

# White-Nose Syndrome: An Emerging Pathogen Impacting Bats that Hibernates in Abandoned Mines

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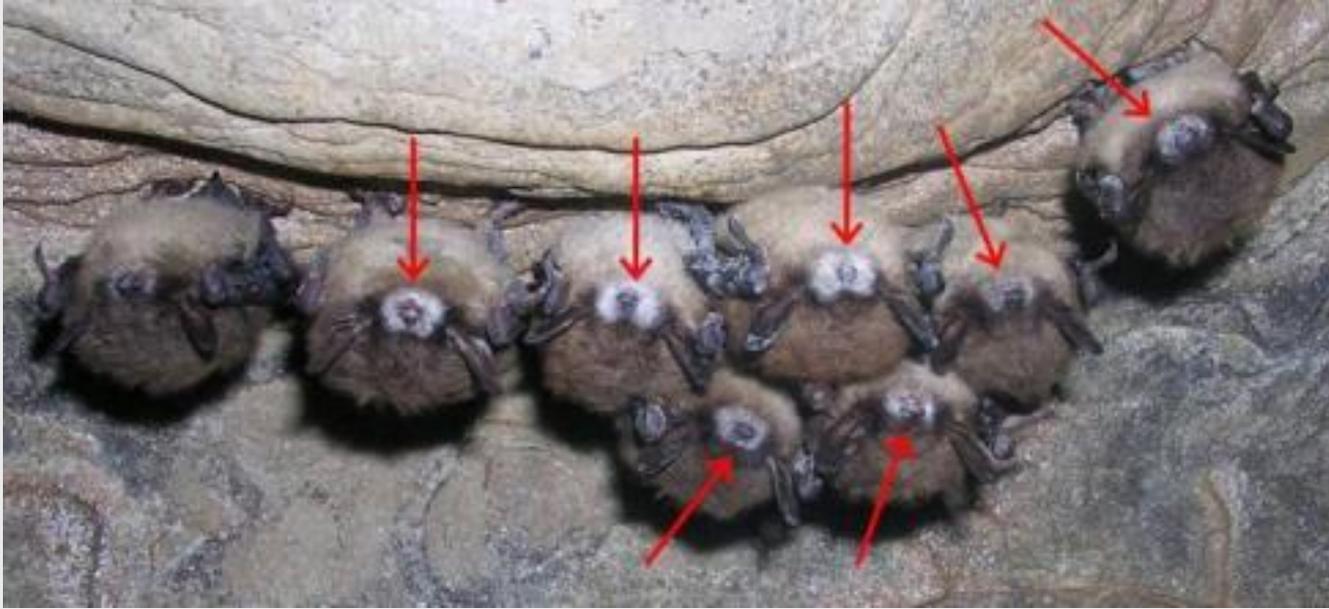
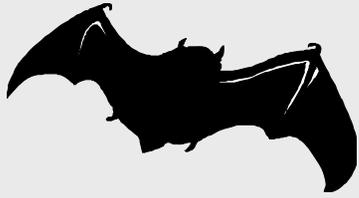


Photo courtesy Nancy Heaslip, New York Dept of Environmental Conservation



# Bat Myths and Reality

- Not a rodent, not a flying mouse.
- Very few have rabies (<0.5%)
- Bats do not carry hantavirus.
- They generally try to avoid people.
- Most bats in North America eat insects.



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# Bat Biology



- Bats are long-lived species (12-30 years) with low reproductive rates.
- Some colonial, some solitary.
- Hibernates, migrate, or both.
- Often return to the same roost sites year after year.
- Some species travel many miles from their roosts to feed in a night.

# Bat Species Diversity

- Worldwide 18 families, 186 genera, ~1,000 species, nearly  $\frac{1}{4}$  of all mammals.
- US/Canada: 45 species, insectivores & nectar-feeding bats.
- Rocky Mountain West: 33 species.
- Montana: 15 species, all insectivores.
- Highest species diversity is in the tropics.

# Montana Bats—A Photo Sampler



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# Bat Habitat: Roosting, Feeding, Drinking

- Roost Functional Types:

- Day roosts, night roosts
- Maternity colonies, “bachelor” roosts
- Hibernation (“hibernacula”)
- Fall “swarming”

- Roost Characteristics:

- Temperature & humidity
- Single bat → large colony
- Proximity to feeding, drinking areas
- Each bat species has different requirements



Kristi DuBois Photo

# Caves and Mines – Provide Unique, Limited Habitat for Bats



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# How Bats Use Mines in Montana

- Many species use mines/caves for hibernation.
- One species (Townsend's big-eared bat) uses caves/mines for maternity colonies.
- Some species may migrate out of Montana to hibernate in caves/mines elsewhere.
- Some bats feed or drink in caves during summer.
- Some use caves/mines in fall for breeding.

# Townsend's Big-eared Bat Maternity Colony



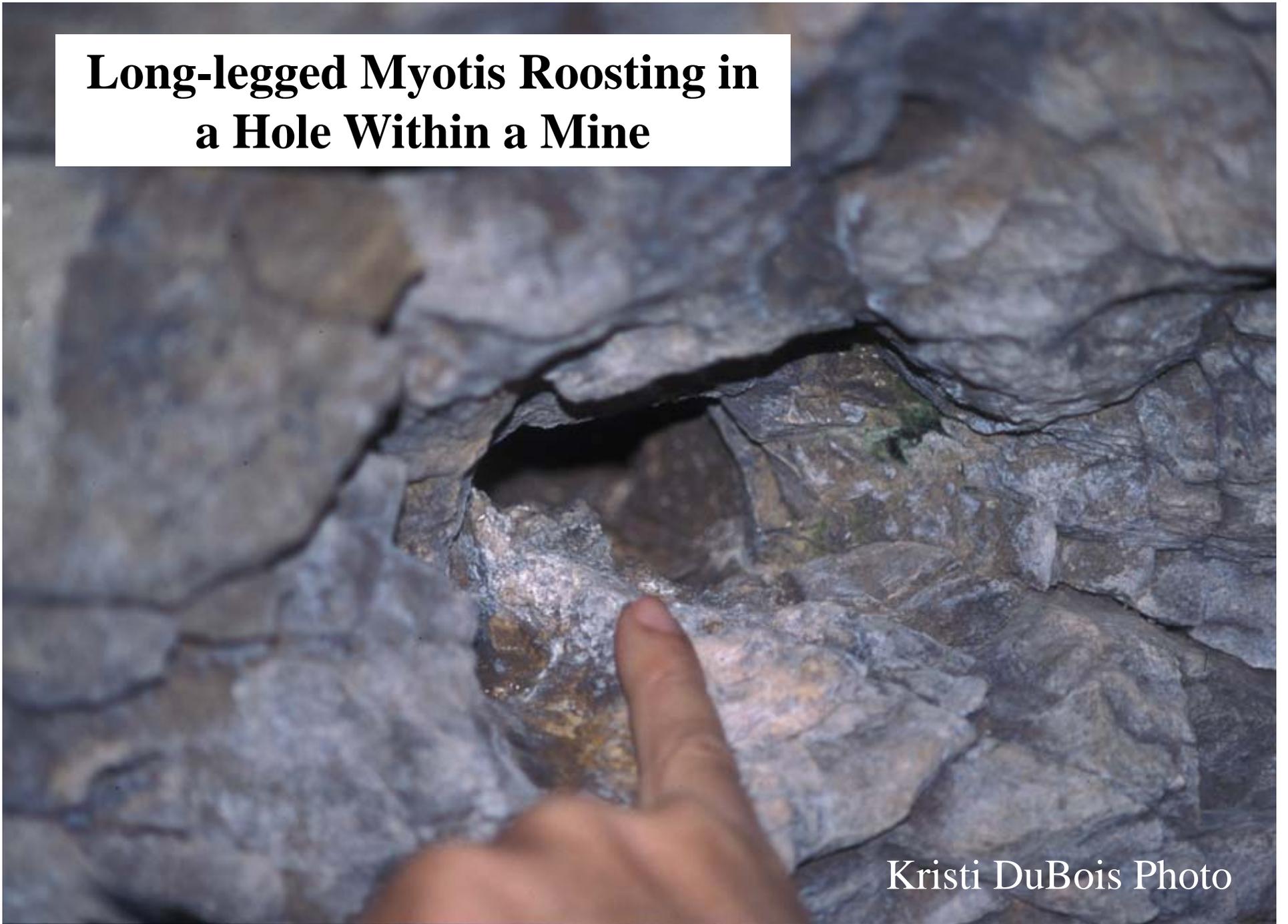
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**Small Mines are Often Used by  
Male Bats**



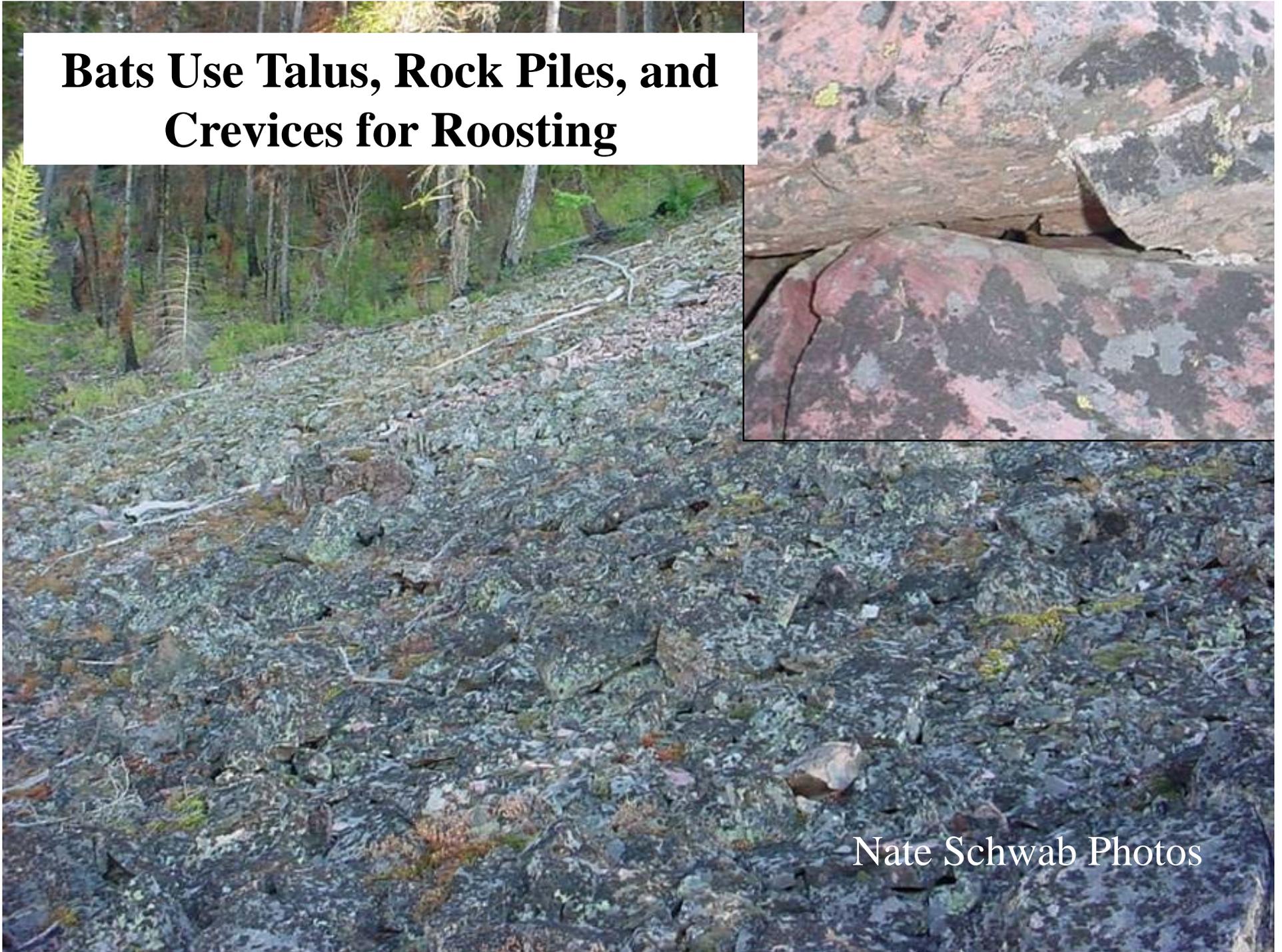
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**Long-legged Myotis Roosting in  
a Hole Within a Mine**



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**Bats Use Talus, Rock Piles, and  
Crevices for Roosting**



Nate Schwab Photos

## Pallid Bat Roosting in a Crevice



Bryce Maxell Photos

# Bat Hibernacula in Montana

- No large colonies, instead they are in small groups scattered among many sites.
- Both caves and mines used in winter.
- Some may hibernate in crevices & rocky outcrops.
- We don't know where most of our bats spend the winter.
- Some may migrate out of Montana to hibernate elsewhere.

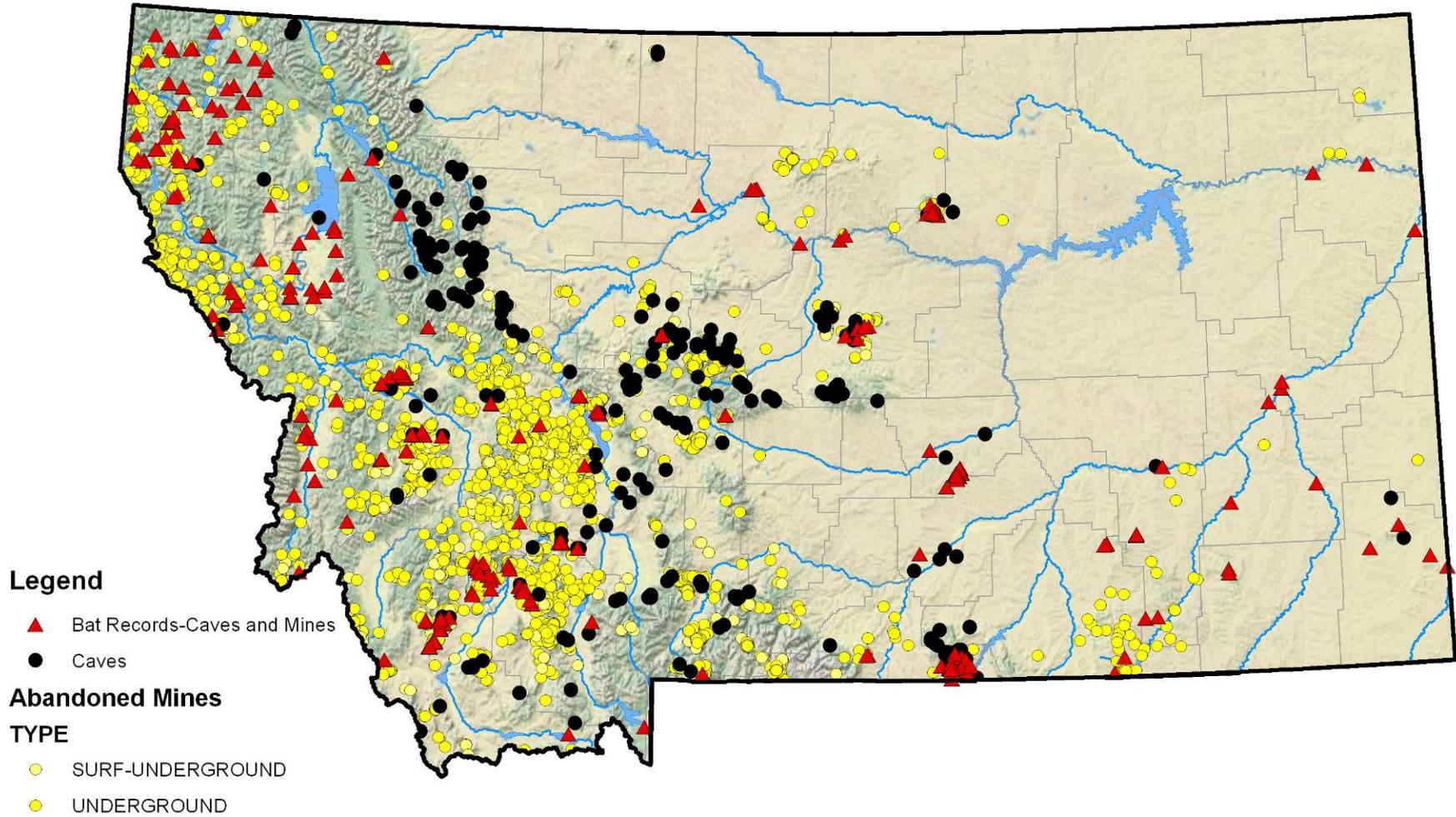
# Bat Species Known or Likely to Hibernate in Montana

- Townsend's big-eared bat
- Big brown bat
- Little brown bat
- Northern myotis
- Long-legged myotis
- Western small-footed myotis
- California myotis
- Long-eared myotis
- Pallid Bat



Hibernating *Myotis* in Lewis & Clark Caverns

# Montana Bat Records from Caves and Mines



# White Nose Syndrome

- Pathogenic fungus, *Geomyces destructans*, that causes an invasive skin infection in hibernating bats.
- First documented in North America on hibernating bats in a popular tourist cave near Albany, New York in 2006.
- May have been inadvertently been introduced from Europe by a cave visitor.
- *G. destructans* has been established as the primary factor causing bat mortality.

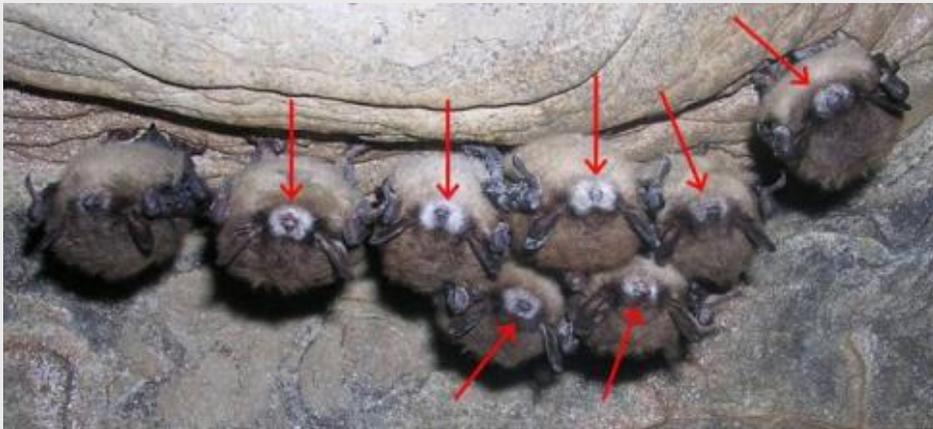
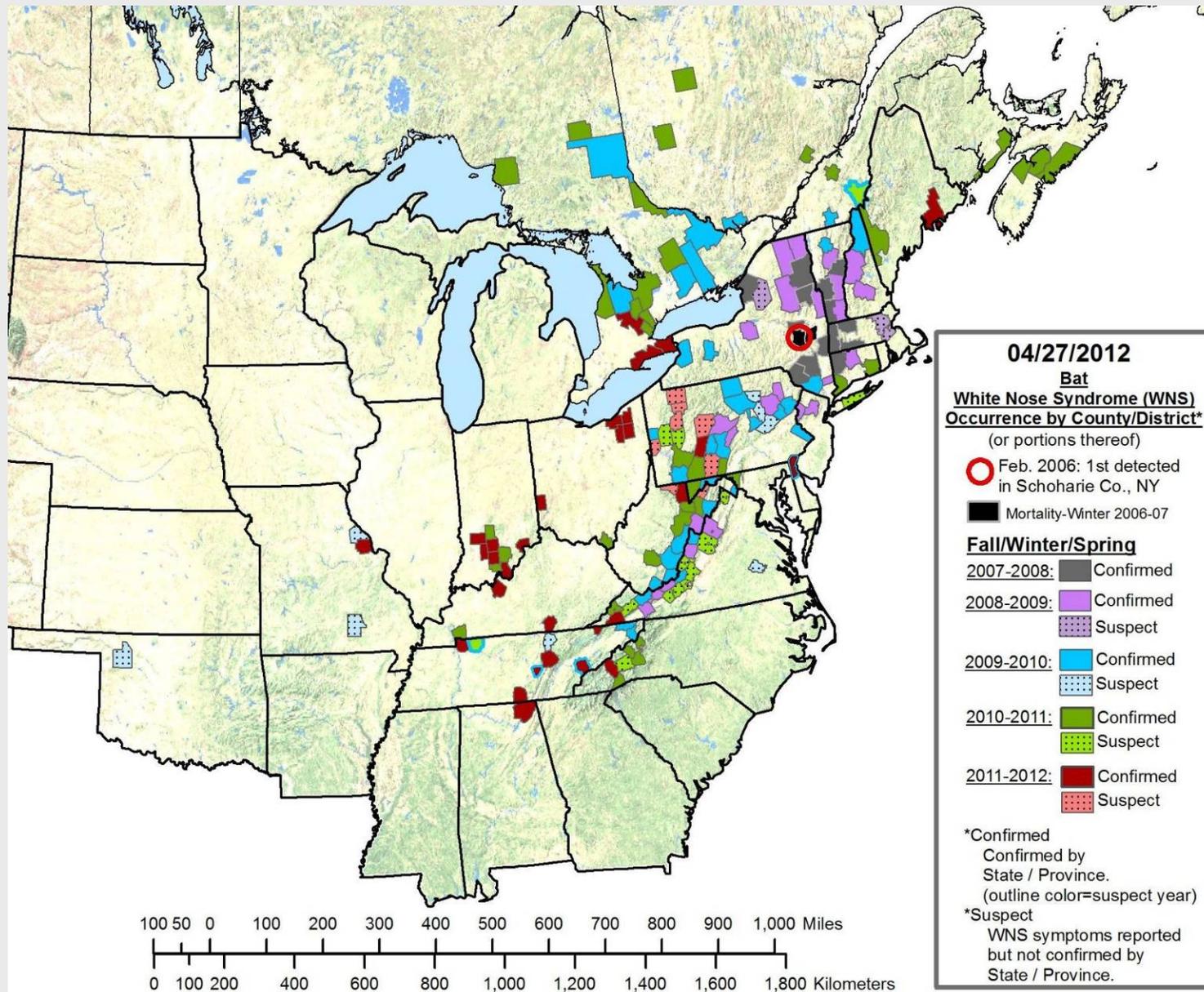


Photo courtesy Nancy Heaslip, New York Dept of Environmental Conservation



Photo courtesy Ryan von Linden/New York Dept of Environmental Conservation

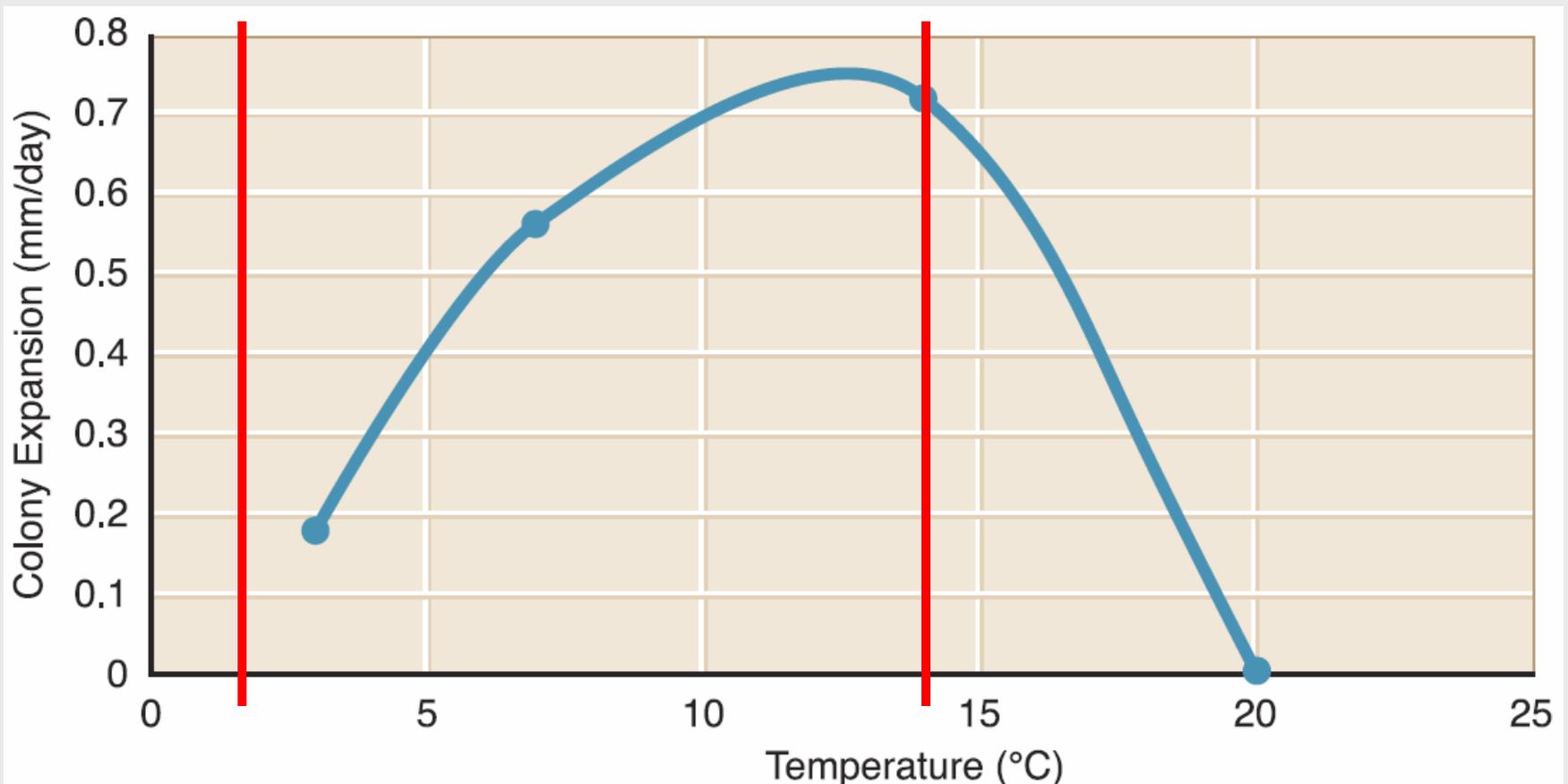
# WNS Spread Rapidly Across E. US & Canada



Map by: Cal Butchkoski, PA Game Commission

## *G. destructans* growth and Hibernacula Temps

- *D. destructans* grows best at temperatures where many bats hibernate.



Temperature range of most bat hibernacula in North America is 2-14°C.

Colony expansion rates of *Geomyces destructans* when grown on cornmeal agar at 3, 7, 14, and 20°C. The trend line estimates colony expansion rates at temperatures ranging from 3–20°C.

Blehert et al. 2007 *Microbe* 6(6): 267-273.

# Bat Species Infected by WNS in NA

- Little Brown Bat (*Myotis lucifugus*) \*
- Northern Long-eared Myotis (*M. septentrionalis*) \*
- Eastern Small-footed Myotis (*M. leibii*) \*\*
- Indiana Bat (*M. sodalis*)
- Tricolored Bat (*Perimyotis subflavus*)
- Big Brown Bat (*Eptesicus fuscus*) \*

\* Species occurs in Montana

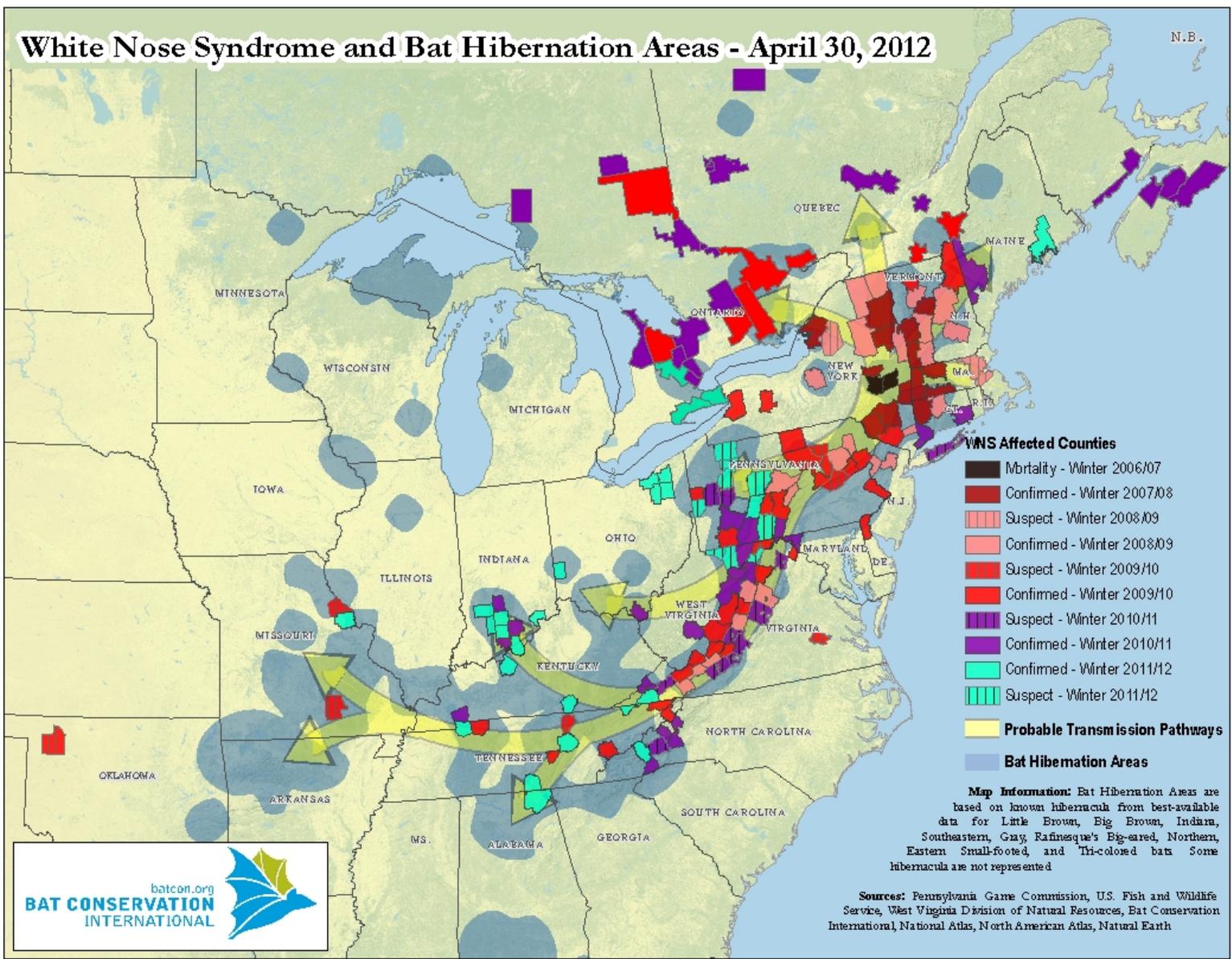
\*\* Closely related species occurs in Montana

# White-Nose Syndrome Consequences

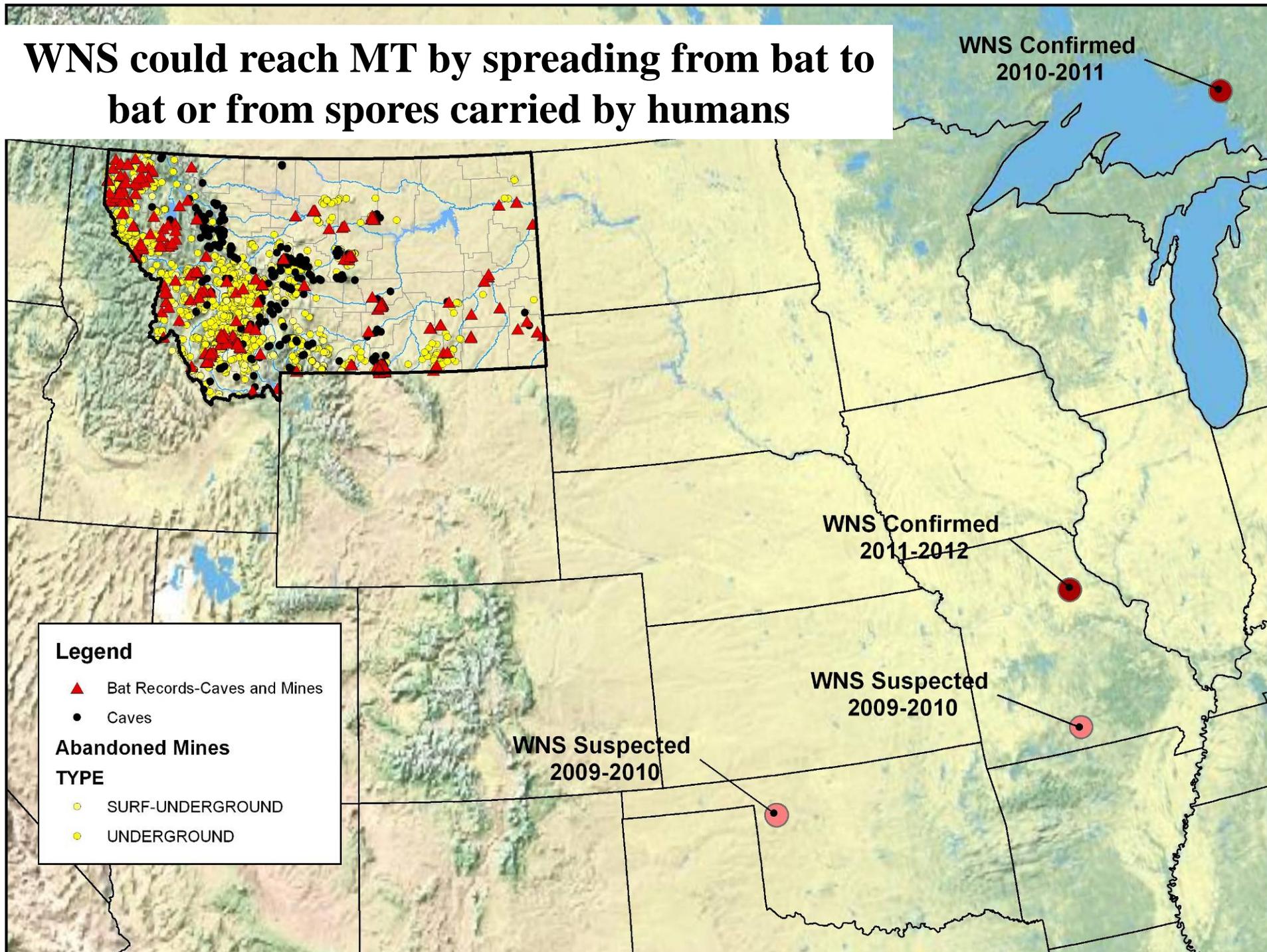
- Has killed 5.7 to 6.7 million bats in N.A. since 2006.  
(USFWS January 17, 2012 news release)
- Some species under status review for T/E listing.  
(USFWS June 28, 2011 news release)
- Predicted regional extinction of Little Brown Myotis by 2026.  
(Frick et al. 2010)
- *G. destructans* found on bats across Europe, but no mass mortality observed there.  
(Puechmaille et al. 2011)



# WNS Spread Typical of Invasive Disease



# WNS could reach MT by spreading from bat to bat or from spores carried by humans



# WNS Management Recommendations for Mines in Montana

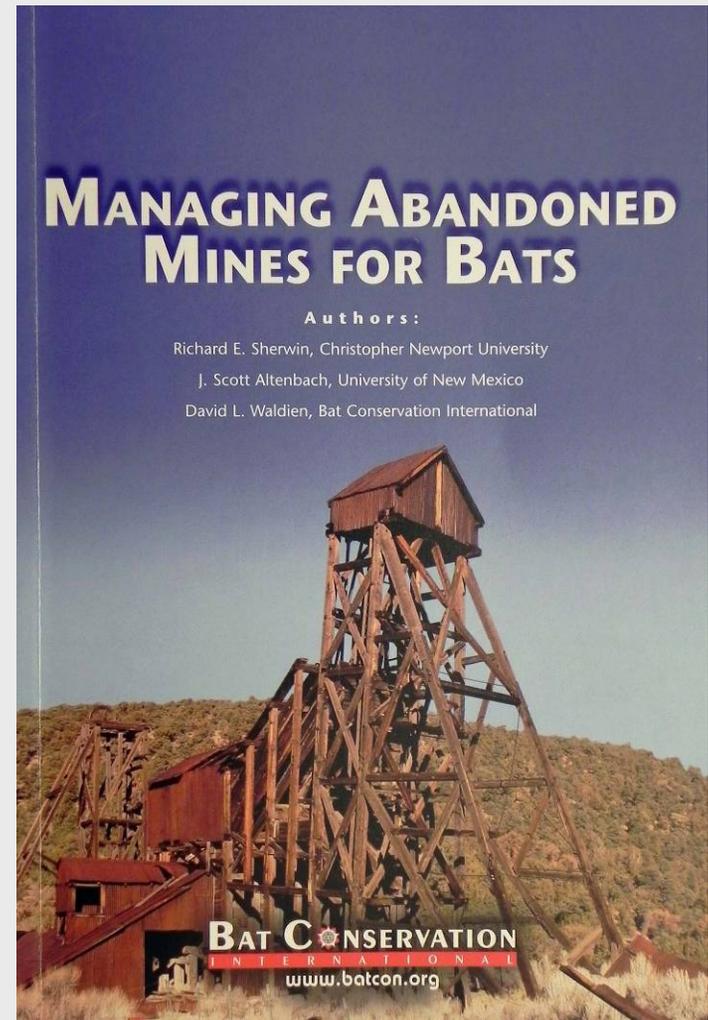
- Report all observations of bats in mines, summer or winter, to Montana Natural Heritage Program.
- Preserve as much underground habitat as possible to avoid concentrating hibernating bats into fewer sites.
- Install bat-friendly gates on sites with suitable underground habitat for bats.
- Prevent inadvertent spread of WNS by avoiding the use of equipment or clothing that has been previously used in a WNS infected state.

# Surveys for Hibernating Bats in Mines

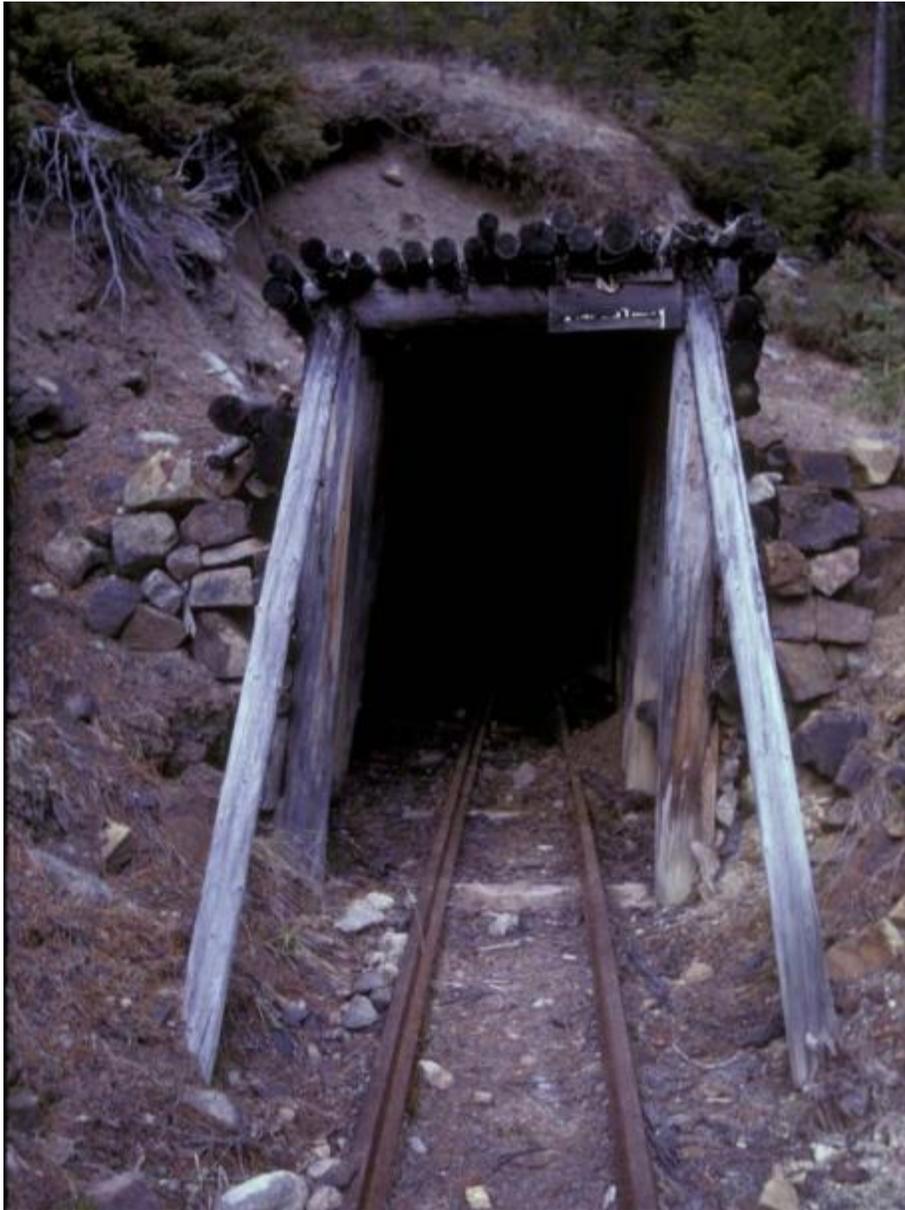
- Hibernating bats leave behind little or no trace of their presence.
- External surveys of mines should include sampling during multiple nights in spring, summer, and fall.
- Internal surveys for bats are much more effective at detecting bats than external/entrance surveys.
- Internal surveys should only be done by qualified personnel in mines that are safe enough for human entry.
- New acoustic sampling devices are being developed to detect bat activity over long periods of time.

# Bats and Mines Publication

- Free download from BCI.
- How bats use mines.
- Characteristics of mines that influence bat use.
- Survey methods.
- Internal vs external surveys.
- Gates and closures.
- Factors to consider during decision making.
- Does NOT include WNS information or recommendations.



<http://www.batcon.org/index.php/what-we-do/caves-and-mines/subcategory/495.html>



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# Web Resources on Bats

## **Montana Bats**

<http://fieldguide.mt.gov/displaySpecies.aspx?family=Vespertilionidae>

## **White Nose Syndrome**

<http://www.fws.gov/whitenosesyndrome/>

## **Western Bat Working Group**

<http://www.wbwg.org/>

## **Bat Conservation International, Bats and Mines**

<http://www.batcon.org/index.php/what-we-do/caves-and-mines.html>

## **NASBR WNS Session Abstracts**

[http://www.nasbr.org/meetings/41\\_toronto/](http://www.nasbr.org/meetings/41_toronto/)