



## Conserve Wildlife Foundation State Of Change Podcast Episode 5: The Bat's Misunderstood Identity

**David:** Welcome to this episode of State of Change, the podcast where we explore how climate change is affecting wildlife in the Garden State. I'm David Wheeler, executive director of the Conserve Wildlife Foundation.

New Jersey is home to an unparalleled diversity of wildlife species. With our ecosystems ranging from dense forest to grasslands to expansive wetlands, many different types of life thrive here. But some of our species are nocturnal and only come out at night. So even the biggest wildlife enthusiasts may only encounter them as fleeting glimpses.

Bats are a perfect example of this. We have nine species of bats, each offering very different appearances and behaviors – but to nearly all of us, any sighting is simply: “look, there’s a bat!” Their nocturnal and aerial lifestyle hides their special qualities – and lends ample room for misunderstandings and myths to take their place. Instead, we have the Hollywood mythology of bats as blood-sucking symbols of evil.

**MacKenzie:** Bats are one of the most unique creatures that I feel exist on this planet. They’re really cool. They’re our only true flying mammals, They’re incredibly diverse. I kind of have a soft spot for the critters that are misunderstood. I love the underdog.

**David:** That's MacKenzie Hall, a biologist with the New Jersey Division of Fish and Wildlife Endangered and Nongame Species Program. She has studied New Jersey’s bat species and the threats against them for nearly two decades.

**MacKenzie:** For animals like bats that tend to freak people out, I want to make them see things a different way. People are pretty familiar with different birds around their homes, bluebirds, robins, chickadees and so forth. A lot of people are surprised to find out that we actually have 9 species of bats. A bat flying around their home could be a red bat, a silver bat, a big brown bat or a long-eared bat.

Since bats are nocturnal, they’ve honed their niche as the night flying predator of insects as opposed to birds that catch insects during the day.

**David:** Bats are crucial members of our local ecosystems in offering a check on populations of flying insects. This behavior happens to be incredibly beneficial to humans as well. The insects they consume include a wide range of agricultural pests as well as mosquitos. A local loss of bats could lead to a boom of some insect pests.

**MacKenzie:** They consume a vast amount of bugs out there. There was a study published a few years ago that tried to quantify the value of bats to humans in terms of agriculture. They estimate that bats are worth several billion dollars to US agriculture alone by eating things like potato beetle and corn earworm moths, cucumber beetles, stinkbugs. That doesn't even take into account the value to forestry in eating tent caterpillars and gypsy moths.

Not only are bats eating crop pests but that also reduces the need for toxic chemicals in our environment like the pesticides that are so easy to use on the landscape. The more bats we have around in healthy numbers, we need less spray. They're preventing a toxic burden on the environment.

**David:** Bats are able to hunt insects so effectively in pitch darkness because of their ability to use echolocation, a form of biological sonar, to locate their prey and expertly navigate through the night.

**Ethan:** Bats are able to produce an ultrasound, which is above our range of hearing. That sound will bounce off of the environment and go back into the bats ears and make a picture of the environment around them. It is extremely sophisticated, they can see down to the thickness of a single human hair through echolocation alone.

They can see if an object is stationary, if it's moving. If it is moving is it moving towards, away, to the left, to the right. They can make a very sophisticated picture of the world around them. They use this as a hunting tool and their version of night vision.

**David:** Ethan Gilardi is an assistant biologist for the Conserve Wildlife Foundation who works closely with bats. Because bats are so difficult to observe, he and other researchers need to use unconventional techniques to study them.

**Ethan:** Bat acoustics is this really cool tech based ecology endeavor. The idea is bats echolocate. There are special microphones and receivers that can pick up on ultrasounds. Which are those high frequency bat calls that they use to echolocate. Different bats species call at different frequencies. They have different call patterns. Each species has its own indicative accent.

We'll put out recorders that record the bat calls and I can run those in a computer program and I can look at them visually and try to determine what species made that call. That can give us an idea of what species are around and in what abundance.

The one thing of particular note in this data is it does drive home just how hard hit the Little Brown Bat and the Long Eared Bat have been by white nose syndrome. They used to be the most abundant species in New Jersey and the northeastern United States.

For example, 2019 I had 21,000 confirmed call files on record. Maybe 1 to 2 percent of them were miota species which are the northern long, the little brown bat. About 95 percent of all the calls I had were of big browns and other migratory species,

**David:** White nose syndrome is a disease that has spread to the United States in recent years that has decimated our bat populations – particularly those miotis species like the northern long-eared bat and the little brown bat. Named after a white fungus believed to have been brought over unwittingly from Europe, white-nosed syndrome grows around the faces and wings of bats, spreading through the caves and abandoned mines where many of our state's bats spend their winters hibernating. It has rapidly become one of the biggest threats to the survival of many bat species in New Jersey and across the nation.

**MacKenzie:** White nose syndrome is a disease that affects bats during that winter hibernation. Their bodies are all but shut down. It's caused by a fungus that's not native to our region but really likes the same kind of cold dark damp environments where the bats hibernate.

Because the bats body temperature is dropped to ambient basically during the winter they present a perfect helpless host for this fungus. It invades their wing tissue and causes a few things to happen. It causes the bats to arouse more often than they normally would which burns through their energy reserve too quickly. When they wake up their immune system flares a defense against this unknown pathogen and it can cause a lot of deterioration in the wings.

Some of the bats with bad cases of white nose syndrome have holes all throughout their wing membrane that can prevent them from flying. So if they don't starve or dehydrate, that another thing the fungus does is dehydrate. The wing membranes are important for water balance during hibernation. So the bats are either starving, dehydrated or they're unable to fly and unable to procure food in the spring.

**David:** Since its discovery in New York state in 2007, the fungus has rapidly spread to 33 states and 7 Canadian provinces. Leading to the decimation of bat populations wherever it establishes. When New Jersey scientists first stumbled upon it in New Jersey, the mass die-offs in some hibernacula were akin to a biblical plague.

**Ethan:** The example I use to explain to people how bad bats have been hit by White Nose Syndrome in New Jersey, we can throw out percentage numbers and say we've seen 98 percent of our bats die due to white nose syndrome. While that number is high, it's hard to get that point across sometimes because people don't know a lot about bats.

The example I use is hibernia mine was the number one hibernacula in New Jersey for Little Brown Bats in particular. We estimated in the upper limits of 30,000 bats every winter that would over winter there. The last time we were in that cave we only counted around 300 bats.

**MacKenzie:** One of the things that has been done to slow it down is to have a lot of public outreach. Especially about recreational caving and underground exploration. The fungus probably came here originally in the treads of someone's shoes or in someone's gear.

The fungus, called *Pseudogymnoascus destructans*, has been genetically matched to several European and Asian countries where it was probably endemic. The bats there can carry the fungus and not die, so it's probably something they've lived with for a long time. The bats in North America have never come in contact with this thing before so it's novel to them.

A recreationist perhaps who had been to one of those countries and brought it here. The same could happen between infected sites here and non-infected sites here. Because the fungus can be transmitted from one bat to another, once a site is infected, it's pretty much always infected because spores can survive for years without a host. So sites can remain infected for years to come even without bats being there.

**David:** With White Nose Syndrome spreading across North America, the situation already seems challenging enough for our bats. Sadly, because of human development, every year bats are finding less and less habitat to roost and hunt for prey in.

**MacKenzie:** In a place like New Jersey we've lost a lot of our natural habitats and since bats are pretty adaptable creatures they're coming closer into contact with people as not so many dead and dying trees are around because of forestry practices and hazard tree removal. Bats have found that some artificial structures are good places to roost like bridges and attics, inside people's patio umbrellas, things that bring bats in close contact with people.

We have a whole field of study and outreach itself that has got to do with bats in buildings and reaching out to homeowners and taking countless calls every year from homeowners who have found a bat and don't know how to deal with that situation.

**Ethan:** At conserve we have the bats and buildings program which is focused on installing bat houses on properties where they have done a bat exclusion. That's when pest control comes in. People have bats in their attic, they don't want them in the attic. The bats are removed in a non-invasive way. Usually by putting a special screen over where the bats are getting in and out so the bats can get out but not back in.

If someone has that done on their property they can reach out to me and I will come out for free and install a bat house on the property. So when the bats return the next season because bats have a pretty high site fidelity, if they find a spot they like they'll return year after year.

**MacKenzie:** It's important to know that bats can be excluded from buildings only during certain months. During the summer we don't want to kick bats out when, for example, the mothers are raising their young. Even if the mom successfully leaves then the flightless young will most

likely die in your attic. Not only is that inhumane and illegal in New Jersey, all bats are protected by law in New Jersey but it can also cause some odor problems and cause the mother to look for new ways in.

People wonder how it ended up there. What does it want with me? What's the best way to handle that? Surely it wants to nest in my hair and suck my blood as I sleep and all those other myths about bats. So while bat's habits allow them to go about their lives unnoticed has served them in terms of predators in the sky it probably hasn't helped them amongst people because we tend to fear things we don't understand.

**David:** Like many other species, the risks faced by bats are expanded because of habitat alterations brought on by the changing climate. Bats are so deeply connected to many other species in their ecosystem that any change in the environment and food chain could have amplified negative effects on bats.

**Ethan:** Vernal pools are recessed areas in the forest that perennially fill with water and then dry out. So in spring and summer when it's rainier and warmer these areas will fill up with water. They're particularly important for amphibian reproduction and insect reproduction. Maternity colonies of bats will pop up around these vernal pools because it's an abundant food source, you have all those insects congregating around those areas.

So when baby bats become volant, which means they're ready to fly for the first time and get their own food, these vernal pools are an excellent source of easy prey for the young bats. As weather patterns shift we have warmer summers, you have less rain, more rain at different times of the year. Because of climate change vernal pools aren't filling up as much as they used to, they're not sticking around for as long as they used to. That is really affecting insect populations and in effect our bat populations.

**MacKenzie:** Another thing we've seen the last couple years in New Jersey that could be climate change related are these harmful algal blooms. Those are basically making our water bodies toxic. They say no human contact, no pets drinking. You can imagine that a wild animal isn't able to follow those rules and they drink from a body of water now deemed toxic. It's bad for them.

Like with other species, timing of migration could be thrown off and the timing of emerging from hibernation and the availability of insects at the right time could start to change. The cues that trigger bats to migrate could be changing.

The last couple winters we've had much higher reports of migratory bats in weird places like clinging to buildings and chimneys. It could be that silver haired bats from up north just didn't keep going. Because we've had milder weather and they're getting caught when it gets colder.

**David:** With threats lining up against bats – like White Nose Syndrome, habitat loss, and climate change – it has become imperative for us to get past our prejudices against the animals and work together to secure them a future in the garden state.

**Ethan:** One of the biggest things we can do is have a good PR push for our little friends. It's hard to conserve species that aren't large or charismatic. That's why you see a lot of global wildlife conservation initiatives around tigers, pandas, lions. Everybody thinks pandas are adorable, because they are, so they're easy to get public support for. We need outreach so people can see how dire it is with bats and get them to participate in conservation.

**MacKenzie:** Bats have suffered a bit historically from poor PR. I think that's largely because bats are creatures of the night and aren't easy for people to understand. Bats are so incredibly cool. If you can just talk to people a bit and get them to watch, get them to look at the sky at dusk. Watch a bat acrobatically catching bugs and not wanting anything to do with you. Just being a bat up in the sky.

I think on the individual level there's a lot of attention now on threats our environment is facing, especially with climate change. One of the things hopefully starting to happen is for people to respect nature and understand that human wellbeing is so linked to the health of the environment and animals.

Animals have their place in the beauty and balance of it all. I think once you get to the place of respecting that it can bleed into other parts of our lives.