

It's November 2023 and scientists are gearing up to enter Stumphouse tunnel. A tunnel originally meant for a railroad to cross the Appalachian Mountains but the project was started and abandoned in the 1850's, and the tunnel has since become a home to several species of bats.

The crew are wearing Tyvek suits to protect the bats living in this tunnel from a deadly fungus called *Pseudogynoaascus destructans*, more commonly known as white-nose syndrome.

This is Susan Loeb, a Southern Research Scientist leading the project.

I started monitoring the population of tricolored bats in the tunnel in 2014. The fungus that causes white nose syndrome grows faster in warmer temperatures. The front of the tunnel is much colder than the back.

As we enter the tunnel, we immediately start looking for bats.

We find the first bat just 29 feet from the entrance of the tunnel.

White-nose syndrome was first found in the United states in 2006 in New York, likely introduced from Europe. Since then, it has decimated bat populations across the States.

The bats in this tunnel are no exception.

Bats come to this refuge, also called a hibernaculum, in the winter to go into hibernation.

A measuring wheel is used to measure the distance from the entrance of the tunnel. The tunnel is about 1630ft long, and the distance is recorded each time a bat is found.

Although we found fungus in 2014, no bats showed signs of the disease. But in 2015, many of the bats showed the characteristic white fungus on their noses and forearms. The population declined sharply between 2014 and 2018, but then it began to stabilize around 2018 and 2019. Since then we have seen a slow increase in the population. We started to see more bats using the front the tunnel section after white nose appeared. And the front section is colder around 45 degrees Fahrenheit on average. And so the fungus grows more slowly in the front section.

At the same time that we saw more bats using the front section, we saw the population of the whole tunnel stabilize, and in recent years the entire population has begun to increase. We think that bats are either adapting or evolving to survive with white nose syndrome.

As bats are counted, their temperature is measured along with the temperature of the wall they are hibernating on. The back of the cave is around 54 degrees on average.

We also look for evidence of the fungus by taking swabs of the walls of the tunnel near where the bats are hibernating. We also swab a few bats, which briefly wake them up.

The bats are not terribly pleased.

We are currently working with cooperators from Virginia Tech who are looking at fungal dynamics across the range of the tricolored bat. They are looking at how the percentage of bats with the fungus relates to colony recovery.

For some years we were worried about some species of bats possibly becoming extinct. Now we're seeing populations like this one and a few other hibernacula slowly recovering. We hope to continue to see this trend back to pre-white nose syndrome populations. But, because bats have such slow reproductive rates, it's going to take a long time. But there's hope.