

Bats Project

Prepared for: Boone County Conservation District

By: Abby Wendt, Allison Jones, Nadine Swinford, and David Weller

Northern Kentucky University, Environmental Science Program

May 12, 2020

Project Summary

This semester, we worked with the Boone County Conservation District to build a platform for bat conservation and education. This involved a wide range of work, including bat data collection, creation of educational workshops and activities, and the creation of an informational bat brochure that can be used in workshops and conservation summer camps.

Bats are extremely important animals in ecosystems for a number of reasons. They are often misconceived as rabid pests, or with recent events have been partially blamed for the Coronavirus pandemic. However, bats play a vital role in ecosystems around the world, and it is important that we educate people about bat conservation. Bats are essential pollinators and spread flower or plant seeds, and they are also excellent pest controllers as they feed on mosquitoes and other bugs.

The Boone County Conservation District purchased acoustic bat monitoring equipment earlier this year to begin an ongoing bat data collection program in Boone County. Among the various equipment, there are acoustic microphones that can be placed in trees that will pick up bat calls. These readings can be run through a software program that identifies the species of bat making the call. We tested some of the microphones on birds and frogs, and the conservation managers have since set up the monitors at their homes to pick up calls. We discussed ways to make the bat monitoring program consistent and long-term and we talked about the possibility of creating data collection sheets. It will be easier for BCCDKY to run analyses on the data and draw conclusions if the collection process is consistent. It also might be useful if there are other factors involved, such as temperature, time of day, etc.

BCCDKY also has summer conservation camps and educational programs where they teach kids about conservation and wildlife. We decided to come up with activities and games for the kids to play to become interested in bats and protection of bats, which are outlined in our Activities document. We also created an informational brochure about bats that covers their impact on forest health, bat myths, and other resources for bat conservation. With their ongoing bat research, we also created a document with information about bats and bat conservation for them to put on the website. We hope that our work from these projects is able to help BCCDKY in their efforts to promote bat education and protection within Boone County and its neighboring counties. We have enjoyed working with BCCDKY and hope that our efforts will be beneficial for them and the programs they offer to the public. In lieu of the state of the world at the moment, we hope that further bat research and education from BCCDKY is possible in the near future so that others may be educated on the benefits of bats.

BAT THEMED ACTIVITIES

Mama-Baby Bat game ~10-15 minutes *

Ages 7+

Materials:

- Something smelly per pair of students
 - Toothpaste
 - Gum
 - Garlic
 - Peppermint
 - Lemon/ Oranges
 - Vanilla
 - Sunscreen
 - Popcorn
 - Perfume (samples)
 - Coffee grounds
 - Various spices (cinnamon)

Procedure:

1. Divide class in half; one half becomes the mama bats, half become the baby bats.
2. Pair each baby with a mom (if there's an uneven number of students, the "mama" bats can get more than one baby).
3. Each baby gets a specific scent. Have the mother student smell and remember the scent (if a mama has more than one baby, the multiple babies will have the same scents).
 - a. The mama-baby pair will also share a code word or a squeak
4. It's now nighttime, the mother bats will close their eyes (at one side of the room) and the babies will squeak (at the other side of the room).
5. The mothers will find their way to their babies, and confirm their baby's identity with the scent given at the beginning of the game

* Adapted from AZA Bat Taxon Advisory Groups' "Family Sense" activity:

https://assets.speakcdn.com/assets/2332/activity_family_sense1.pdf

Ecosystem/Food Web String Game **

Grades 2-6

1. Each student is assigned a role (plant, bug, bat, cat, etc.)
2. Every student hold a string depending on their trophic level (predetermined)
3. Call out different situations and have all the students following drop their string
 - a. Like fertilizer kills all the flowers... flowers (and everyone after) drop your string
 - b. A lot of cats move into the neighborhood. Bats, drop your string. Bugs, collect the dropped string
 - i. Kids have to brainstorm ways to get the string back

** Adapted from the Smithsonian Environmental Research Center's "Weaving the Web" activity:

<https://forces.si.edu/main/pdf/2-5-WeavingTheWeb.pdf>

Bat Survival Game***

Grades 6-10

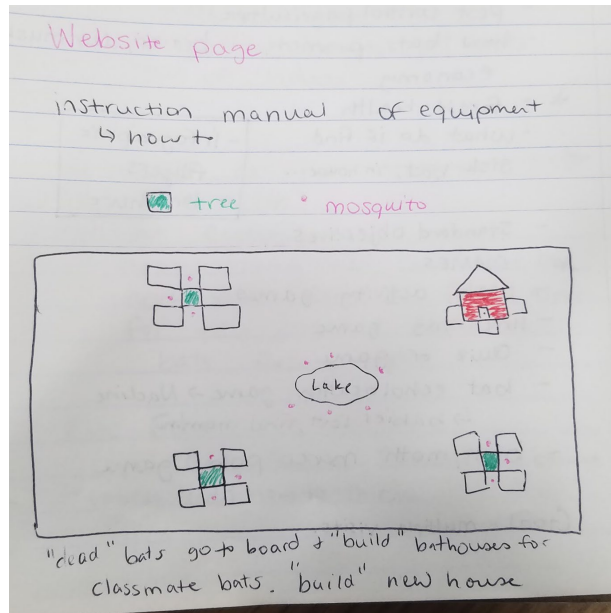
Could be outside if nice weather

1. Starting out, each student is a bat. Make little tags with construction paper so that students identify with their "bat persona"
 - a. Students pick what species they are from local bat species
 - b. Students pick if they're a male or female bat
 - c. Name (if the game needs to last longer)
2. Set up the room so that there are "trees" and "houses" and a "lake." Number of trees and houses depends on the number of students.
 - a. Each house has two bat habitats. Each tree has four. Create enough trees and houses that each student has a habitat.
 - b. Set mosquito tickets (can just be "mosquito" written on a piece of paper) around the room. Start with triple (number of tickets) to the number of students.
3. Each student has at least one mosquito ticket, and everyone starts out at a tree.
 - a. Students could count off in numbers to go to designated tree spot
 - b. Everything is all good everyone gets a chance to survive
4. Every night, students have to collect two mosquito tickets and make it back to their habitat by dawn.
5. Throughout the game, there are "challenges." How often a challenge happens depends on how long the game is required to last. No challenges happen the first night.

Challenge examples:

- a. A tree gets cut down and becomes a house. When a tree is cut and becomes a house, it loses half its bat habitats
 - b. Someone sprays pesticides that kill half the mosquitos. Students still have to collect 2 mosquitos each night, those who don't, don't play the next round.
 - c. A cat moves in! (Teacher plays as the cat and catches one student a night)
 - d. The bats in a house are discovered! They must move.
6. Susan/teachers are the ones that alter the game as
 - a. Predators
 - b. Construction company (Amazon)
 - c. Person living in house
 - d. Random person who takes tickets away
 - e. Something else
7. For students who don't survive the night:
 - a. Students still playing can save up their mosquito tickets to make babies. Students who are out can become babies (mother bats must collect one extra mosquito per night).
 - b. Students who are out of the game can build one bat habitat each night.
8. If a bat dies they can become a predator/make a bat house/become a baby

Example layout:



*** Adapted from the US Forest Service's "Desert Gardeners" game

https://www.fs.fed.us/wildflowers/kids/teacher/documents/k5_DesertGardeners_batGame.pdf

If you find an injured bat...

What should you do?

- Contact a local rescuer/rehabilitator
- Leave it alone for a few hours, it may leave on its own
- If you have to touch it, use thick gloves
- Keep it in a designated, ventilated container with something to hang onto (like a sock or old shirt)
- You may give it water in a small, shallow container

What should you not do?

- Touch it with your bare hands
- Try to feed, wash, treat, or rehabilitate it yourself
- Use a piece of clothing that has loops, it's toes can get stuck!
- Don't rely on email to contact rescuers. Always call!
- Transport it across state lines

You can always call the **Kentucky Department of Fish and Wildlife** at (800) 858-1549 or find local rescues using <https://batworld.org/local-rescue/>. Rescuers may be willing to travel to help. Bats **cannot** be transported across state lines!

LEARN MORE

Reach us at (859) 586-7903 or
6028 Camp Ernst Rd, Burlington, KY 41005
Stay connected!
Facebook: @bccdky
Instagram: @bccdky
Email: info@bccdky.org

Mythbusting Bats

MYTH: ALL BATS ARE BLOODSUCKING VAMPIRES!

- **TRUTH: VAMPIRE BATS ARE ONLY FOUND IN SOUTH AMERICA AND MOSTLY FEED ON COWS**



Check the Facts: The legends of vampires originated long before vampire bats were seen by westerners

MYTH: BLIND AS A BAT!

- **TRUTH: WHILE BATS ARE GENERALLY COLORBLIND, THEY STILL HAVE GOOD EYESIGHT**



Check the Facts: A bat's hearing is their most powerful sense. They use their echolocation to form a picture of their surroundings, similar to Dopplar radar weather detection.

MYTH: BATS ARE FLYING PESTS

- **TRUTH: BATS ARE IMPORTANT FOR REDUCING THE NUMBERS OF MOSQUITOES AND CROP EATING INSECTS**

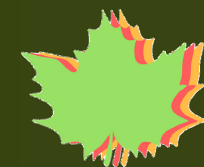


Check the Facts: One bat can eat around 10,000 mosquitoes in one night. According to Merlin Tuttle's Bat Conservation, bats save US farmers \$23 billion in insect related crop loss.

Bats In Boone County



Boone County
Conservation District





The Indiana Gray Bat pictured above is an endangered bat that can be found in and around the tristate area.

Photo by Adam Mann, Environmental Solutions and Innovations US Fish and Wildlife

Bats are unable to make their own nests or create holes in trees, so they roost in small crevices in trees or between decaying bark.

Photo from the Bat Conservation Trust



Why are bats important for forest health?

Bats provide essential services to the forests that they inhabit. They are the best form of natural pest control, eating their own weight in insects each night when they are most active. Some of those insects can be destructive to the trees that grow in our forests so it is in our best interest to protect our native bat populations in Kentucky.

There are currently 16 bat species found in Kentucky and 3 of those species are endangered. The Indiana Bat, Virginia Big Eared Bat, and the Gray bat are the most at risk for extinction. According to the USGS, bats that live in North America are worth billions of dollars when it comes to pest control and fertilization for the agriculture industry. Some estimates have calculated this monetary worth to be greater than \$53 billion! The ecosystem services that America's native bats provide are entirely free yet bat populations are decreasing fast.

Bat Proofing Your Home

Examine your home:

- Look around your roof line, windows and doors for openings.
- Check your chimney and ridge vents on your roof for gaps.

Seal up openings:

- There are a variety of ways to seal up openings and gaps:
 - Expandable foams, stainless steel screening, sheet metal, pieces of wood, caulking

What if you find a bat inside your home?

- Do not touch the bat! You could be putting yourself and the bat in danger
- Call a local wildlife conservation center for help safely removing the bat.



Website Information for BCCDKY

Current as of 4/22/2020

How Bats are Good for Forest Health

Bats provide essential ecosystem services to the forests that they inhabit. They are the best form of natural pest control, almost eating their own weight in insects each night when they are most active. Some of those insects can be destructive to the trees that grow in our forests so it is in our best interest to protect our native bat populations in Kentucky.

There are currently 16 bat species found in Kentucky and 3 of those species are endangered. The Indiana Bat, Virginia Big Eared Bat, and the Gray bat are all endangered and are the most at risk for extinction and the Northern Long Eared bat is federally threatened. According to the USGS, bats that live in North America are worth more than \$3.7 billion, possibly up to \$53 billion when it comes to pest control and fertilization for the agriculture industry. Some estimates have calculated this monetary worth to be greater than \$53 billion! Bat guano is one of the most nutritious forms of soil with high levels of nitrogen, potassium, and phosphorus, as well as extremely high rates of decomposition. The ecosystem services that America's native bats provide are entirely free yet bat populations are decreasing fast.

White nose syndrome is one of the main culprits that kill native bat populations in the US. This fungus spreads easily between tight knit bat colonies, especially those that live in underground caves. The bats that are found in Kentucky mostly find refuge in between the bark of dead and dying trees, off cliff faces, and even in the attics or sheds of homeowners. Even native Kentucky bats are at risk for contracting the deadly white nose fungus.

Without healthy bat populations in our forests, we would not have the rich diversity of plant wildlife and nutrient dense soil in our forests. Bats are important drivers for our local ecosystem services and they are vital to the forests that they inhabit. A world without bats means a world with no natural pest control, or rich soils. We need bats just as much as they need us for protection. For more information on local bat populations, myths, and information, please read below.

Bat Species Found in Kentucky

- [Big Brown Bat - *Eptesicus fuscus*](#)
- [Brazilian Free-Tailed Bat - *Tadarida brasiliensis*](#)
- [Eastern Red Bat - *Lasiurus borealis*](#)
- [Eastern Small-Footed Myotis - *Myotis leibii*](#)
- [Evening Bat - *Nycticeius humeralis*](#)

- Gray Bat - *Myotis grisescens* *
- Hoary Bat - *Lasiurus cinereus*
- Indiana Bat - *Myotis sodalis* *
- Little Brown Bat - *Myotis lucifugus*
- Northern Long-Eared Bat - *Myotis septentrionalis* *
- Rafinesque's Big-Eared Bat - *Corynorhinus rafinesquii*
- Seminole Bat - *Lasiurus seminolus*
- Silver-Haired Bat - *Lasionycteris noctivagans*
- Southeastern Myotis - *Myotis austroriparius*
- Tricolored Bat - *Perimyotis subflavus*
- Virginia Big-Eared Bat - *Corynorhinus townsendii virginianus* *

*indicates endangered or federally threatened

Bat Myths/Facts

Myth: All Bats are bloodsucking vampires!

- Truth: Vampire bats are only found in South America and mostly feed on cows
 - Check the Facts: The legends of vampires originated long before vampire bats were seen by westerners
- Myth: Blind as a Bat!

- Truth: While bats are generally colorblind, they still have good eyesight
 - Check the Facts: A bat's hearing is their most powerful sense. They use their echolocation to form a picture of their surroundings, similar to Doppler radar weather detection.
- Myth: Bats are flying pests!

- Truth: Bats are important for reducing the numbers of mosquitos and crop eating insects.
- Check the Facts: One bat can eat around 10,000 mosquitoes in one night. According to Merlin Tuttle's Bat Conservation, bats save US farmers \$23 billion in insect related crop loss.

Bat Proofing your Home

If you find a bat in your home, it is important to not handle the bat, as you could harm yourself or the bat. Call your local wildlife rehabilitator to see if they can safely remove the bat. It can be helpful to take pictures of the bat so they can see what kind or if it is injured. Bats that end up in homes or attics are usually crevice-dwelling bats that are often youngsters or migrating bats. They can carry diseases that are harmful to humans, so again it is important to leave the bat alone and call a professional in to remove the bat.

Bats can find crevices or holes on and around your home to dwell in. Examine your home for holes that might allow bats to enter and patch them up using caulk, foam, metal, or another appropriate seal. Check chimneys, ridge vents, and around your roof line. You can also contact your local animal control or wildlife conservation agency for assistance in bat proofing your home.

What to do if you find an injured bat

DO NOT try to feed, treat, wash or rehabilitate it yourself! Get it to a trained person asap. Even with good intentions, trying to take care of injured wildlife yourself can worsen the problem. If the bat is hanging from a wall or tree, leave it for a few hours and see if it will leave on its own. If not, you can gently scoop it up with a cloth or gloves and put it in a nice little designated container- like a shoebox. Just make sure it's ventilated and has something inside, like a sock or hat (but nothing with loops), to hang on to.

Never touch bats with your bare skin. Make sure that whatever fabric you're using to house it or pick it up with doesn't have loops or holes. Its toes can get stuck and can get injured. **Find a rescue or rehabilitation center near you.** You can always call the Kentucky Department of Fish and Wildlife at (800) 858-1549 or find local rescues using <https://batworld.org/local-rescue/> or <https://app.fw.ky.gov/rehabilitatorNew/>

Activities

- Link to download the Activities word document
 - <https://docs.google.com/document/d/1j0xZ4gxRp8WpLEyvaSG9m-MV67UH6-MT7Q7Rbk4tSPc/edit?usp=sharing>

Current Bat Research

BCCDKY is currently conducting its own research on local bat species. We use special acoustic equipment that picks up bat calls that humans cannot hear. The sounds are analyzed using a software program that identifies the species making the call. We are collecting data in both rural and urban environments to see which species are present in Boone County and then monitor those species.

Other Sources for Info.

- Tufts Wildlife Clinic- what to do if you find a bat <https://wildlife.tufts.edu/found-wildlife/sick-injured-mammal/rabies-vector-species/bat/>
- Link to find local bat rescues: <https://batworld.org/local-rescue/>
- Animal Rescues in Kentucky: <https://app.fw.ky.gov/rehabilitatorNew/>
- Ky Department of Fish and Wildlife site all about bats!
<https://fw.ky.gov/Wildlife/Pages/Small-Mammals-and-Bats.aspx>

Bat Research: Possible Urban Vs. Rural Parks

This document contains suggestions for urban and rural parks, in case BCCDKY decides to look into how local bat populations utilize different areas.

Urban:

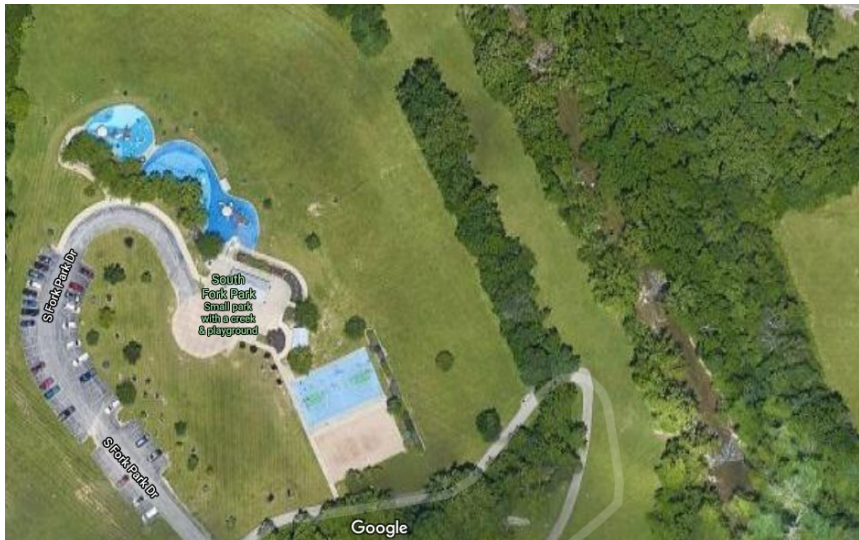
- Florence Nature Park- we believe this would be a good urban example because the park is surrounded on all sides by housing/subdivisions. The park has forested areas and corridors bats could use for hunting insects, although it is not near a body of water.

- Link to park map-

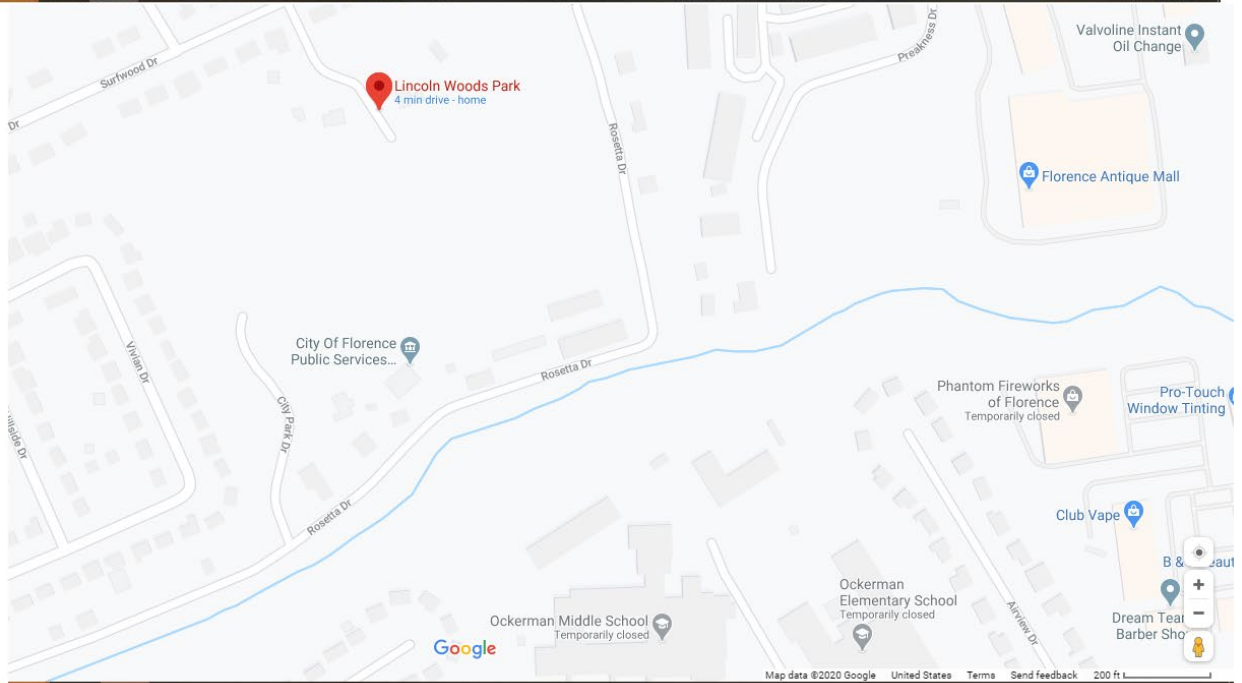
https://www.boonecountyky.org/document_center/Parks/FlorenceNaturePark.pdf



- Southfork park- we believe this park is a good candidate because it is also surrounded by different forms of housing. The park contains wooded areas, corridors, and a stream/river. Bats have been seen around the area by residents.



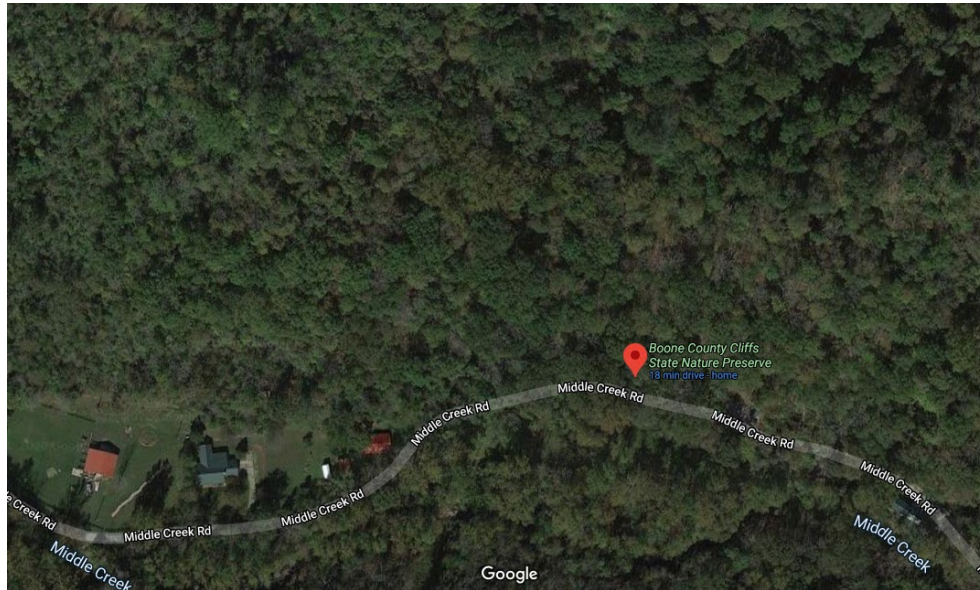
- Lincoln Woods Park- this park is also surrounded by different buildings/housing. It has wooded areas and more open fields. It's close to a stream.



Map provided by Google Map. The top shows the land use, the bottom shows how close it is in relation to a stream.

Rural:

- Boone Cliffs Nature Preserve- this park is hidden within the forests of rural Kentucky. When we visited this preserve, there was an open corridor where bats were likely to fly down at night. This would be a great place to set up acoustic bat equipment considering there is a creek running through the corridor. This area also had various spots of elevation and cliffs where bats may also live. The chances of finding bat populations here are probable but we will only know if we set up equipment here.



- Middle Creek Nature Preserve- not far from Boone Cliffs lies Middle Creek nature preserve. This park is flat and a couple trails follow along the Middle Creek therefore we would have to be strategic in where we plant acoustic bat equipment. This area is rural like Boone Cliffs and there are few houses and buildings around. There may be a high population of bats in this area and acoustic equipment in this location could prove it.

