

# **VIRGINIA BATS: NATURAL HISTORY + CONSERVATION**

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# BAT BASICS

- Mammals; order Chiroptera
- Only mammal capable of self-powered flight
- 2<sup>nd</sup> most speciose group; ~1400 species; 20% of all mammals
- Primarily insectivorous, but wide variety of feeding habits (frugivore, nectarivore, sanguivore, piscivore, carnivore)
- Wide variety of roosting habits
- Heterothermic endotherm
- ***Break all the small mammal rules***



Bat World Sanctuary

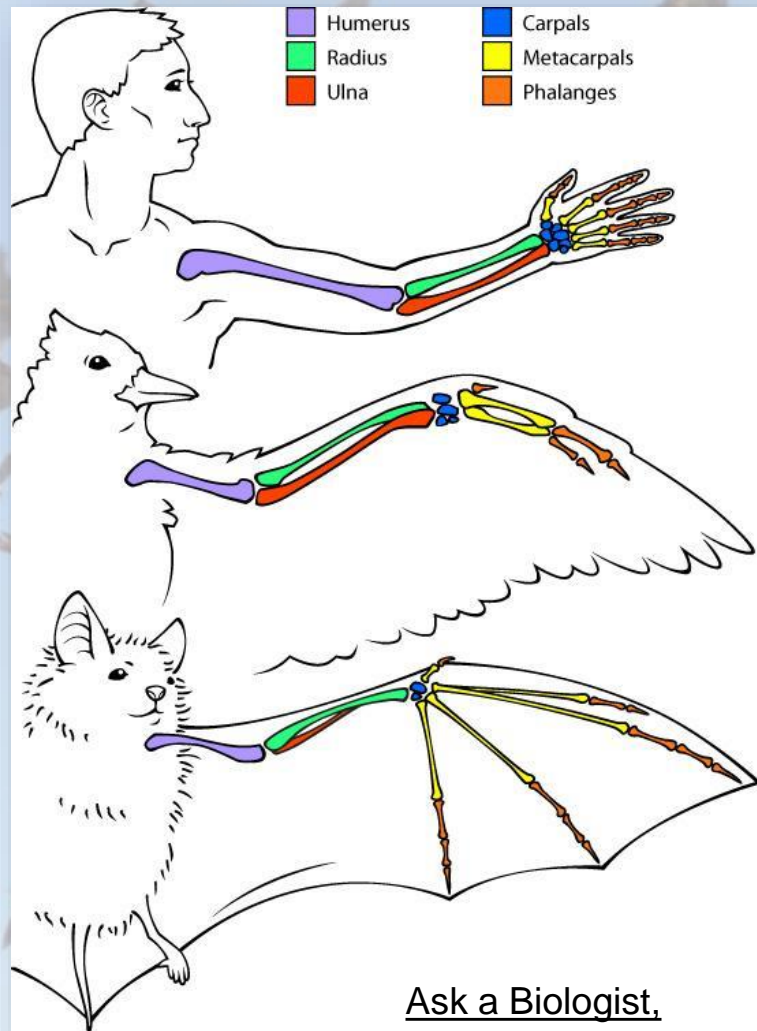


# LIFE HISTORIES

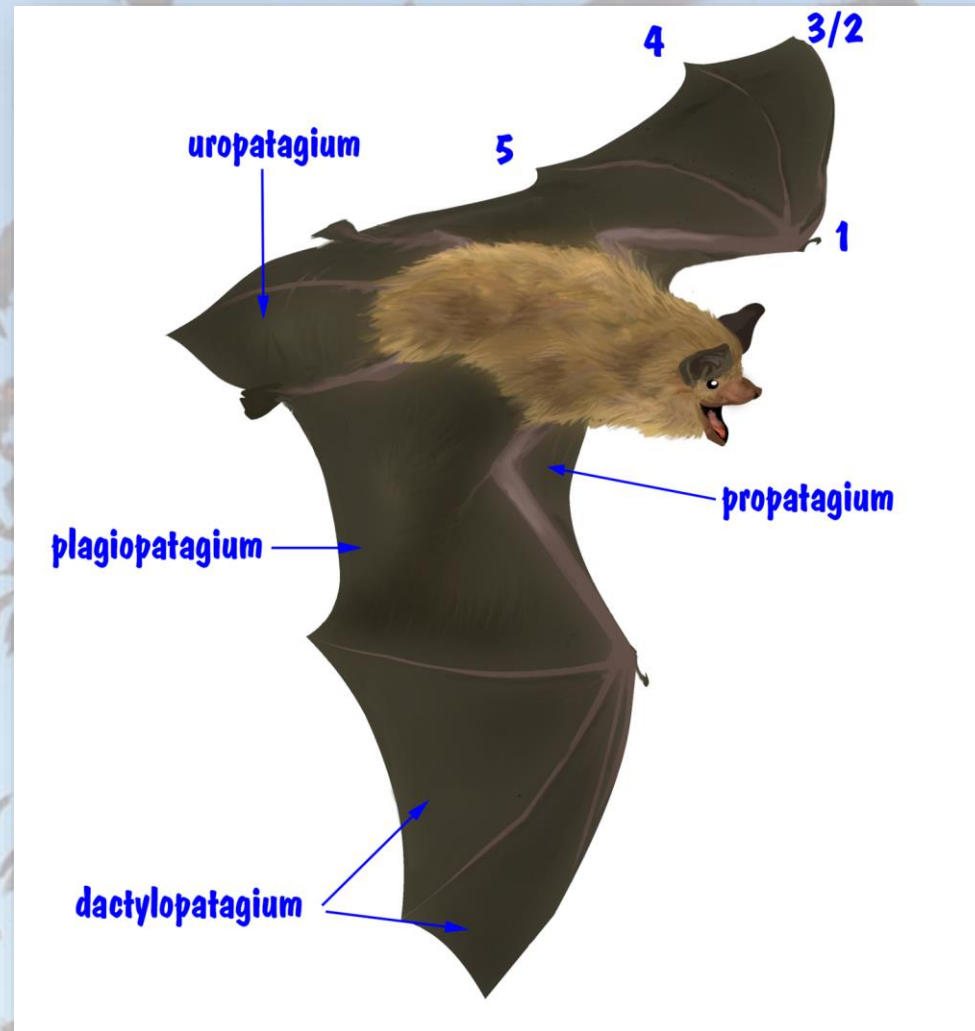
- Relative to size, most long-lived mammal
  - Brandt's bat in Russia (~4g) 2005 longevity record of 41 years
  - Little Brown Bat in US recaptured at 34 years (7—9g)
- Very low reproductive rate
  - 1 litter per year; most have only one offspring per litter (K selected)
- Highly mobile
  - Huge home range; *Tadarida* forage up to 40 mi nightly
- For many, habitat changes seasonally



# MAMMALS THAT FLY!



Ask a Biologist,  
ASU





# BATS HAVE BEEN BATS FOR A VERY LONG TIME



*Onychonycteris finneyi*  
Fossil Butte National Monument

52.5 MILLION years ago

But, likely originated closer to  
65 million years ago

(go watch this

<https://fb.watch/gM4EKvH4-v/> )

# MOST BATS ARE INSECTIVORES





# BAT LIVES CHANGE WITH THE SEASONS

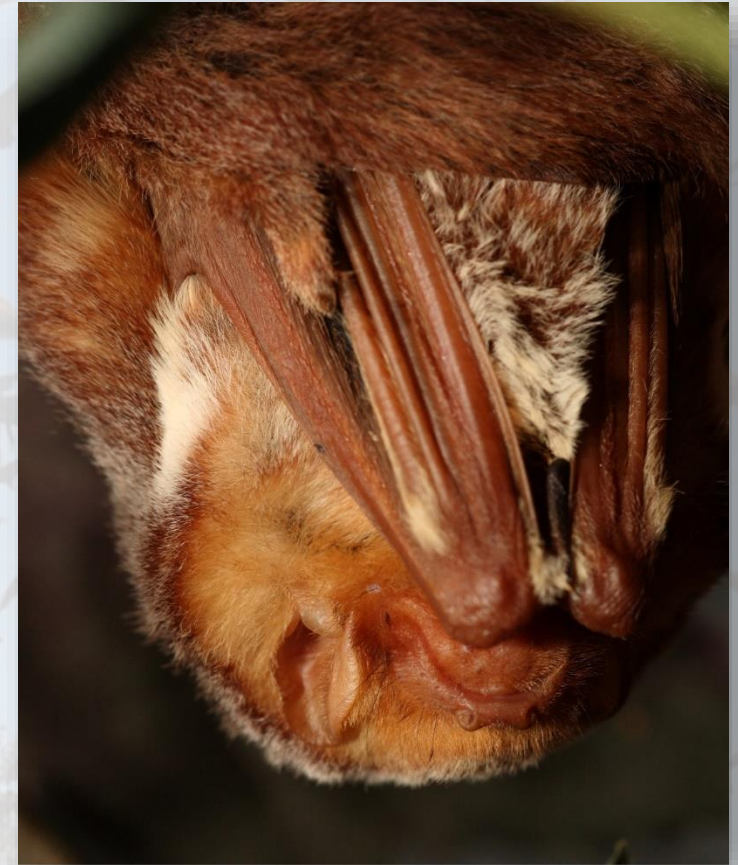
Bats use various strategies to deal with temperate climate that features a dramatic decrease in food availability; most strategies involve movement over the landscape





# WINTER: HIBERNATION, MIGRATION, OR BOTH

- Cave dependent hibernators use the constant cool temperatures and high humidity of caves to drop into long-term torpor, which curtails energy consumption. Hibernating bats survive on stored fat
- Migratory bats move to areas that provide food sources in winter OR migrate to areas that support punctuated hibernation
- Cold hardy residents use short bouts of torpor during severe weather and take advantage of warm snaps to get water and forage
- Hibernators often migrate to appropriate hibernacula; migrators often hibernate



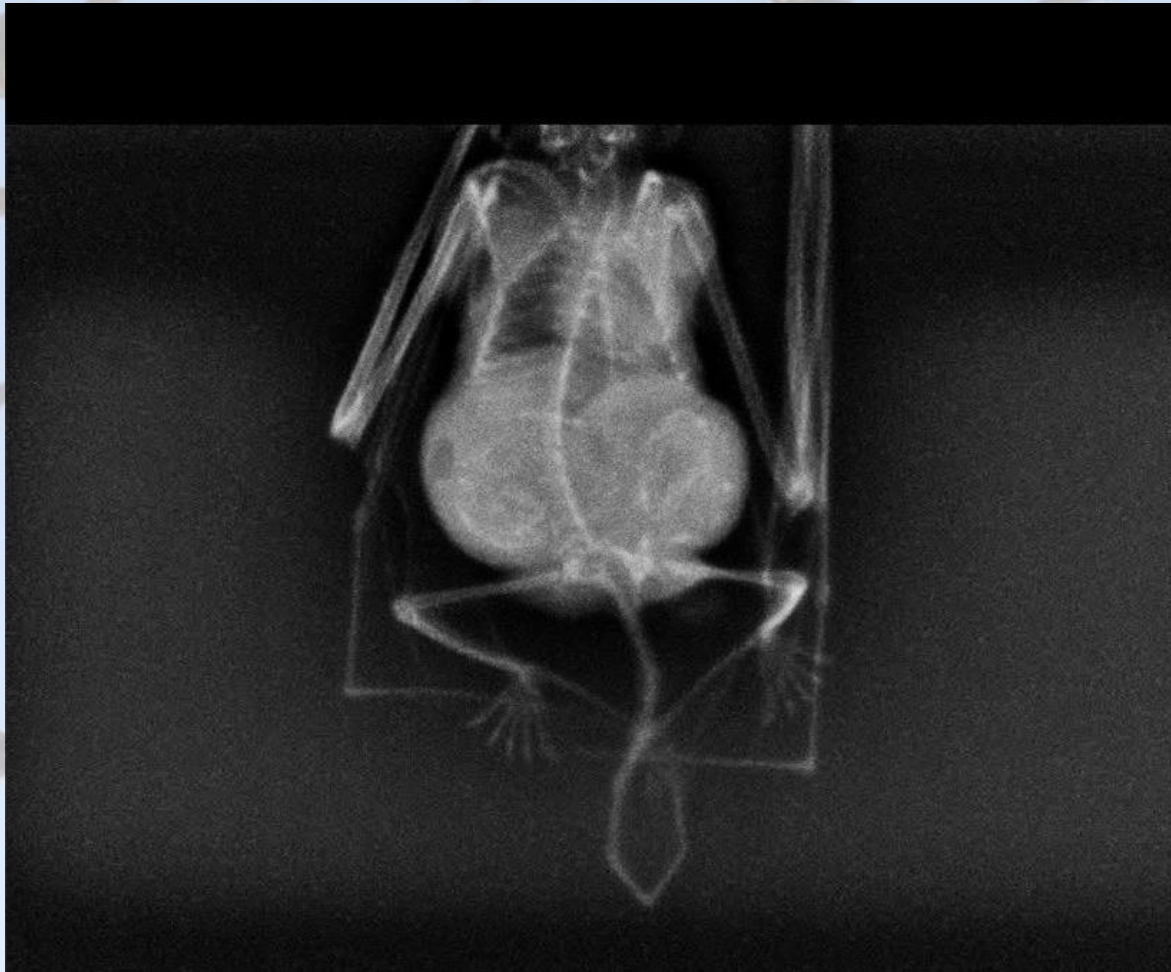


# SPRING: PREGNANCY + PUPS



- Pregnancy starts on spring return to maternity range or on arousal from hibernation, when stored fertilized ova implant
- Onset of pregnancy seems to be triggered by temperature and food availability
- Pups are born in mid-late spring into early summer in order to maximize insect availability for lactating mothers and newly volant young
- Pups are large and grow extremely quickly; they can be full sized, flying, and mostly weaned at 6-8 weeks







# SUMMER/FALL

- High insect abundance allows young to grow rapidly
- Colonies disperse as pups become independent
- Bats start to put on fat to fuel hibernation or migration
- Increase in naïve bats on the landscape
- Hibernators move toward hibernacula
- Migrators start heading out



Rich Sturges, 2019



# FALL/WINTER: MATING SEASON

- Most North American bats mate in fall. Males' energy expenditure can be very high in fall/early winter
- Variety of mating habits—on the wing, leks, singing, harems, swarms, taking advantage of torpid females, etc.
  - Swarms: cave dependent bats, and others
  - Reproductive big brown males can be found in exposed places during fall, known to “sing”
  - Red bats mate in flight. Sometimes they crash in spectacular fashion!





# FUEL

- North of Mexico, all but **THREE** species are insectivores
  - Pallid bats are omnivorous
  - Long tongued bats are nectarivores
  - All of “our” bats are insectivorous



M. Tuttle

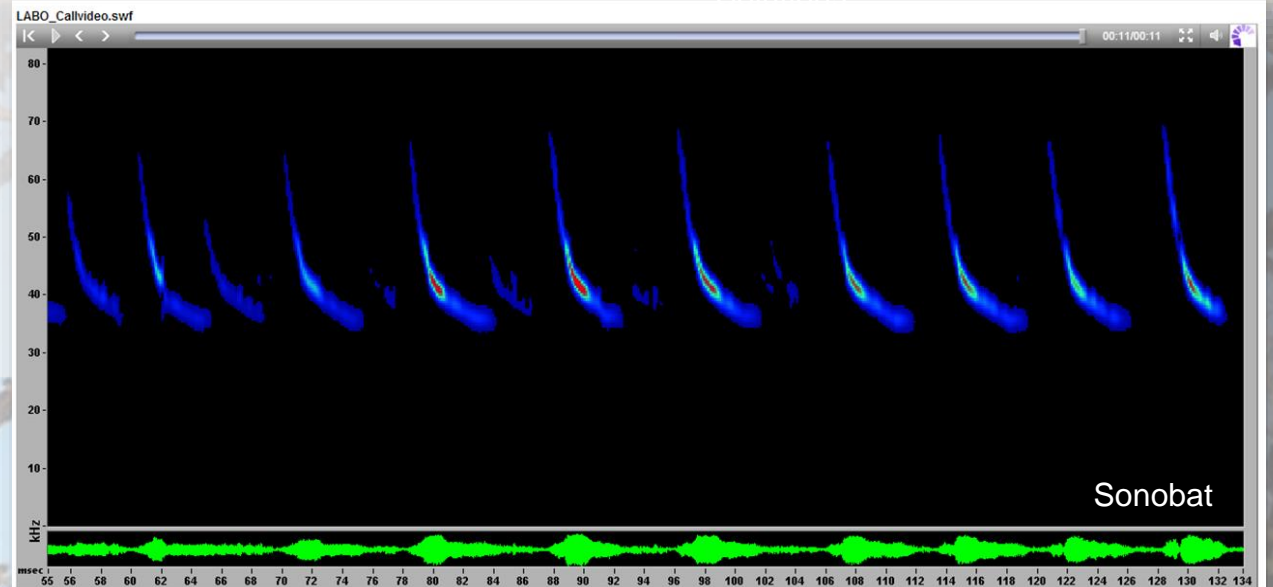
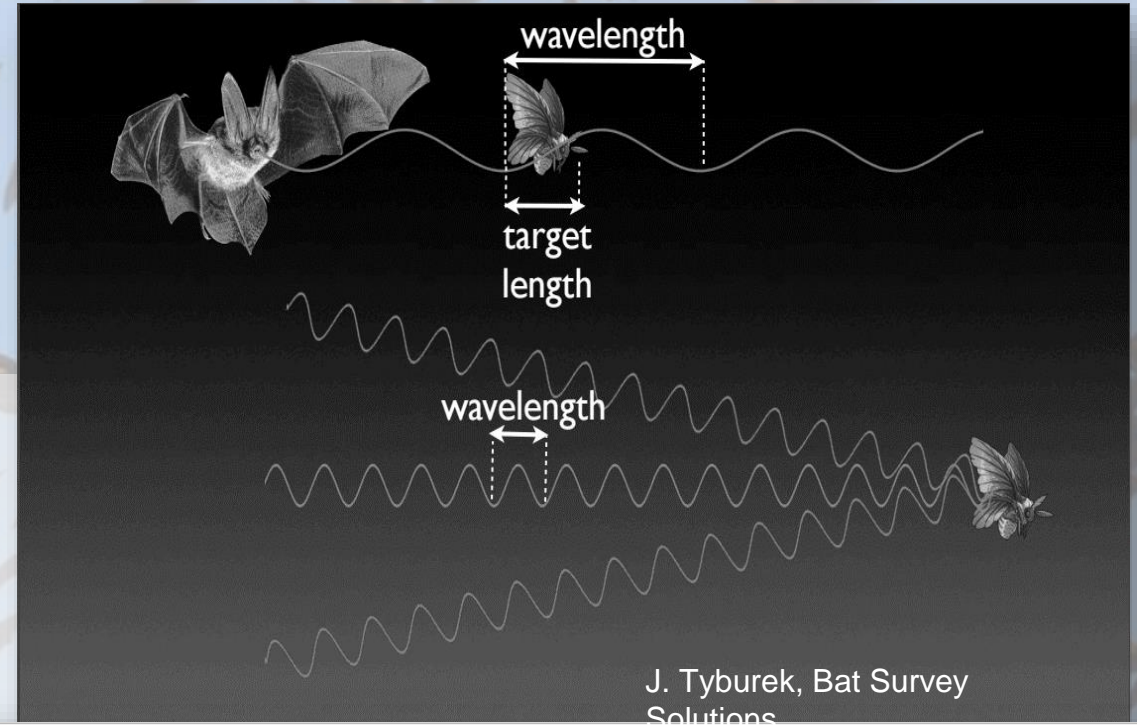


Richard Jackson Photography c



# ECHOLOCAATION

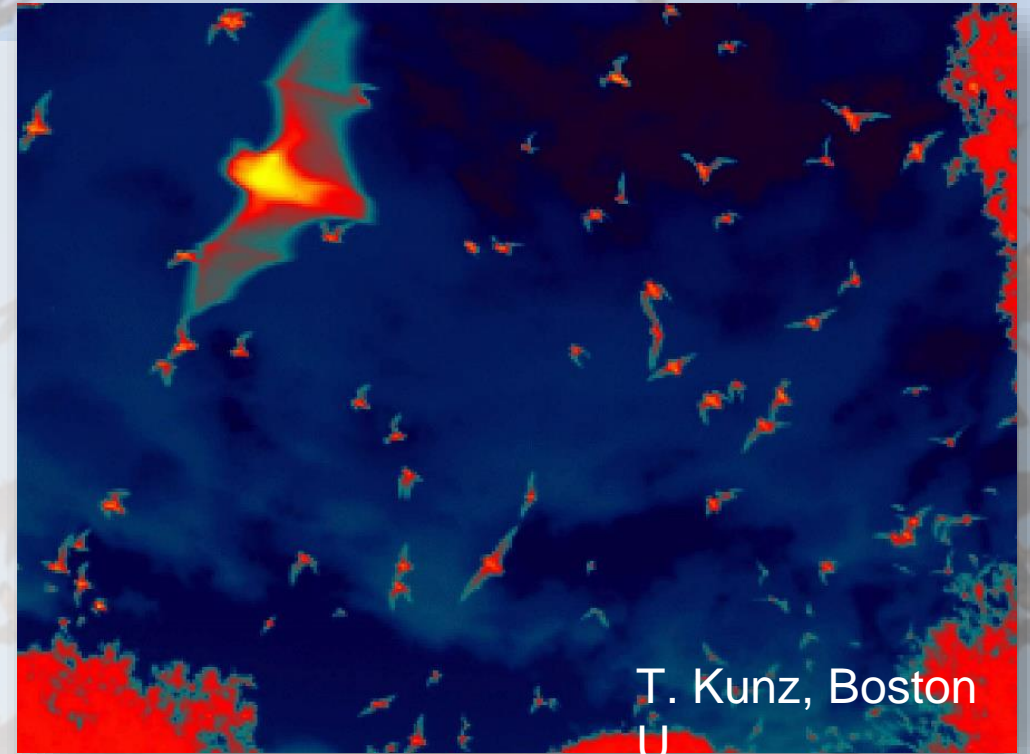
- Allows bats to find and capture small, erratic prey in low light
- Allows navigation in total darkness
- Very expensive; long learning curve
- Bats are highly auditory!!





# ENERGETICS

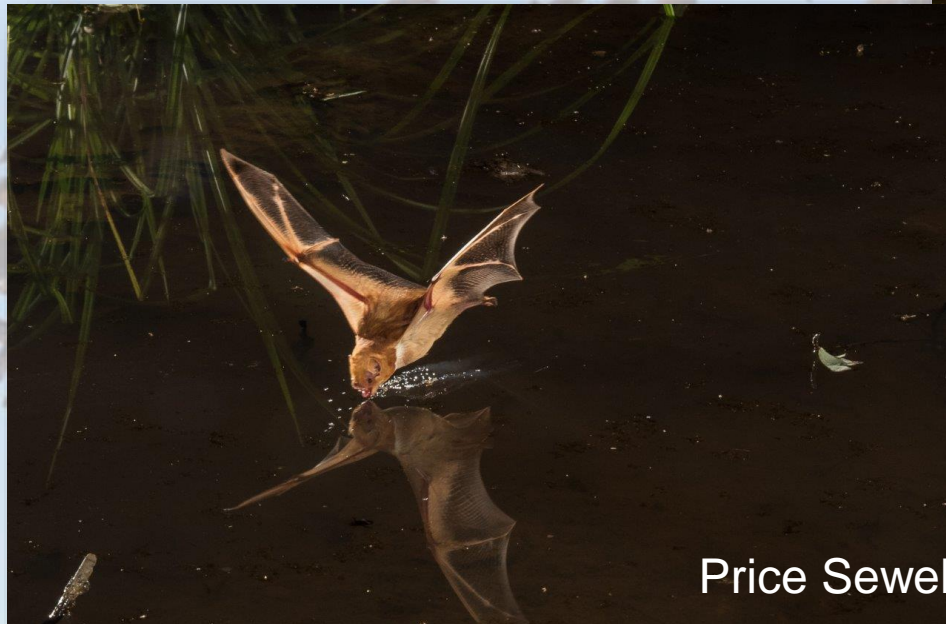
- Bats lead expensive lives
  - Small size = fast metabolism
  - Lactation = most energetically expensive activity of mammals
  - Flight = huge energy expenditure
  - Echolocation = major energy drain
- Eat a LOT—lactating females eat body weight nightly
- Large heart relative to body size
- Torpor to conserve energy
- Temperature and mother's nutrition drives development of young (as it will in human care!!!)





# LIFE ON THE EDGE

- Bats arouse from daily torpor in a dehydrated state
- Wing membranes and roost humidity are crucial to maintaining water balance
- Need access to still, open water



Price Sewell



**QUESTION: GROUNDED BATS CAN BE OUT  
IN A TREE AND TH  
THEY'RE READY.**

Know your  
Species!  
Natural History!  
Seasons!



MERCIAL RESIDENTIAL FAQ'S MAKE A

### DO A SICK BAT?

at has been kicked out of the roost for  
tlay around for long, not when there is





# SOCIAL STRUCTURE

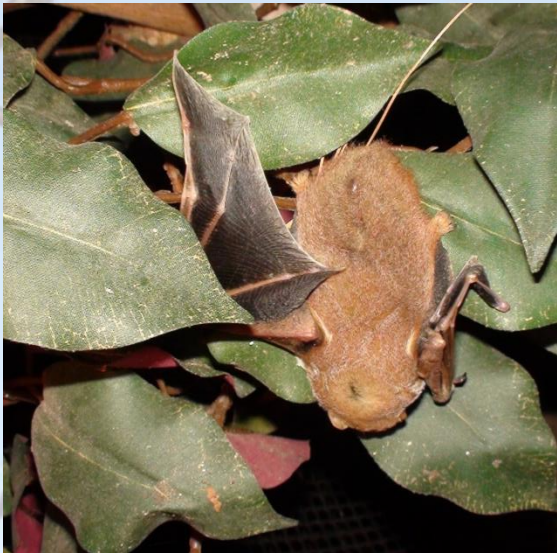
- Solitary vs. Colonial (Foliage vs. crevice)





# SOLITARY/TREE BATS

- Tend to live in tree foliage and are camouflaged for dappled light or to match dry foliage.
- Live in family groups during pup season so pups are social!
- Tend to be heavily furred and have furred tail membranes for temperature control.





# COLONIAL/CREVICE BATS



- Can form the largest aggregations of a single mammal species (that we know of)
- Utilize fission/fusion models
- High site fidelity
- High social intelligence
- Are usually dark colors





# THE IN-BETWEENERS

- “Semi-solitary tree bats”
- Not foliage roosters; use tree hollows, sloughing bark, and wood piles
- Very small colony size





# BATS ARE IN TROUBLE

- Northern long-eared Bat (USFWS threatened, being upgraded to endangered)
- Tricolored Bat (VA endangered, proposed for federal listing)
- Little Brown Bat (VA endangered, proposed for federal listing)
- Indiana Bat (USFWS endangered)
- Eastern small-footed bat (VA rare)
- Rafinesque's big-eared bat (VA endangered)
- VA Big Ear Bat (USFWS endangered)
- Gray Bat (USFWS endangered)





# WHAT'S GOING WRONG? HABITAT LOSS

- Loss of forest structure
- Increased ambient light levels
- Changes in insect guilds
- Degraded water
- Changes in waterway structure
- Private cave management





# HUMAN "CONFLICT"

- House colonies
  - Improper exclusions
  - Sprays
  - Hoses
- Misuse of caves
- Fear
  - Rabies





# BATS IN HOUSES: WHEN IS EXCLUSION 'SAFE'?

- BEFORE late pregnancy
- AFTER pups can fly well enough to follow or find the mother
- For us, May 1 – August 15 OR September 1, depending on seasonal weather
- Not 'seeing' pups is NOT an acceptable reason to do an exclusion during maternity season
- Lack of "pink pups" does not mean exclusion is OK (WTH???)
- Any colony of more than 5-6 bats is likely a maternity colony
- Freetail males are present in maternity colonies. They do not form bachelor colonies where they are abundant.





# RABIES IN BATS

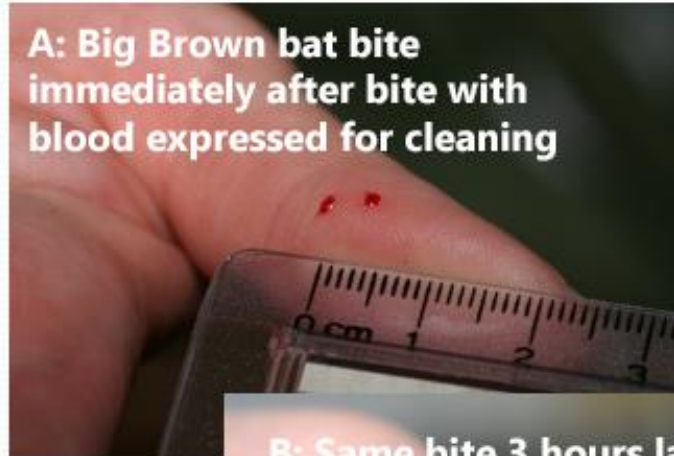
- No blind carriers
- Transmitted primarily by bites
- Bat bites hurt
- Clinical symptoms may be apparent to experienced bat handlers, not to the public
- Flying during the day is NOT UNUSUAL BEHAVIOR
- Adult bats prone and vocalizing, tremoring, biting at any soft object, able to chew but not swallow, disinterest in or negative reaction to water
- BUT, not always & not all the time
- Seasonal spike when population is under stress (Boston U studies)
- Very good evidence that big browns and other species can seroconvert (not all individuals)
- Develop protective titers after vaccination
- Just don't get bitten, protect your eyes, and don't stick animals in your nose





# BAT BITES!!

- Bats bite in self defense OR because they're rabid.
- They have sharp teeth AND strong little jaws
- Bats have to be in contact with a person in order to bite





# STATS

- From [CDC](#):
  - 2009—2019; 25 cases; 23 fatalities
  - 16 cases acquired in US
  - 3 attributed to raccoon variant, 2 of those from organ transplants
  - 12 were bat variant; 5 Brazilian freetail; 3 tricolor, 2 silver hair, 1 *Myotis* sp., 1 unknown bat
  - 1 of unknown animal variant
  - 4 bat variant cases had no record of contact with a bat; 5 had record of contact but no bite; only 3 cases had record of a bite
  - Bat case demographics: 8 male (7 adult, 1 child); 4 female (all adult)



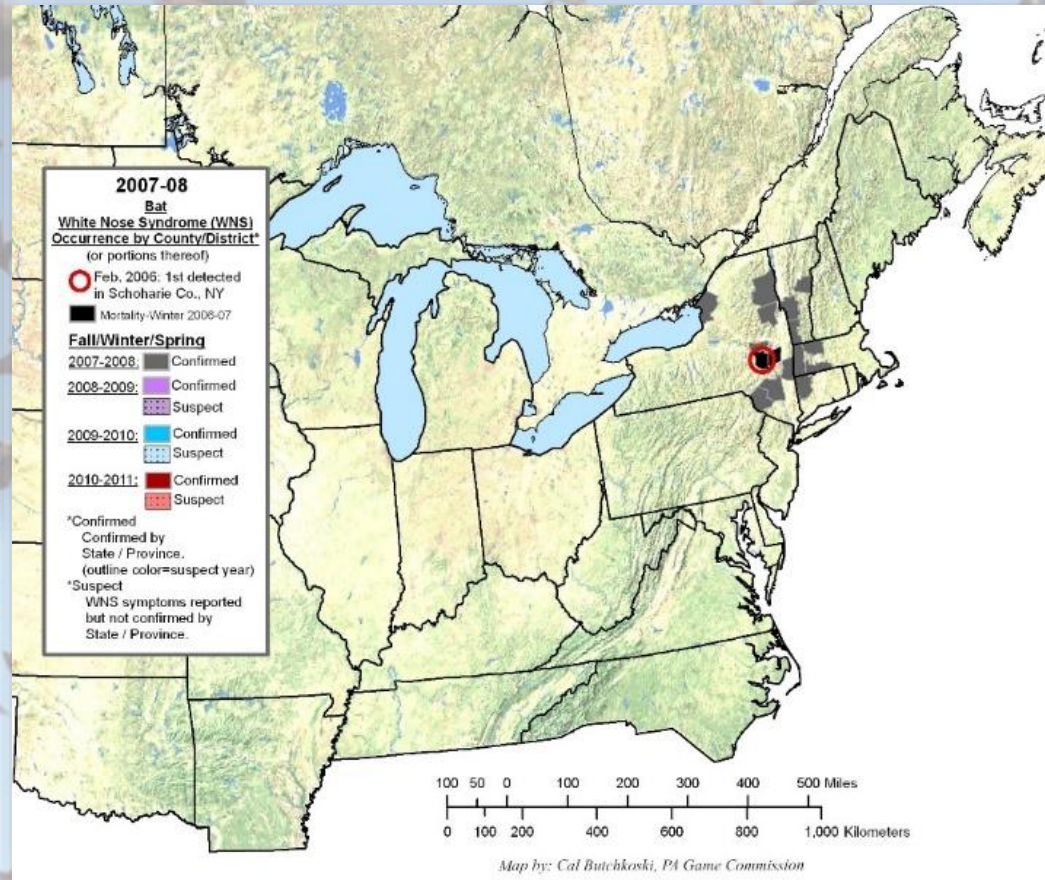
# WHITE NOSE SYNDROME

- White nose syndrome (WNS) is devastating populations
- WNS is a fungal disease that affects bats that hibernate in caves
- Seven of VA's bat species hibernate in caves
- NE & mid-Atlantic have already seen losses of over 90% in many hibernacula
- Whole maternity colonies have disappeared; little brown bats may be functionally extinct
- In 38 states and 7 Canadian provinces
- Bats live long lives and have few young; populations cannot recover



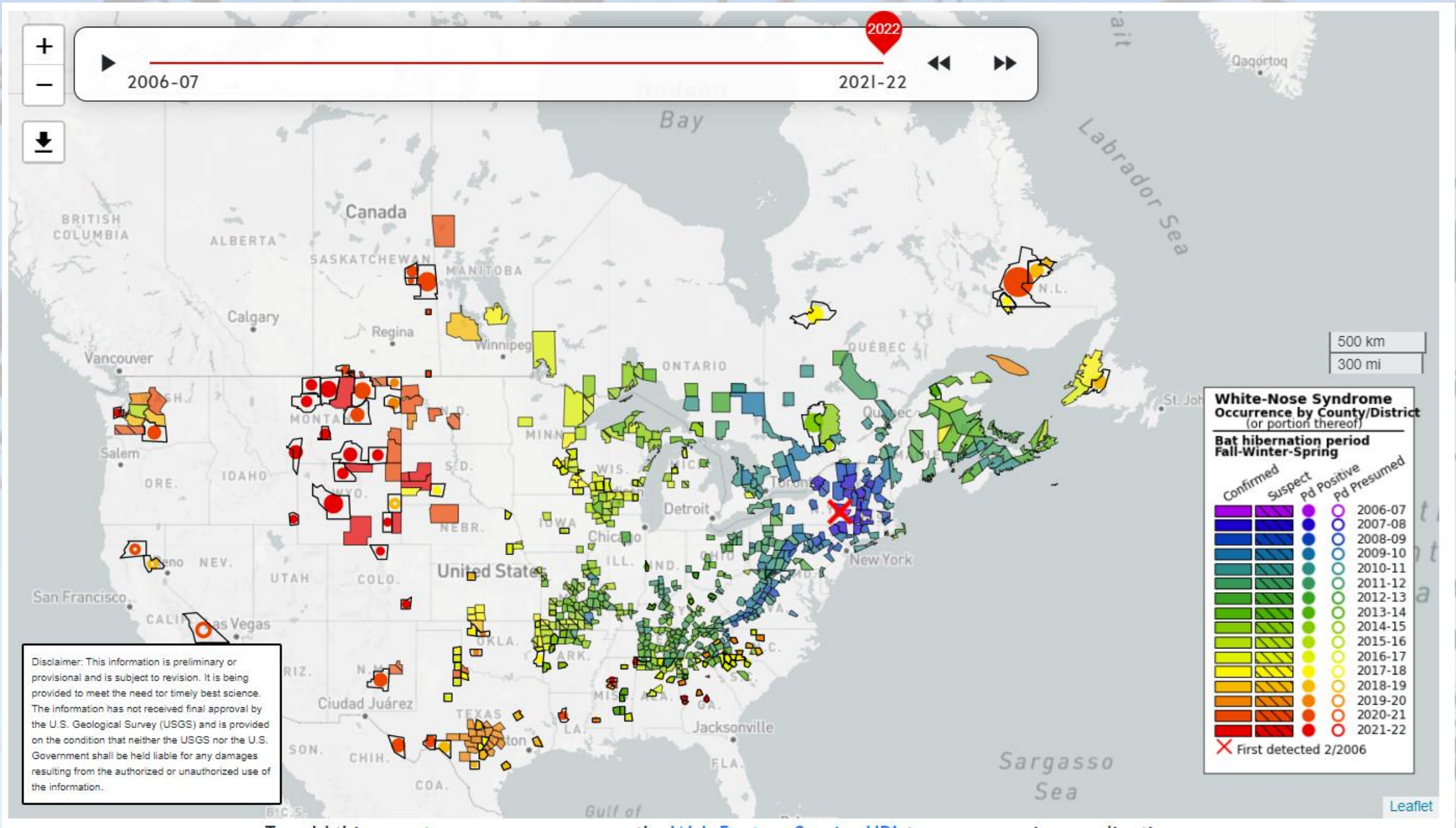


# 2007





# NOW..



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# THERE IS HOPE!



- Wind industry is working with conservation orgs
- Public perception of bats is far more positive, despite COVID
- Many municipal Animal Services are opting NOT to euthanize bats except for bona fide exposure situations
- Many professional exclusion services are declining to exclude during maternity season
- More rehabbers are taking bats
- LOTS of interest in citizen science projects & habitat mitigation
- Small increases in Northeast bats post WNS

(<https://www.nationalgeographic.co.uk/animals/2021/07/white-nose-syndrome-has-devastated-bats-but-some-are-developing-immunity>)



# THANK YOU!

## Resources

- Bat Conservation International  
[www.batcon.org](http://www.batcon.org)
- Bat World Sanctuary  
[www.batworld.org](http://www.batworld.org)
- Bat Conservation & Management; *ID Key*, Eastern US & Canada  
[batmanagement.com/products/id-key-eastern-us-canadian-bats](http://batmanagement.com/products/id-key-eastern-us-canadian-bats)
- National WNS Response  
[www.whitenosesyndrome.org](http://www.whitenosesyndrome.org)
- Texas Technical University, Natural Science Research Laboratory, *Field Identification Key and Guide for Bats of the United States of America*  
<https://bit.ly/2UAgpfs>
- The Save Lucy Campaign  
[https://docs.google.com/presentation/d/1wXd5zGvmMMPqdUtl\\_vv\\_wSIWNsquo8MuFqmEbQJPxKs/edit?usp=sharing](https://docs.google.com/presentation/d/1wXd5zGvmMMPqdUtl_vv_wSIWNsquo8MuFqmEbQJPxKs/edit?usp=sharing)
- Virginia Department of Game & Inland Fisheries  
*A Guide to the Bats of Virginia*

## References

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The Save Lucy Campaign  
2015