

Montana's Winter Bat Roost and White-Nose Syndrome Surveillance Efforts



Montana Chapter of TWS, February 26, 2015

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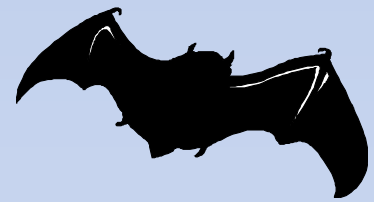
Bigfork High School Cave Club, <http://bigforkhighschoolcaveclub.weebly.com>

Northern Rocky Mountain Grotto, <http://nrmg.cavesofmontana.org>



US Army Corps of Engineers®





Why Should We Care About Bats?

- A single little brown bat can eat 1,200 mosquito-sized insects in one hour.
- A colony of 150 big brown bats can eat 33 million cucumber beetles each summer.
- The 20 million Mexican free-tailed bats from Bracken Cave, Texas eat 200 tons of insects nightly.
- Tropical bats pollinate plants and help reseed forests.
- Bats have inspired new medical treatments
- Kids like bats!

Major Conservation Issues

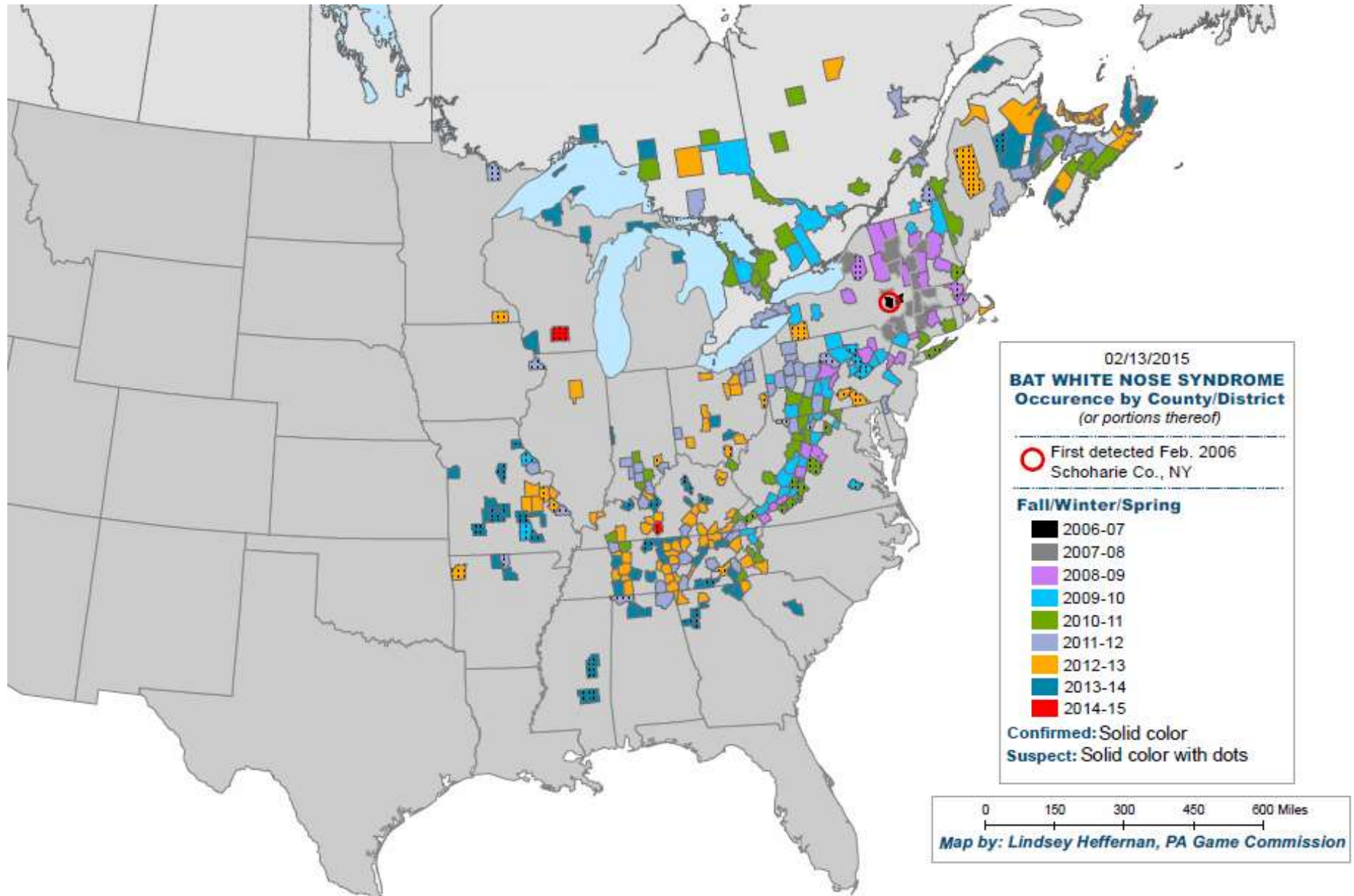
- **Loss of natural roost habitats – trees, rock outcrops**
- **Drowning hazards at artificial watering sites**
- **Loss of prey species (pesticides)**
- **White-Nose Syndrome**
- **Collisions hazards, including wind turbines**

White-Nose Syndrome

<http://whitenosesyndrome.org>

- 25 (28) States

- 5 Canadian Provinces





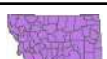

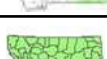










- Mortalities in 7 species and detected in 5 more
- 5.7 to 6.7 million bats killed in eastern North America
- Extinction of eastern Little Brown Myotis pops by 2026

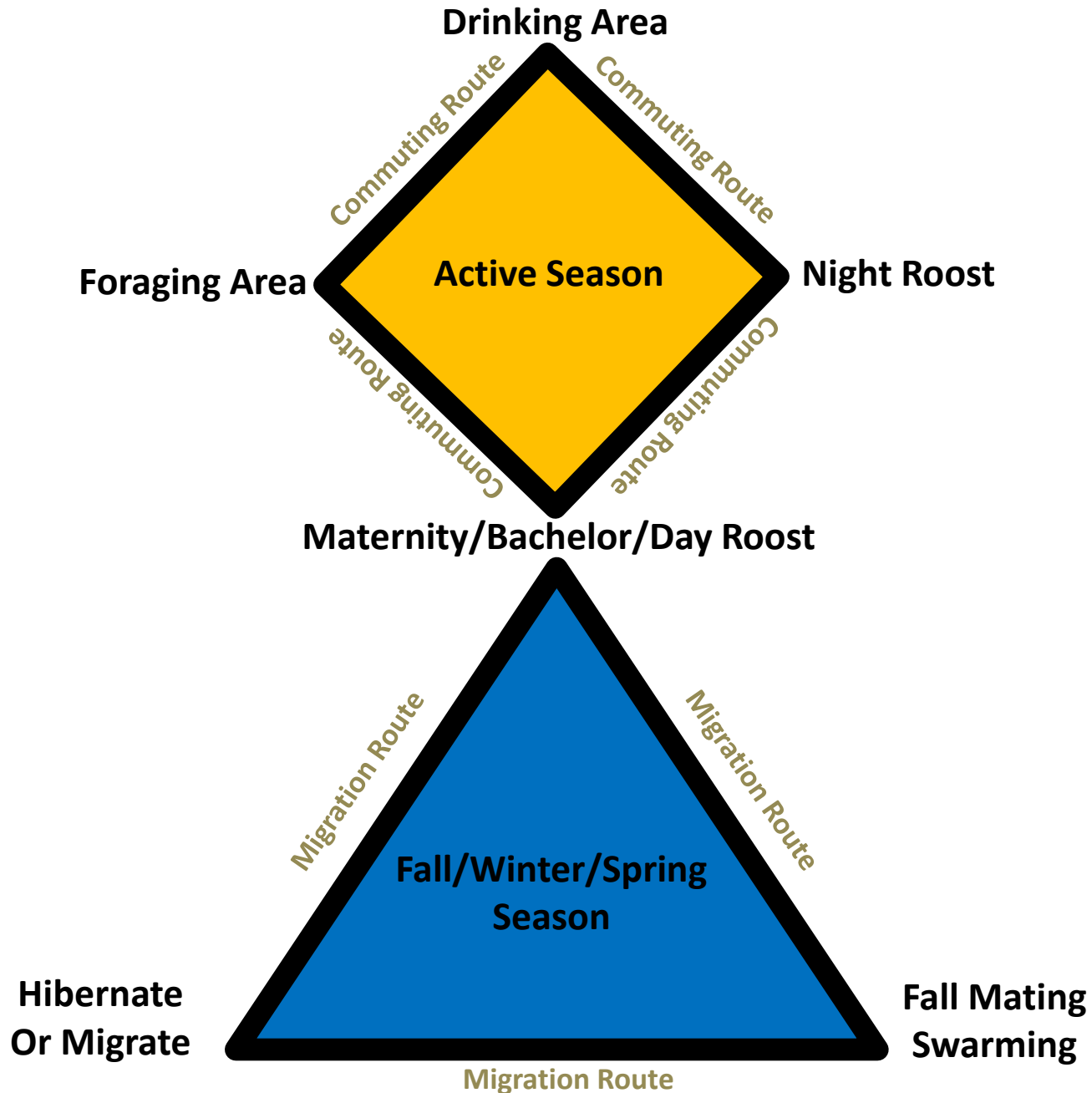


(Images from USEWS and Frick et al. 2010, Science 329: 679-682)

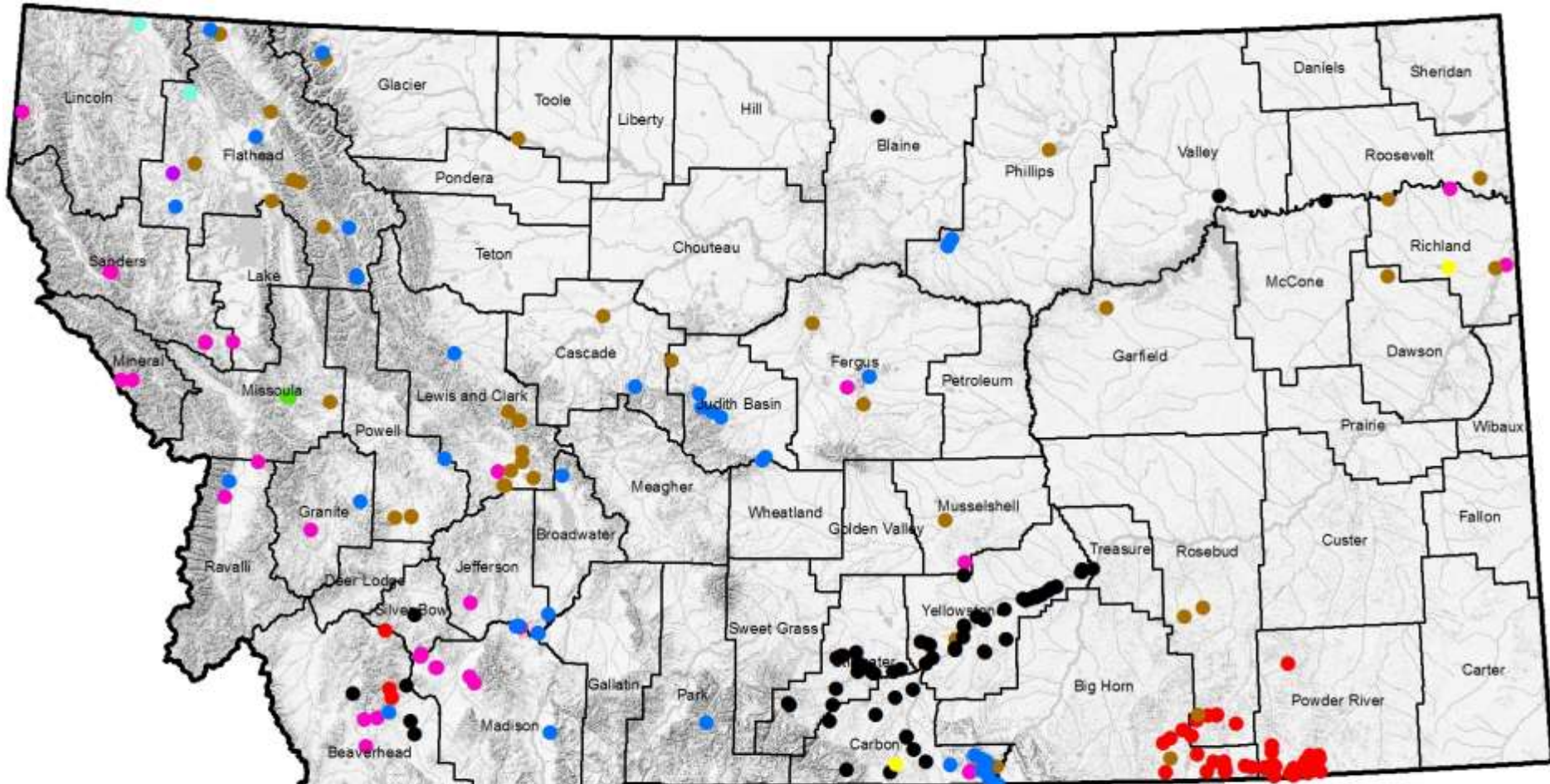
Likely WNS Impacts on Montana Bats

Species	Cave/Mine Use	MT Range/No. Recs	WNS Impact
Pallid Bat (<i>Antrozous pallidus</i>)	No	 17	?
Townsend's Big-eared Bat (<i>Corynorhinus townsendii</i>)	Year Round small numbers	 281	Vector
Big Brown Bat (<i>Eptesicus fuscus</i>)	Winter small numbers	 1,090	Mortality!
Spotted Bat (<i>Euderma maculatum</i>)	No	 108	?
Silver-haired Bat (<i>Lasionycteris noctivagans</i>)	Not in Montana, rarely elsewhere	 1,381	Vector
Eastern Red Bat (<i>Lasiurus borealis</i>)	No	 65	Vector
Hoary Bat (<i>Lasiurus cinereus</i>)	No	 1,041	?
California Myotis (<i>Myotis californicus</i>)	? Elsewhere	 189	Mortality?
Western Small-footed Myotis (<i>Myotis ciliolabrum</i>)	Year Round small numbers	 917	Mortality?
Long-eared Myotis (<i>Myotis evotis</i>)	Winter small numbers	 1,085	Mortality?
Little Brown Myotis (<i>Myotis lucifugus</i>)	Winter small numbers, but a few large aggregations	 1,468	Mortality!
Northern Myotis (<i>Myotis septentrionalis</i>)	Winter extent unknown	 1	Mortality!
Fringed Myotis (<i>Myotis thysanodes</i>)	No	 130	Mortality?
Long-legged Myotis (<i>Myotis volans</i>)	Winter small numbers	 252	Mortality?
Yuma Myotis (<i>Myotis yumanensis</i>)	? Summer mine use elsewhere	 34	Mortality?

Landscape Considerations for Bats



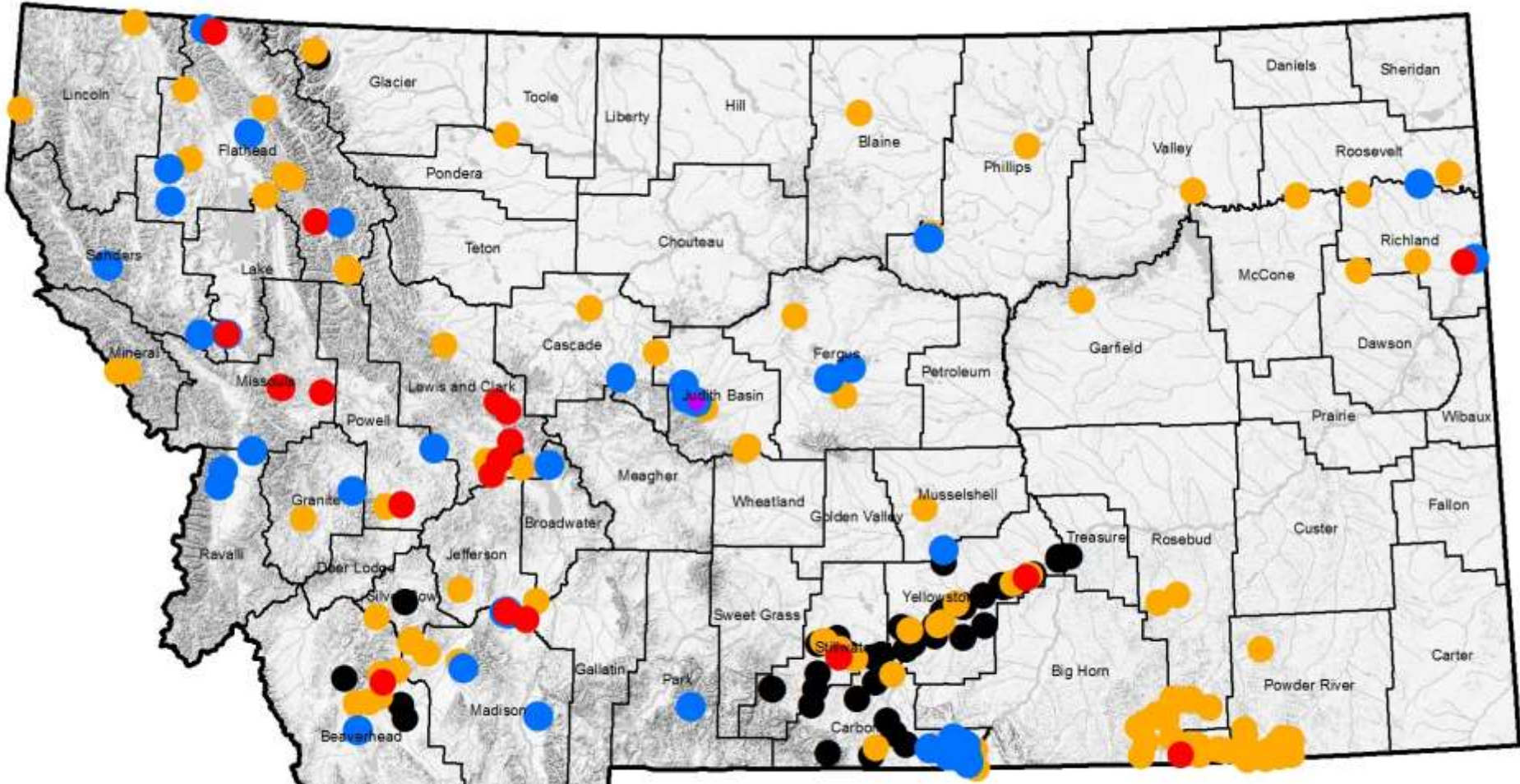
Establishment of Bat Roost Monitoring Database



- Bat House
- Bridge
- Building
- Cave
- Mine
- Other
- Rock Outcrop
- Tree
- Tunnel

Roost Type	No. Unique Sites
Bat House	2
Bridge	87
Building	40
Cave	54
Mine	52
Other	2
Rock	60
Tree	2
Tunnel	1

Overview of Montana Bat Roost Use Types



- Bachelor Roost
- Maternity Roost
- Hibernacula
- Day and Night Roost
- Night Roost

Roost Type on Survey	No. Records
Bachelor Roost	1
Maternity Roost	45
Hibernacula	98
Day and Night Roost	225
Night Roost	72



Working with Cavers



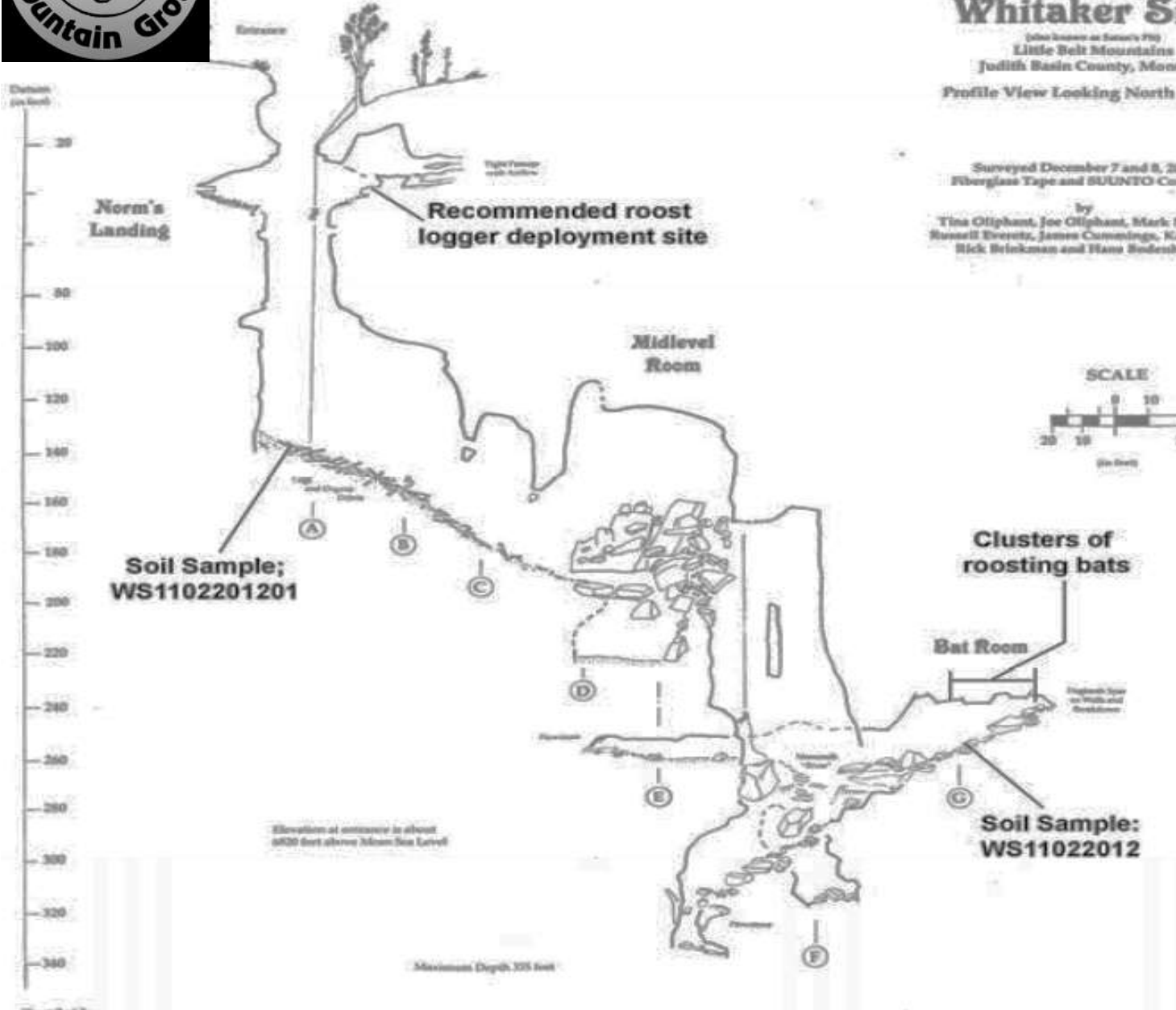
Whitaker Sink

(Also known as Sawyer's Pit)
Little Belt Mountains
Judith Basin County, Montana

Profile View Looking North 18° East

Surveyed December 7 and 8, 2002
Fiberglass Tape and SUUNTO Compass

by
Tina Oliphant, Joe Oliphant, Mark Madson,
Russell Everett, James Cummings, Kasey Cory,
Rick Brinkman and Hans Bodenhamer



Map and Photo by Hans Bodenhamer





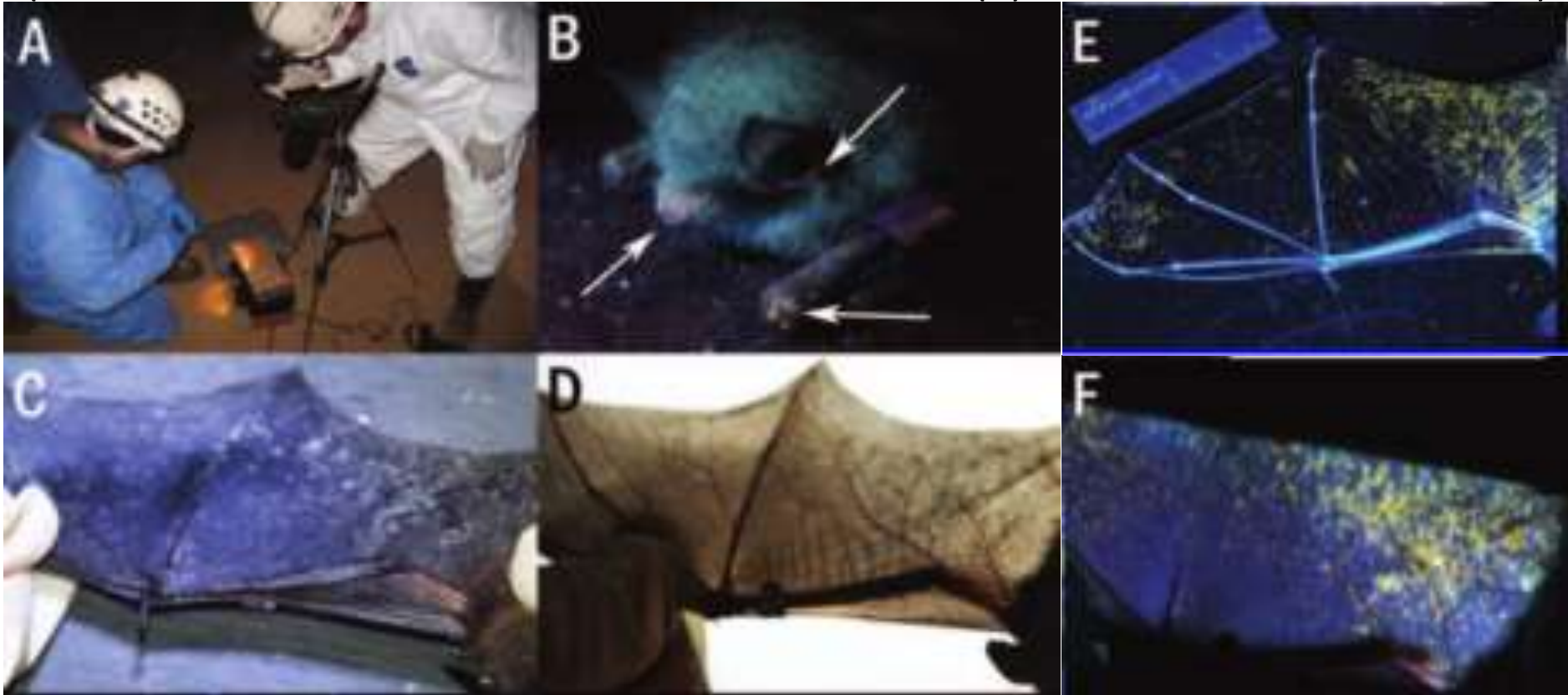




Detection of *P. destructans*

Orange-Yellow Fluorescence 365-385 nm UV

(Turner et al. 2014, Journal of Wildlife Diseases 50(3):DOI:10.7589/2014-03-058)



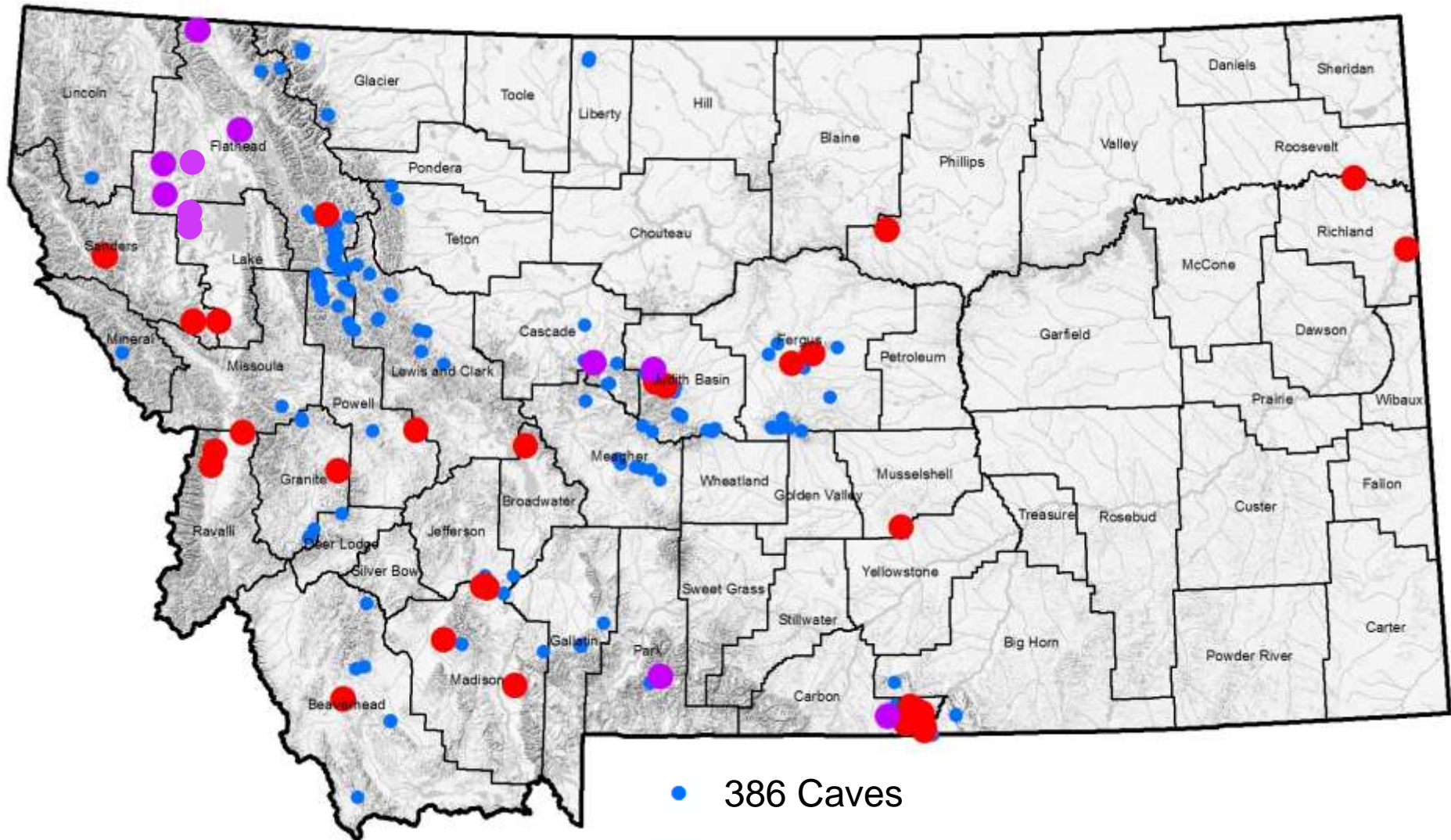
Swabs of Epidermis or Substrate for PCR-based ID

(Shuey et al. 2014, Applied and Environmental Microbiology 80(5):1726-1731)

(Muller et al. 2013, Mycologia 105(2):253-259)



Montana Caves and Known Bat Hibernacula

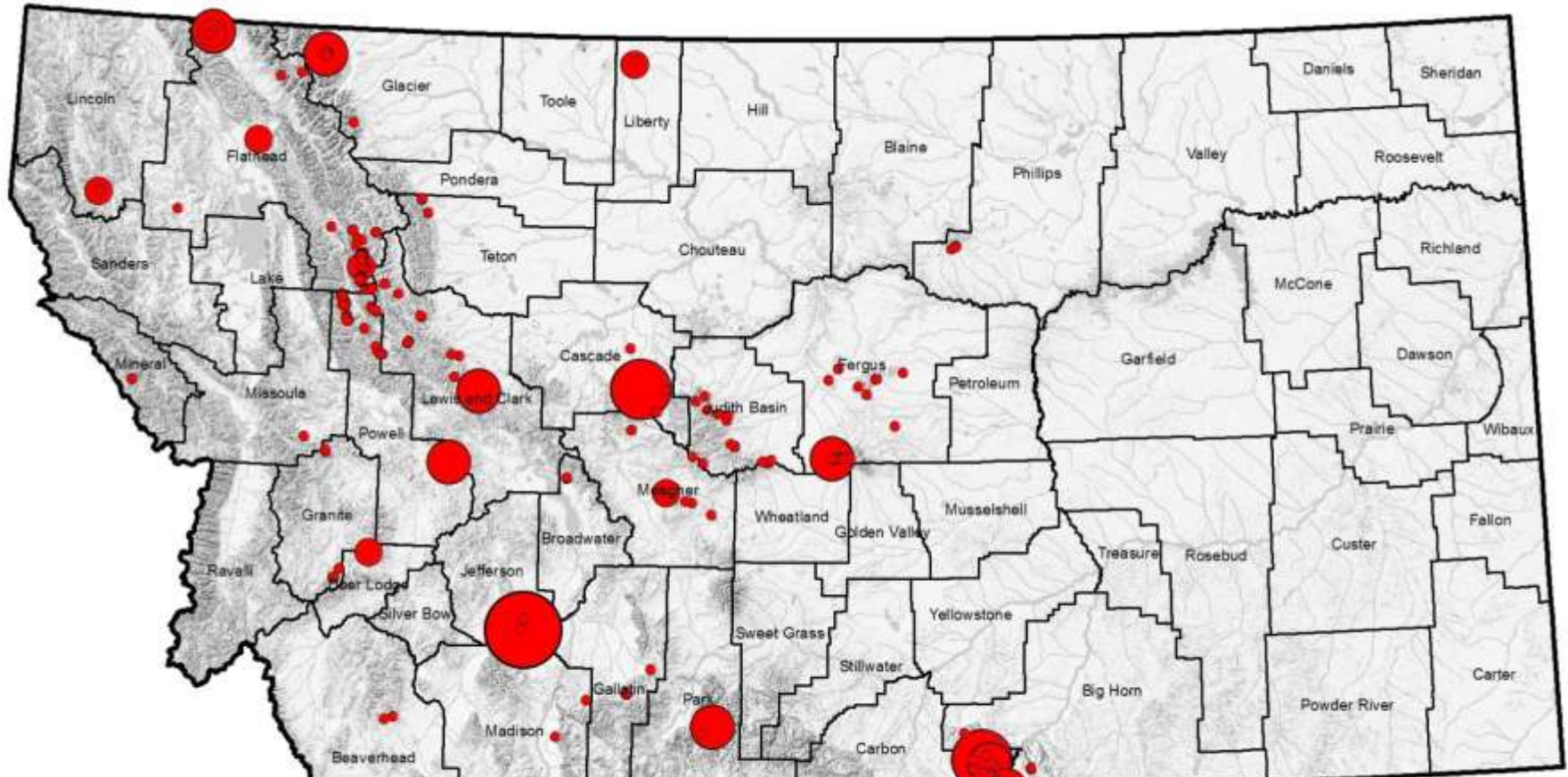


● 386 Caves

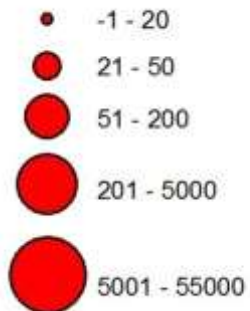
● 41 Hibernacula detected prior to 2010

● 12 new Hibernacula detected since 2010

Annual Estimates of Cave Visitation



Estimated No. Visits



Most Visited Caves (estimated 100+ visits per year)

Lewis and Clark Caverns*
Lick Creek Cave*
Big Ice Cave*
Poia Lake Cave*
Mill Creek Crystal Cave*
Ophir Cave*

Bighorn Caverns*
Snowy Mountain Ice Cave
Yakinikak Creek Cave #1
Yakinikak Creek Cave #2
Blacktail Ranch Cave
 * Bat Use Documented

Numbers of Bats at Montana Hibernacula

Lick Creek Cave

- 140 Myotis species
- 2 Long-legged Myotis
- 1 Long-eared Myotis

Whitaker Sink

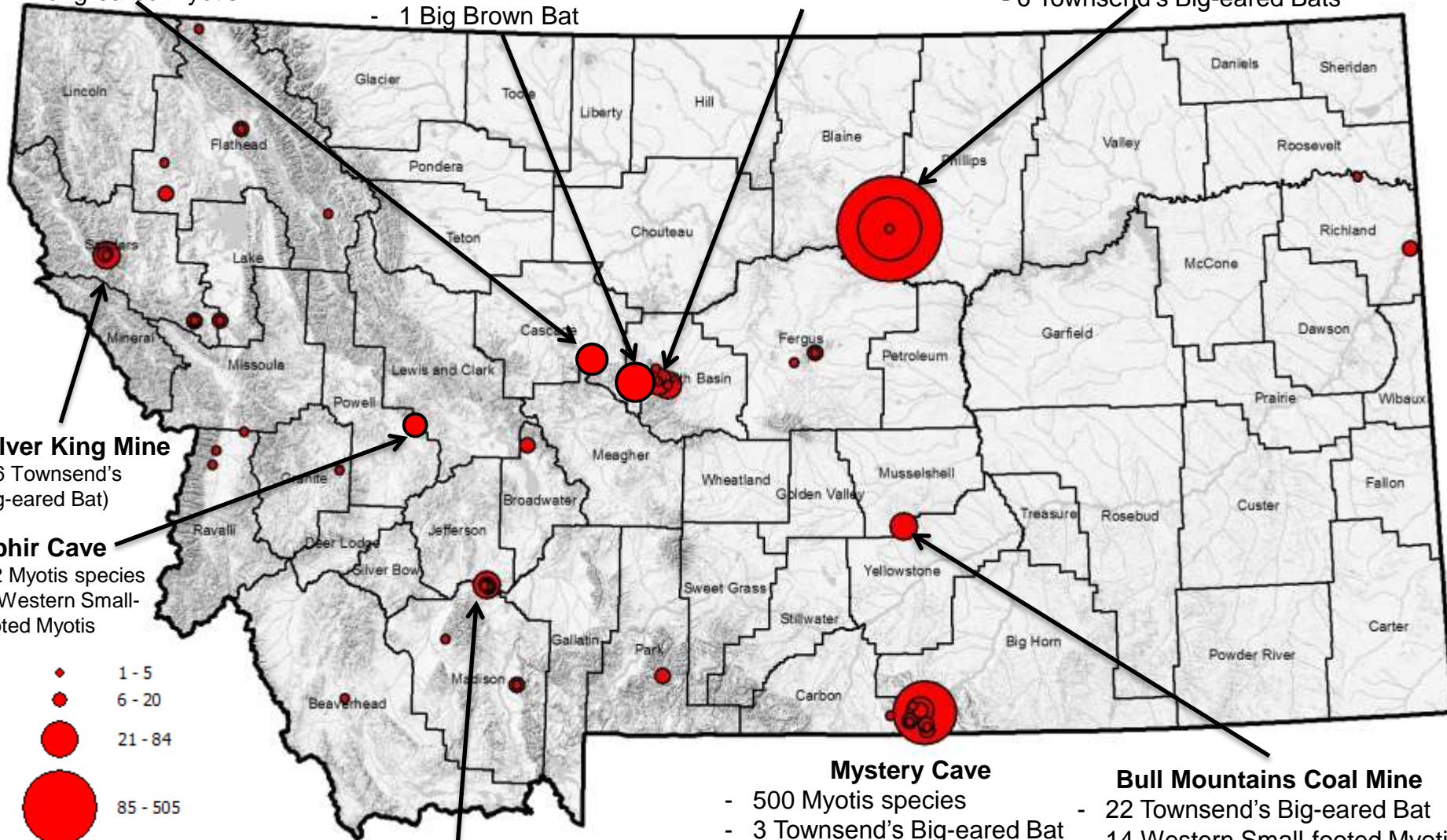
- 214 Myotis species
- 1 Long-legged Myotis
- 1 Big Brown Bat

Old Dry Wolf Station

- 63 Unidentified bats

Azure Cave

- 1751 Myotis species
- 6 Townsend's Big-eared Bats



Silver King Mine

(36 Townsend's Big-eared Bat)

Ophir Cave

-42 Myotis species
-2 Western Small-footed Myotis

Lewis & Clark Caverns

- 14 Townsend's Big-eared Bat
- 3 Western Small-footed Myotis
- 12 Myotis species

Mystery Cave

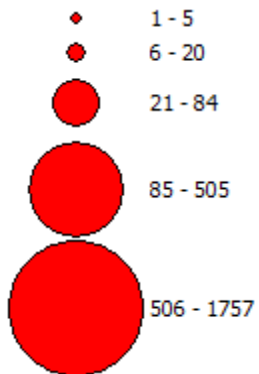
- 500 Myotis species
- 3 Townsend's Big-eared Bat
- 1 Big Brown Bat
- 1 Long-eared Myotis

Bull Mountains Coal Mine

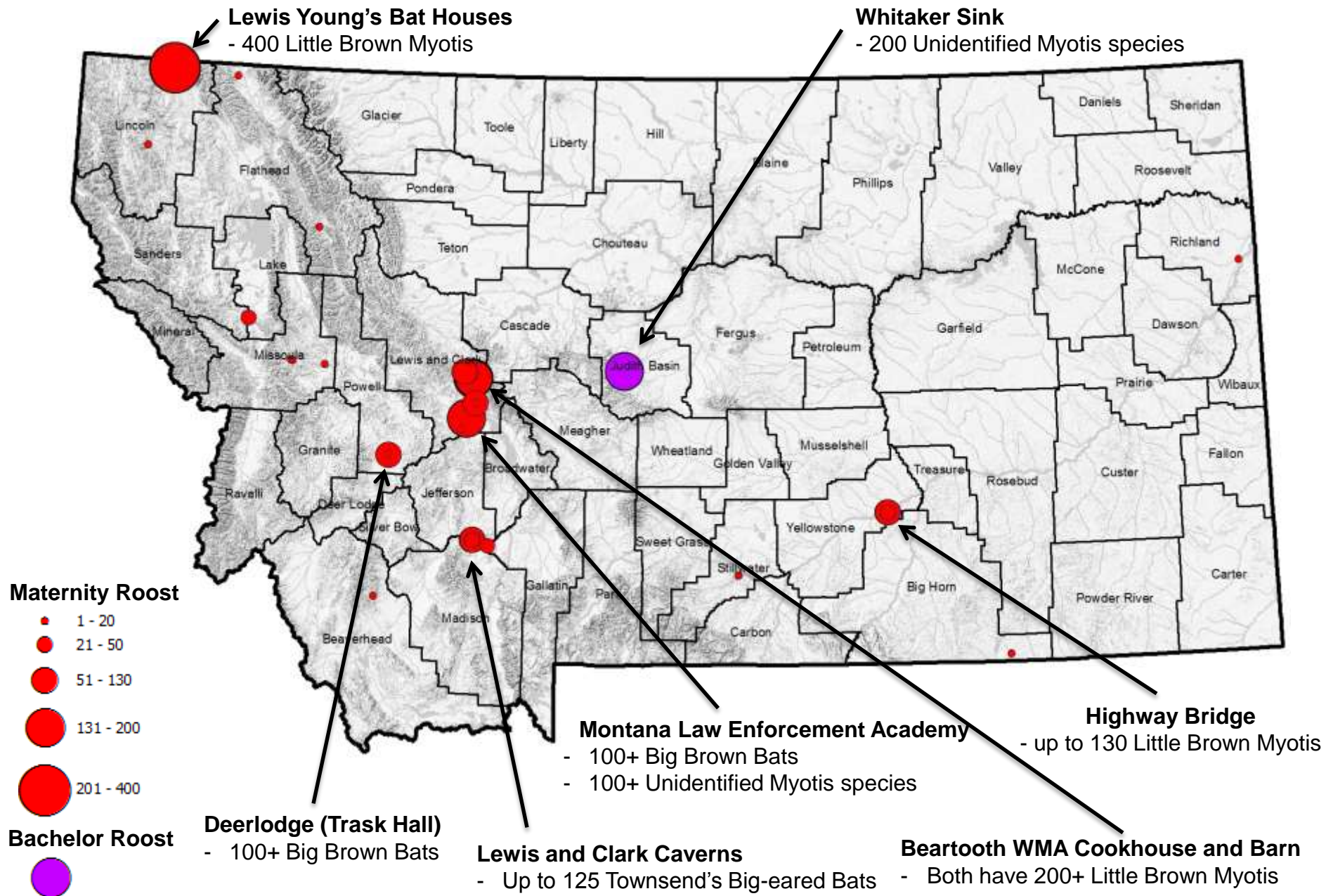
- 22 Townsend's Big-eared Bat
- 14 Western Small-footed Myotis

Little Ice Cave

- 45 Myotis species

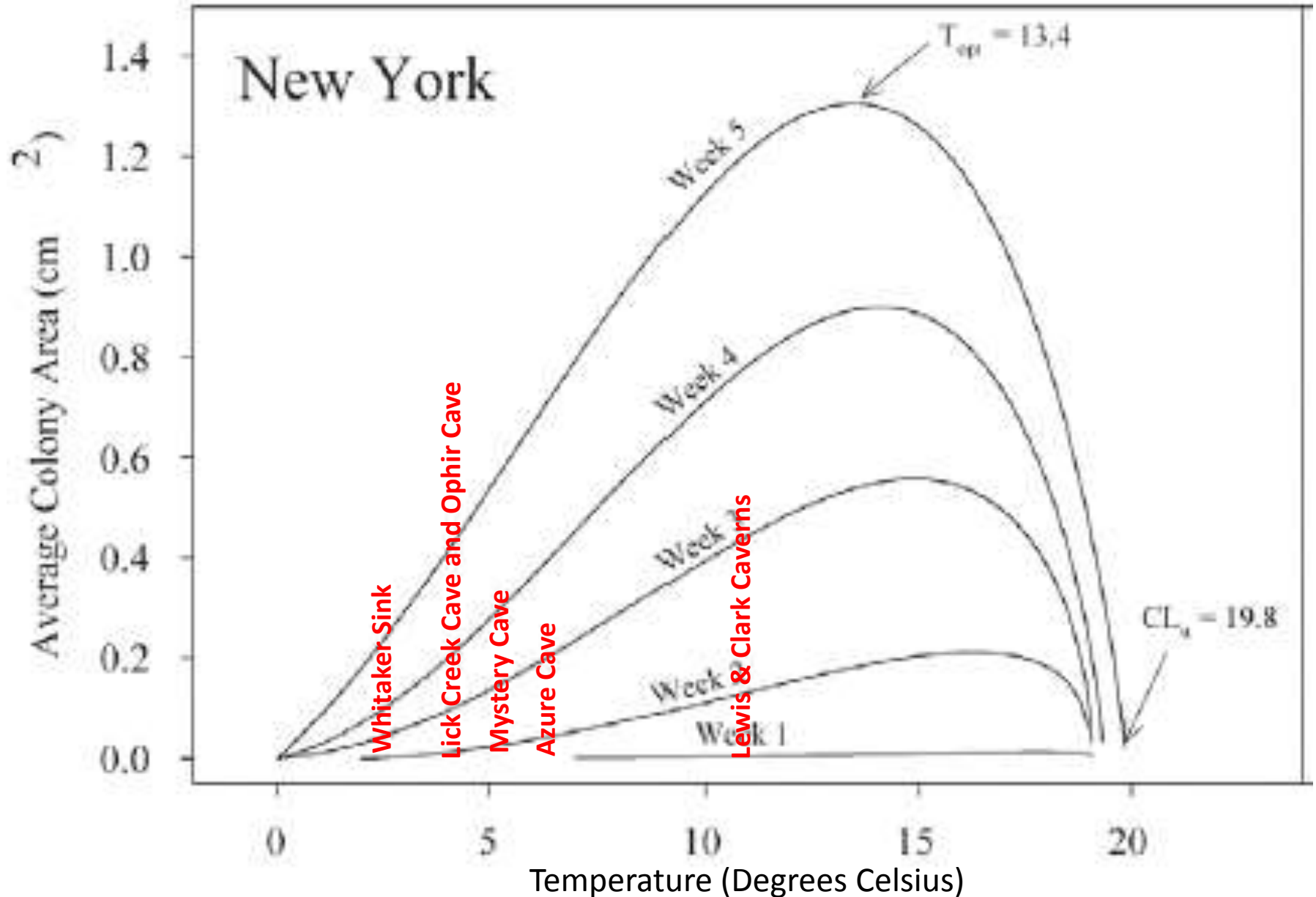


Numbers of Bats at Maternity and Bachelor Roosts



Growth of *Pseudogymnoascus destructans*

(Verant et al. 2012, PLoS One 7(9):e46280)



Just Where Are Our Bats are Overwintering?



Educational Signs and Visitation Monitoring

LICK CREEK CAVE

BATS IN PERIL



Species? roost site in Azure Cave, Montana (courtesy of somebody Bryce Maxwell knows)

WHITE-NOSE SYNDROME KILLS

In 2006, a caver in New York noticed hibernating bats with an unusual white substance on their muzzles, like frost on the beard of a skier. This White-Nose Syndrome has been linked to a fungus (*Pseudogymnoascus destructans*) that has already killed more than 6 million bats. White-Nose Syndrome causes bats to lose their fat reserves long before the winter is over. Without these reserves—vital for surviving hibernation—they often die.

And there is no known cure.

Little brown bats with WNS (courtesy of Nancy Headip, NY Dept. of Environmental Education)



Left: Townsend's big-eared bat (© Bruce Tabern) Above: Little brown bat with WNS (courtesy of Ryan von Linden)

YOU CAN HELP REDUCE THE SPREAD

White-Nose Syndrome is primarily spread from bat to bat. However, people can potentially spread the fungal spores among caves, mines, and other bat roost sites with contaminated clothing or equipment. Here's how you can reduce the risk:

- ✓ Clean and decontaminate all items that have been in a cave, mine, or roost before entering a new site.
- ✓ If you have been in a potentially infected site, do not bring any item from that trip into a new cave.
- ✓ To minimize disturbance, avoid caves, mines or passages with hibernating bats.







Conducting a bat inspection (courtesy of Ann Prosser, USFWS)



THE BEAUTY OF BATS

The poor bat—for centuries it has been portrayed as a blind, blood-sucking vampire or an ugly flying mouse. In truth, they have astonishing capabilities and are a vital part of our ecosystem.

-  Some bats are essential pollinators for many plants.
-  A single bat can eat up to 1,000 mosquitoes in an hour.
-  Bats are not blind and most can see as well as humans. If a bat swoops toward you, it's probably after the insect hovering above your head.
-  Bats have a sonar system (echolocation) that allows them to navigate at break-neck speed in total darkness. Nothing built by humans can compare.

BATS ARE AN INTEGRAL PART OF OUR ECOSYSTEMS—
WE CAN HELP SAVE THEM FROM THIS DEVASTATING DISEASE!



For further information, visit the Northern Rocky Mountain Grotto at www.NRMG.org



MONTANA Natural Heritage Program



Montana Fish, Wildlife & Parks

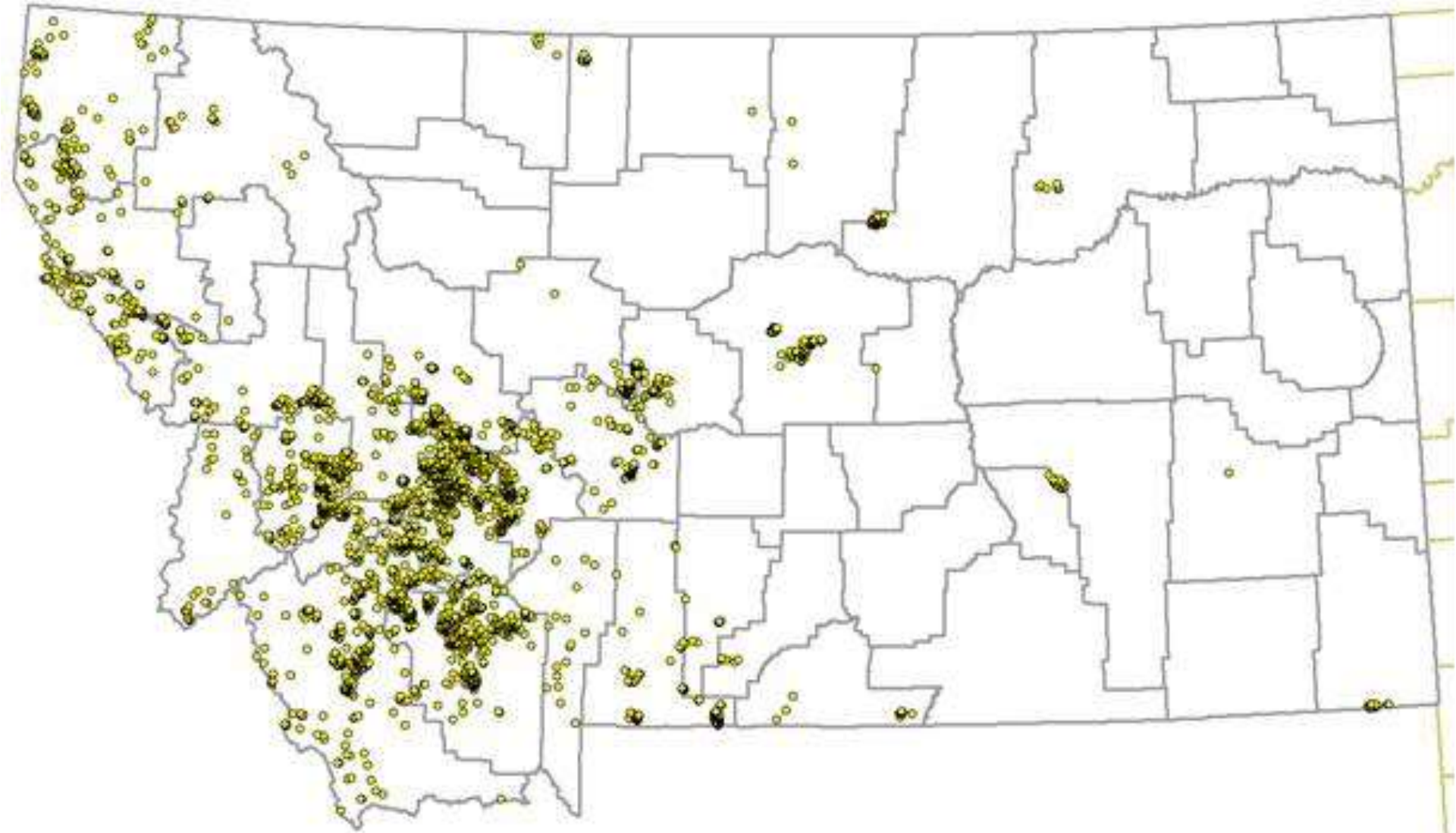
U.S. FISH & WILDLIFE SERVICE



LEWIS AND CLARK National Forest



Montana's Abandoned Mines



HIBERNATING BATS ARE SENSITIVE TO NONTACTILE HUMAN DISTURBANCE

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I measured natural baseline activity and the response of hibernating bats to human presence in a hibernaculum containing ca. 1,300 bats of the species *Myotis lucifugus* and *Myotis septentrionalis*. Infrared detectors registered baseline flight movements in the hibernaculum over 62 days in January to March and over 8 days in April, when no observer was present, and they also registered the increase in flight movements following six visits of 1–2 h each to the hibernaculum. Visits to the mine resulted in a dramatic increase in flight activity of bats beginning within 30 min of the visit, peaking 1.0–7.5 h later, and remaining significantly above baseline level for 2.5–8.5 h. These results show that, contrary to previously published studies, hibernating bats are sensitive to nontactile stimuli and arouse and fly following human visits. To avoid increased mortality due to the premature depletion of fat reserves, human visits to hibernacula should be kept to a minimum.

Thomas 1995, *Journal of Mammalogy* 76(3):940-946.