RHODY CRITTER KITS

BAT CHAT

RHODE ISLAND FISH & WILDLIFE

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Learn more about Rhode Island's wildlife and our conservation programs!

Rhode Island Division of Fish and Wildlife

Rhode Island Division of Fish and Wildlife Outdoor Education

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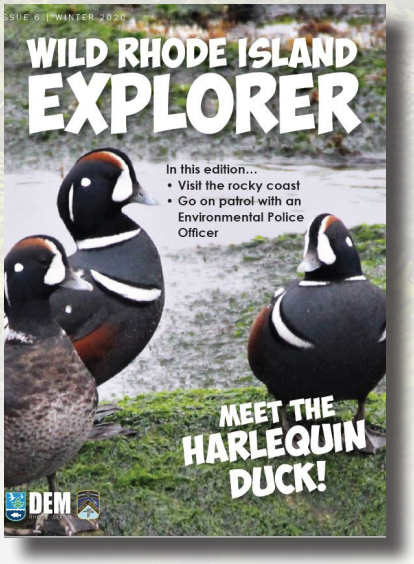
Rhode Island Department of Environmental Management



Read, learn, and explore! Sign your school up for a FREE subscription to our quarterly magazine for kids, Wild Rhode Island Explorer. For more information, visit dem.ri.gov/wildlifeoutreach.

RHODE ISLAND FISH & WILDLIFE

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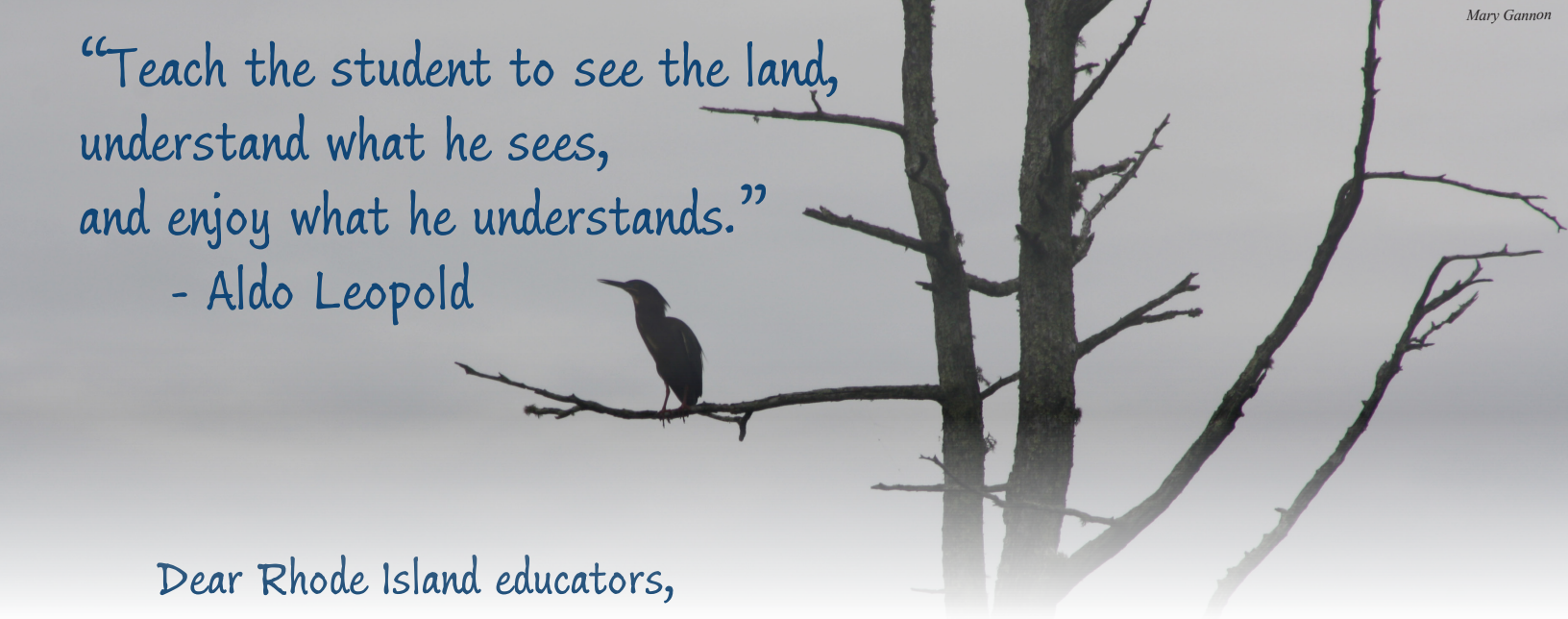
U.S. FISH & WILDLIFE SERVICE

Office of CONSERVATION INVESTMENT

Partnering to fund conservation and connect people with nature

WILDLIFE & SPORT FISH RESTORATION

Cover: Charlie Brown; Inside cover: Mike Stultz; Rhody Critter Kits logo by Nick Pires



"Teach the student to see the land,
understand what he sees,
and enjoy what he understands."
- Aldo Leopold

Dear Rhode Island educators,

Thank you so much for your participation in the RIDEM Wildlife Outreach Program, and for incorporating conservation education into your teaching practice! Through your participation in this program, you are nurturing the growth of our next generation of environmental stewards and advocating for Rhode Island's diverse and amazing wildlife. On behalf of our wild creatures, big and small, thank you!

The Wildlife Outreach Program has grown in leaps and bounds since its inception in 2017. Coordinating this program has been the most enjoyable and rewarding whirlwind I could imagine. In the wake of the COVID-19 pandemic, our team created these the Rhody Critter Kits to connect with teachers and kids, and keep Rhode Islanders engaged with our natural resources. Now more than ever, it's critical to get children outdoors, engaged with the world around them. It's been a joy to help facilitate these connections and to see this program grow! With your help, we've been able to connect thousands of students from diverse communities to our local wildlife, a feat which could not be accomplished by our tiny team alone.

These kits are not limited just to science lessons, but can be incorporated into art, reading, writing, and social studies lessons as well. We built them with room for flexibility and creativity, so you can tailor them to fit your individual class's needs. We hope the design of the kits inspires you, and encourage you and your students to have FUN with them!

When we create connections to nature in a memorable, enjoyable way, we inspire responsible stewardship and care. As educators, you are incredibly important cultivators of those connections. Every time I meet with educators who have used these kits, I am encouraged and inspired by your dedication. Thank you again!

Best wishes,
Mary Gannon

Wildlife Outreach Coordinator
Rhode Island Department of Environmental Management
Division of Fish and Wildlife

Mary.Gannon@dem.ri.gov | 401-782-3700

Gabrielle DeMeillon

Hello wonderful educators!

We couldn't be more excited to introduce you to our Rhody Critter Kit Program! While we always enjoy visiting schools in person, there are only two of us, and so many students who deserve to learn about the interesting and important wildlife that inhabit our state.

Necessity drove us to create these kits, and thank goodness it did. We strive to reach every community in Rhode Island and have now created a fun and interactive way to do so! We all rely on the resources that nature provides and are all responsible for conserving it, no matter our age. Introducing these important concepts to students today will help shape caring and responsible individuals in the future.

The Rhody Critter Kits aim to encourage students to explore the natural world around them with an open mind and observational eye. The resources provided are designed to be adapted to individual class needs, so please use them however you see fit!

Since joining the RIDEM Fish & Wildlife Outreach Team, I have had the opportunity to share our conservation work with students across the state and see their eyes grow wide with inspiration. Seeing misinformation and fear turn into awe and curiosity is one of the greatest transformations to witness. Through these kits, I hope your students are able to learn and grow in the same way. After all, knowledge is the key to growth!

Thank you for sharing in the education of future conservationists through our Rhody Critter Kit Program and we hope you have fun!

Kind regards,
Gabrielle DeMeillon

Biological Technician
Rhode Island Department of Environmental Management
Division of Fish and Wildlife

Gabrielle.DeMeillon@dem.ri.gov | 401-782-3700

About Us


D. Birch

The Division of Fish and Wildlife (DFW) protects, restores, and manages the freshwater and wildlife resources of the state. We share management responsibility of more than 60,000 acres of land, including 25 State Management Areas, and are responsible for thousands of species. We serve a wide and diverse segment of the public from outdoor recreationists (e.g., hunters, hikers, mountain bikers, wildlife watchers) to the general public (e.g., backyard birders, public concerned with nuisance wildlife, municipalities, legislators). In addition, we are responsible for the State's public hunter education programs and overseeing all hunting and trapping in the state. This includes setting seasons, size limits, hunting methods, and daily limits for the harvest of game species like white-tailed deer, wild turkey, waterfowl, and furbearers.

As part of a larger network of recreational opportunities in Rhode Island, hunting and fishing play an important role in connecting people with nature, supporting quality of life and family traditions, and attracting tourism. Anglers and hunters purchase around 70,000 licenses, permits, stamps, and tags each year and contribute more than $235 million to Rhode Island's economy. Revenue generated from license and permit sales support Rhode Island fish and wildlife conservation programs.


S Petrarca

The DFW is primarily funded through the Federal Wildlife and Sport Fish Restoration Program (WSFR), which is administered through the U.S. Fish & Wildlife Service's Office of Conservation Investment. This program uses taxes placed on firearms, ammunition, and archery equipment to help fund avian and mammalian research and conservation programs, habitat acquisition, and outreach and education programs.


C. Raithel

Annual appropriations for WSFR's State Wildlife Grants (SWG) Program provide an additional, smaller, yet less restricted pot of money that can be put toward conservation of all Species of Greatest Conservation Need (SGCN) as identified in the RI Wildlife Action Plan. The list of SGCN includes game and non-game species, and also provides much needed attention to amphibians, reptiles, and invertebrates. It is our goal to responsibly manage and steward our state's wildlife resources, safeguarding them in perpetuity.

Chelsea Thompson

Bat Chat

Bats are often associated with Halloween, but in reality, they aren't all that scary! With the materials in this kit, your class will learn about bat natural history, their importance as part of a healthy ecosystem, the challenges they face, and current monitoring efforts in RI.

What's included in this kit?

- Information about Rhode Island's bats
- Resources on what to do if you encounter a bat in your home
- Sample lesson plans
- PowerPoints
- Instructions for building a bat box
- Photos and videos
- Show and tell items
- "Batty" activities from Project WILD and Project EduBat

Next Generation Science Standards

LS1A	Structure and Function
LS2A	Interdependent Relationships in Ecosystems
LS2C	Ecosystem Dynamics, Functioning, and Resilience
LS4C	Adaptation
LS4D	Biodiversity and Humans
ESS3A	Natural Resources
ESS3C	Human Impacts on Earth Systems

Are you using this kit online only?

After using these materials in your classroom, please fill out our feedback form, available on the Rhody Critter Kits page.

Are you borrowing the kit bin from the Division of Fish and Wildlife office?

Please be sure to fill out the feedback form and materials checklist (included in the bin) to ensure all items have been returned.

Kit Materials

Item	Talking Points
Little brown bat skull replica	Take a look at the bat skull when talking about bat diets. Those tiny sharp teeth are perfect for crunching up insects!
Bat puppet	A cuddly, oversized version of a big brown bat! Big brown bats are the most common species here in RI. Pair this with the "Meet the Big Brown Bat" on our Bat Chat YouTube playlist.
Counting tokens	Use these as "bugs" in the "Bat Blitz" activity.
RI bat species cards	These are the 8 species of bats that can occur in RI. Use these cards to get students familiar with our local species.
Bat photos	There are photos of a bat pollinating, a flying fox, bat pups in a maternal roost, and lists of plants that are pollinated or dispersed by bats. Illustrate your lessons with the help of these photos!
Fabric bat silhouettes	From largest to smallest, the life-sized silhouettes represent a flying fox, big brown bat, and bumblebee bat. These silhouettes help to illustrate the diversity of size in bats around the world.
Slinky & toy bugs	Use this to demonstrate how bats echolocate, showing students how "sound waves" travel along the slinky to the bug and bounce back.
Blindfold	Use for the "Bat & Moth Echolocation Game."
Bat Count (book)	This story is about a family that has bats living in their barn, information on White-Nose Syndrome, and how citizen scientists can help bats.
A Little Brown Bat Story (book)	Suitable for younger readers, this story follows a little brown bat on his-- search for a place to hibernate. This book also includes information about White-Nose Syndrome.
Bat myth cards	Bust some bat myths with these fun cards!
Mist net	This is a piece of an actual mist net used by our bat biologist to catch bats. This little fragment came from a net that was past the point of repair.
Tape measures	Use for the "How Do I Compare to a Bat?" activity.


Charles Brown

Introduction: Bats are Amazing!

In the past, bats have been cast as villains due to false myths and legends. However, bats normally pose no threat to people and are beneficial in many ways. These amazing flying mammals are the primary predator of night-flying insects, and play a crucial role in the control of agricultural pests and mosquitoes. Many bat species around the world provide **pollination** and **seed dispersal** services, especially in the rainforest. Unfortunately, many bat species are facing threats including disease, habitat loss and collisions with wind turbines. Some populations of once-common species have experienced dramatic population declines in recent years in Rhode Island and across America.

Bats are the only mammals capable of true flight, and are equipped with many unique adaptations. It is a misconception that bats are blind. In fact, most bats have excellent eyesight. Many bat species, particularly those that feed on insects, use high frequency sounds known as **echolocation** to detect prey, navigate, and communicate. Bats emit these high frequency sound pulses from their mouth or nose, which reflect off objects (such as a flying moth or beetle), and back to the bat. The bat can then pinpoint the distance, size and movement of the object. These calls are ultrasonic and beyond the range of human hearing. Each species of bat has a unique echolocation call frequency. Each year in Rhode Island, we use acoustic detection equipment to identify the species present in our state. These bat detectors translate the high pitched echolocation calls into a visible representation of the sound waves. The calls of each species make a very distinct sound wave pattern.

Read on to learn more about bats!

Bat Fun Facts

Mammalian order: Chiroptera

"Chiroptera" translates from Greek, meaning "hand-wing."

Did you know?

- There are over 1,400 bat species worldwide.
- Bats constitute about 25% of the world's total number of mammal species!
- Insect-eating bats can consume up to 4,000 insects in one night.
- There are 47 bat species in the United States.
- There are 8 bat species that can occur in Rhode Island.

Bat Species Found in Rhode Island

Eastern Red Bat

Lasiurus borealis

Resident status in RI: Summer

Wingspan: 11 to 13 inches

Weight: 0.25 to 0.46 ounces (This is about the weight of 3 to 5 pennies.)

Habitat: Red bats like to forage along field edges, farms, and forested areas with deciduous trees. During the summer, they roost in the leafy canopy.

Hibernation: Red bats migrate south for the winter. They spend the winter in hollow trees, tree bark, and leaf litter on the ground.

Big Brown Bat

Eptesicus fuscus

Resident status in RI: Year-round

Wingspan: 12 to 13 inches

Weight: 0.8 ounces (This is about the weight of 9 pennies.)

Habitat: Big brown bats are found almost everywhere in America, from deserts and forests, to farms and cities. Females form maternal colonies and roost together in buildings, barns, and bat houses during the summer.

Hibernation: Big brown bats migrate north to hibernate in caves with above-freezing temperatures. In Rhode Island, big brown bats may stay the winter and hibernate in buildings.

Information for species profiles was provided by America's Neighborhood Bats *by Merlin D. Tuttle, Adirondack Ecological Center (SUNY) and BioKIDS, an educational resource provided by the University of Michigan.*

Bat Species Found in Rhode Island

Al Hick, NYSDEC

Little Brown Bat

Myotis lucifugus

Resident status in RI: Summer

Wingspan: 8 to 10 inches

Weight: 0.18 to 0.49 ounces (This is about the weight of 2 to 5 pennies.)

Habitat: Forested areas near water, places where the bats can roost during the day, night, and hibernation

Hibernation: Little brown bats migrate north to hibernate in caves with above-freezing temperatures.

Larisa Bishop-Boros, Creative Commons

Tri-colored Bat

Perimyotis subflavus

Resident status in RI: Migrant, known to hibernate in RI; uncertain of summer residency status

Wingspan: 8 to 10 inches

Weight: 0.16 to 0.28 ounces (This is about the weight of 2 to 3 pennies.)

Habitat: Open woods near water; roosting sites include rock crevices, caves, mines, buildings, and trees

Hibernation: Tri-colored bats typically hibernate alone, or in small groups of 2-3. Most other bat species huddle together during hibernation.

Due to severe population declines, the US Fish and Wildlife Service has proposed to list this species as endangered under the Endangered Species Act.

Bat Species Found in Rhode Island

Northern Long-Eared Bat

Myotis septentrionalis

Resident status in RI: Summer, migrant, known to hibernate in RI

Wingspan: 9 to 10 inches

Weight: 0.21 to 0.32 ounces (This is about the weight of 2 to 3 pennies.)

Habitat: Forests

Hibernation: Northern long-eared bats typically hibernate alone, or in small groups of 2-3. Most other bat species huddle together during hibernation.

Due to severe population declines, the US Fish and Wildlife Service has listed this species as endangered under the Endangered Species Act.

Eastern Small-Footed Bat

Myotis leibii

Resident status in RI: Summer (?), migrant

Wingspan: 8 to 10 inches

Weight: 0.12 to 0.21 ounces (This is about the weight of 1 to 2 pennies.)

Habitat: Roosts include buildings, bridges, caves, mines, trees, rocky outcrops

Hibernation: Eastern small-footed bats hibernate in the coldest and driest parts of caves, which is different from other bat species.

Bat Species Found in Rhode Island

Daniel Neal, Wikimedia Commons

Hoary Bat

Lasiurus cinereus

Resident status in RI: Summer (?), migrant

Wingspan: Average 16 inches

Weight: 0.70 to 1.23 ounces (This is about the weight of 7 to 13 pennies.)

Habitat: Forested areas; hoary bats are the most widespread bats in the United States. They can be found in every state (though have not yet been documented in Alaska), Canada and Central America.

Hibernation: Hoary bats migrate south for the winter, though some have been documented hibernating in northern states.

John MacGregor, Kentucky Dept. of Fish & Wildlife Resources

Silver-haired Bat

Lasionycteris noctivagans

Resident status in RI: Summer (?), migrant

Wingspan: 10 to 12 inches

Weight: 0.30 to 0.40 ounces (This is about the weight of 3 to 4 pennies.)

Habitat: Woodlands; roost sites include tree bark and tree cavities

Hibernation: Silver-haired bats migrate south for the winter, and can be found in wood piles or in crevices under rocks.


Charles Brown

Life History

Habitat and Range

In Rhode Island, cold weather and the subsequent lack of insects as a food source force bats to migrate to other areas or hibernate during the winter. **Hibernation** is a state of inactivity in which an animal reduces its metabolism and does not feed or drink for an extended period, living off stored fat reserves. The locations where bats hibernate are referred to as "**hibernacula**." Some species of bats migrate south for the winter and may remain active in warmer climates during the winter months, or hibernate only if necessary. The Eastern red bat, the silver-haired bat, and the hoary bat all migrate south from Rhode Island for the winter. Silver-haired bats are occasionally found hibernating in man-made structures in Rhode Island.

Other species, like the big brown bat, little brown bat, Eastern small-footed and Northern long-eared bat, head north for hibernation. Northern hibernacula are usually natural caves or abandoned mines with generally above-freezing temperatures and high humidity. Rhode Island does not have any natural caves or abandoned mines, so most bats that spend the summer here leave the state in late summer and fall to hibernate elsewhere. However, some individuals do remain here. The big brown bat, the most common species in our area, will frequently hibernate in buildings, and is the bat species you are most likely to encounter in Rhode Island during the winter months. If disturbed, bats can wake up during hibernation, but disturbance can cost bats valuable energy reserves critical to their survival. If the weather is very mild bats may fly during winter months to drink or feed, although this is not typical in most winters.

Food Habits

Most bat species eat insects (**insectivores**), but there are many species around the globe that feed only on fruit (**frugivore**) or nectar (**nectarivore**). There are even a few species that prey on small fish, frogs, or small rodents. There are three species of vampire bat in the tropics, which survive on vertebrate blood (**sanguinivore**). All bat species in Rhode Island and the Northeastern U.S. are strictly insectivores.

Reproduction

Bats are long-lived, which is typically not the case for most small mammals. They can live 10-20 years, with some known to live more than 30 years. Bats also have low reproductive rates. In many species, an adult female bat will only have one young per year. Female bats of some species form "nursery" or "maternal" colonies, giving birth and raising their young together. These **maternal colonies** may consist of just a few adult females or in some cases hundreds or even thousands of female bats. Male bats do not participate in caring for young bats. In most species, male bats roost alone or collect together into small "bachelor" colonies of a few individuals, often near a nursery colony. Mating takes place in the fall during **swarms**, when male and female bats congregate before entering their hibernacula. Female bats delay ovulation, and do not actually become pregnant until spring. The gestation period lasts about 2 months.

In Rhode Island there are two species of bats that frequently use man-made structures for giving birth and raising their young. The big brown bat is the most common bat species in our area, found in the most urban parts of the state to the most rural. The little brown bat was until recently also very common in our area and a frequent user of man-made structures. Female bats of both species begin to arrive at the maternity colony in late spring. They are very loyal to their maternity colony site, and will return year after year to the same location, which was probably where they were born. Maternity **roost** sites are often located in attics or loft spaces where the day and nighttime temperatures can be very high. This is especially important for the young bats during early development when it is difficult for them to regulate their body temperature, especially when their mothers leave to feed. Bats will frequently move around within the roost to find the optimal temperature conditions. Young bats, called "**pups**" are born in early summer, the first or second week of June in Rhode Island. Pups are born blind and hairless. The adult females leave the roost at dusk to feed, returning numerous times to nurse and check on their young. After 4 to 6 weeks the pups will begin attempting to fly, and by late July begin to leave the roost nightly to feed with their mothers. By late summer, the mothers and young bats gradually begin to leave the roost site entirely and move to other areas prior to migrating to their hibernacula.

Some bat species roost in trees and rarely, if ever, enter buildings unless by accident. In our area the eastern red bat, the silver-haired bat, and the hoary bat roost and have their pups high in the tree canopy, hanging from small branches. Females of these species roost alone. Other species such as the tri-colored bat and northern long-eared bat roost alone or in small groups in tree cavities or under loose bark but occasionally use man-made structures.


USFWS

White-nose Syndrome

White-nose Syndrome (WNS) is a disease that has caused rapid, dramatic declines in bat populations of some once-common species in the Eastern United States and Canada. It is caused by a fungus, *Pseudogymnoascus destructans* ("Pd") that occurs in the cold, humid environments of caves and mines where bats tend to hibernate.

How does WNS affect bats?

The fungus grows on the noses and other parts of bats and can cause the wing membrane to deteriorate. The disease affects the bats during hibernation by disrupting their metabolism, causing dehydration and loss of fat reserves. Bats arouse from hibernation apparently to search for food and water only to encounter sub-freezing temperatures, predators, and no available resources. At least 6 million bats have died in North America from this disease, but scientists believe that this is a serious underestimate, and that this number is growing. Scientists across the United States are doing research to learn how to treat and cure bats with WNS. Currently, there is no precise cure.

Where did WNS come from?

WNS was first documented in upstate New York in 2006; as of 2019 it has been confirmed in 33 states and 7 Canadian provinces. It is believed that the fungus may have been transported by humans, possibly on equipment or clothing, from caves or mines in Europe, where the fungus is now known to have originated.

Are there any human impacts?

The disease does not affect humans and the fungus does not occur in hot, dry environments such as attics. However, the loss of bats causes negative impacts on our ecosystem, which will also impact humans because of all the **ecosystem services** bats provide.

What are we doing to help in Rhode Island?

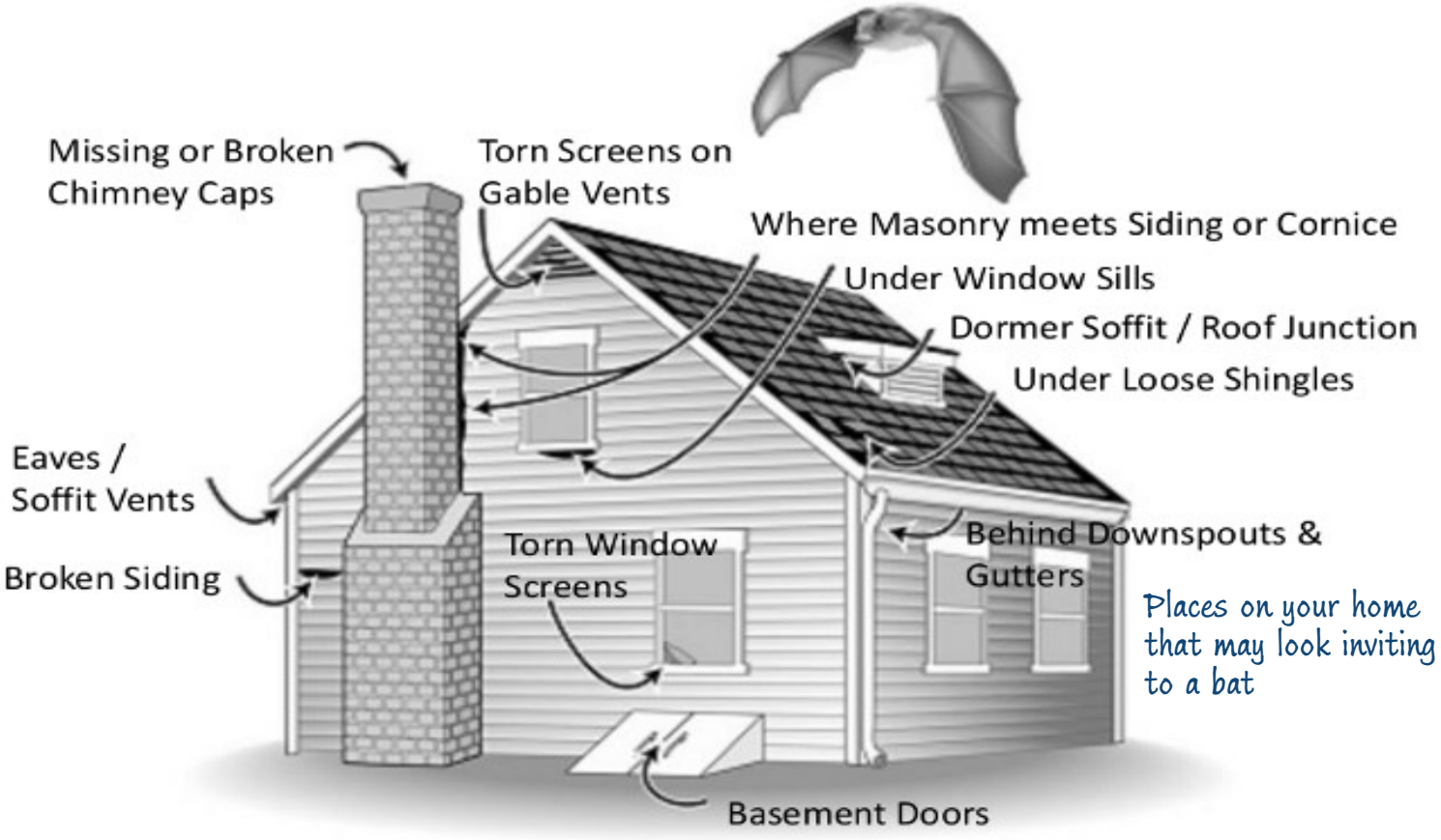
In 2016, the RI Division of Fish and Wildlife conducted sampling in the few known places where small numbers of bats hibernate in Rhode Island. The presence of the fungus was confirmed at all sites, and present on a single tri-colored bat. It was not unexpected, as WNS had been previously confirmed in all other New England states. Although large die-offs of bats have not been documented here, the finding does not bode well for the long-term viability of bat populations in the region.We continue annual monitoring of bat populations and local hibernacula.

Bat Conservation Work in Rhode Island

The RI Division of Fish and Wildlife uses several methods to monitor our state's bat populations year-round. In May and June, before pups are able to fly, state biologists and volunteers conduct **exit count** surveys at known maternal colony sites. At dusk, bats are counted as they exit their roost, one by one, to feed. In July, when pups are exiting the roosts with their mothers, counts are repeated. These counts give biologists an estimate of the number of adults and the number of young produced by each colony that year.

Over the course of the summer, biologists capture adult bats through the use of 24 foot tall **"mist" nets** (very thin, loose nets that catch bats as they are flying along a pathway or in a field). Once captured, each bat is weighed, measured, and inspected for signs of sexual maturity (e.g., pregnant or lactating). Lastly, each bat is given a lightweight aluminum band with a unique number registered with the United States Fish and Wildlife Service. The band is fitted to the forearm of the bat, and does not hinder flight or quality of life. This entire process takes about 5 minutes, and then the bat is released back into the wild. Recapture of banded bats provides a lot of insight into their life history. RI biologists have captured bats with wing scars from White-Nose Syndrome, which suggests that there may be some hope for bats' ability to fight the disease and survive. In RI, biologists often recapture bats at the same exact place where they were banded! Rhode Island-banded bats have also been spotted in hibernacula by biologists in Vermont. It is important to note that biologists who directly handle bats must have had a rabies vaccine, and wear leather gloves to protect themselves from the bats' sharp teeth.

Lastly, **acoustic surveys** are conducted throughout the summer and during migration periods. Bat detectors, mentioned in the introduction, are set up around the state to pinpoint potential banding sites, document which species are migrating through the state (often along the coast), and to gather general information about which bat species are present in the state. Acoustic surveys can be passive, with the detector strapped to a tree, or can be done along a driving route, with the detector strapped to a vehicle.



Living Alongside Bats: Bat-proofing Your Home

Bats are beneficial in the control of insect pests and generally do not pose a threat to humans. However, they can pose a health risk if they are handled or enter the living space of a home. There are a number of effective and humane ways to exclude bats from attics or other buildings. Sealing up entryways or using one-way devices are effective but must be done appropriately and with consideration to the time of year, otherwise these methods could lead to bats being trapped within the structure and subsequently dying. Remember, if it is between May and August and you have found a bat or evidence of bats in your home, it could be because there is a maternal colony of bats living there. On extremely hot days, bats may move down from the attic ceiling to find cooler areas to roost. Young bats attempting their first flights will often end up on the attic floor, and from there may crawl under an attic door or find other access into living quarters.

The use of poison is not a legal, humane or permanent solution and poses risks to human occupants. Poisons are toxic to humans and can remain harmful for years after they have been applied. Bats that leave the building and die on the ground outside could be handled by humans or become exposed to domestic or wild animals. Bats do not chew wood or screens, but may use openings that were created by rodents. Look for evidence of dark staining on shingles or trim boards and also look on the ground for droppings, which are black and about the size of a rice grain, and often accumulate under entry/exit points. Most bats will exit the roost within a half-hour after the first bat leaves, usually just after sunset. However, on some nights, not all of the bats will leave at the same time, and some may stay behind. Waiting outside at dusk may be the best way to determine how bats are gaining access.

Living Alongside Bats: Staying Safe

What is rabies?

Rabies is a disease caused by a virus that affects the nervous system of mammals and can be fatal without prompt medical treatment.

How is rabies transmitted?

The rabies virus is typically transmitted from an infected mammal to another mammal by a bite wound. The virus passes from the saliva of the infected mammal into the bloodstream of another, eventually moving through the central nervous system to the brain. Although rare, it is possible to become infected without being bitten, for example by having infected saliva come into direct contact with an open wound or eyes.

How common is rabies in humans?

Due to public education programs, post-exposure treatment, and vaccination programs for domestic animals, cases of humans contracting rabies in the United States are rare. Those few cases that occur are because people did not recognize the risk and did not seek medical advice.

How can you tell if an animal is rabid?

You cannot tell if a bat or other mammal has rabies just by looking at it. Rabies can only be confirmed by laboratory testing. In a given year, the RI Department of Health may test between 100 and 200 bats for rabies. The average infection rate in a given year, and over a ten year period is about 4 percent. If one bat tests positive for rabies, it does not mean all the bats in the colony also have rabies.

How to Safely Capture a Bat:

Contact a licensed professional if possible. If a licensed professional cannot be reached:

- Put on leather gloves and slowly approach the bat when it lands.
- Place a clear, see-through container over the bat.
- Slide a lid under the container to trap the bat inside.
- Securely tape the lid to the container and punch small holes in the lid so the bat can breathe.
- Call RIDOH at 401-222-2577 to make arrangements for rabies testing.

I found a bat in my home, what should I do?

Any bat that is found within a home, especially a bedroom, where there are pets, or a person who is unable to communicate, should be tested for rabies. Follow these steps to safely deal with the bat:

1. **If you are unable to capture the bat, or do not wish to attempt to capture the bat yourself, contact the RI Department of Health (401-222-2577) or the RIDEM Division of Law Enforcement (401-222-3070).** If an Environmental Police Officer is available, they may be able to provide assistance. You may be directed to one of the licensed Nuisance Wildlife Control Specialists (NWCS), who are licensed by the RIDEM to provide assistance in a number of ways to the public with respect to wild animals. They are familiar with the protocols for capture, handling, transport, and submission of specimens to the Department of Health Laboratory. A current list of Nuisance Wildlife Control Specialists is available on the RIDEM website: http://www.dem.ri.gov/programs/bnatres/fishwild/pdf/relok8rs.pdf

2. If you are bitten by a bat, wash the wound with soap and hot water.

3. **Immediately contact the RI Department of Health Rabies Hotline (401-222-2577) for instructions.** The RI Department of Health Rabies Hotline is staffed 24 hours a day, seven days a week for reports of possible exposure or for consultation. If you know or suspect a domestic animal has had contact with a bat or other wild mammal, contact the local animal control officer and a veterinarian immediately.

4. **DO NOT** release the bat, particularly if it was found in a bedroom with an unattended child, a mentally impaired person, or a pet.

5. Vaccine treatment will only be recommended if the bat tests positive for rabies. Post-exposure rabies vaccinations may be recommended when the bat is not available for testing.

What is histoplasmosis?

Histoplasmosis is a fungal disease associated with the droppings of birds and bats. Inhalation of dust containing spores can cause an infection in the lungs. Symptoms may include fever or congestion and in some cases a mild infection that may go unnoticed.

The disease is rarely fatal but people with compromised immune systems may be at risk. Do not sweep bat or bird droppings without protective clothing or an appropriate respirator. Wetting droppings before and during clean-up will reduce dust and most household disinfectants and bleach solutions will kill the spores.

Bat Vocabulary

Acoustic survey – when biologists use bat detectors to record sounds of bats to determine which bat species are in the area

Echolocation – when an animal makes a sound, and listens for how that sound bounces off an object; how bats sense the world around them

Ecosystem services – direct or indirect benefits freely provided to humans from the environment

Exit count – when biologists count how many bats are leaving a roost at sunset

Frugivore – an animal that primarily eats fruit

Hibernacula – areas where bats spend the winter to hibernate (caves, mines, buildings)

Hibernation – a state of inactivity in which an animal reduces its metabolism and does not feed or drink for an extended period, living off stored fat reserves

Histoplasmosis – a fungal disease associated with the droppings of birds and bats

Insectivore – an animal that primarily eats insects

Mammal – an animal that has fur, gives birth to live young, feeds its young with milk, and is warm blooded

Maternal colony – a place where female bats of some species gather each year to birth and raise their pups

Migration – when an animal moves from one place to another in a seasonal pattern

Mist net – a thin, light net that is hung between two tall posts to catch bats and small birds

Nectarivore – an animal that primarily eats nectar

Nocturnal – active at night

Pollination – spreading pollen from one flower to another, how plants produce fruits

Pup – a baby bat

Rabies – a disease caused by a virus that affects the nervous system of mammals

Roost – a place where bats gather to rest

Sanguinivore – an animal that primarily eats blood or other animals

Seed dispersal – the transport of a seed from its plant to another place, important for plants to continue growing in a habitat

Swarms – when male and female bats gather and mate before entering their hibernacula

Wing membrane – the skin that is stretched between a bat's fingers, allowing it to fly

White-Nose Syndrome – a fungal disease found in damp caves where bats hibernate; this disease has killed millions of bats since its discovery in 2006


Gabrielle DeMeillon

Quick Links

Bat Conservation International
Keep up to date with international bat news and conservation, and be sure to check out their Kidz Cave page!
http://www.batcon.org/
http://www.batcon.org/resources/media-education/learning

Bats Live & Project EduBat
Learn all about bats with webinars and batty activities.
https://batslive.pwnet.org/index.php

Bat Week
Become a bat hero and celebrate bats with your students!
http://batweek.org/

White-Nose Syndrome
Learn more about White-Nose Syndrome research across the country. This site includes an interactive map that shows the spread of the disease over time.
https://www.whitenosesyndrome.org/

Bat Conservation & Management
Check out this great playlist of educational videos about bats, geared towards upper elementary and middle school students.
https://batmanagement.com/pages/gallery-bat-acoustics


G. DeMeillon

Lesson 1: Bat Basics

Theme
Bats aren't as scary as you think. In fact, they're very important members of the ecosystem!

Learning Objectives
In this lesson, students will learn about the cultural connotations surrounding bats, and will bust some bat myths. Students will also learn about the basics of bat natural history, anatomy, and ecosystem services.

Corresponding Activities for this Lesson
- Bat & Moth Echolocation Game
- Bat Origami
- How Do I Compare to a Bat?
- Calculate the Value of Bats

Materials
- Lesson 1 PowerPoint
- Bat skull model
- Slinky
- Bat myth cards
- Bat silhouettes

Lesson
1. Start by asking the class how people feel about bats. As the students provide answers, write them on the board.
- Some of the answers may raise some questions. For example, many people associate bats with Halloween and vampires, which might raise the question, "Do bats want to drink your blood?" On another section of the board, write down the students' questions as they come up.
- Once the class is satisfied with the list they have created, click through the slide with the collage of pictures to review and illustrate the students' ideas. *We have provided corresponding information for each image in the notes section of the PowerPoint. You can choose to reveal some of the information to the students now or during the next parts of the lesson. You could also use the Bat Myth Cards instead.*

2. Ask students to participate in taking some guesses at the bat trivia questions and bust some bat myths. The answers to the trivia questions are included in the notes section of the PowerPoint. *Use the slinky to demonstrate how echolocation works (when busting the "blind as a bat" myth). Ask one student to be a bat and one to be a bug, standing on either end of a stretched out slinky. The bat taps the slinky, and then senses the "waves" bounce through the slinky to the bug and back!*

- Are bats blind?
- Do bats suck blood?
- How many insects can a bat eat in one night?
- Can bats carry rabies?

3. Take a look at the next slide to review some basic information about bat natural history and anatomy.

- Explain to students that bats are not rodents, but are in their own order of mammals called Chiroptera.This is a good time to show students the bat skull. Bats don't have large front teeth like rodents, but instead have lots of small, sharp teeth.
- Chiroptera means "hand-wing" in Latin, one of the languages used for scientific categorization. This makes sense, because a bat's wings are actually its hands! Take a few minutes to allow students to look at the color coded illustration of the arm and hand bones of a human compared to a bat. Ask if they can spot similarities between the two. Explain that humans and bats are both mammals, which means we have many of the same bodily structures, but have adapted to do different things. Bats use their hands to fly and scoop up insects, while humans use their hands to hold things, write, build, etc.

4. Review the next set of bat trivia questions, asking students to guess the answers. The answers to the trivia questions are included in the notes section of the PowerPoint.

- How many species of bats are there worldwide?
    - *For this question, ask students if they can figure out what the colors might mean on the map of the world. Ask if they can figure out where in the world the number of bat species is the highest.*
- How many species of bats are there in Rhode Island?
- How long can bats live?
- After reviewing the trivia questions, ask for a few volunteers to help hold up the fabric bat silhouettes to illustrate the size diversity of bats across the world. *Fabric silhouettes are provided in the hands-on kit. If you are accessing this kit online, templates for the bat silhouettes are available in the Lesson 1 section.*
    - The largest bat silhouette represents the flying fox. There are multiple species of flying foxes found across southeast Asia, East Africa, Australia, and other islands in the Indian and Pacific Oceans. The golden-crowned flying fox of the Philippines can have a wingspan up to 6 feet wide!
    - The smallest bat silhouette represents the bumblebee bat, which lives in Thailand. This is the smallest bat species in the world.
    - The medium-sized silhouette represents the big brown bat, which is the most common bat species found in Rhode Island.

5. Ask students why they might think bats are important to people and the ecosystem.

- Bats are incredibly important worldwide for insect control, pollination, and seed dispersal. Explain to students that bats provide these ecosystem services to humans for free, so it is important that we care for our bat populations. *Information about each ecosystem service can be found in the notes section of the PowerPoint.*

Lesson 2: Meet the Rhody Bats

Theme
Biologists collect annual data on bats in order to learn more about their populations and health. Data collection over time is an important part of wildlife conservation.

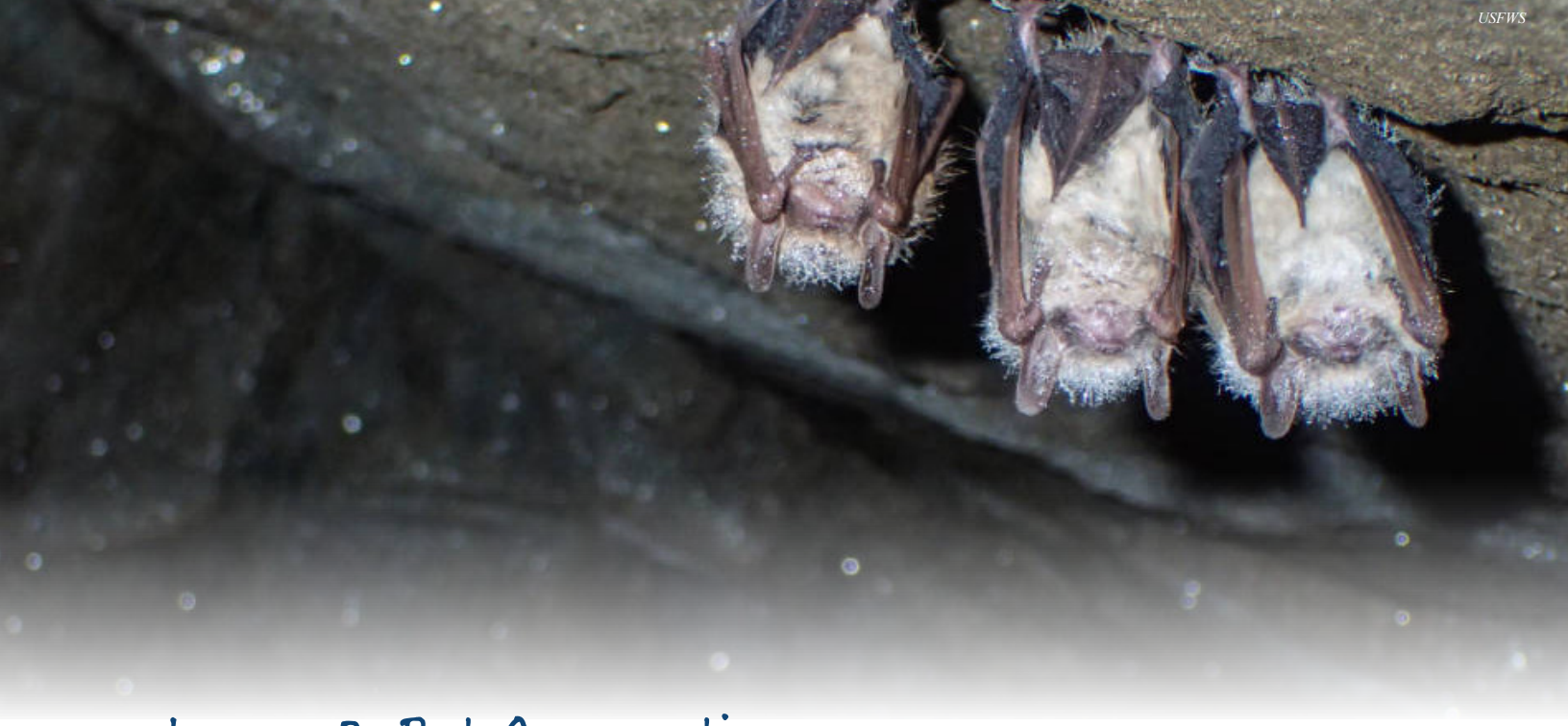
Learning Objectives
In this lesson, students will learn about the bat species of Rhode Island, and the current monitoring efforts being conducted by the Rhode Island Division of Fish and Wildlife.

Corresponding Activities for this Lesson
- Working the Night Shift *(Note: This activity includes some of Rhode Island's bat species, as well as species from different states.)*

Materials
- Lesson 2 PowerPoint
- Mist net sample
- RI bat species cards

Lesson
1. Show students the pictures of Rhode Island's bat species. *Ask students if they can spot some similarities and differences between the bats. Ask students to guess which bats might be the most common, and which might be the rarest.*
- Explain that the big brown and Eastern red bats are the most common species, and that the little brown used to be more common than it is today. The Northern long-eared bat is listed as Threatened under the Endangered Species Act. The Eastern small-footed bat has been documented in Rhode Island, but not in a long time. Hoary, silver-haired, and tri-colored bats are seen occasionally.
    - *Ask students why they think some bat species are more common than others, or why some bat populations are threatened/declining. After brainstorming, ask students to keep these predictions in mind. Threats to bats will be covered in the next lesson.*

2. Ask students what Rhode Island biologists may want to study about bats.
- Show students sequence of photos and videos of Rhode Island biologists capturing/banding bats, counting bats, and acoustic surveys. Pass around the mist net fragment for students to feel and see up close. *Information about each bat research project can be found in the notes section of the PowerPoint.*


USFWS

Lesson 3: Bat Conservation

Theme

Biologists collect annual data on bats in order to learn more about their populations and health. Data collection over time is an important part of wildlife conservation.

Learning Objectives

In this lesson, students will learn about the threats bats face and how we can all do our part to help bats.

Corresponding Activities for this Lesson

- Bat Blitz
- Bat Mural
- There's a Fungus Among Us

Materials

- Lesson 3 PowerPoint

Lesson

1. Review with students the benefits of bats to humans and the ecosystem. *Ask students what they think would happen if bat populations were to decrease. Write students' answers on the board.*

2. Show students pictures of bats with White-Nose Syndrome, and explain that this disease has become the leading threat to bats across the United States.

- Define White-Nose Syndrome.
- Explain how this disease affects bats.
- Explain the origins of the disease and how quickly it has spread.
- You can see an interactive time lapse of the spread of White Nose Syndrome across the country at www.whitenosesyndrome.org.
- Explain that this disease does not directly affect humans, but could indirectly affect us. Circle back to students' ideas of what could happen if bats began to disappear.

- Explain that this disease has made its way to Rhode Island, discovered when our state biologists conducted sampling in the few known places where bats hibernate in the state.
- *Detailed information about White Nose Syndrome can be found in the notes section of the PowerPoint.*

3. **Ask students what they think everyone can do to help bats.**
    - **Create healthy habitat –** Plant a bat-friendly garden with lots of different plants. This will attract insects, and provide natural food for the bats.
    - **Don't use pesticides –** Chemical pesticides are often used to kill certain insect pests, but can end up unintentionally killing other insects too. This can impact bats because killing off insects greatly reduces their food source. Also, if an insect is sprayed, but does not die immediately, it could be eaten by a bat. The bat will have ingested the chemical pesticides via the insect. The poison can make its way up the food chain, eventually harming bats and other wildlife. This is a common occurrence with birds of prey eating rats that have consumed rat poison before becoming a hungry bird's lunch.
    - **Provide shelter –** Building a bat house can help give bats a place to rest. Bats are very site faithful, meaning they return to the same roosts and hibernacula each year. They may not find your bat house right away, but it's always good to offer them the option!
    - **Share what you know about bats with your friends and family! –** The more people know about bats, the better. Bats are often misunderstood, and need your help to spread the word that bats are super cool!