areas makes them especially vulnerable to human disturbance and habitat destruction. Documented declines at some roosts are cause for concern because there is a delicate balance in the ecosystem that depends on the bats. There is also cause for concern among other bat species that are falling victim to white nose syndrome, which is a condition named for a distinctive fungal growth around the muzzles and on the wings of affected animals. It is a cold-loving fungus that grows at temperatures below 20 °C (68 °F). It grows on bats when they are hibernating in winter. The fungus appears to disrupt the normal patterns of hibernation, causing bats to arouse too frequently from torpor and starve to death. This program goes deep into the caves where the Mexican free-tailed bats roost and shows a glimpse into their behavior, reproductive habits, diet and how they utilize echolocation.

CURRICULUM UNITS:

- Biology
- Ecology
- Environmental Science

CAREER OPPORTUNITIES:

- Biologist
- Ecologist
- Environmentalist
- Zoologist

PROGRAM OVERVIEW:

Bracken Cave, Texas is the perfect place for the Mexican free-tailed bats because it provides high humidity and very stable temperatures. Roosting in large numbers helps regulate their temperatures. The warmth and humidity is necessary for raising bat pups. The pups are often born within a few days of each other as they synchronize their births. You may have heard the term “blind as a bat.” For the Mexican free-tailed bat, that term is not entirely accurate, they do have good vision. However, they mostly rely on sound and echolocation for flying and feeding. Echolocation is a sonar-like system that bats use to locate and detect objects by emitting sounds that reflect off objects and return to their ears. Bats are often in environments of total darkness and use echolocation to navigate and forage. They can tell the size, shape, and even texture of objects using this system.

In recent years, there has been an outbreak of a fungal growth on some bat species called white nose syndrome. It has not affected the Mexican free tailed bats because the fungus tends to thrive in cooler conditions. However, the fungus has been associated with the deaths of more than a million bats since it was identified. It tends to grow on the muzzles, wings and ears of the bats. The fungus disrupts a bat’s hibernation pattern. Instead of sleeping for long periods before waking, the bat is constantly waking up and falling back into torpor. This causes the bat to burn more calories than it has stored and it can starve to death.

White Nose Syndrome is decimating bat colonies throughout the northeastern United States. The reduced number of bats is a major ecological issue because bats are a valuable natural pesticide as they consume large quantities of insects.

If the insect populations rapidly increase, they could devastate agricultural production. Several species of bats, including the Indiana bat and the big-eared bats are on the endangered species list and are suffering in population because of the fungus. There is ongoing critical research, monitoring, and management of bats affected by this powerful fungus. Many small skin samples have been submitted for testing. The fungus, Geomyces destructans, has also had its genome sequenced. This allows geneticists the ability to identify the virulent determinants, the genetic history, and possibly identify genetic markers for the development of improved diagnostic tests.

ISSUES & CRITICAL THINKING:

1) How are bats linked to the food web in your local community?

2) Construct a chart to describe the different issues bats in warm environments, and those living in colder environments must face to survive.
What specific issues threaten their existence?

3) Predict what would happen if bats were not able to survive the impact of white nose syndrome.