Bats of New York

Lucara Aman
Bat Technician
NYS Dept. of Environmental Conservation

Outline

- What we know about bats in general
- Why are bats important?
  - Ecosystems
  - Humans
- New York bats
  - WNS and monitoring
  - Threats
  - Management
- What we can do to help

Some common misconceptions

True or False?

- Bats are flying mice

True or False?

- Bats are flying mice

True or False?

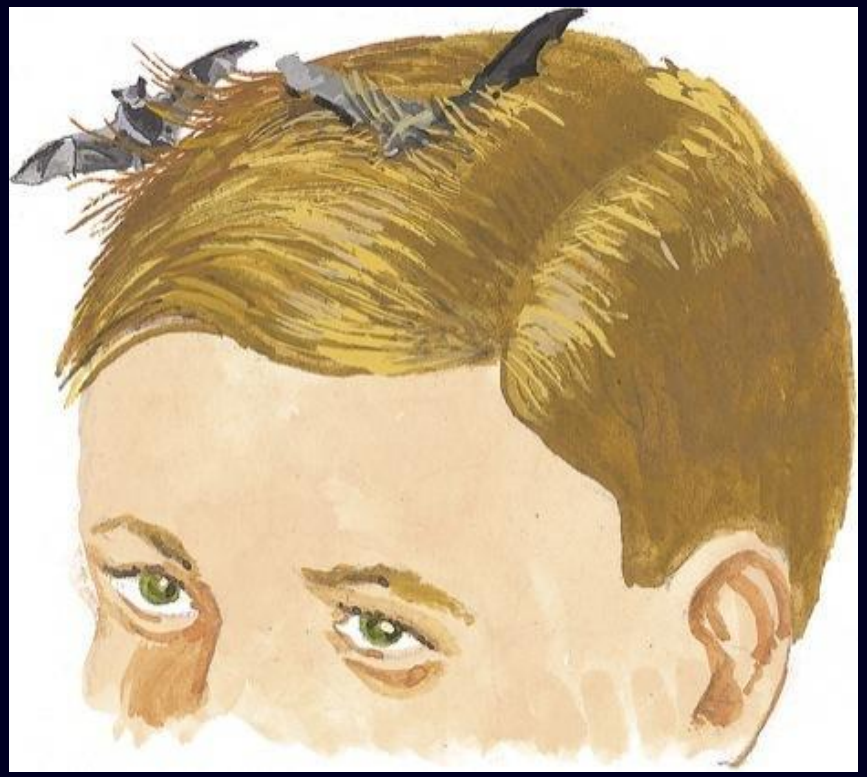
- Bats are flying mice

Truth:

- bats are more closely related to primates than rodents
- bats have one pup per year, rats have multiple litters of babies
- some bats can live up to 35 years, rats typically live 1-2 years

True or False?

- Bats try to become tangled in hair



True or False?

- Bats try to become tangled in hair

True or False?

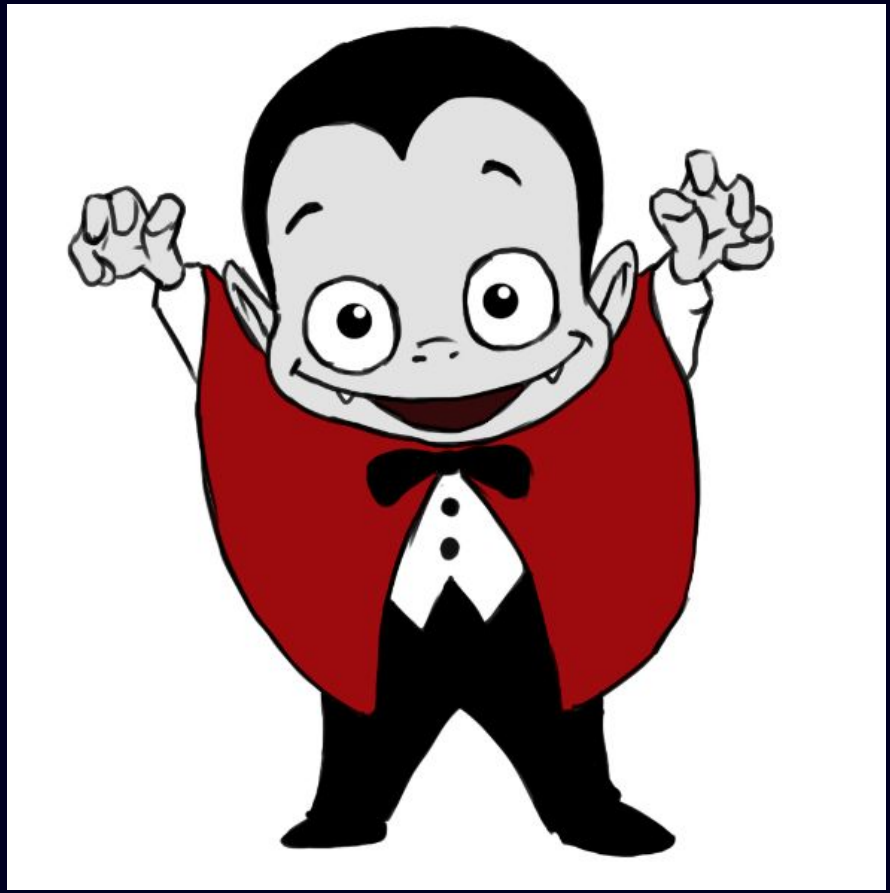
- Bats try to become tangled in hair

Truth:

- bats are curious but unlikely to get in your hair

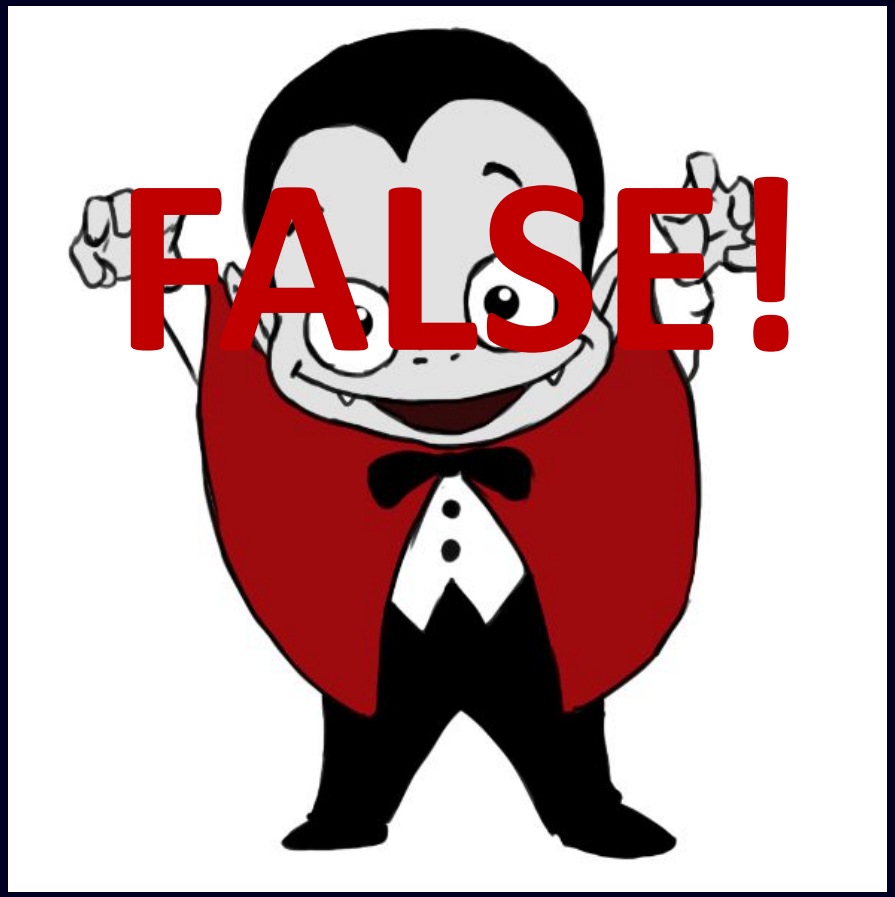
True or False?

- All bats are vampires



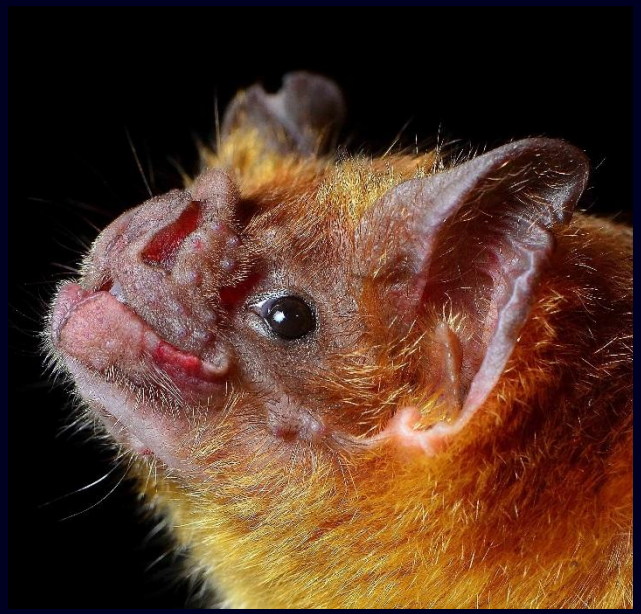
True or False?

- All bats are vampires



Only three species of vampire bats still exist

- *Desmodus rotundus* – Common vampire bat
- *Diphylla ecaudata* – Hairy-legged vampire bat
- *Diaemus youngi* – White-winged vampire bat



Common vampire bat

Hairy-legged

White-winged

Vampires, continued

- *Desmodus rotundus* – common vampire bat

https://en.wikipedia.org/wiki/Common_vampire_bat

- Consumes 59.5% of body weight in blood.
- Done feeding within 30 minutes.
- Urine flow peaks 20-25 minutes after initiating feeding.
- Well developed inferior colliculus in brain-processes sound

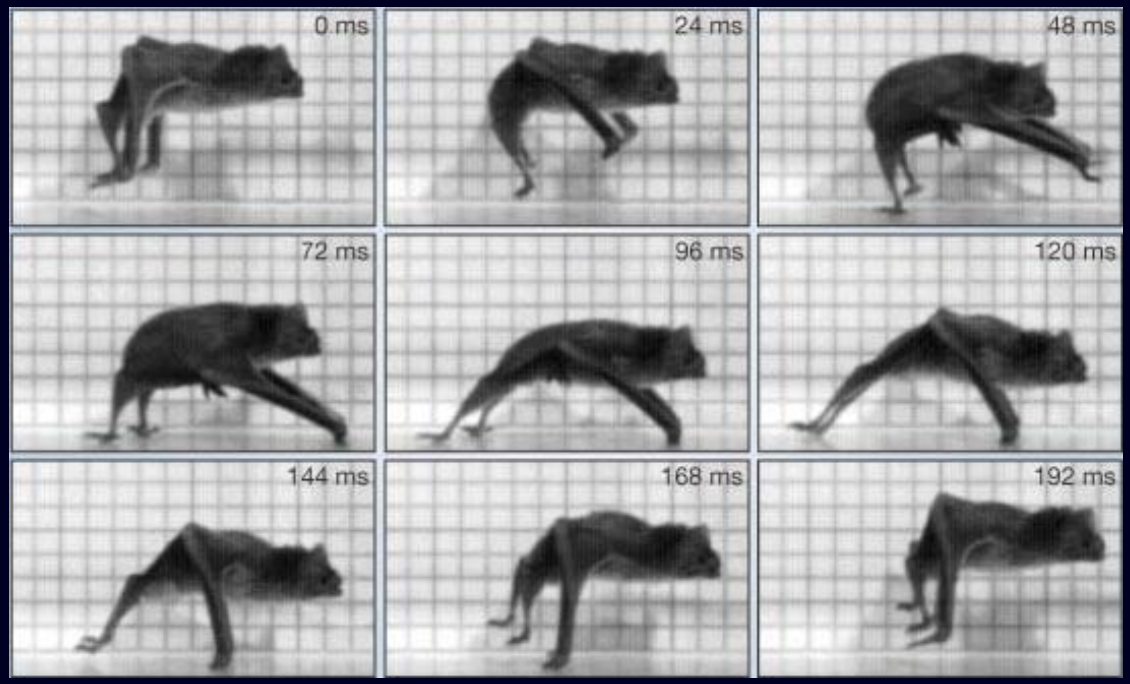
Vampires, continued

- They have complex social interactions and form strong bonds
  - Beg
  - Share food
  - Assess another's need for food
  - Groom each other
  - Social distance when sick!

And they don't need to be related to do so!!

Vampires, continued

- They can RUN!



https://www.livescience.com/6908-yikes-vampire-bats-run.html

Vampires, continued

- They practice social distancing when they feel ill.

(Lipopolysaccharide injection)

Vampire bats socially distance when they feel sick

The nocturnal creatures' social networks are among the most complex in the animal world.

By Maria Paula Rubiano A. | October 30, 2020

Vampire bats have extremely complex social networks. They live in roosts that can include thousands of mammals. Simon Ripperger

www.popsci.com/story/science/bats-social-distancing/

True or False?

- All bats are rabid

True or False?

- All bats are rabid

True or False?

- All bats are rabid

Truth:

- Less than 1% of bats have rabies
- 2020 NYSDOH <3% (71/2635) of submitted bats were rabid

https://www.health.ny.gov/diseases/communicable/zoonoses/rabies/

True or False?

- Bats are the only true flying mammals

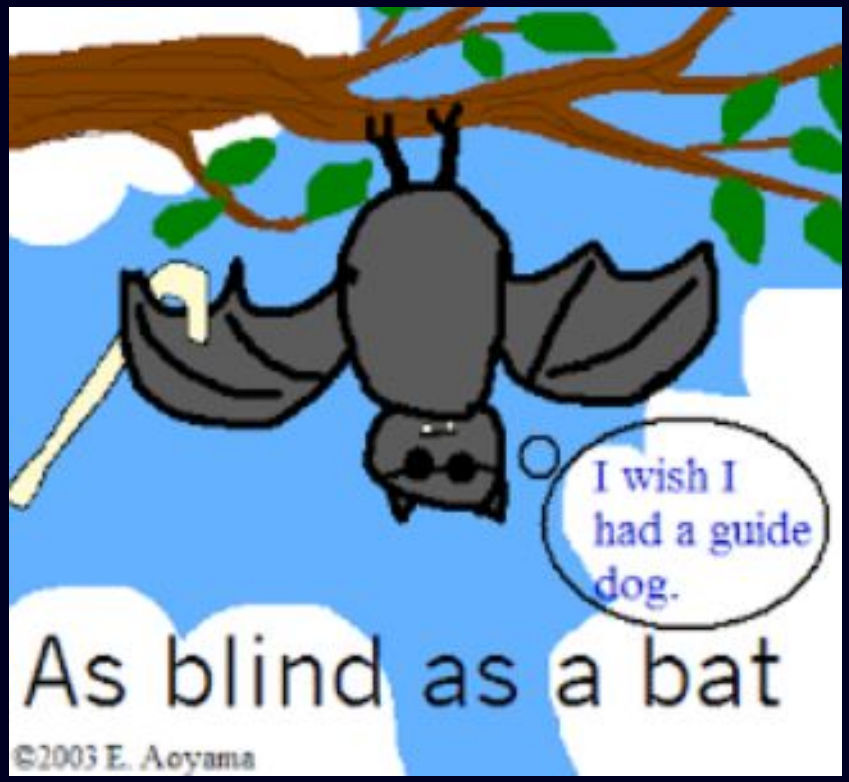
What about these??

True!

- Only true flying mammals (powered flight)

True or False?

- Bats are blind



True or False?

- Bats are blind

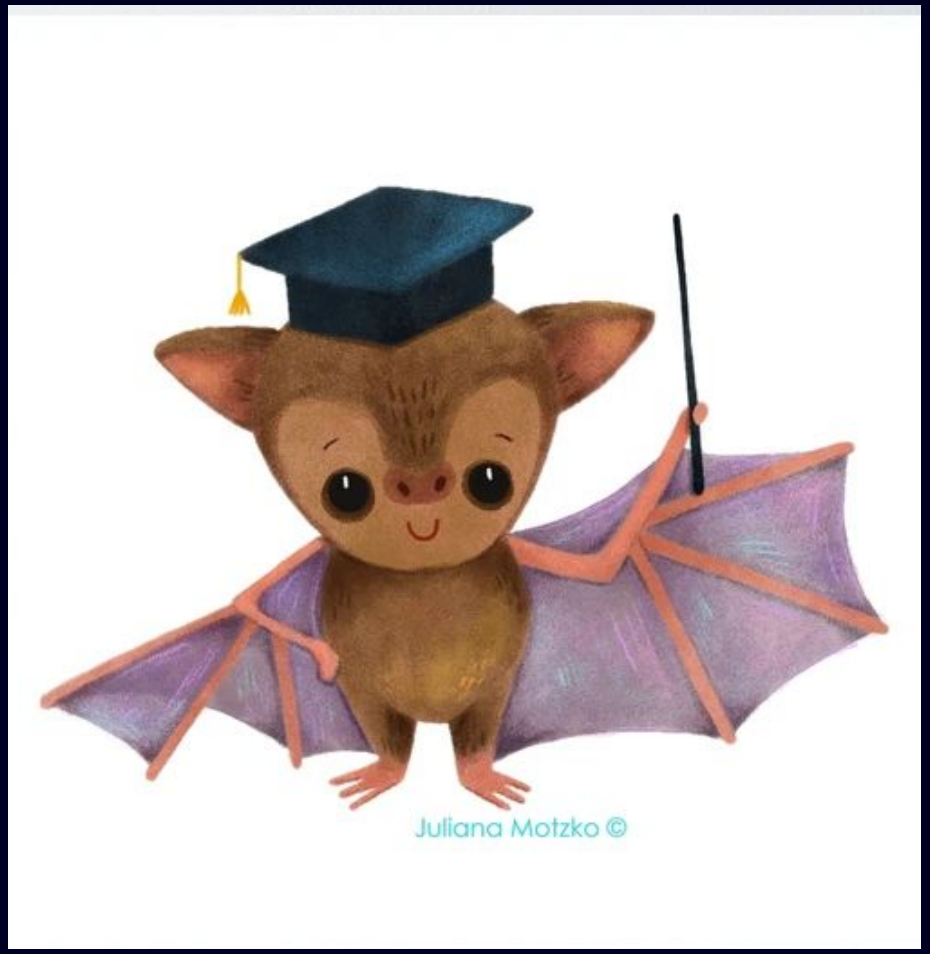
True or False?

- Bats are blind

Truth:

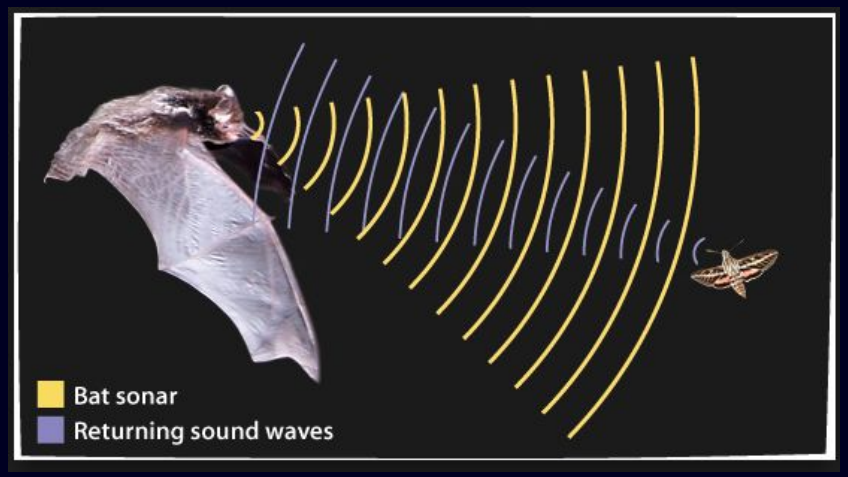
- bats have excellent eyesight
- bats can see colors/wavelengths humans can not

BAT BASICS



Bats Basics

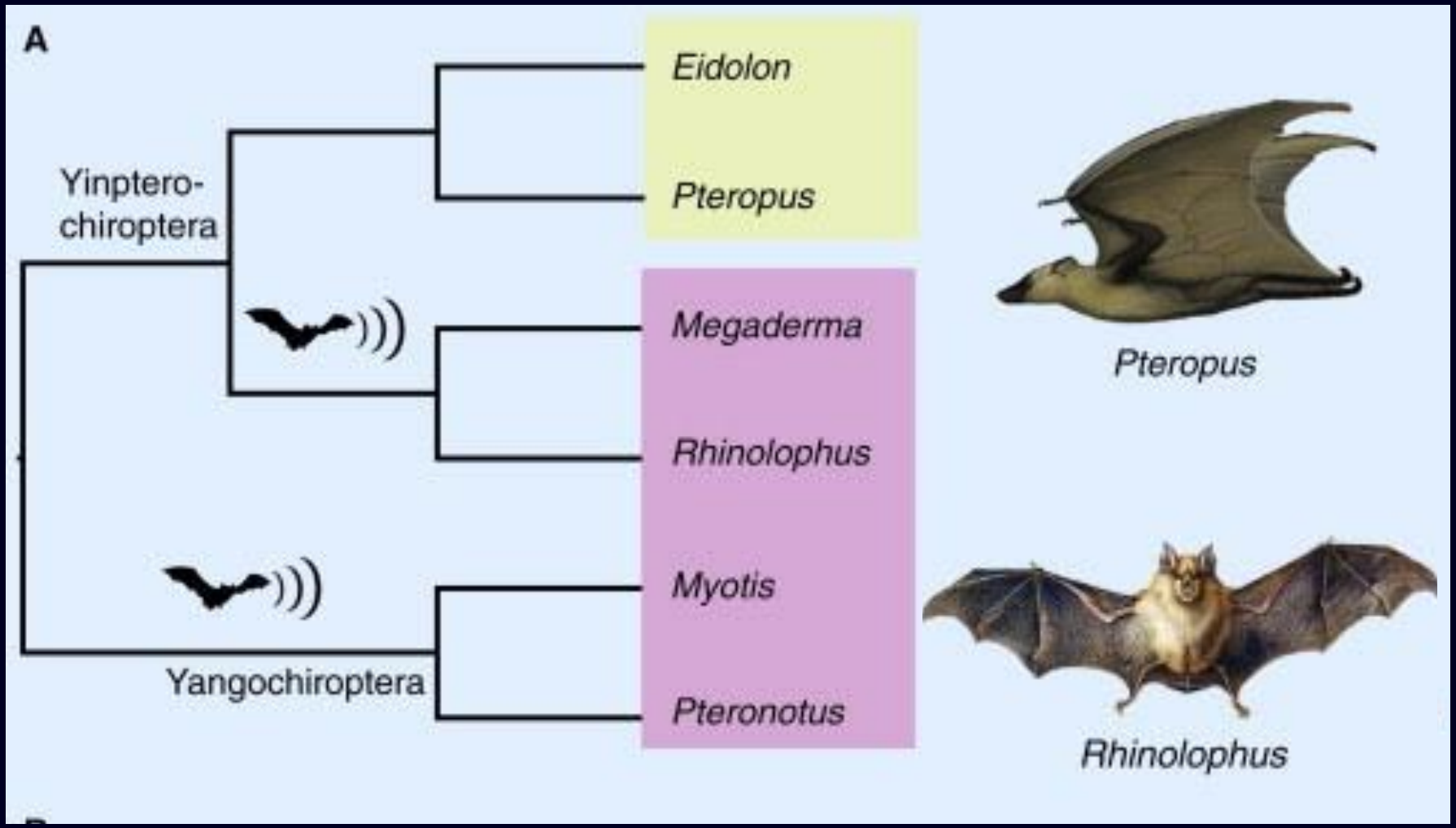
- Most use echolocation



Bats Basics

- Primarily nocturnal (crepuscular)

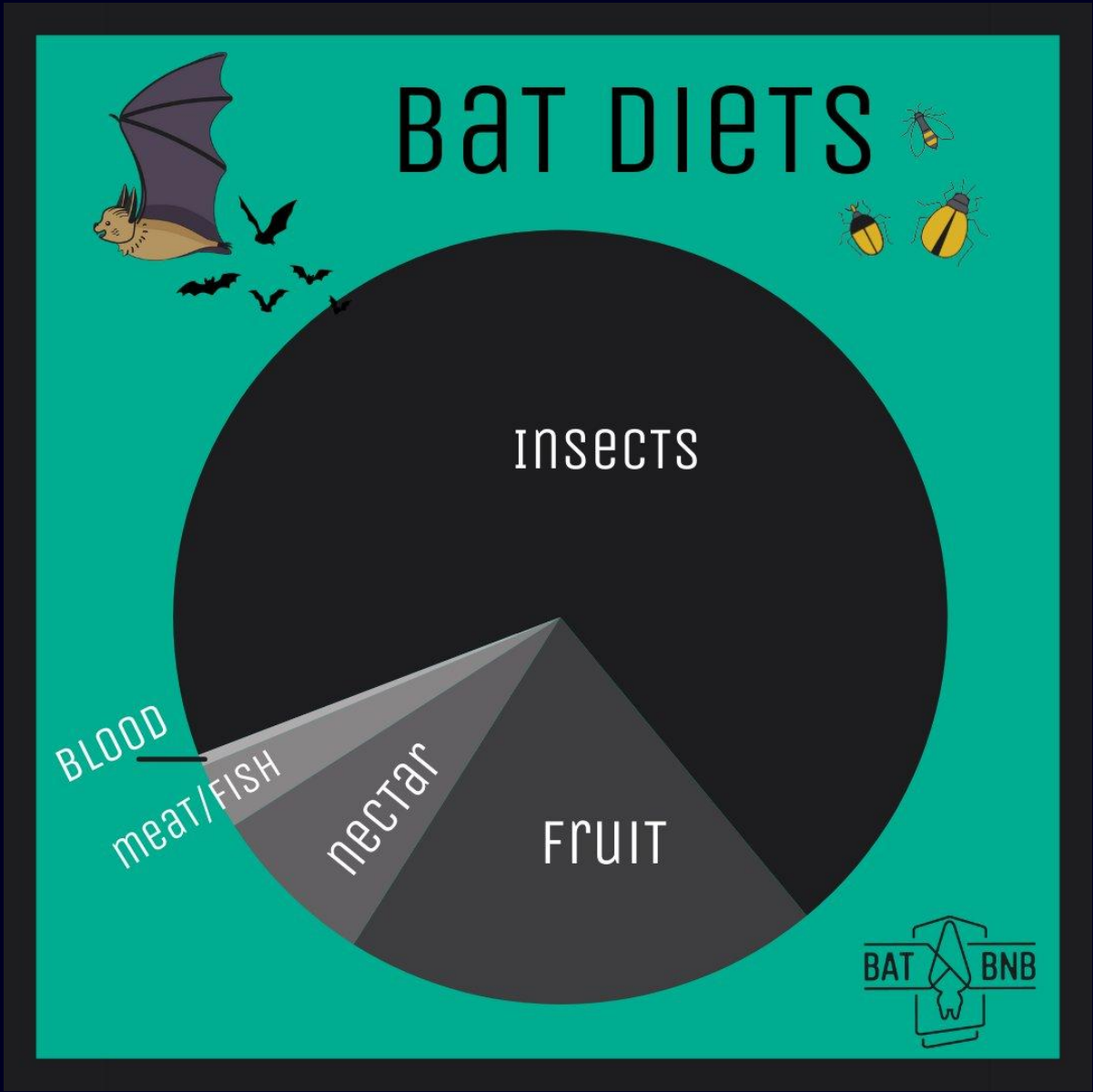
Bats Basics


A
Eidolon
Pteropus
Yinptero-
chiroptera
Megaderma
Rhinolophus
Myotis
Pteronotus
Yangochiroptera
Pteropus
Rhinolophus

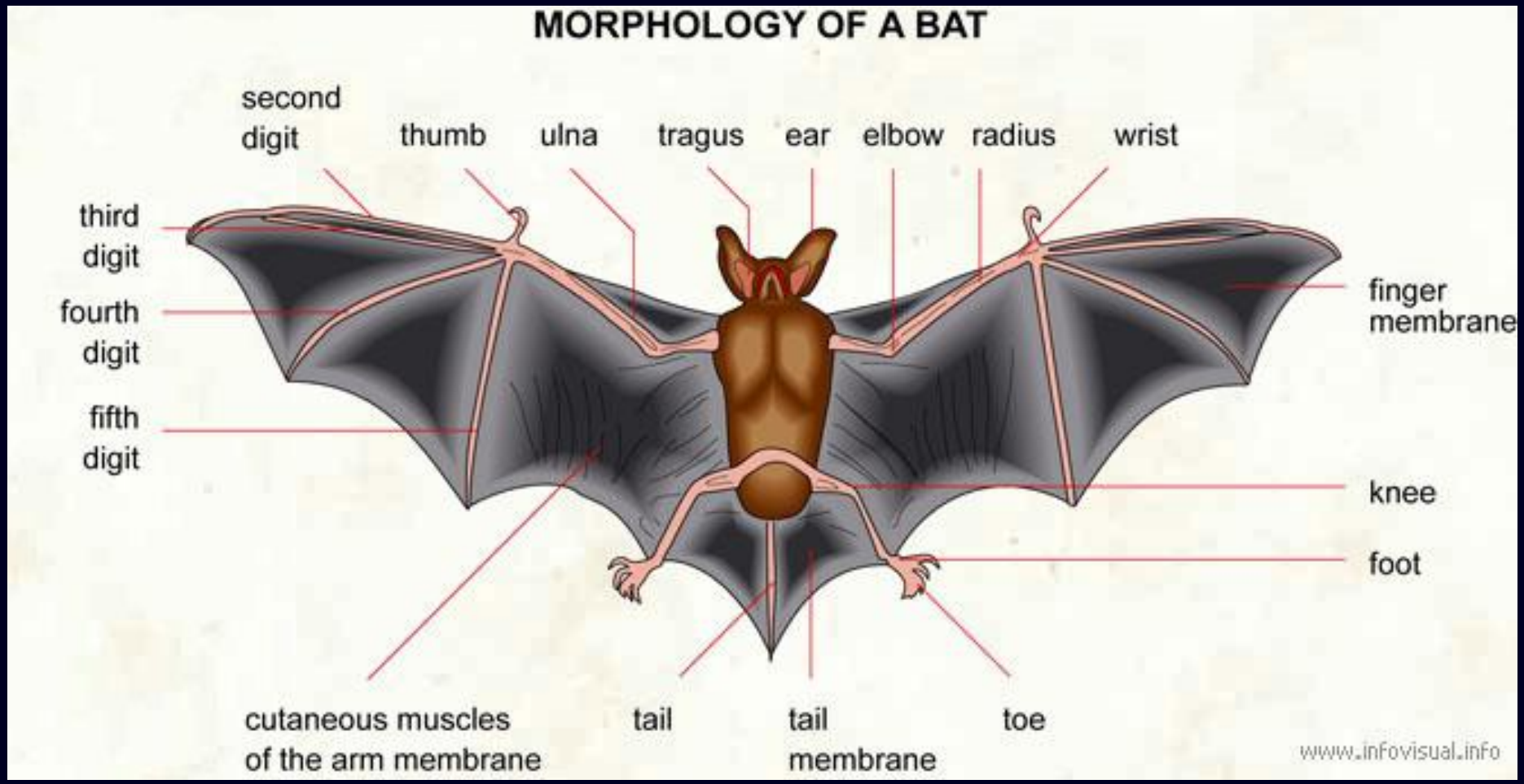
Bats Basics

- Over 1,400 species in the world
- One in five species of mammal in the world is a bat!
  - Found everywhere except in the most extreme desert and polar regions
- Order Chiroptera (which means “hand-wing”)
- They are long lived despite their small body size

Bat Basics



Bat Basics


MORPHOLOGY OF A BAT
second digit
thumb
ulna
tragus
ear
elbow
radius
wrist
third digit
fourth digit
fifth digit
finger membrane
knee
foot
cutaneous muscles of the arm membrane
tail
tail membrane
toe
www.infovisual.info

Bat Basics - Reproduction

- Pups = juvenile bats
- 1 - 2 per year
- Births during June – July in maternity roosts
- Fall Swarming = mating season, building up fat reserves

Bats Basics – Benefits!

- Primary predators of insects
  - Save agriculture $3.7B in pest control

Bats Basics – Benefits!

- Play a key role in ecosystem balance
  - Rainforest seed dispersal

Bats Basics – Benefits!

- Play a key role in ecosystem balance

  Pollination (bananas, guava, avocados, mangoes, agave)

Bats Basics – Benefits!

- Play a key role in ecosystem balance

  Guano is a high quality fertilizer

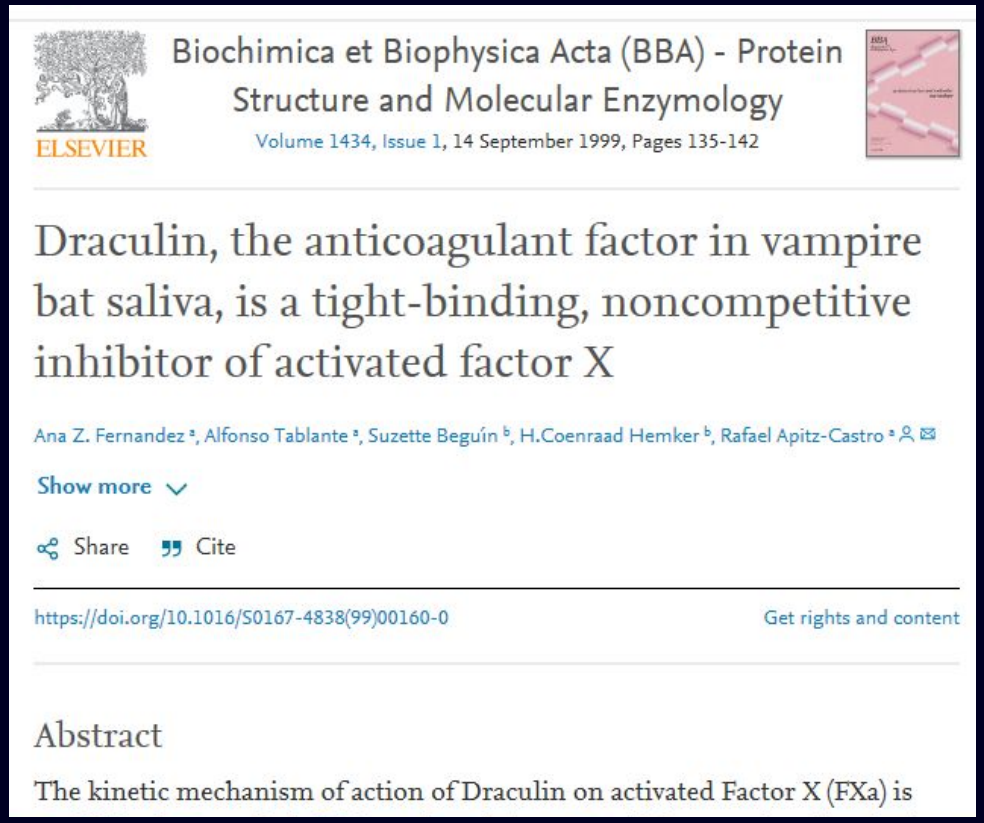
  Bring in nutrients from outside caves

Bats Basics – Benefits!

- Other sneaky benefits to human health
  - Bats are hosts to RNA viruses (MARV, Ebola, SARS, etc.) and yet have low inflammatory responses to such diseases

- Draculin being studied as medication to treat stroke patients

- Anti-aging and anti–cancer abilities being studied



ELSEVIER

Biochimica et Biophysica Acta (BBA) - Protein Structure and Molecular Enzymology

Volume 1434, Issue 1, 14 September 1999, Pages 135-142

Draculin, the anticoagulant factor in vampire bat saliva, is a tight-binding, noncompetitive inhibitor of activated factor X

Ana Z. Fernandez [a], Alfonso Tablante [a], Suzette Beguín [b], H.Coenraad Hemker [b], Rafael Apitz-Castro [a]

Show more

Share Cite

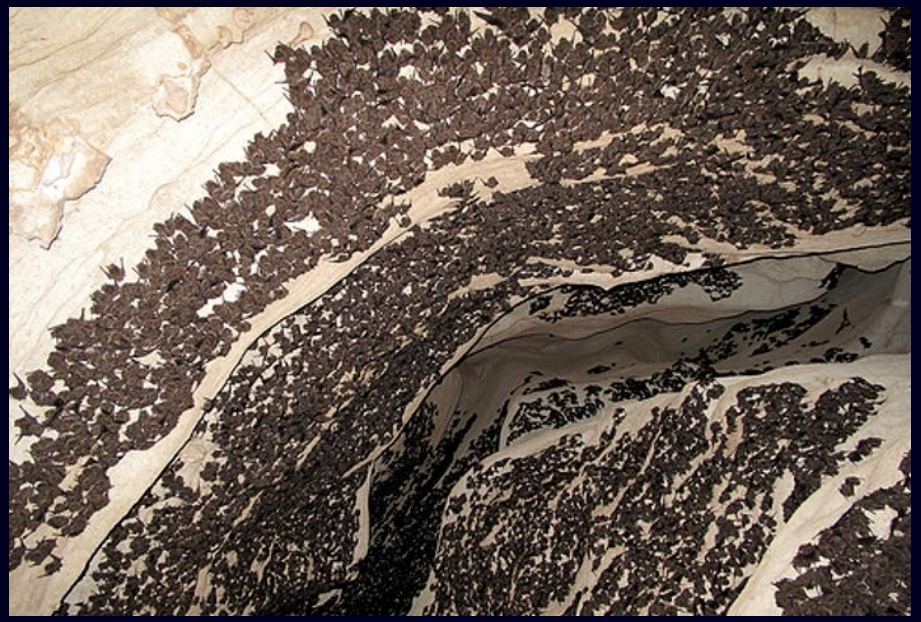
https://doi.org/10.1016/S0167-4838(99)00160-0 Get rights and content

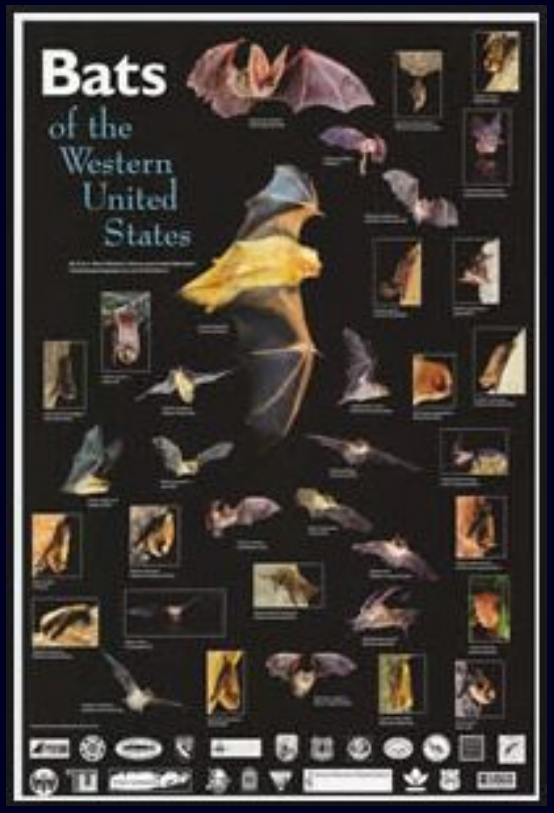
Abstract

The kinetic mechanism of action of Draculin on activated Factor X (FXa) is

Bats Basics – Closer to Home

- 45 species in the U.S.





9 Bat Species in New York

Little brown bat

Indiana bat

Hoary bat

Big brown bat

Tri-colored bat

Silver-haired bat

Small-footed bat

Northern long-eared

Eastern red bat

9 Species

Cave Bats - 6

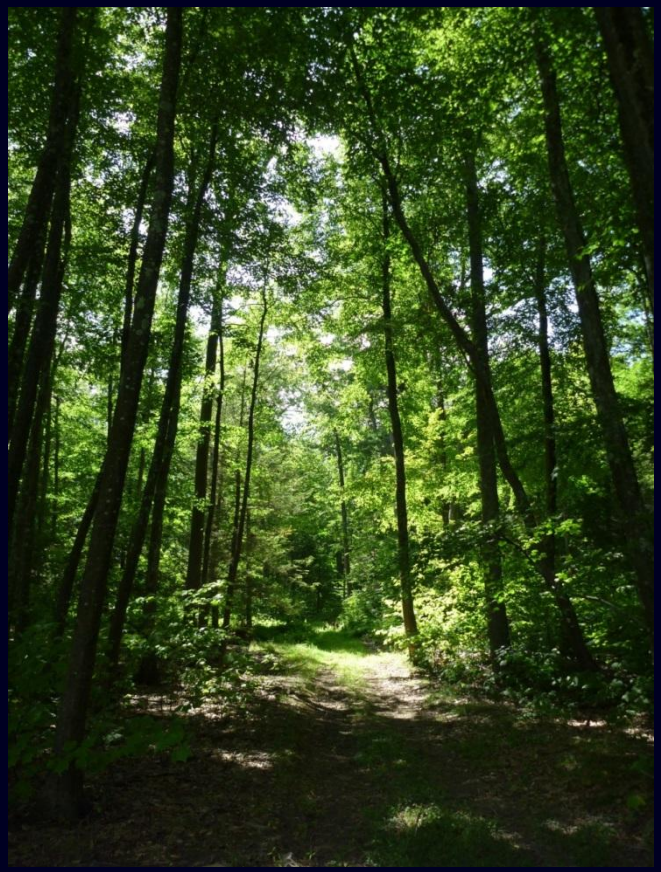
Hibernate in NY

Tree Bats - 3

Migrate south for the winter

Where do bats in NY live?

Trees, Leaf litter, Rock piles



Houses, Barns, Other Buildings – mostly little brown and big brown bats

Caves, Mines – winter for 6 NY species

Bat Hibernation

- **No food**
  - Build stores of body fat in late summer/early autumn
  - Greatly reduced body temperature
  - Periodic arousals

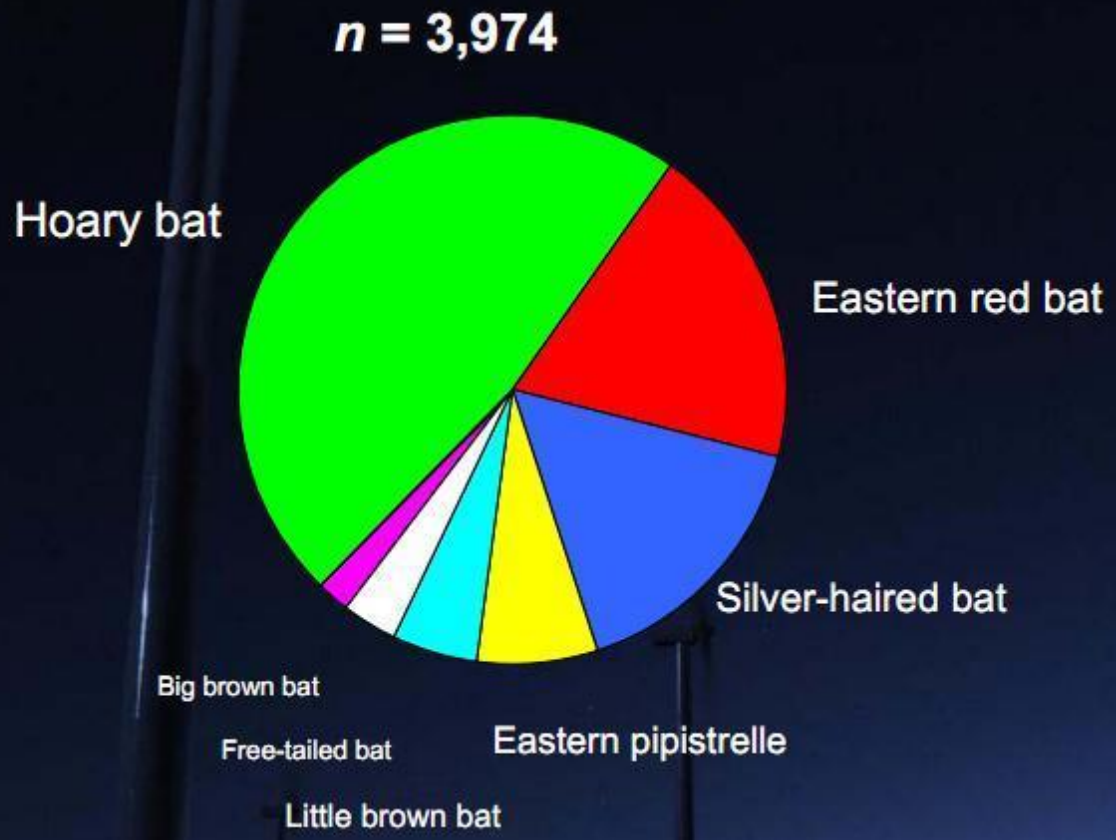
Potential threats

Habitat loss and fragmentation

Disturbance/vandalism in winter

Collisions with wind turbines

Species involved in North America



Data: Arnett et al. 2008; J. Wild. Man. 72:61-78

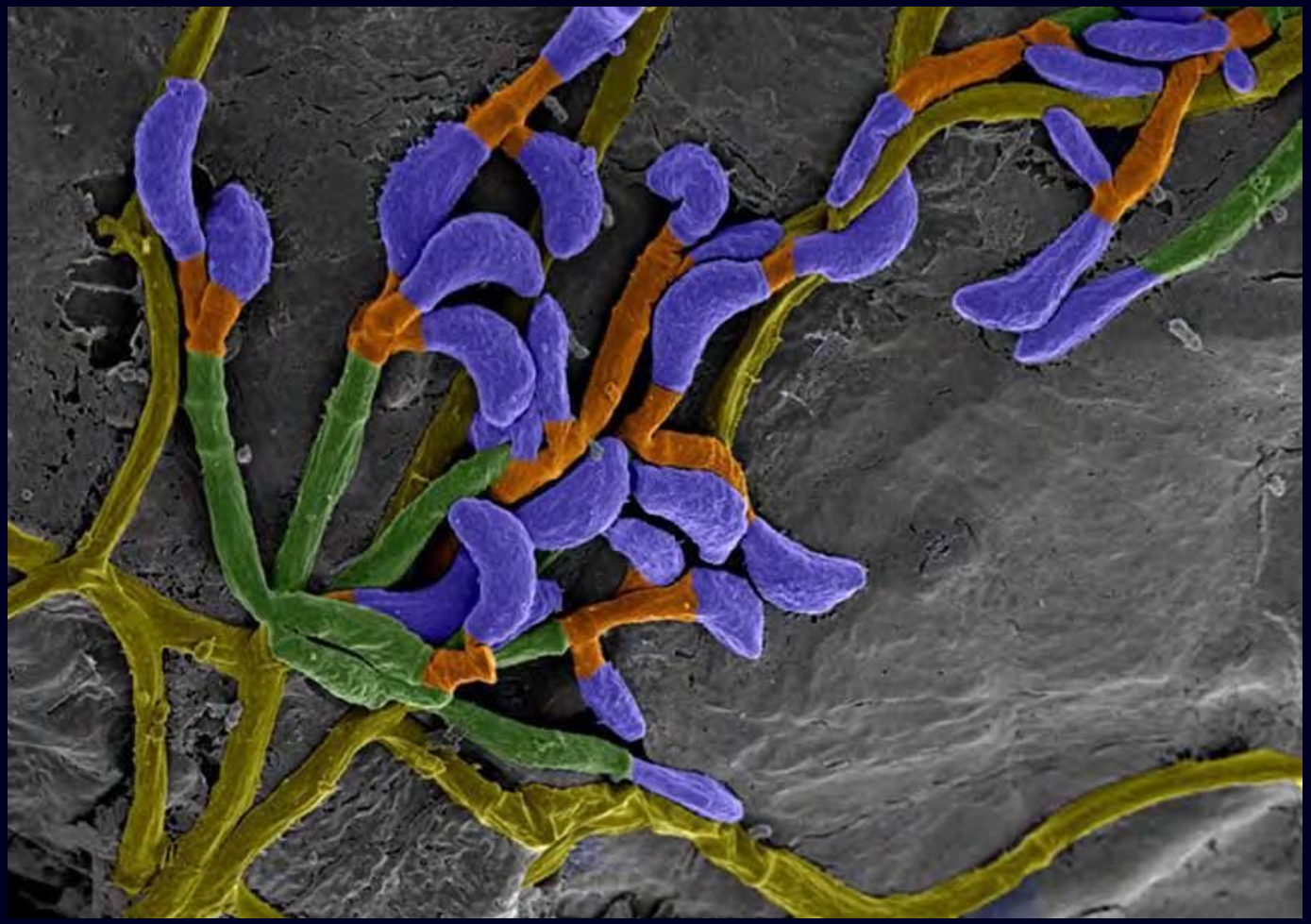
USGS
science for a changing world

White-nose Syndrome – millions of bats have died

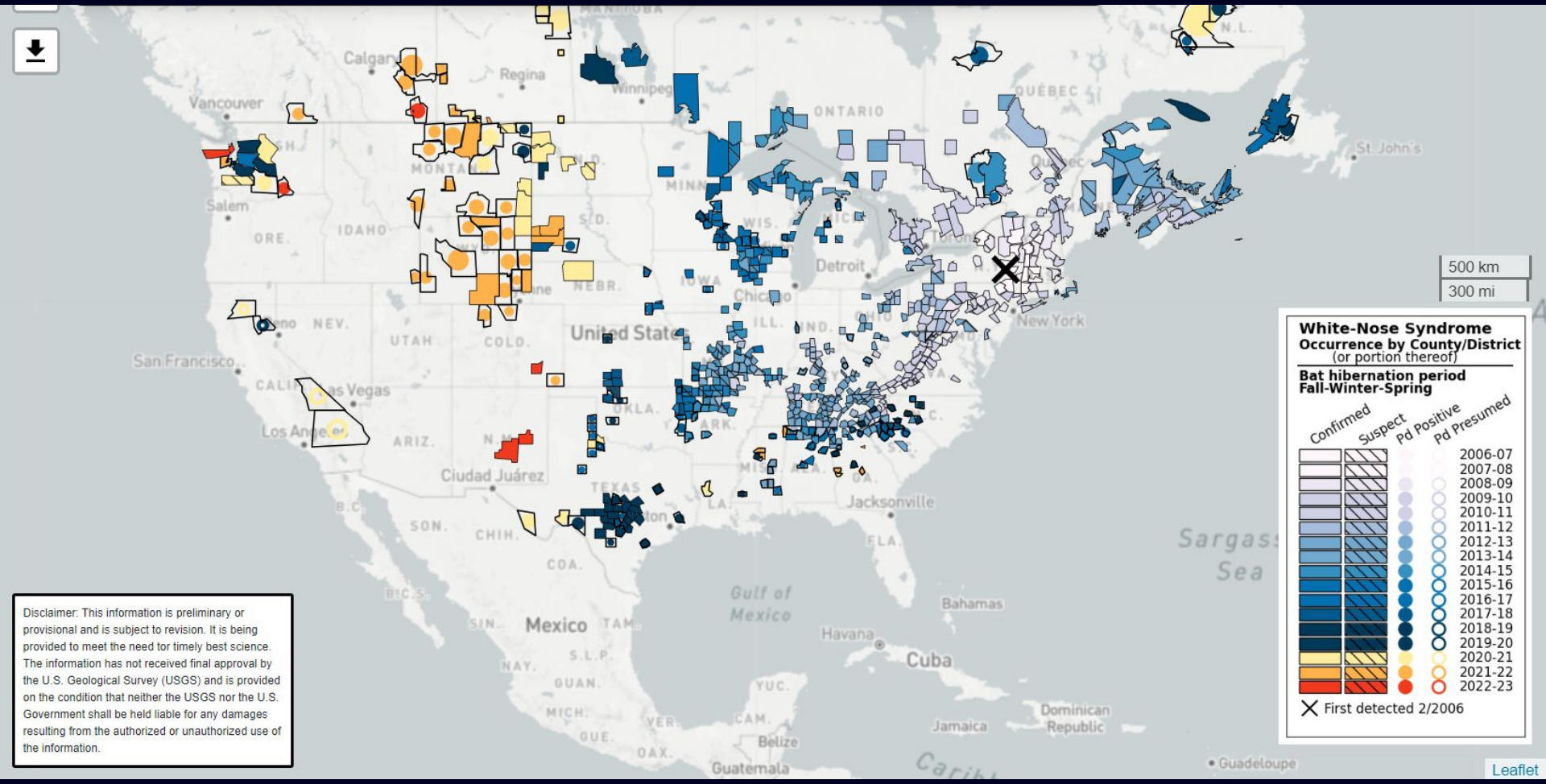
White Nose Syndrome (WNS)

- Fungal disease affecting hibernating bats
  - Responsible for unprecedented mortality
- First recognized in New York State in 2006, the fungus has since spread rapidly to 40 states and 8 Canadian provinces
  - Further spread is expected
  - Probably brought here by people from Europe / Asia
  - Bat to bat transmission is now the main mechanism of spread

The Cause: *Pseudogymnascus destructans, P.d.*



Fungus thrives in low temperatures (5-14°C; 40-55°F) and high humidity levels (>90%)

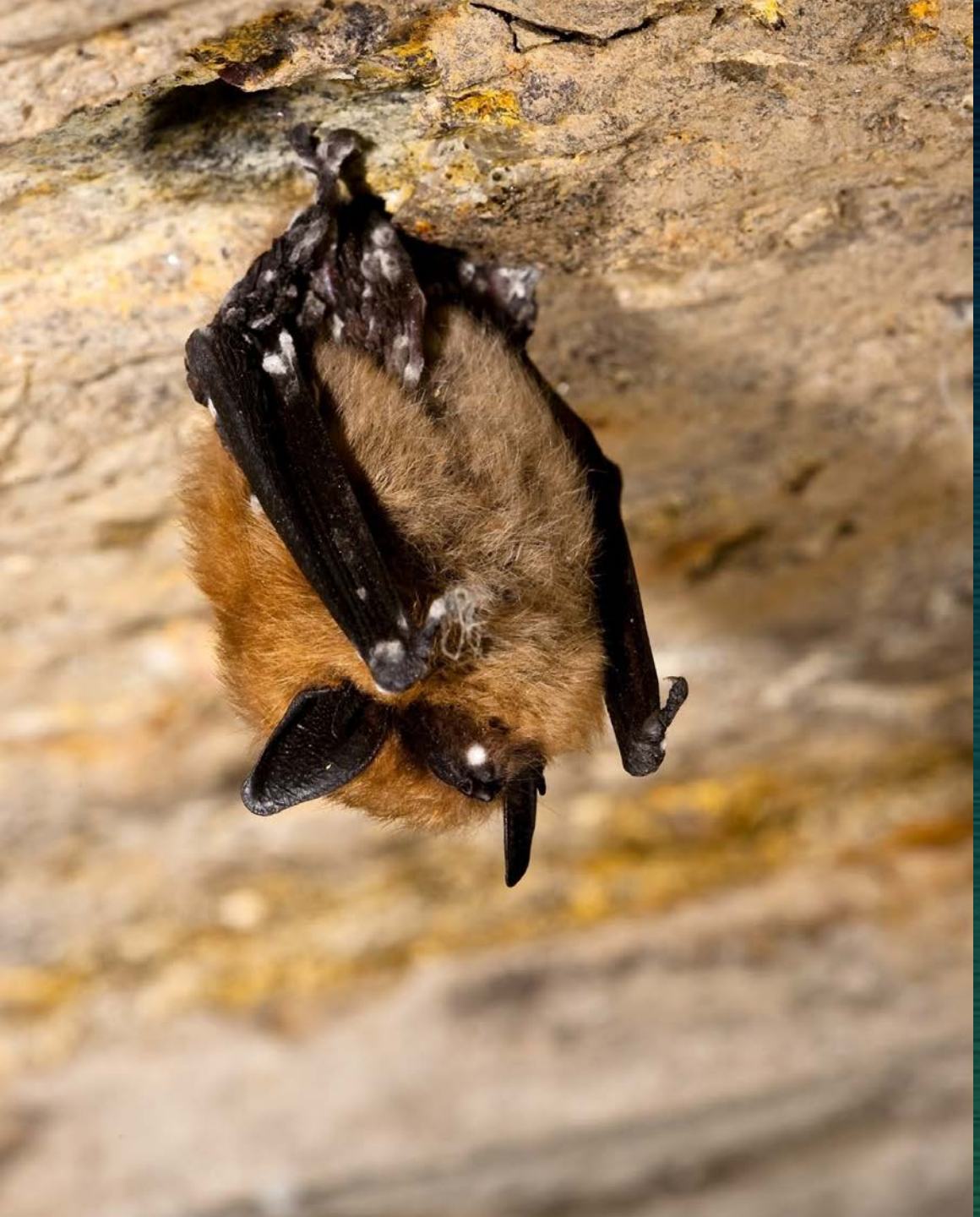


https://whitenosesyndrome.org/

Symptoms of WNS

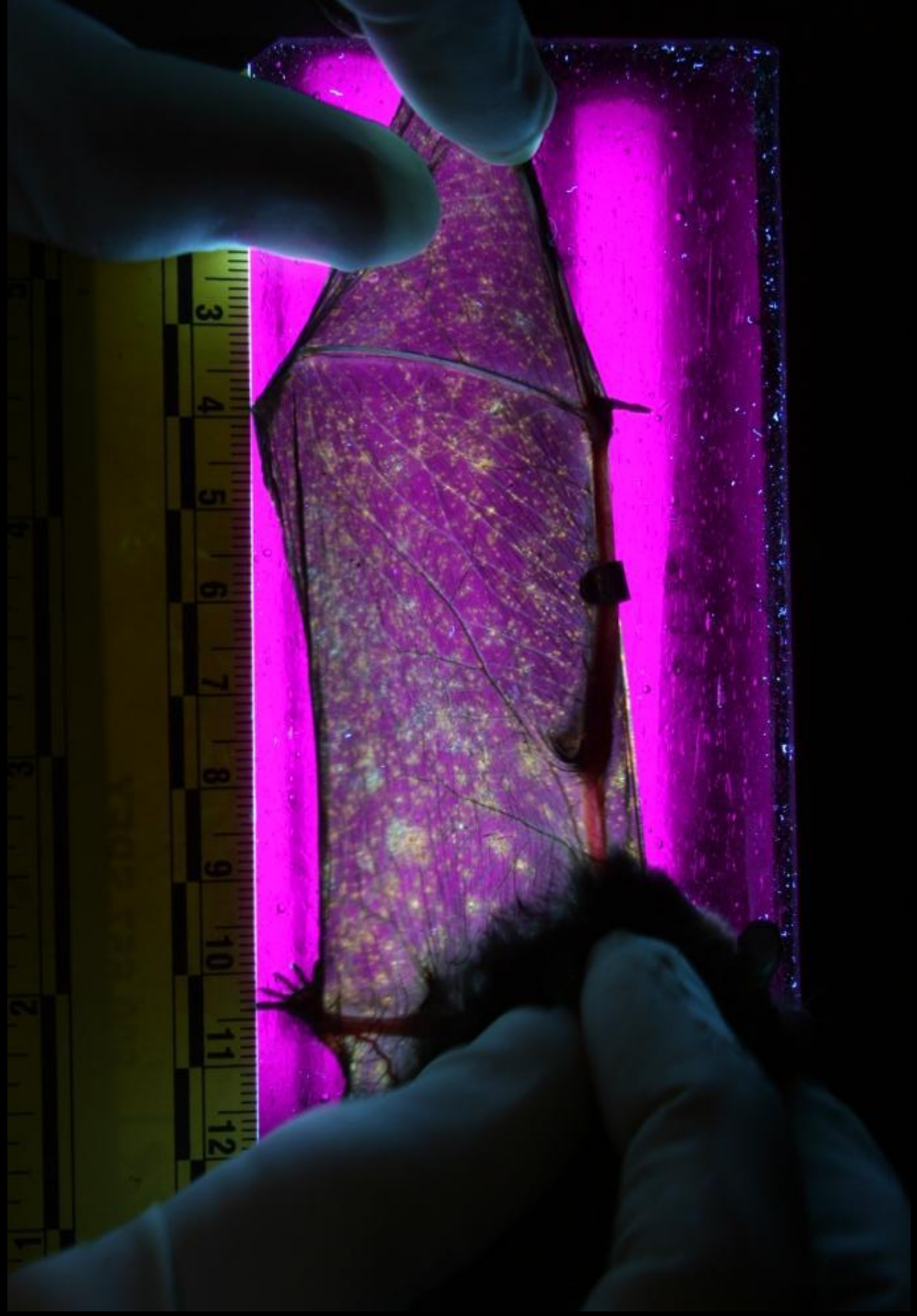
2008/2009

- Fungus was first described as *Geomyces destructans (G.d.)*
- Tested transmission of fungus from environment to bat



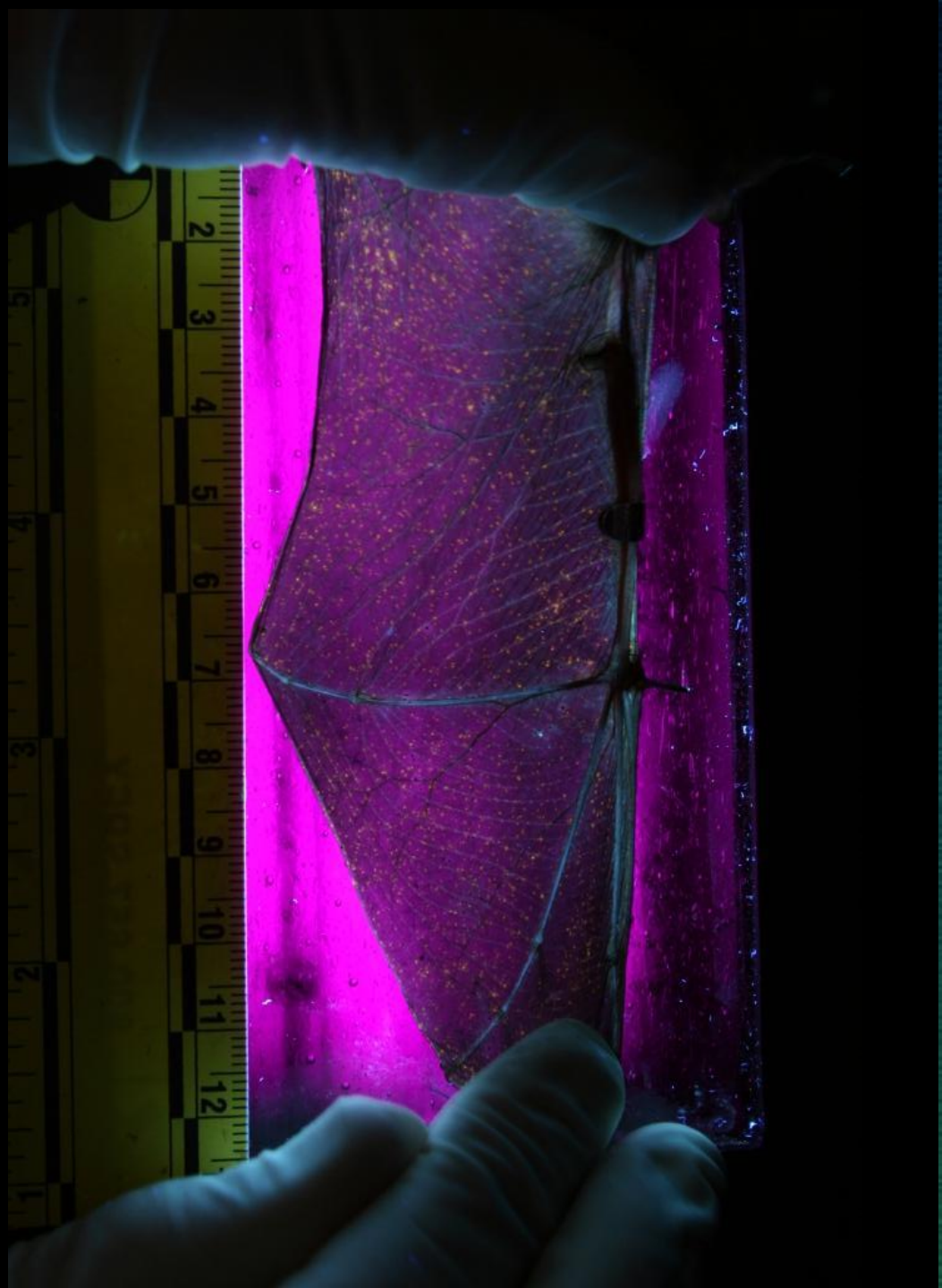
2009/2010

- Strong evidence for etiological role of *G.d.* in WNS
- Erodes living skin of hibernating bats but unknown how infection kills bats (Cryan et al. 2010)
- *G.d.* as symptom or trigger for mortality? (Chaturvedi et al. 2010)



2011/2012

- Frequent arousal linked to severity of infection & mortality (Reeder et al. 2012)
- Inoculation of bats with European *G.d.* supports novel pathogen hypothesis (Warnecke et al. 2012)



2012/2013

- Name changed to *Pseudogymnascus destructans* (Minnis & Linder 2013)
  - No close relatives of *P.d.* found in eastern North American hibernacula
  - Further supports hypothesis that pathogen is non-native & invasive

2013/2014

- Long-term persistence of *P.d*. found in cave soil during summer in absence of bats, capable of persisting in lab and likely in the environment indefinitely (Hoyt et al. 2014)
- Resistance of Big Brown Bats in North America (Frank et al. 2014)

2014/2015

- Fungus found to be widespread in China, no obvious evidence of population collapses (Hoyt et al. 2015)
- Seasonality of disease transmission (Langwig et al. 2015)

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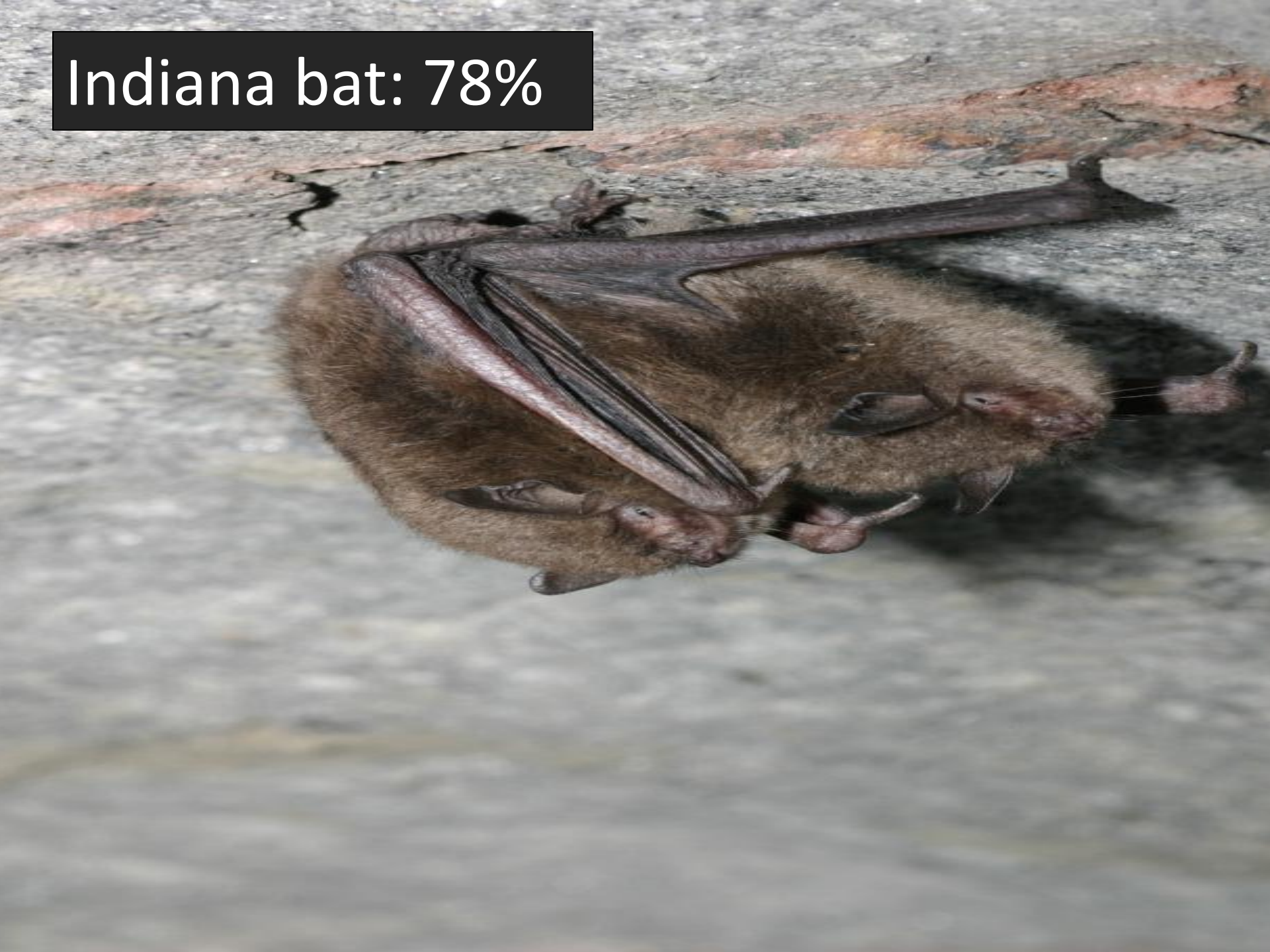
Tricolored bat

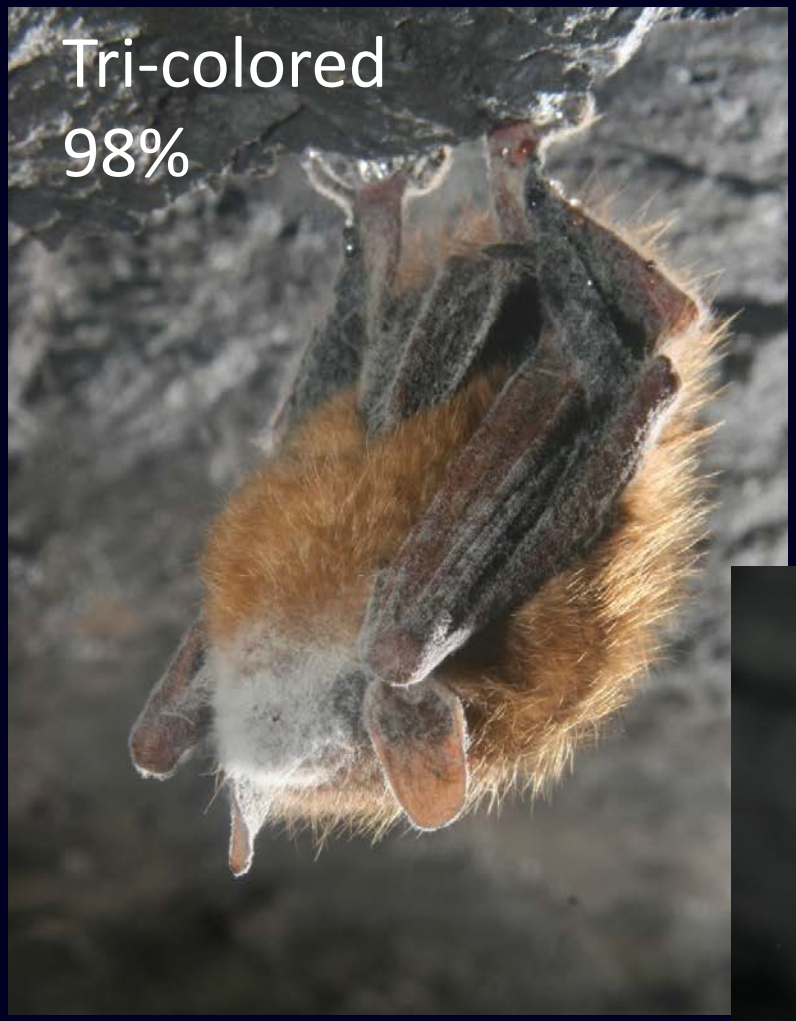
Silver-haired bat

Small-footed bat

Northern long-eared

Eastern red bat

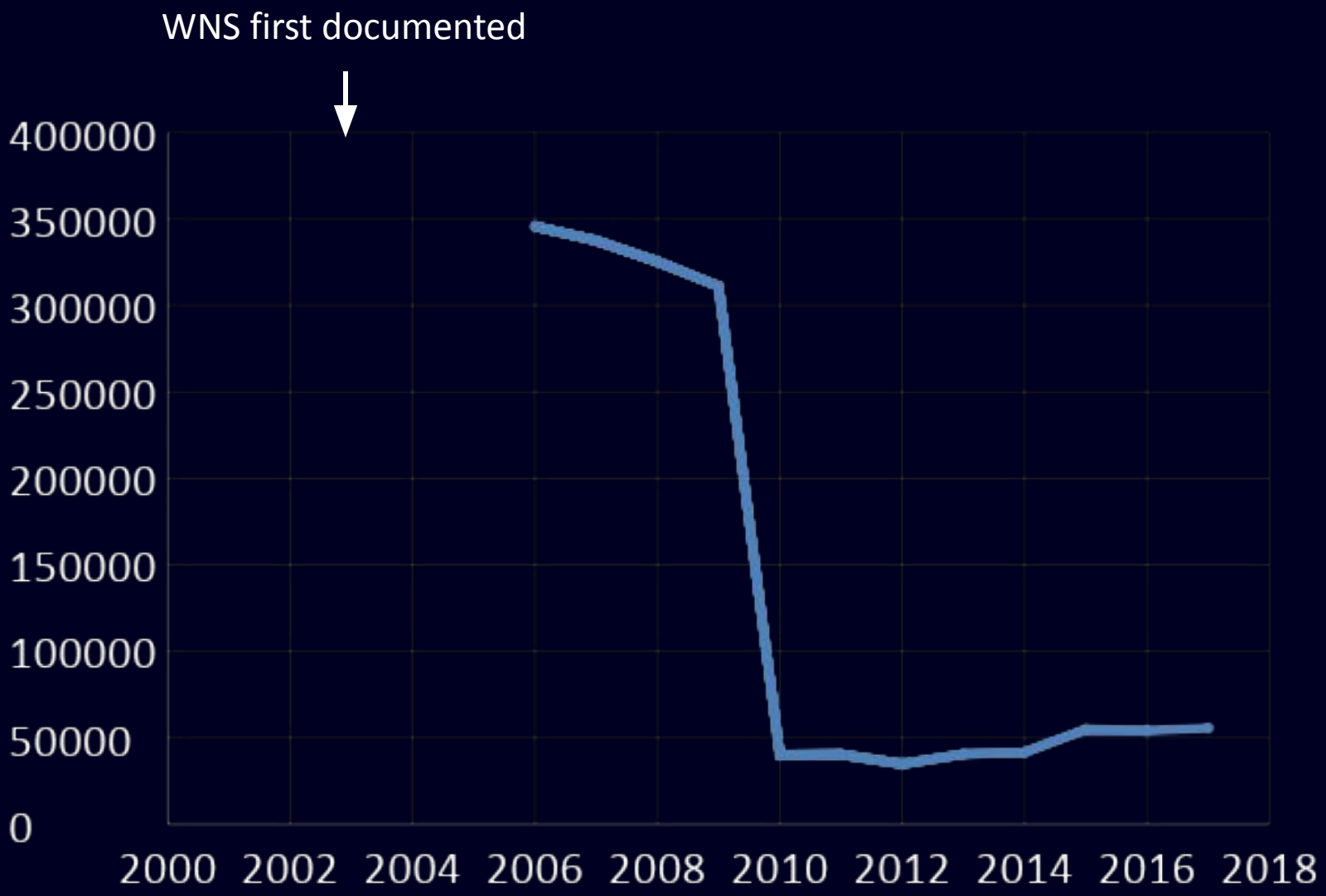

Indiana bat: 78%

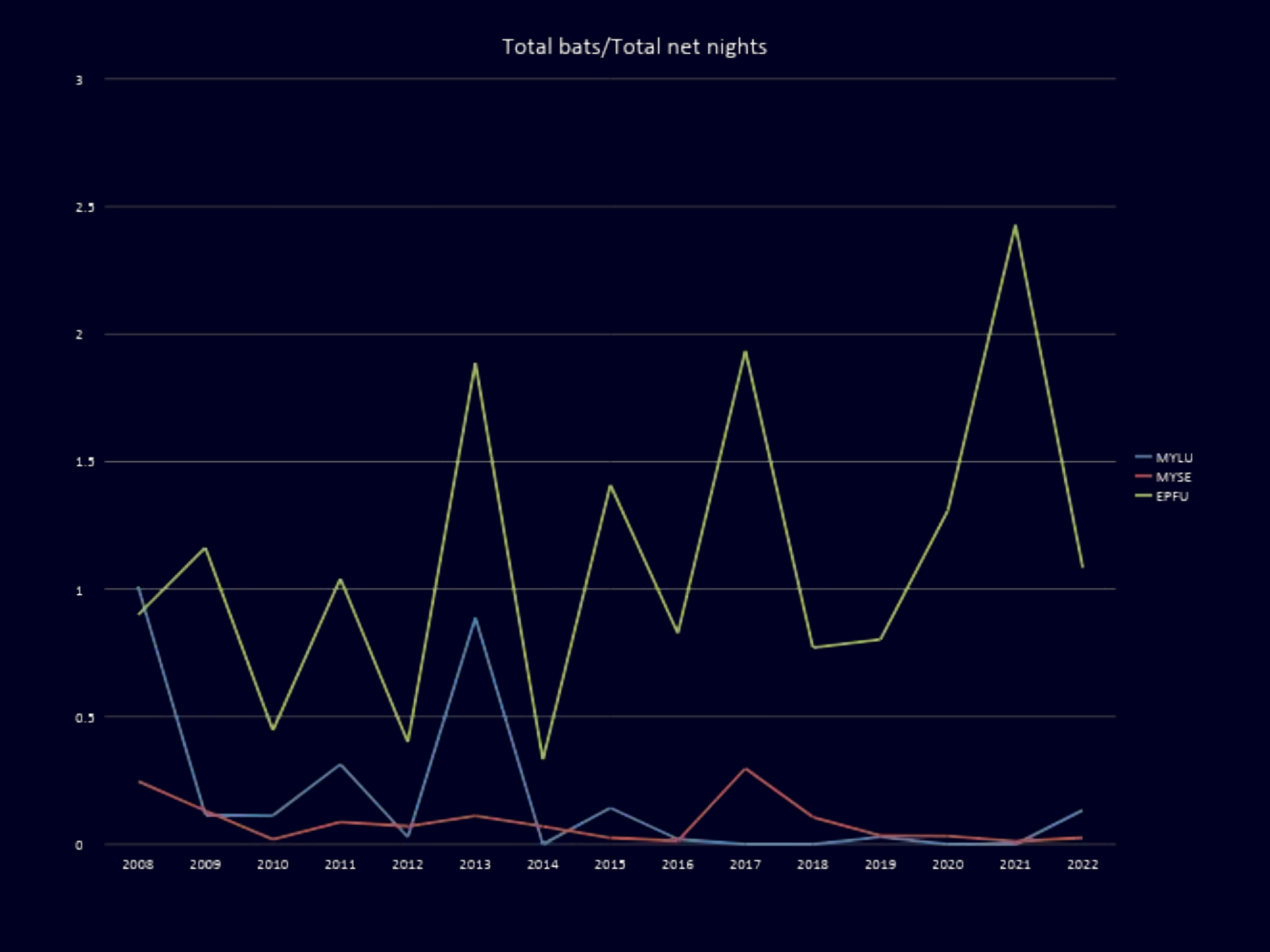

Tri-colored
98%


Little
Brown
91%


Northern Long-eared 99%

Index Hibernation Counts Little Brown Bat




Total bats/Total net nights
3
2.5
2
1.5
1
0.5
0
2008
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
MYLU
MYSE
EPFU

Management Efforts

Hibernacula Surveys

9 Bat Species in New York

Little brown bat

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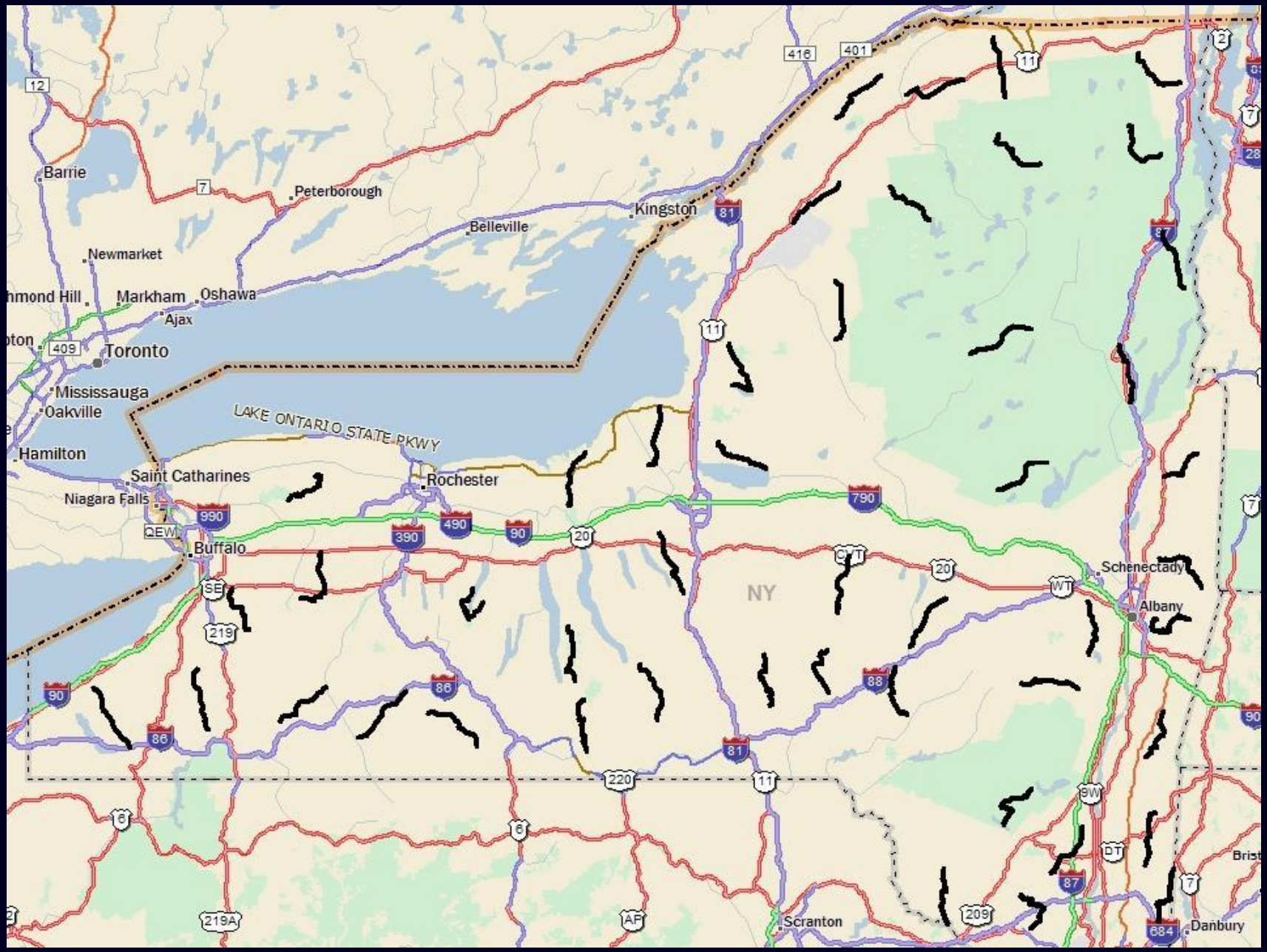
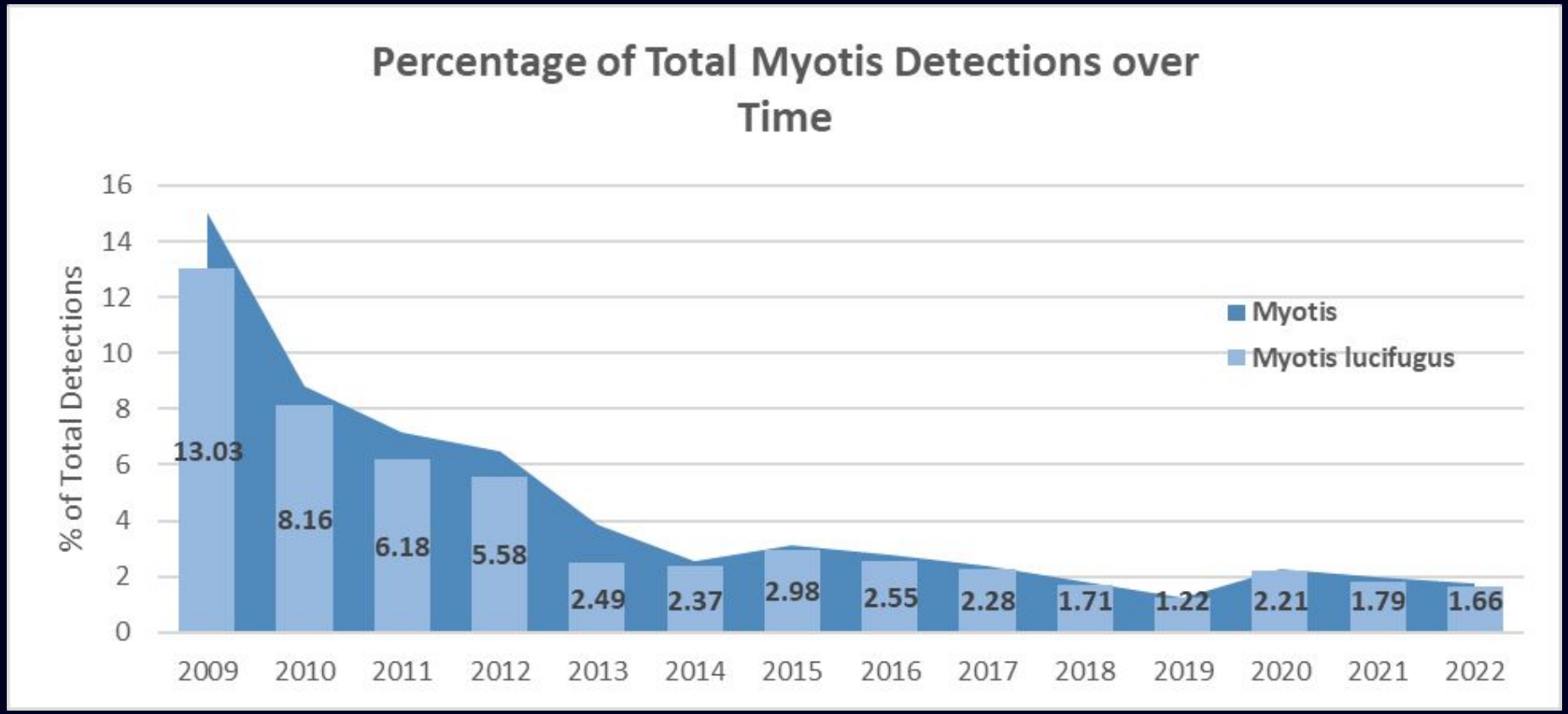
Acoustic Transect Surveys

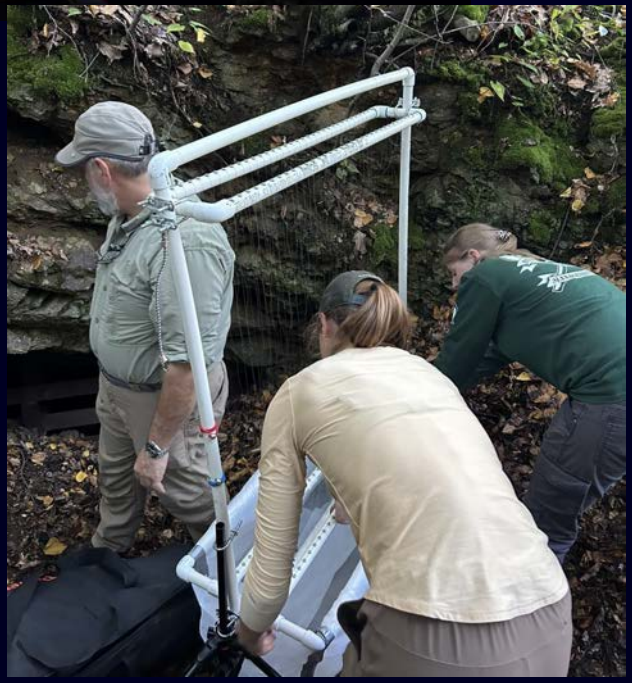


Acoustic Transect Surveys

- Drive route at ~ 20 mph
- Drive for ~ 20 miles
- 2 Replicates per year
- Point detector straight up from roof


Percentage of Total Myotis Detections over Time
% of Total Detections
16
14
12
10
8
6
4
2
0
13.03
8.16
6.18
5.58
2.49
2.37
2.98
2.55
2.28
1.71
1.22
2.21
1.79
1.66
2009
2010
2011
2012
2013
2014
2015
2016
2017
2018
2019
2020
2021
2022
Myotis
Myotis lucifugus

Bat catching & tracking



Exclusions and Signage

Project Review

Untitled - ArcMap

File Edit View Bookmarks Insert Selection Geoprocessing Customize Windows Help

1:99,563 Editor

Zoom To County | Zoom To Town | Zoom To Quad | Zoom To Feature | Zoom To Zip Code | Zoom To XY

Table Of Contents

- Layers
  - Master_BAEA_productivity12.17
  - Town, City or Village Boundary
  - Natural Heritage EOs All - Full Legend
    - Rare Animals -- Recent
      - Vertebrate Animal
      - Invertebrate Animal
      - Animal Concentration Area
    - Rare Animals -- Historical
      - Vertebrate Animal
      - Invertebrate Animal
      - Animal Concentration Area
    - Rare Plants -- Recent
      - Vascular Plant
      - Moss
    - Rare Plants -- Historical
      - Vascular Plant
    - Natural Communities -- Recent
      - Wetland/Aquatic Community
      - Upland/Terrestrial Community
    - Natural Communities -- Historical
    - Natural_Heritage_EOs_All_points
  - Animal_Screening_Layers
    - E&T_Animals_Recent
      - All except fish
      - Freshwater Mussels
      - Fish
    - SC_Animals_Recent

496429.508 4934852.269 Meters

11:05 AM
2/19/2021

Management Efforts

What can you do to help?

- Avoid killing or injuring bats
  - Remove suitable roost trees during winter
  - Work with trained Nuisance Wildlife Control Operators to remove bats from buildings without killing them
  - Don’t use sticky traps in barns/attics where bats are roosting

What can you do to help?

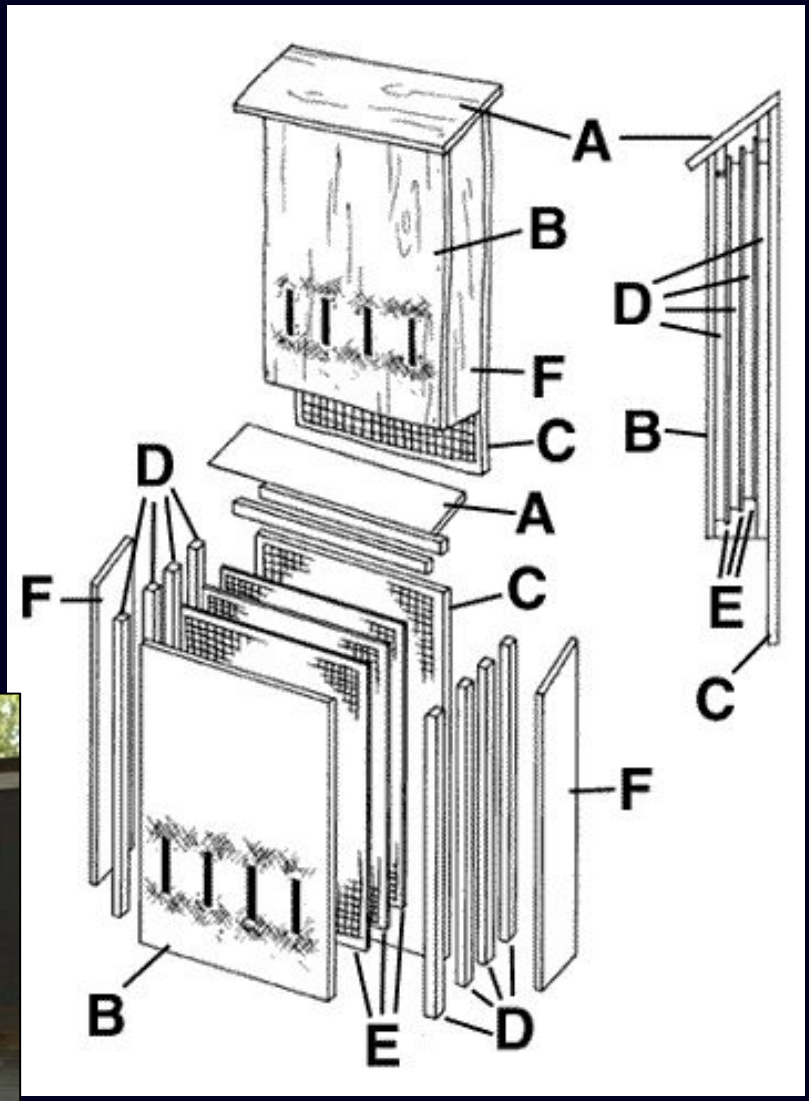
- Maintain suitable roosting and foraging habitat and clean drinking water sources
- Minimize widespread use of insecticides
- Learn more about bats in your area and WNS
- Teach others about bats
- Support nature centers and other natural areas

What about bat houses?

- They have a role in some situations –
  - Primarily if you have bats in a structure and are excluding/evicting them
  - Put up bat houses prior to the eviction to provide suitable alternatives

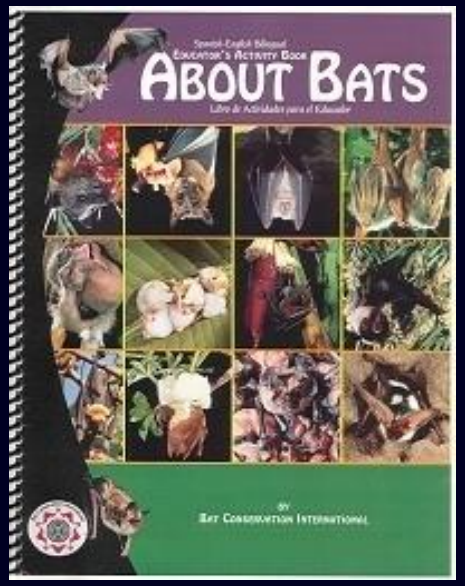
Bat Houses: construction

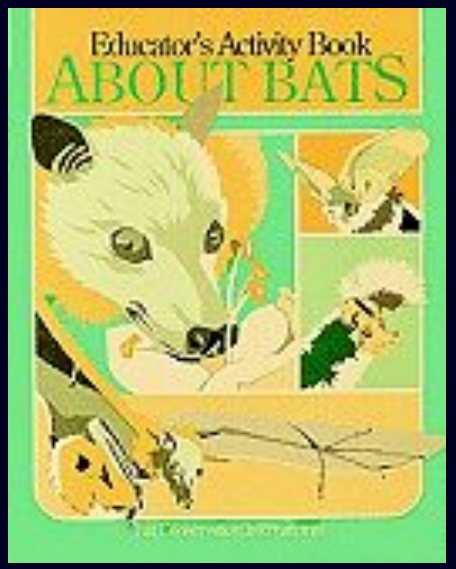
- DESIGN:
- Greater than 2 feet tall
- Chambers are at least 14 x 20” (W x H)
- Roosting chambers are partitioned ¾ - 1” apart



Excellent Bat Resources

- Whitenosesyndrome.org
- NYSDEC: www.dec.ny.gov
- Bat Conservation and Management, Inc.
  http://www.batmanagement.com
  Bat boxes
- Bat Conservation International
  http://www.batcon.org
  Curriculum guides
  Lots of great info and how to get involved





Remember

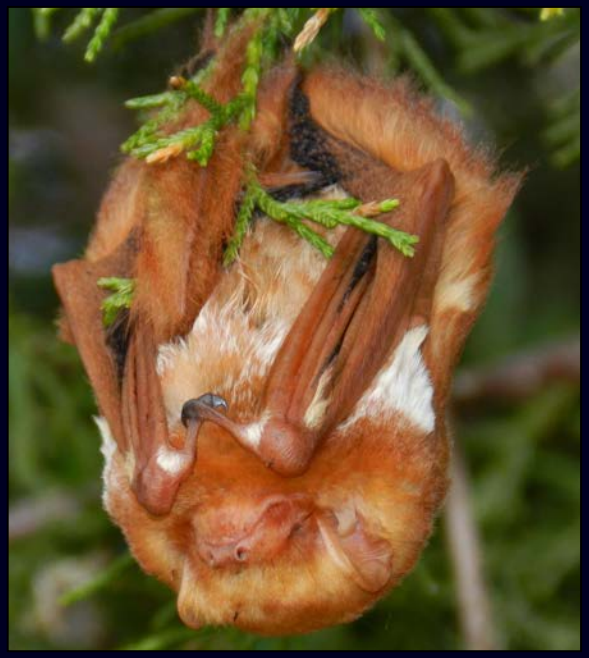
- Although it is rare, bats can carry rabies
- Do not touch bats
- If you or your pet comes in contact with a bat, contact the County Heath Department and your veterinarian for instructions

- Regardless of whether there are bats in your yard, please keep your cat and dog vaccinated against rabies!

Happy bat days!

www.dec.ny.gov

For questions: wildlife@dec.ny.gov



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  Flickr: www.flickr.com/photos/nysdec

– Photo credits: Merlin Tuttle, Ralph Eldridge, Michael Durham, Justin Boyles, Bat Conservation and Management, Charlie Eichelberger, DIY network, Nick Hristov (NPS), Mylea Bayless, and Kathy Adams Clark

Questions?

Video of Humboldt Penguin being preyed upon by vampire bats in Peru!

The video shows how adept the vampire bats' are at moving on the ground. It also mentions that the penguin chicks have to worry about vampire bats "because they carry diseases like rabies". However, rabies is strictly a mammal disease (birds are not mammals!).

Enjoy! It is worth watching!

https://www.youtube.com/watch?v=iK0QiSiAYds