

Natural History and Rehabilitation of Ohio Bats

Focusing on Big Brown Bats, Eastern Red Bats
and Silver Haired Bats.

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Big Brown Bats (*Eptesicus fuscus*)

- Occur throughout most of North America.
- The most common Ohio bat found in urban areas.
- In the western part of the U.S. they typically have one pup per year, in the eastern U.S. usually have two.



Big Brown Bats –Diet and Feeding

- Beetles and other hard bodies insects make up a large part of their wild diet.
- Leave their roost and start foraging for insects earlier than many other species.
 - ~ 30 min. after sunset
- Nursing females will often go out and feed at dusk and dawn to meet the energy demands of feeding growing pups.

Big Brown Bats - Roosting

- Have many different roosts –
 - Summer roosts are often different from winter roosts.
 - When they are not hibernating, their day roosts are different than night roosts.
- Summer roosts are often in buildings.
 - In western US they use more tree cavities as summer roosts.
- Strong attachments to their roosts and often return to the same roosts every year.
- Strong homing instinct.
 - Most will return if released within 250 miles of their roost.

Big Brown Bats –Hibernation

- Crevice roosting bats.
- In the winter they typically roost singularly.
- Hibernates in buildings, mines, caves and rock crevices.



Big Brown Bats - Hibernation

- Start to hibernate in November and emerge in March.
 - One of the last bats to hibernate in the fall and first to emerge in the spring.
- Ideal hibernation temps around 40-42F.
- Those bats that hibernate in buildings often choose different building to hibernate in than those they use for their summer roosts.

Big Brown Bats - Reproduction

- Breeding season begins in Sept. but mating can also occur during hibernation.
- Female stores the sperm until spring.
- Around the time female is emerging from hibernation ovulation will occur egg will be fertilized.
- Start forming maternity colonies in mid-March.

Big Brown Bat - Reproduction

- Most pups are born late May - early June.
- Pups stay on their mother under her wings during the day but are left behind in the maternity colony when females go out to feed at night.
 - Mother / pup recognition combination of vocal recognition along with visual and olfactory clues.
- Pup's eyes open the day they are born.
- Pups learn to fly when 18-35 days old.
- Pups wean when 32-40 days old.
- Pups grow up quickly so they can complete growth and acquire fat reserves prior to their first hibernation.

Eastern Red Bats (*Lasiurus borealis*)

- One of the most common bats in Ohio.
- Solitary tree roosting bats.
- Males bright red and females more brownish in color.
- Only bat in Ohio where males and females are different colors.



Eastern Red Bat – Diet and Feeding

- Eat mostly soft bodied insects like moths and flies but they will also consume beetles, cicadas and crickets.
- Come out to feed 1-2 hours after sunset.
- They can often be found around street lights feeding on moths that are attracted to the light.

Eastern Red Bat - Roosting

- Solitary bats except mothers with pups.
- In summer they often roost in trees and shrubs in woodland habitat, often found 3.5 – 10 feet off the ground.
 - Females with pups usually found higher up in trees often 10-20 feet off the ground.
- Roost in conifer and hardwood trees.
- They will change their roost every few days.
- Well camouflaged, often looking like a dead leaf hanging from a tree.
- Often hang from only one foot.
 - This may also be a form a camouflage, to help them look like a leaf hang in a tree (single foot/leg looks like leaf stem).

Eastern Red Bat - Migration

- Found throughout eastern U.S. in the summer.
- Most bats leave Ohio by Oct. and return Mar. or Apr.
- It is believed these bats migrate to the southern part of the US.

Eastern Red Bats - Hibernation

- Some red bats do overwinter in Ohio, mostly in southern Ohio.
 - Southern Ohio is typically the northern most part of its winter range.
- They hibernate on the ground under leaf litter.
- They are very hardy bats that are adapted to tolerate very low temps and drastic temperature fluctuations.
- Thick fur, short ears covered in fur, fur on tail membrane that they will pull up wrap around them like a thick blanket.



Eastern Red Bat - Reproduction

- Mating occurs in flight, usually in Aug.
- Sperm is stored by the female, fertilization of eggs usually occurs in spring.
- Pups born May or June.
- Normally have 2-3 pups but can have as many as five.
- Pup's eyes open when they are 10-11 days old.
- Pups learn to fly 3-4 weeks old.
- Pups are weaned around 5-6 weeks old.

Silver Haired Bat (*Lasionycteris noctivagans*)

- Unique bat:
 - Considered a migratory tree bat species but are more closely related to big brown bats than red bats.
 - Sometimes they are classified as crevice bats.



Silver Haired Bat – Diet and Feeding

- Eat mostly soft bodied insects.
 - Moths, true bugs, beetles and flies.

Silver Haired Bat - Roosting

- Prefer mature forests with ponds or streams nearby.
- Summer roosts are under bark, rock crevices, or in tree cavities.
- May travel up to 30 miles a night from their day roost to preferred foraging area.
- Typically change roosts every 3-10 days.

Silver Haired Bat

Hibernation and Migration

- Most commonly found in Ohio during spring (April - May) and fall (Sept. - Nov.) migration.
- Migrate to the southern US in the winter.
- Most migrate further south but some do stay and hibernate in southern Ohio.
 - Usually the males that will stick around.
 - Did find silver haired bats in Hocking Co. along with the big brown bats.
- Hibernate in tree cavities, rock crevices and occasionally buildings.

Silver Haired Bat - Reproduction

- Breeding likely occurs in autumn.
- Also have delayed fertilization like BBB and Reds.
- Give birth to two pups usually late May - early July
 - Only a few records of them giving birth in Northern Ohio.
- Wean when they are 3-4 weeks old.

Flying and Weaning

- Juvenile big browns, reds and silver haired bats all begin to fly when they are ~75% of adult body mass. They don't wean until they are almost full adult size.
- They don't have enough bone density to support the physical demands of flight until they ~75% adult body mass.
- By the time they are proficient at flying and able to hunt for their own food they are almost full adult size.



Caring for bats in rehab.

Different ways to care for different types of bats while in rehab.

Handling

- A nitrile glove worn under an unlined all leather glove is fine for handling these bats.
- Big Brown and Silver Haired Bats (crevice bats) –should be held gently in a closed secure hand. They are more comfortable in confined spaces. Small towel can also be used.
- Red bats (tree bats) -Tree bats typically prefer a more loose open hand. Being held too tightly is often very stressful for tree bats.
- Red bats use their teeth to hold on like they use their thumbs and feet.
 - Often bite and hold onto towels / gloves when they feel insecure or to reposition themselves.

Handling



Housing Bats in Rehab

- Choose the appropriate size.
- Hard sided or soft sided.
- Water dish hanging or on ground.
- Appropriate roosting additions:
 - Different towels
 - Mesh drawer liner
 - Roosting pouches
 - Knitted nests or small bird pouches.
 - Artificial or real plants - hanging



Small Size Housing

- Small soft sided butterfly tents good for transporting bats, housing an injured bat that need to be on limited movements or for newly admitted bats learning to self-feed or under observation.



Medium Size Housing

- Larger soft sided dog kennels good for single tree bat, non -flighted bats needing exercise, transition between small enclosure and flight room.



Large Size Housing

- Large tents or flight rooms used for getting bats ready for release.

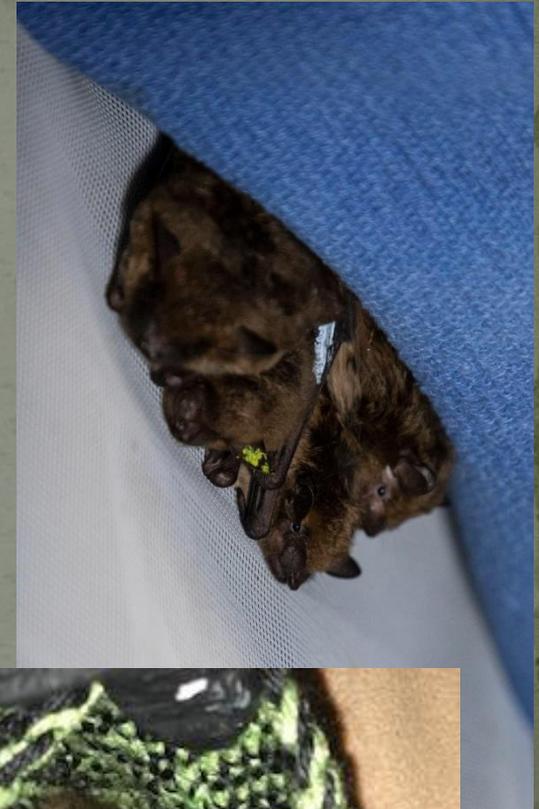


Flight Room Housing

- Access to water.
- Mesh touching ground to give bats a way to climb back up if they land on the floor and get grounded.
- Provide a wide variety of place to roost so bats can roost where most comfortable and get away from others they don't want to roost with.
- Open window on warm nights often stimulates flight went bats can get smells from the outside.

Housing for Big Brown and Silver Haired Bats

- Crevice bat enclosures should have: different types of towels, drawer liner mesh, and fleeces to hide under.
- Crevices to hide in: small fabric pouches, and hide huts designed for small birds.
- Don't over crowd bats.
- Give everyone enough space and roosting choices.
- Males more solitary than females.



Housing for Red Bats

- Tree bats do not do well in small confined spaces.
- These bats must have larger enclosures with soft mesh sides.
 - Tree bats may try to fly, even with severely injured wings, if housed in small enclosures.
- Soft sided kennels, soft laundry hampers and butterfly houses work well.
- These bats often flap around on floor at night and can injure themselves on hard surfaces and items on their floor.
 - Hanging water bowls and towel not dragging on ground.
- Tree bat enclosures should have: artificial (silk) plants, branches with real leaves, tree bark, mature grape vine.
- In small / medium size housing house adults alone except pups should stay with mom until they are weaned then separate pups from mom.
 - In large flight room more options of housing tree bats with other bats.

Housing Bats Together

- Big Brown and Silver Haired bats:
- Crevice bats should always be housed with other crevice bats if possible, especially females.
- Medium or larger size housing ideal.
- Don't put pregnant females or females with pups with male bats.
- Be mindful of keeping too many bats together in an enclosure or flight area.
 - If one bat comes down with rabies, all other bats housed with that one may all have to be euthanized or quarantined.

Flight Room Housing

- Bat choosing to roost near other bats of different species.
 - Red and Big Brown
 - Red and Hoary



Temperature

- Temperature is the most important physical factor in roost selection.
- Most Ohio bats will do well at 77 - 82 F.
- Big brown bats prefer a slightly cooler temperature.
- Sick bats benefit from a slightly higher temperature.
- A bat that hangs with its wings open may be too hot.
- Pregnant females close to giving birth need an ambient temperature of 90 - 100 F.
 - They should be in an incubator.

Humidity

- Bats kept in a room with too low of humidity can have problems with dehydration resulting in loss of appetite and dry wing membranes.
- Wing membranes of well hydrated bats will appear glossy.
- Dehydrated wing are wrinkly like crape paper.
- The high humidity that bats have in the wild can not be safely achieved indoors.
- High humidity indoors promotes mold growth, this poses a risk to bats and people.
- Maintaining a relative humidity (RH) of 60% indoors is an acceptable level for adult bats and inhibits mold growth.
 - RH below 62% stops all chance of mold growth and most mold won't grow under 70%.
- Sick, infant and weak bats need a higher relative humidity level.
- It is especially difficult to achieve proper humidity levels indoors in the winter.
- Ways to increase humidity in a room during winter:
 - humidifier (clean weekly)
 - Wet sponges
 - EasyComforts Room Humidifiers - Good for increasing humidity in a small area.

Humidity

- Easy Comforts Room Humidifiers.
- Pair of 2 on Amazon ~\$23
- Good for increasing humidity in a small area.



Diets

- Ohio bats are selective + opportunistic foragers = they may select for certain insects but will also eat what is available
- The diets of different bat species are determined by the bats:
 - wing size and shape
 - tooth structure
 - cranial structure
 - amount of muscle mass in the skull
 - habitat where they feed
 - age
 - gender
 - availability of insects

Wild diets

- Researchers have analyzed the fecal matter of wild bats to determine what insects they ate.
- The insects were rated by the hardness of their body.
 - 1 = softest insects (mayflies, termites, lacewings etc.)
 - 5 = hardest insects (beetles and weevils)
 - Silver haired bats – 1.75
 - Eastern red bats – 2.52
 - Big brown bats – 4.14
- Insect eating bats like big browns that eat a hard diet like beetles have more robust skulls, thicker teeth, larger canines, shorter and wider faces than those that eat softer insects like the red and silver haired bats.

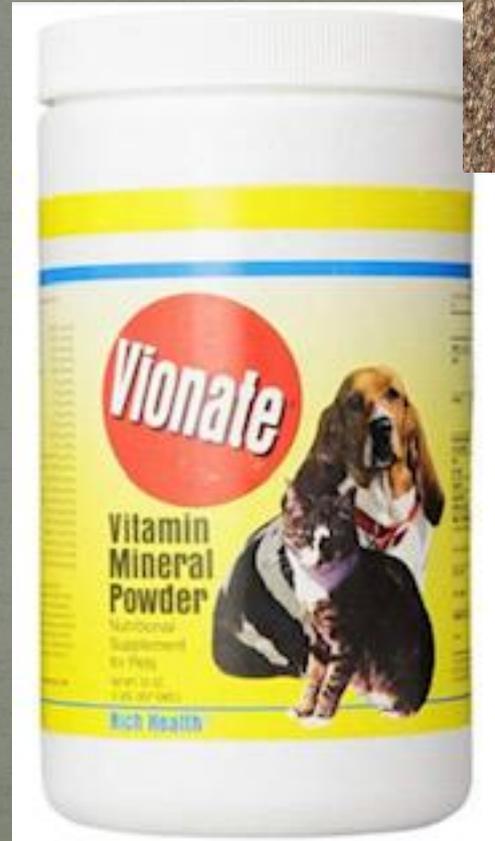
Feeding

- Silver haired bats and red bats should be fed the smaller softer mealworms.
 - White recently shed mealworms are great.
- Big browns are better at handling the larger mealworms with tough exoskeleton.
- Feed only live mealworms. Freeze dried mealworms can cause stomach impaction especially if bat is dehydrated
- I don't feed wax worms to bats.
 - Can't gut load them
 - High in fat (ww = 22% fat, mw =12-13% fat)
 - Skin is tough to chew
 - Can cause dental issues
 - Also a problem for bee keepers if they escape into the wild.
 - Wax worms pupate into moths and can infest bee colonies.

Mealworms

- Majority of my mealworm colony kept on plain bran.
- Small amount, ones I am feeding out soon, are kept on Fluker's high calcium bran.
- A rotation of greens and vegetables (especially romaine, spring mix greens, kale, corn on the cob, carrots, sweet potato, winter squash, red pepper) are added to the mealworms in the high calcium bran.
- Just prior to feeding the mealworms are lightly dusted with Vionate supplement.
- Select the shiny, actively moving, plump, firm mealworms for feeding.
 - Mealworms that are dull, not-moving, curved and squishy are preparing to pupate.
 - They are not gut loaded because they stop eating before pupating.

Feeding



Hair Loss Problems – March 14th



One Month Later – April 18th



Feeding Big Brown and Silver Haired Bats.

- Big brown bats and silver haired bats can usually be taught to drink and self feed from a dish.
- Water should be offered from a syringe at each feeding until bat is self feeding and is no longer interested in taking water from syringe.
- Learn from watching bats self-feed.
- Big brown bat waiting for his food.



Feeding Eastern Red Bats

- Usually more difficult to teach these bats to self feed.
 - They usually won't go down to the floor of the enclosure to feed.
- They can learn to eat from a dish but the dish of mealworms usually needs to be placed directly under them within reach while they are hanging.
- Water dishes should be up off the floor. Hang water dishes close to where they like to roost.
- Red bats should be offered water from a syringe at each feeding and mealworms can be dipped in water prior to feeding.
- These bats can become dehydrated quickly in care.

Feeding Red Bats



Releasing Big Brown Bats.

- Release bat in the same place where it was found.
- If original location is not known release the bat in an area where another colony of big brown bats are found.
 - Best to release when colony is out flying around.
- Bats can be released by allowing it to hang from a gloved hand extended above the person's head.
- Some bats will fly off quickly others will take a few moments to orient themselves and will fly off when ready.
- Never toss the bat into the air.
- If bat refuses to fly off on its own, attempt to release again at a later date.
- Take a flashlight along during release in case retrieval of bat is necessary.
- Do not place bat on the side of a tree or building, it may be eaten by a predator before it flies away.
- Big brown bats can also be placed in an unoccupied bat house to leave when ready.
- If the bat is still in the bat house the next day, palpate the abdomen to see if the bat ate overnight.
- Often bats that are still in the bat house the next day didn't leave or eat over night.
- In this case the bat is not ready for release.
- Remove bat from bat house, continue to feed and try again at a later date.

Releasing Red Bats

- They can be released in the general area from which they were found.
- A single adult can be released from gloved hand.
- Bat can also be placed in the branches of a tree (not on the trunk) at least 8 feet off the ground with a clear drop underneath.
 - Always place females with pups on a tree branch.
- Best to put the bat in a small forked branch with rough bark and leaves.
- Try not disturb bat too much prior to release, especially moms with pups – often best to do during the day.
- If disturbed, female bat may fly off and leave her pups behind.
- Monitor bat after release.
- Come back the next day to see if bat is still there.
- If bat is still there bring back in, feed and hydrate.
- Try again another night.

Releasing Silver Haired Bats

- Release from gloved hand after dark.
- Usually silver haired bats (and some red bats) are found grounded in downtown areas – they get caught up there during fall migration.
 - Oftentimes just need a little supportive care and sent on their way.
 - I will take them to a forested area south of downtown to get them past all the buildings.

Over Wintering Bats

- Healthy bats in care overwinter should be cooled down
 - big brown bats can be hibernated.
- To cool them down:
 - Keep them in a 60-62F room (unheated basement)
 - Humidity 60-70%
 - Feed three times / week
 - Turn on small space heater before feeding
 - Monitor weights closely
 - Increase number of feeding if weights start getting to low.
- I try very hard not to keep red bats overwinter.
 - They are extremely cold tolerant
 - They often don't do well in care for long periods of time.

Hibernating Big Brown Bats

- BBB very tolerant of fluctuating hibernation temps which makes them ideal for overwinter hibernation in wine coolers.
 - Currently only hibernating big brown bats.
- Hibernate them in two wine coolers, one for males and one for females.
- Bats must be healthy and at appropriate body condition before going into hibernation.
 - Injuries will not heal during hibernation.

Hibernating Big Brown Bats

- PVC frames with zipper mesh covers inside.
- Towels hung on sides with zipties.
- Temp 42F
- Humidity 60%+
- Two temp / humidity readers in each (top and bottom).
- Drinking water in with the bats.
- Bats must be able to climb and hang inside.



Hibernating Big Brown Bats

- Bats were fasted and cooled down for 12 -24 hours prior to hibernation.
- Just prior to going in to the coolers bats were weighed and marked.
- Coolers were checked from outside twice a day – temp, humidity was recorded, checked for bats on the ground.
- Once a week – new bats added, everyone in the cooler was looked at, humidity waters filled, drinking water changed.
- One month from start bats were weighed and looked at.
- Again at half way point everyone weighed and looked at.

After Hibernation

- In the spring bats are taken out of the coolers weighed, examined and put in soft sided kennels.
- They are given food and water for 48 hours.
 - Many will not eat right away after emerging from hibernation.
- Release 48 hours after leaving hibernacula.
 - Min low temp 50F and available bugs
 - No flight practice needed.
 - All bats released in same location

Wings

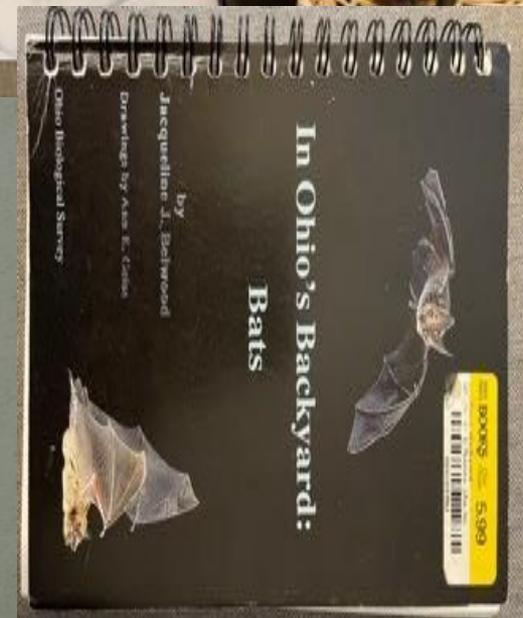
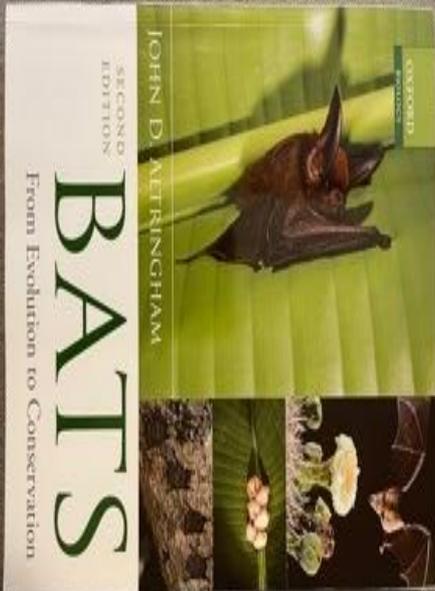
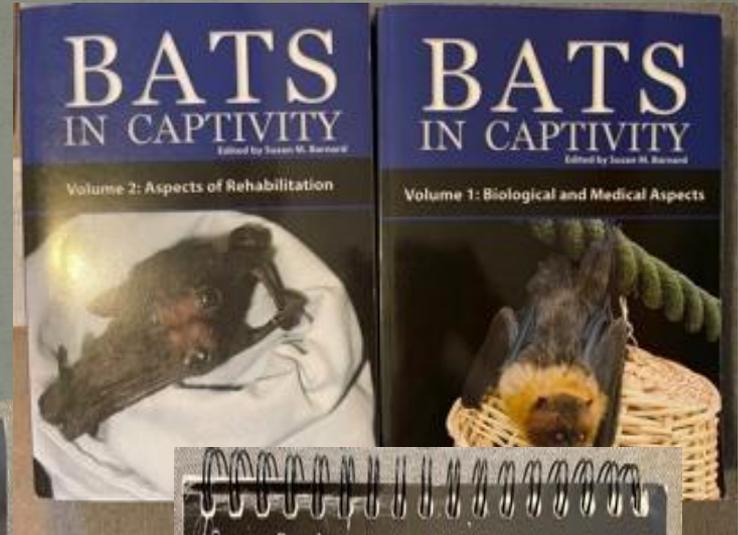
- Wing membranes are not just skin.
- Wings are two layers of skin with nerves, blood vessels, muscle and elastic tissue.
- Wing tears can be quite painful.
- Small holes in the wing usually heal up quite well.
- Larger holes take more time to heal and can be quite painful.
- If a tear in the wing membrane goes all the way to the edge of the wing prognosis is poor that it will heal correctly and bat will be able to fly well again.

Bed Bugs v/s Bat Bugs



Books and other Resources

- Bat World Sanctuary.
- Ohio Bat Working Group
- NA Society for Bat Research



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