mother nature network

Bats & Mines 101

MONTANA FISH, WILDLIFE & PARKS

MONTANA Natural Heritage Program

WHO?

Partners


MONTANA
FISH, WILDLIFE & PARKS


FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE


U.S. DEPARTMENT OF THE INTERIOR


Northern Rocky Mountain Grotto


MONTANA
Natural Heritage
Program


Bigfork High School
Cave Club


Montana Department of
Environmental Quality


MONTANA
DPHHS
Healthy People. Healthy Communities.


U.S.
FISH & WILDLIFE
SERVICE

Bats of the World

Nearly 1,300 species worldwide

Over 20% of all mammals are classified as bats
(1 of every 5 mammals!)

Two orders:

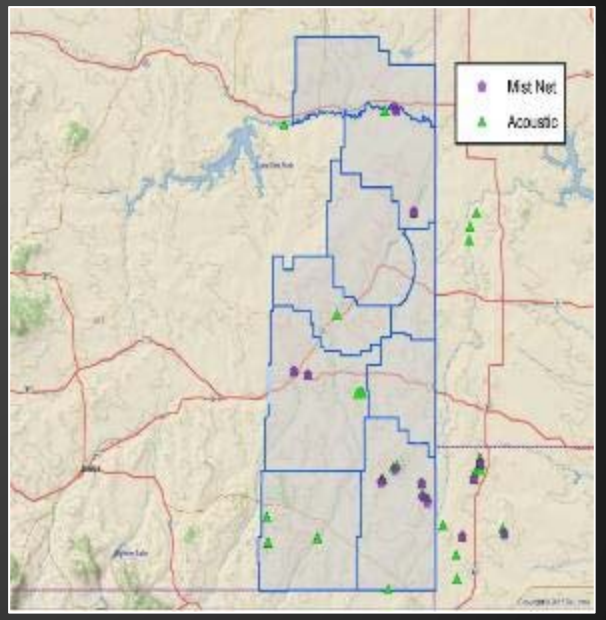
- Mega – big bats: largely fruit-eating or flying foxes
- Micro – small bats: insectivores

Montana Bats

15 species of bats in Montana

Sensitive Species

There is one federally listed species in Montana (Northern Myotis).



Species is listed within 9 of the furthest east counties.

There is one historical winter record.

Targeted captures since 2017 have found several more including lactating females and young of the year.

There are 10 Montana listed Species of Concern.

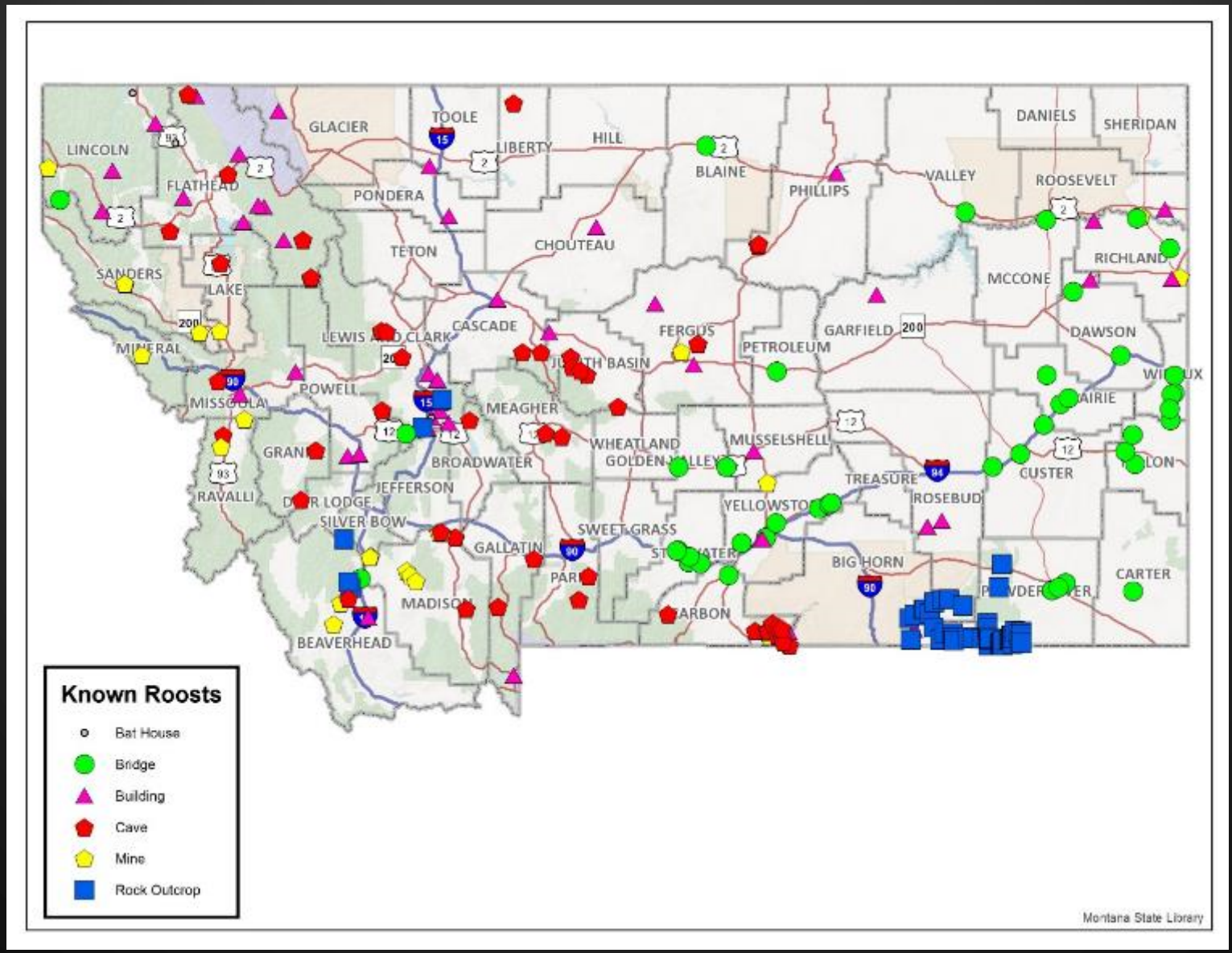
WHERE?

Caves
Bridges
Trees
Buildings
Cliffs
Houses
Mines

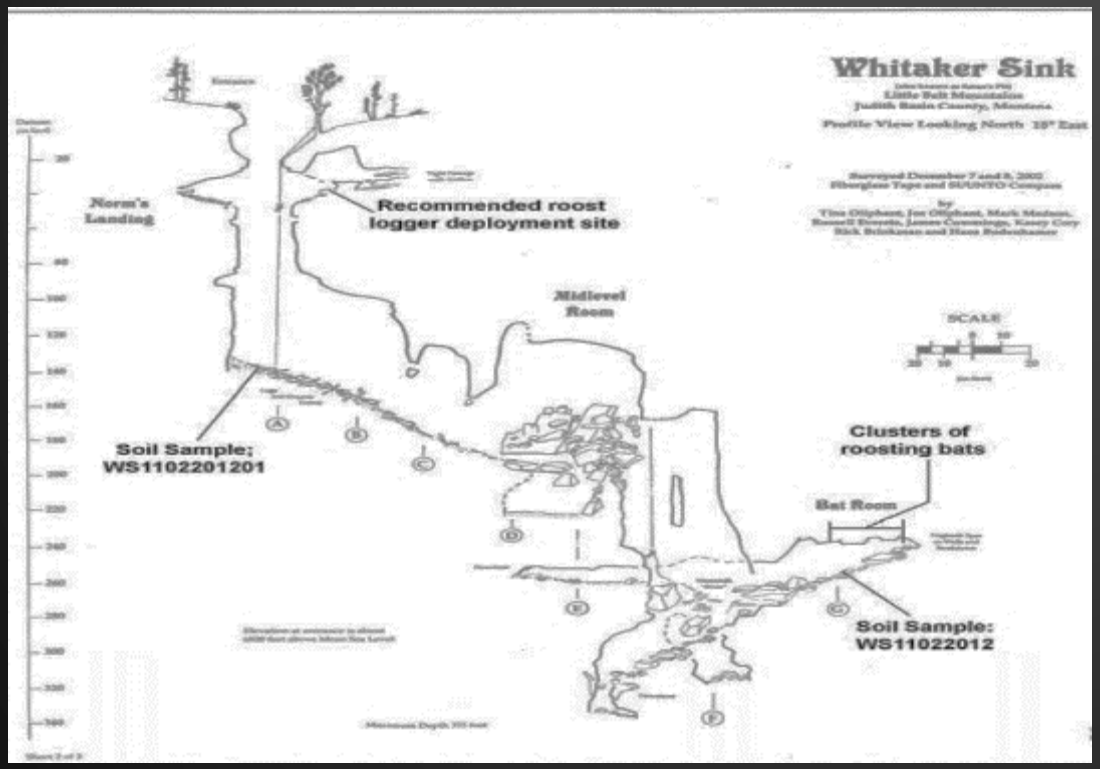
Tiny, tight spaces

K DuBois

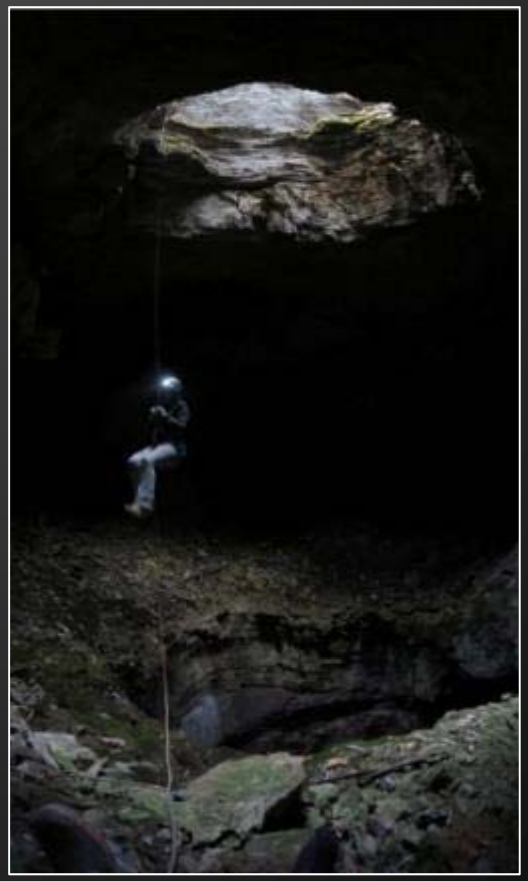
Summer Roosts in Montana



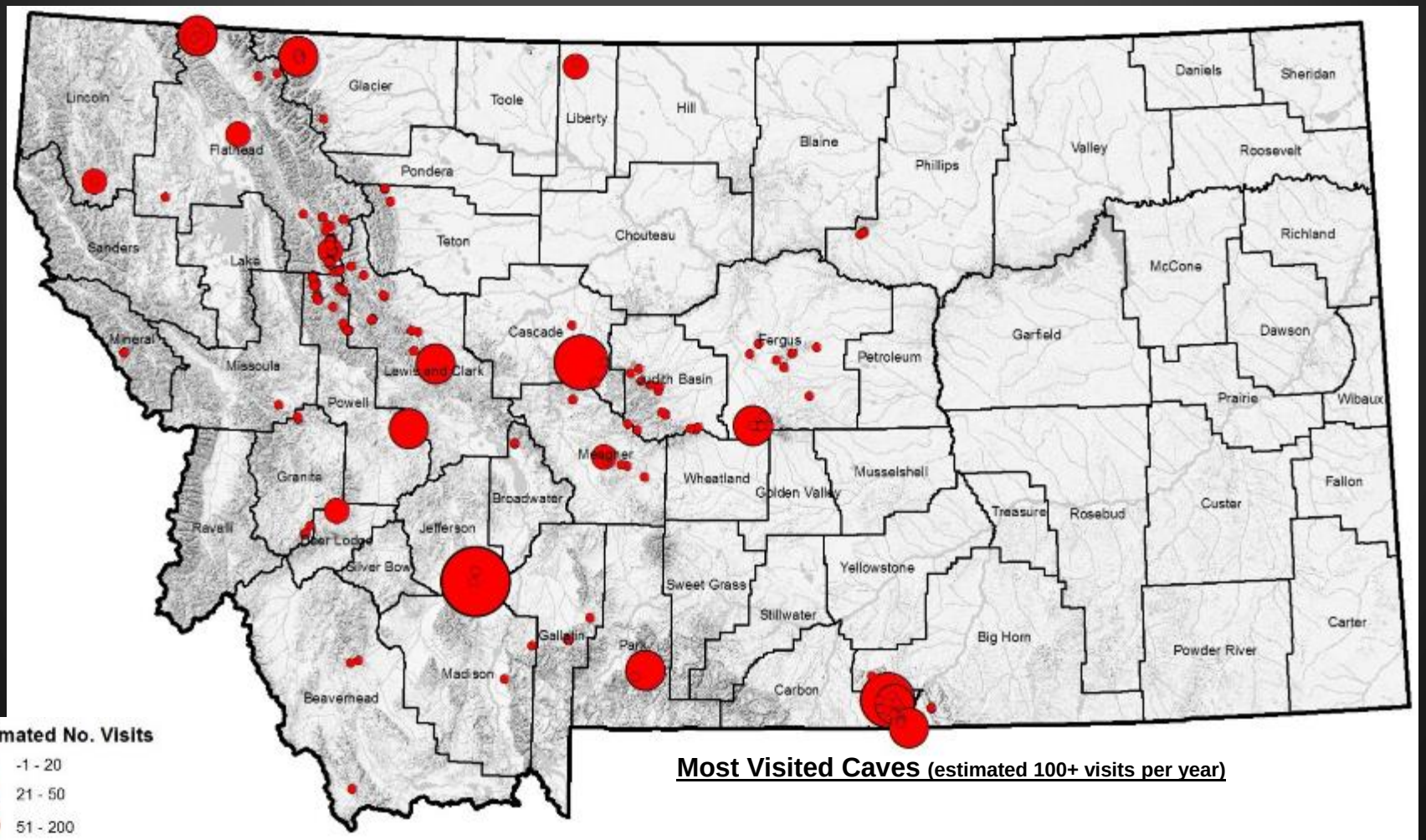
Cave Habitat



Map and Photo by Hans Bodenhamer

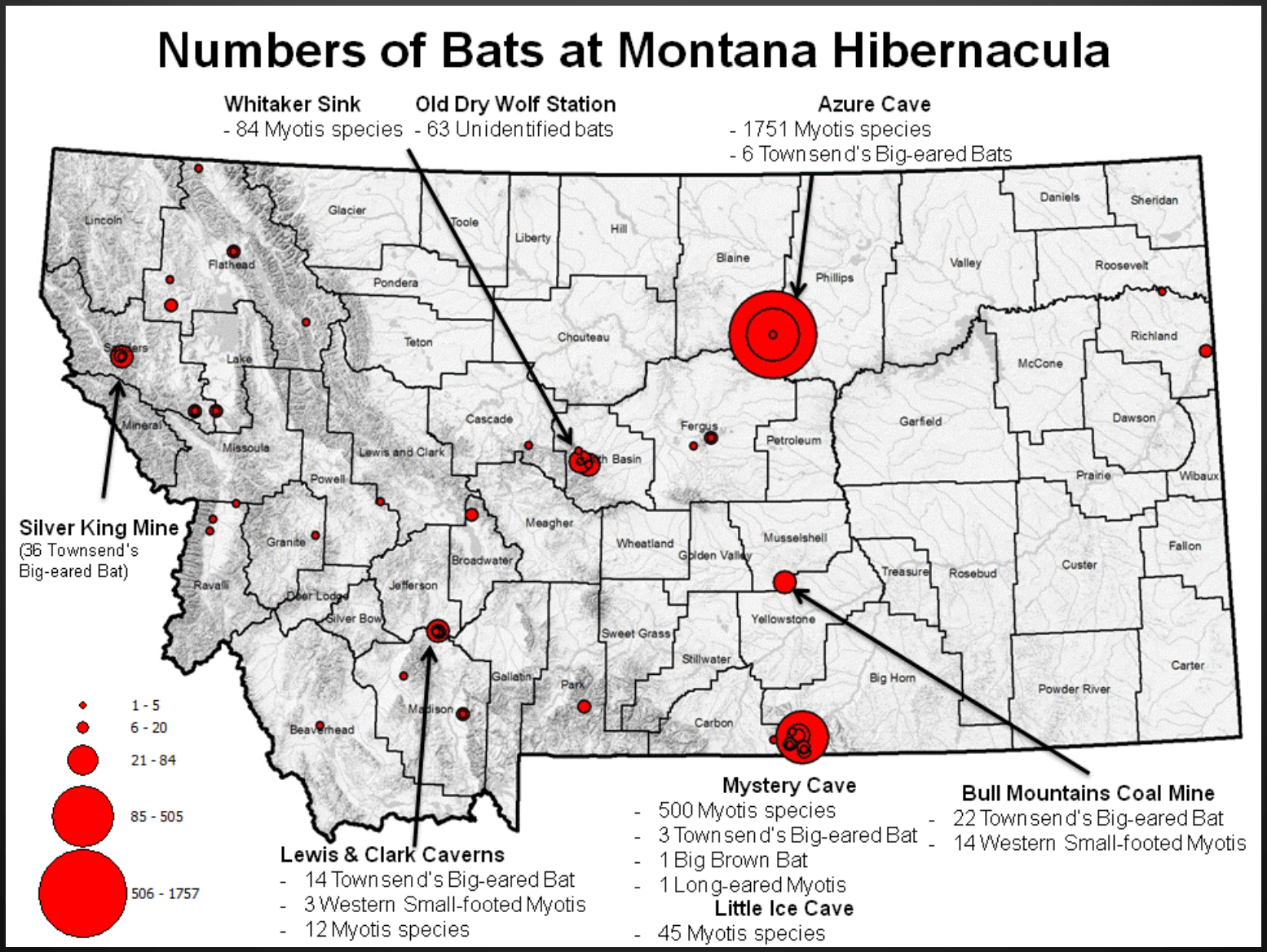


Annual Estimates of Cave Visitation



Most Visited Caves (estimated 100+ visits per year)

Winter Habitat



Mine Habitat

- Roughly half of all bat species in North America rely on subterranean habitat for some part of their life cycle.

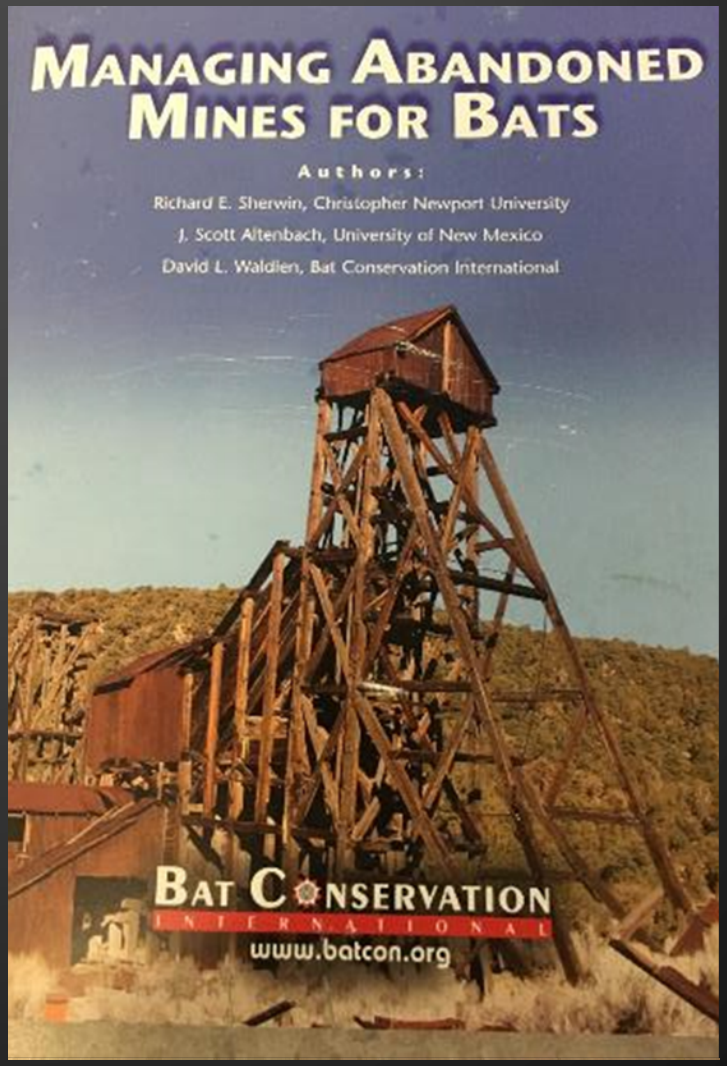
Photo: Brian Corbett

- Huber Mine in Texas houses millions of bats

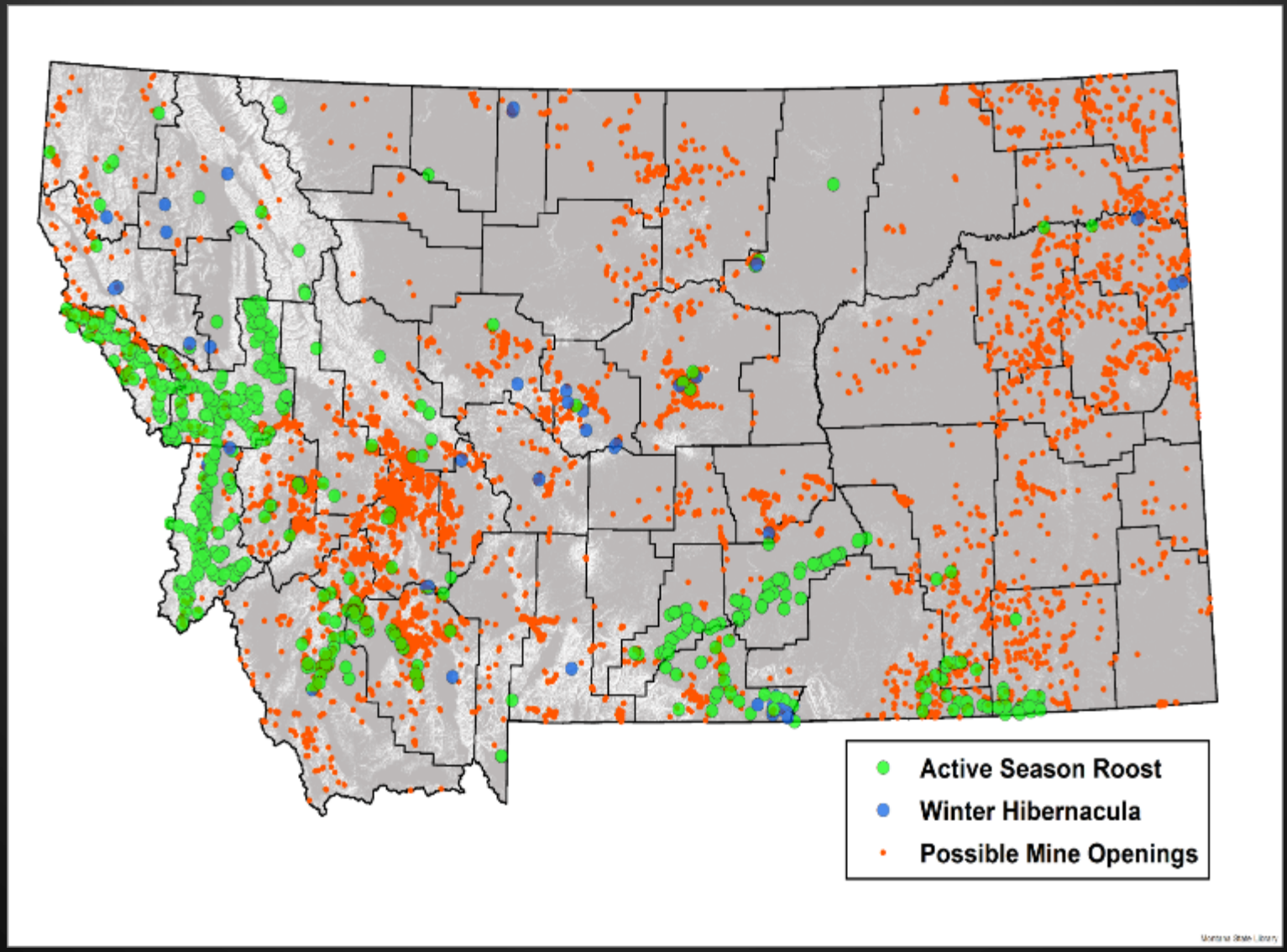
- Montana mine in the ghost town of Ruby, Arizona is used by nine species of bats year round.

Mine Habitat

- Bats are the single biological component that programmatically influence mine closure and mitigation efforts.



Mines in Montana



WHAT DO WE KNOW?
&
HOW DO WE KNOW IT?

Bat Monitoring Techniques

Presence/absence surveys

(droppings or visual)

Acoustic surveys

Roost counts-visual

Capture-mist nets, harp traps

Marking-banding, microchips

Radio telemetry

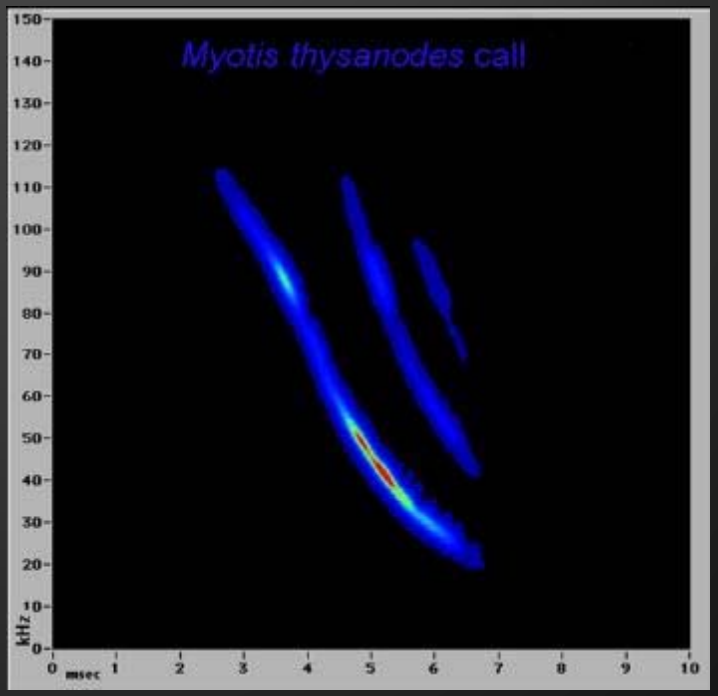
Night video, thermal imaging, etc.

Genetic analysis-tissue & droppings

Dogs???

K. DuBois

Acoustic Monitoring

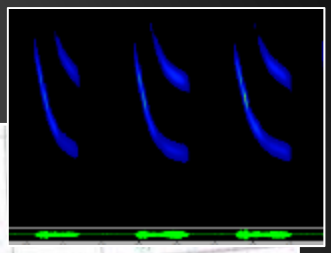


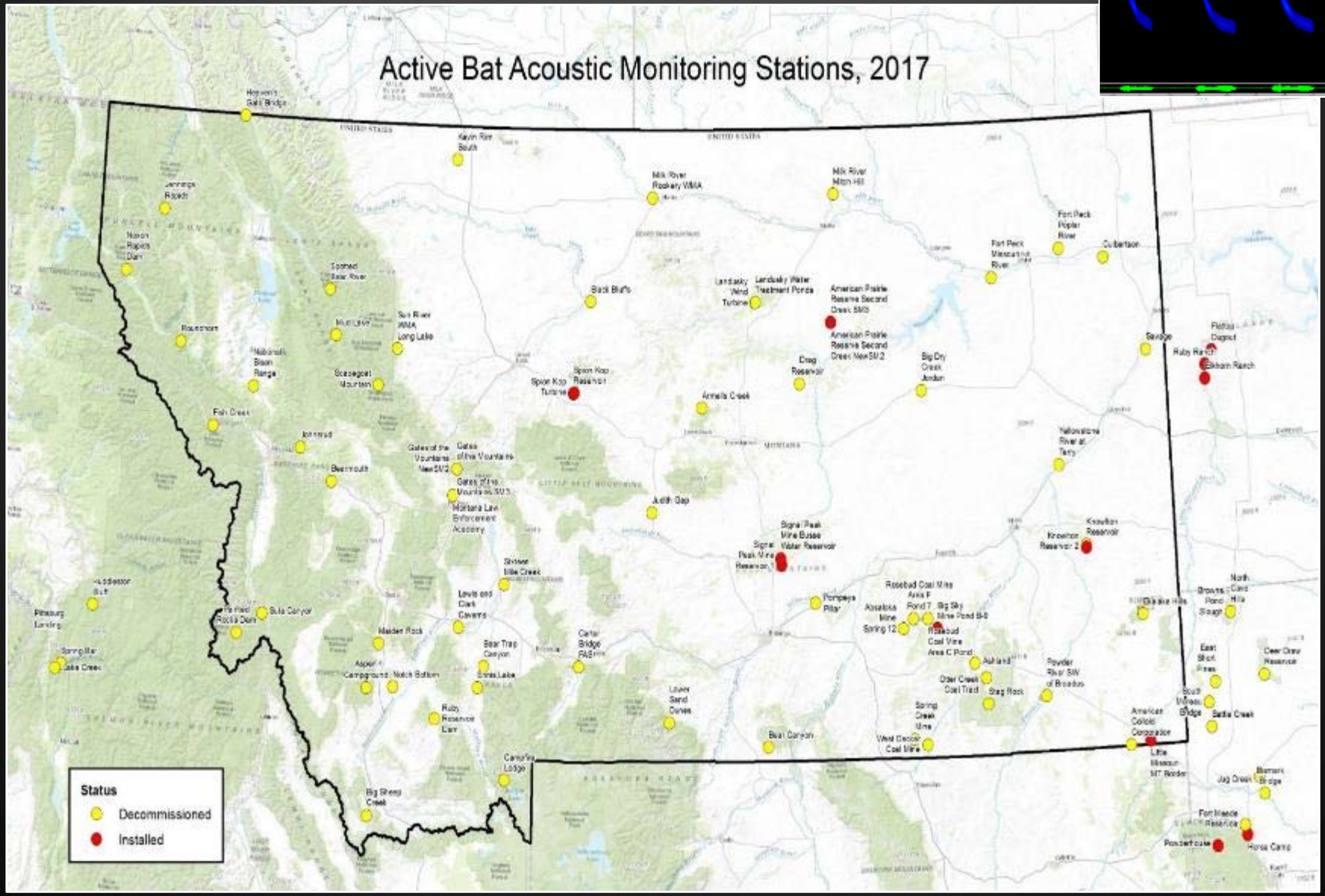
Objectives of Acoustic Surveillance

Document year-round spatial and temporal activity patterns:

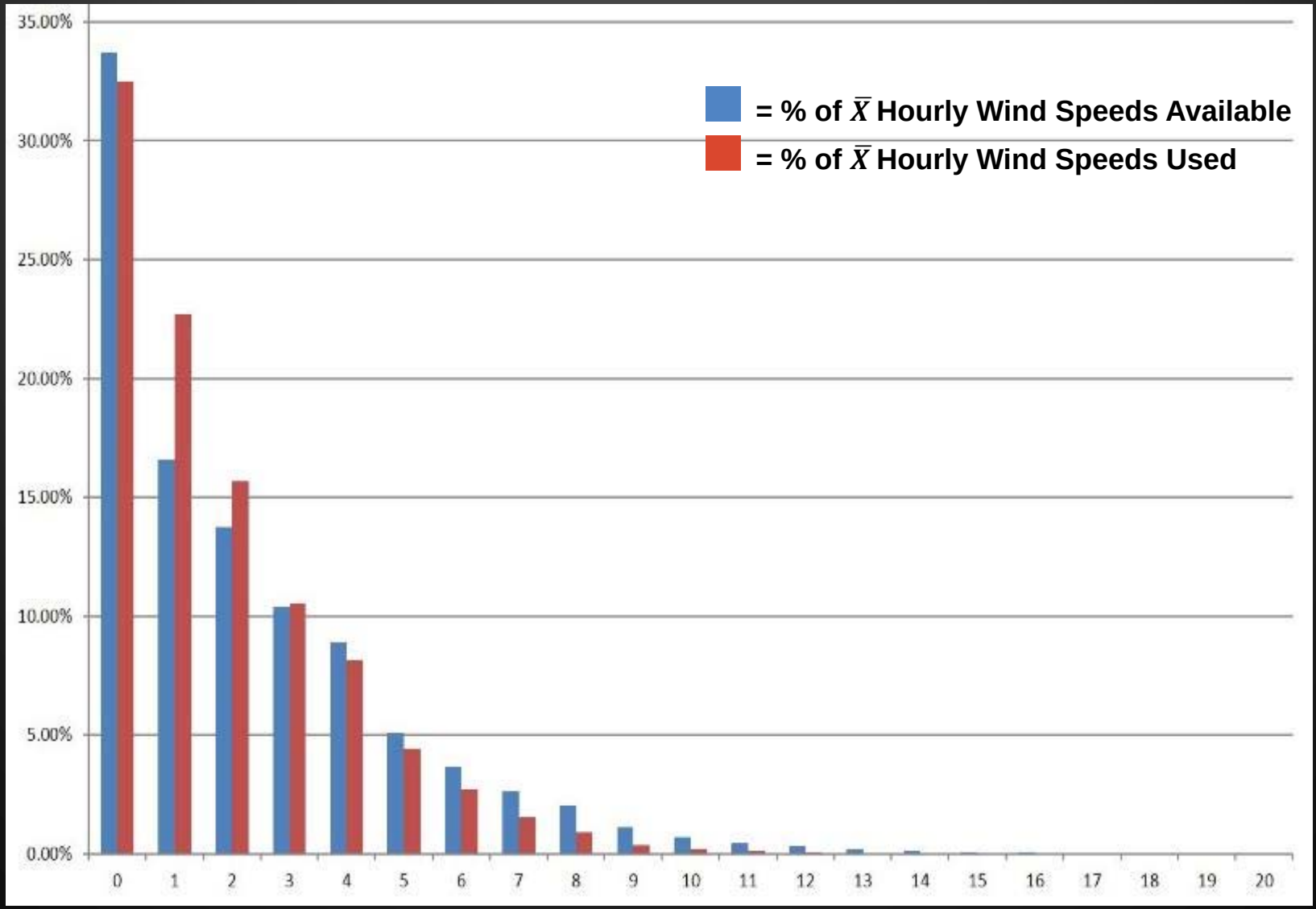
- Nightly activity levels
- Monthly species presence
- Correlate activity with weather variables
- Correlate activity with landscape variables
- Timing of migrations
- Timing of hibernation

Acoustic Detectors

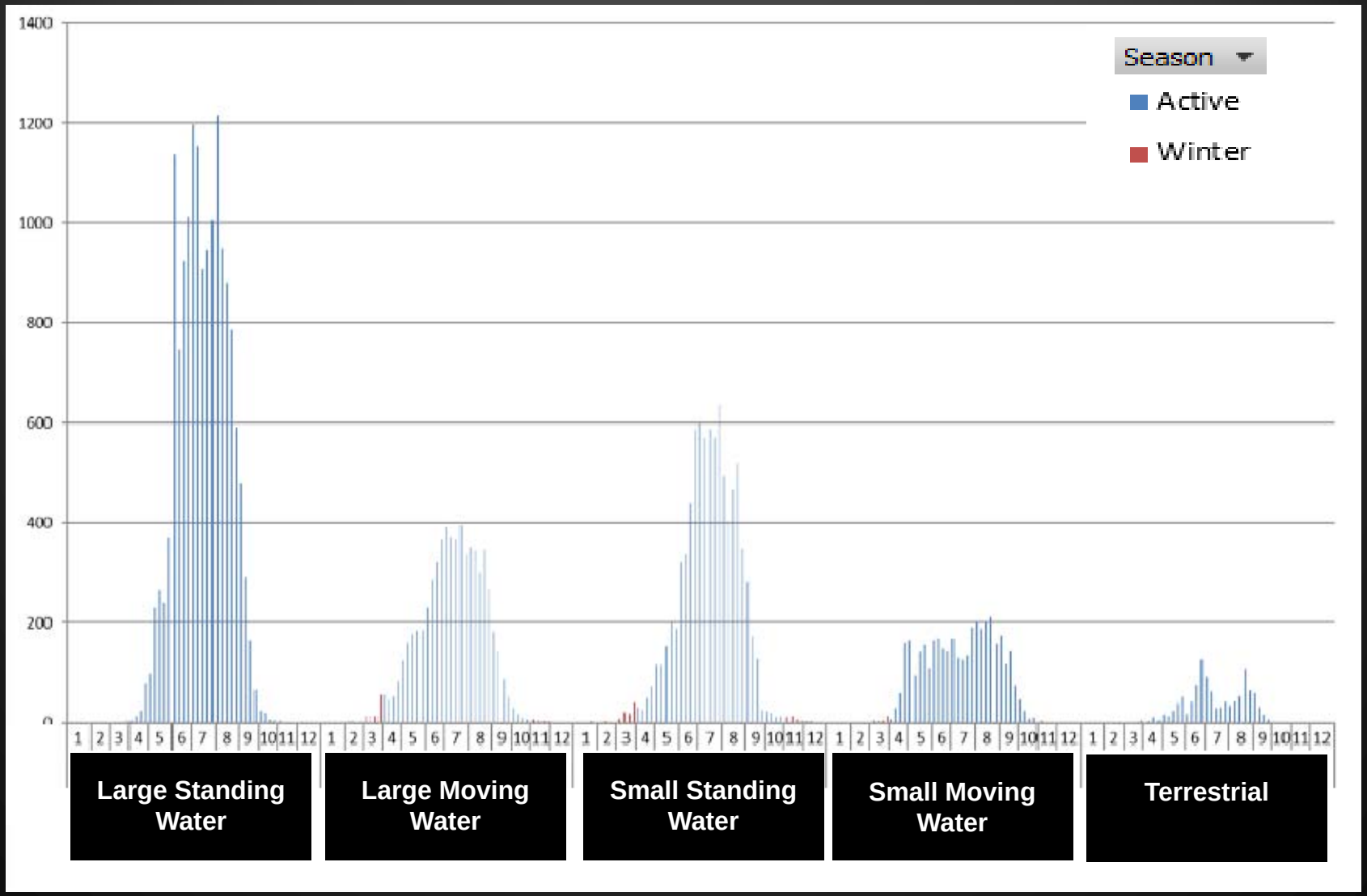




Bats More Active At Wind Speeds of 1-3m/s



Bats Have Greater Activity in Areas with Standing Water



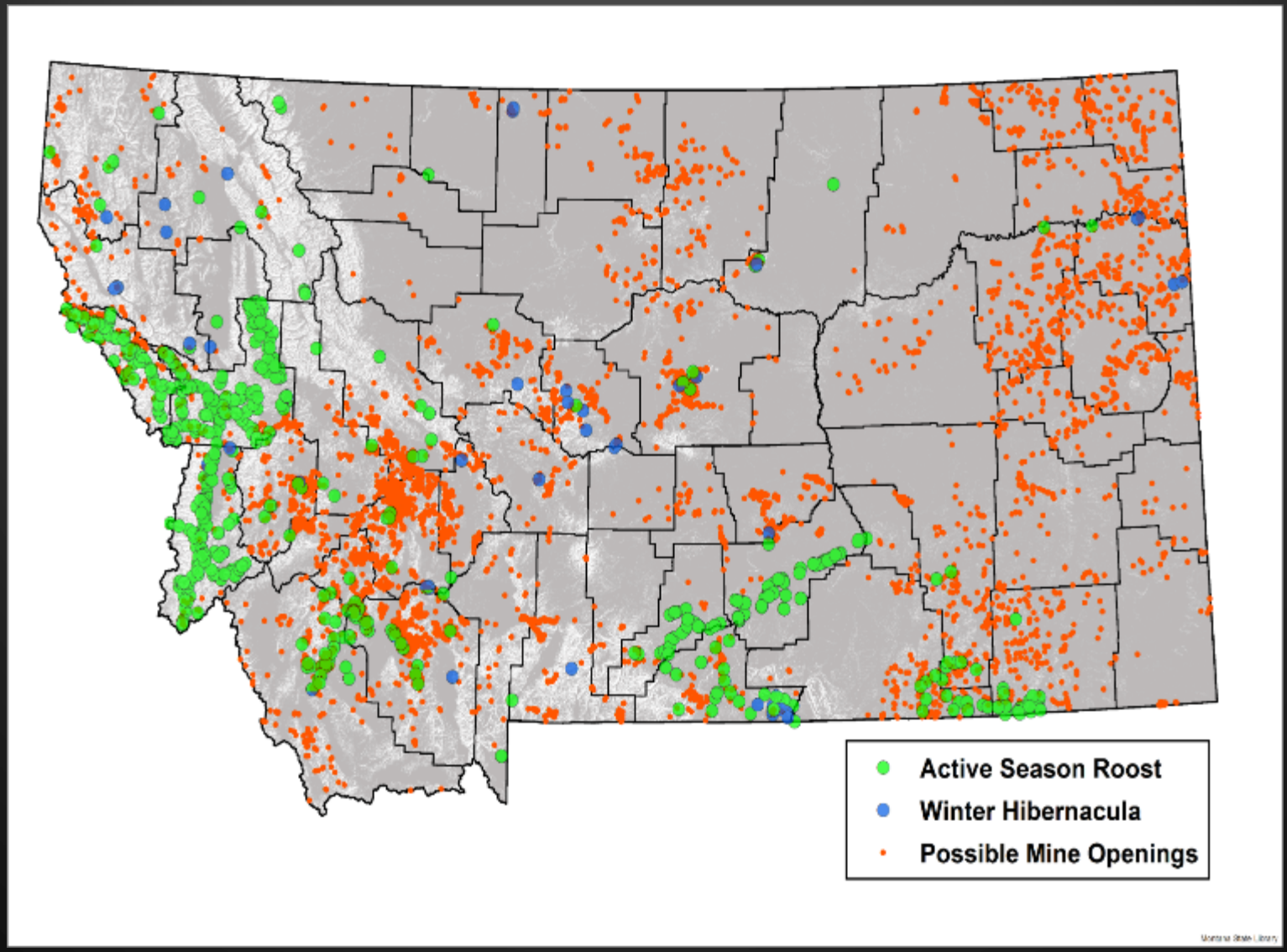
Timing of Hibernation

Scientific Name	Species	Earliest Record	Start Common Presence	End Common Presence	Latest Record
Myotis thysanodes	Fringed Myotis	Mar-28	Mid-April	Mid-Oct	Oct-31
Euderma maculatum	Spotted Bat	Mar-10	Mid-June	Early Oct	Nov-12
Antrozous pallidus	Pallid bat	Apr-1	Mid-May*	Early Sept*	Sept-23
Lasiurus cinereus	Hoary Bat	Mar-22	Late May	Mid-Sept	Nov-15
Lasiurus borealis	Eastern Red Bat	Jun-14	Late Jun	Mid-Sept	Oct-26

*** Pallid bat definitive records are currently limited, probable calls were also included.**

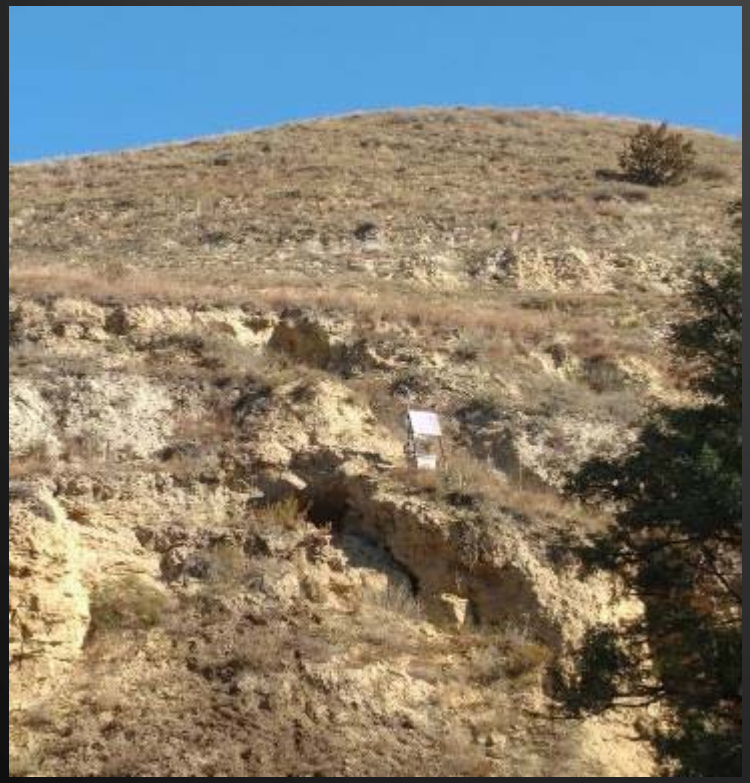
SPECIFIC TO MINES

Mines in Montana



Mine Monitoring

An acoustic detector set near the adit of an abandoned coal mine to gather data on what species are present.



Remember: this only tells us so much!

Mines may have more than one entrance and bats may use the mine only seasonally.

Preliminary Work at Montana Mines

2016-17

- Using information on abandoned mines provided by MT DEQ, identified mines that may support bat hibernation along major river drainages along the eastern border of Montana.
- Deployed 10 bat detectors at mine entrances over the fall, winter, and spring of 2016-2017.

Mine Monitoring
Live Animal Captures

If a mine is found to be an active roost, future efforts may focus on mist netting at the entrance in spring to assess the disease status of roosting bats.

A zoologist removes a bat from a mist net at the entrance of a uranium mine.
(Dan Bachen photos)

Mine Monitoring
Internal Surveys

Internal surveys involve looking for:

- Live or dead bats
- Guano
- Insect parts

Signs of use at one time of the year may reflect use during another time or not.

SO WHAT

Mine Management

Do you have too?

- The presence of any federally Threatened or Endangered bat in a roost may require its protection.

- Current state classification of bats allows for the destruction or removal of habitat or animals….however, there are currently pending proposals for more ESA listings.

Bats are the single biological component that programmatically influence mine closure and mitigation efforts.

Mine Management

- Does the detected use warrant safeguarding an opening with a bat-compatible, air flow compatible or other wildlife-compatible closure?
- Is such a protective closure, typically more costly than a destructive closure, worth the extra money?
- Relative significance of a site may change as field surveys are conducted.

Mine Management

- Considerations
  - Timing
  - Landscape of the surrounding area
  - Use of the site, i.e., maternity colony hibernacula or bachelor roost
  - Ability to exclude present bats

Photo: : Shawn Thomas Bat Conservation International

Mine Management

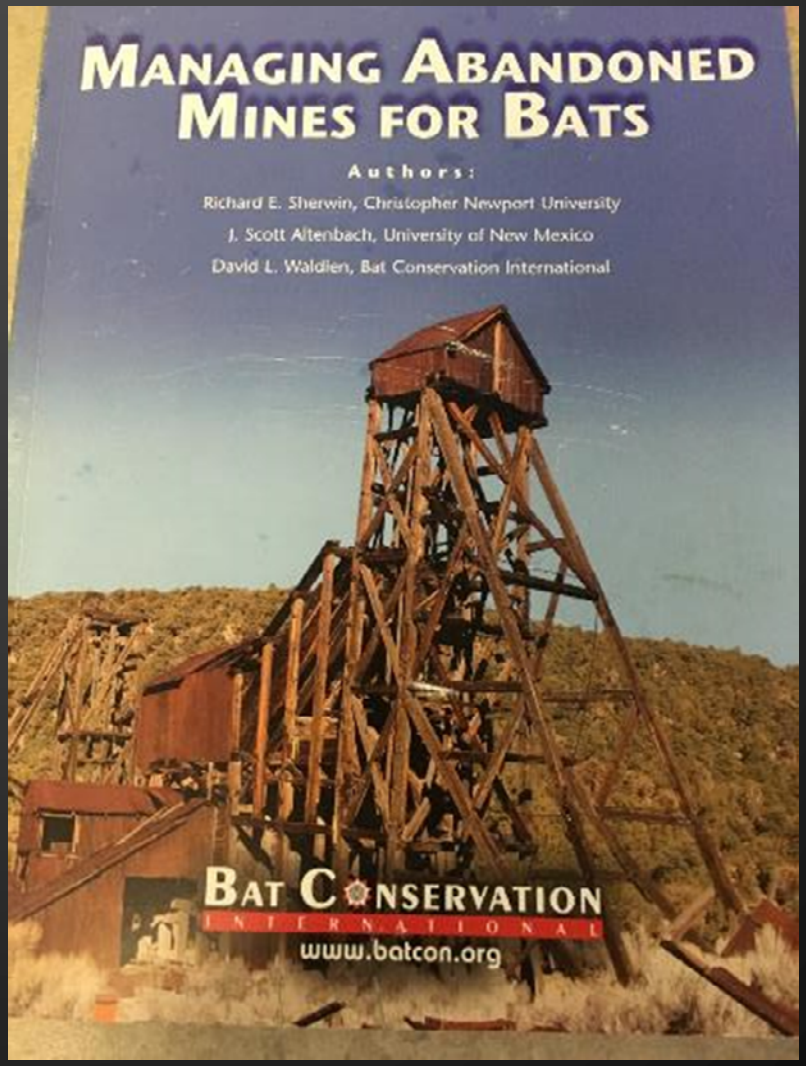
- Exclusion Considerations
  - Timing (remember the hibernation table)
  - Landscape of the surrounding area
  - Physical structure of the site
  - No ‘whack a mole’ approach

Photo: : Shawn Thomas Bat Conservation International

Resources

Agency Guide to Cave and Mine Gates *2009*

Jerry Fant, American Cave Conservation Association
Jim Kennedy, Bat Conservation International
Roy Powers, Jr., American Cave Conservation Association
William Elliott, Missouri Department of Conservation



Resources

Bat Conservation International

Resources of BCI SubTeam

Operational Capabilities

The BCI Subterranean Program provides a wide range of services and technical capabilities to meet subterranean conservation goals worldwide.

- Abandoned Mine Survey - Uranium, Coal, Hard Rock
- Seasoned Experience, International Reach
- Vertical Access - Shafts, declines, and winzes
- Adits - Partially collapsed, timbered and untimbered, dry to flooded
- Internal Mapping and Habitat Survey
- Field Photography / Videography
- Gating - Assistance with prioritization, design, and construction / implementation of all types of bat gates and bat-compatible closures.
- All-Terrain Reach - Our field teams are capable of extended backcountry access, via 4WD, ATV, ski/snowshoe, and rugged off-trail travel.
- Precision - Accurate characterization and documentation of cave and AML sites on the landscape.
- All-season field capability.
- Remote Acoustic Monitoring - Soundscape and Species Diversity Analysis
- Policy Development and Study Design
- Management Plans - Research, Design, and Implementation
- Mist Netting - Live capture and bat identification.
- Radio tagging and telemetry tracking

Major Conservation Issues

Human intolerance

Alan Hicks

Collisions hazards, wind turbines

Loss of prey species (pesticides)

Lack of basic biological knowledge management

Disturbance of or loss of roost habitats – trees, rock outcrops, caves, buildings

Drowning hazards at artificial watering sites

White-Nose Syndrome

White-nose Syndrome (WNS)

Know that 7 species of Montana bat may be impacted by WNS

Death toll is 6-7 million bats in North America since 2006

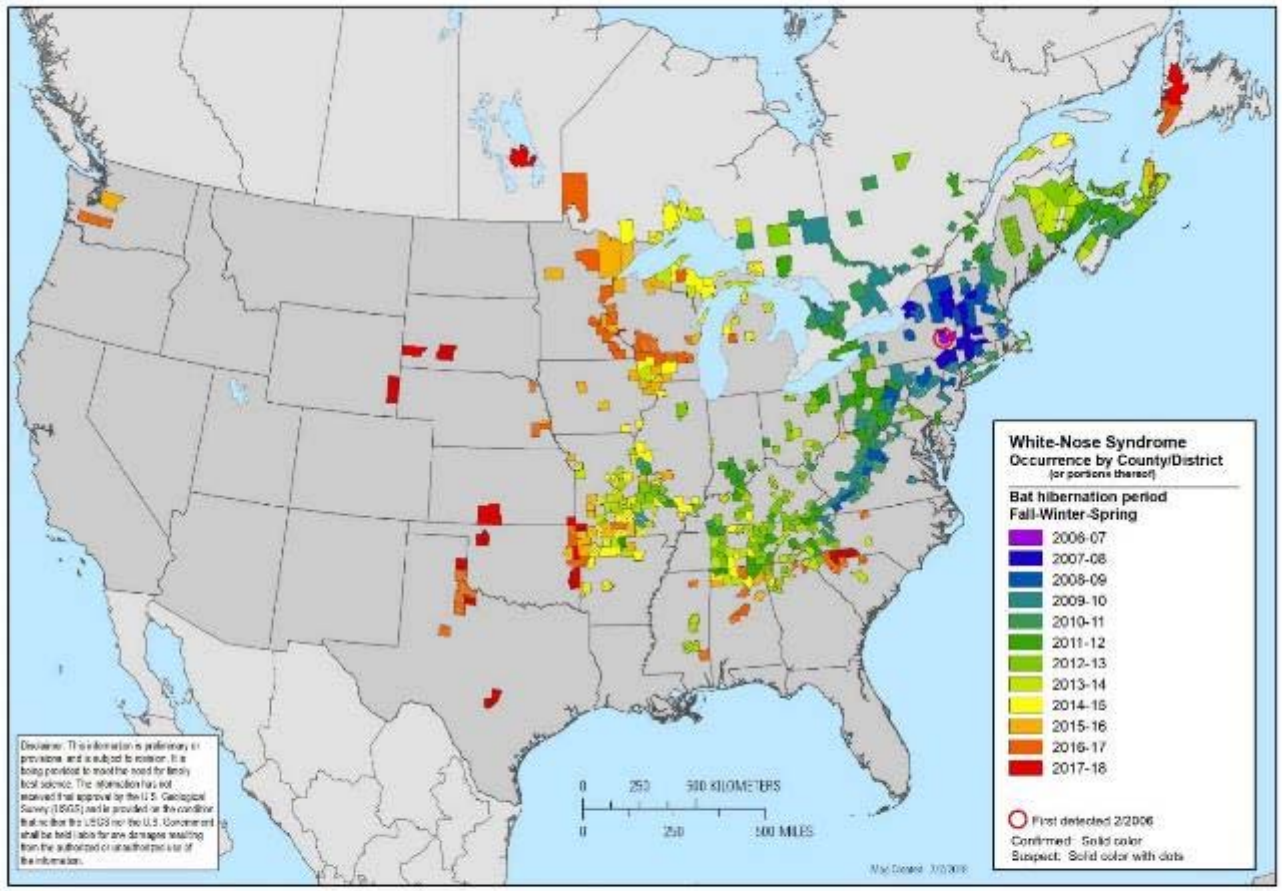
Cause: *Geomyces destructans (this is a fungus)*

Predicted regional extinction of the Little Brown Myotis by 2026!

Fungus exists in Europe, but no mass mortality

Latest Info: http://whitenosesyndrome.org/

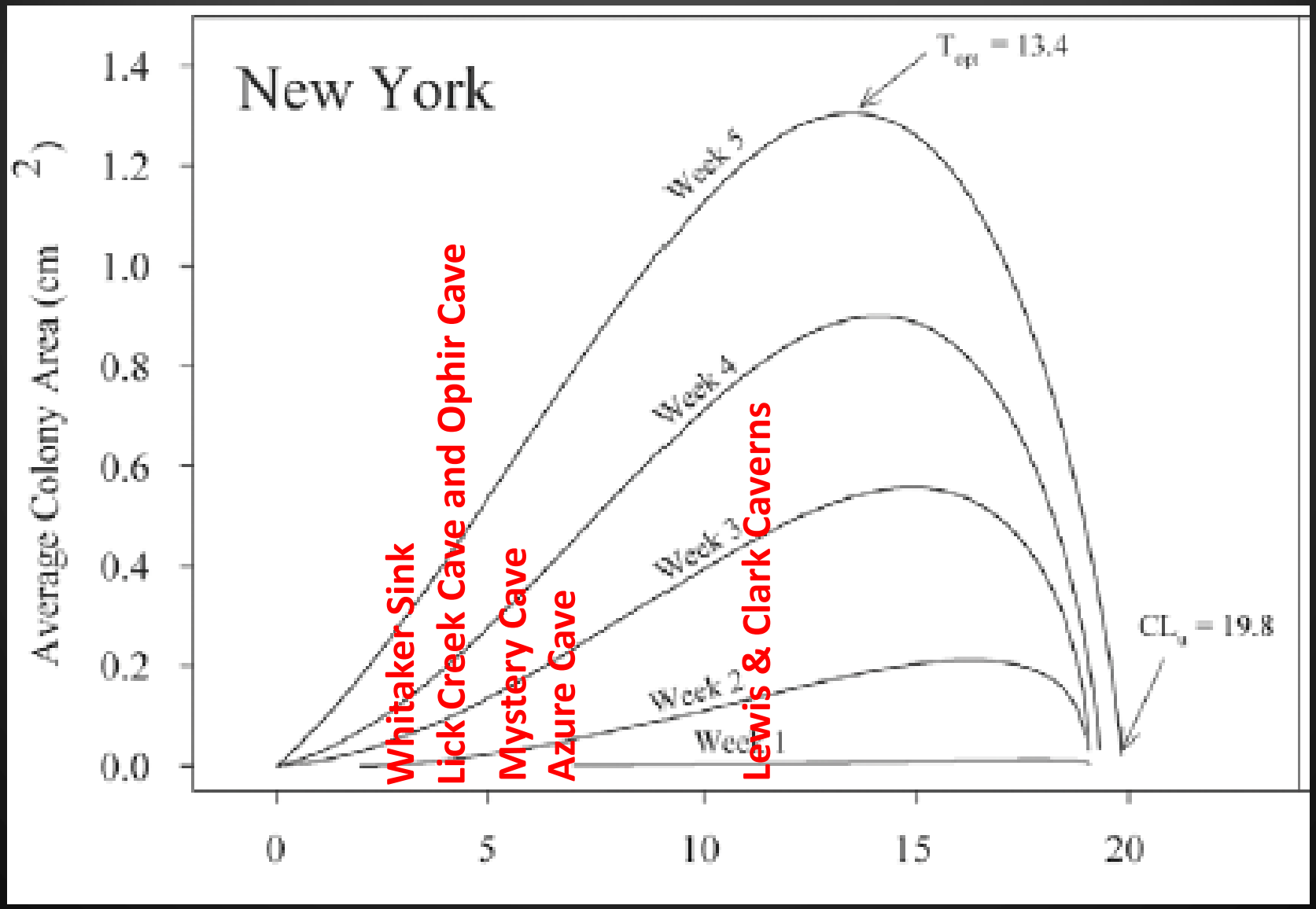
Current Distribution of WNS



Citation: White-nose syndrome occurrence map - by year (2018). Data Last Updated: 7/2/2018. Available at: https://www.whitenosesyndrome.org/resources/map.

White-Nose Syndrome.org

Ideal Conditions for Fungal growth



Questions

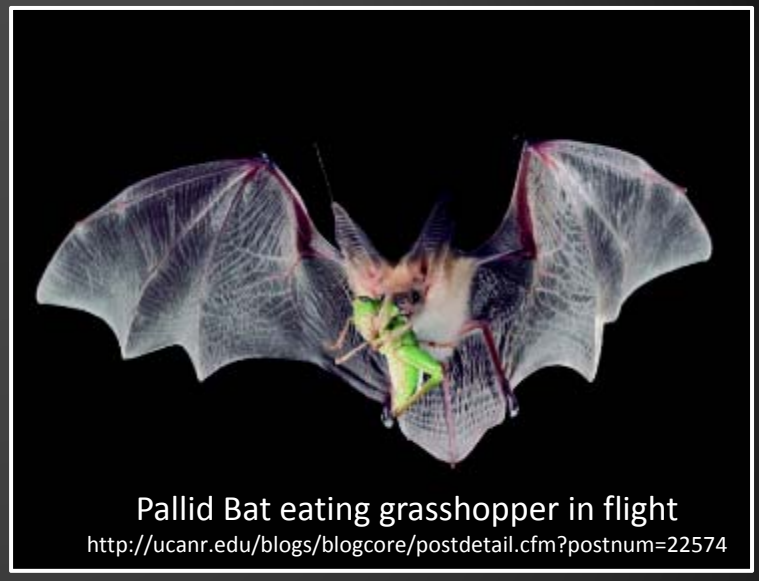
You Should Care About Me

K. DuBois

Bats Eat Pests…Lots of Them

Little brown bat can eat 1,200 mosquito-sized insects in 1 hour

Colony of 150 big brown bats can eat 33 million cucumber beetles each summer



Pallid Bat eating grasshopper in flight
http://ucanr.edu/blogs/blogcore/postdetail.cfm?postnum=22574

20 million Mexican free-tailed bats in Bracken Cave TX eat 200 tons of insects nightly!

Pest removal services in Montana
=
$680,000,000 (Science, 2011)

Bats Eat Pests…Lots of Them

Bats can eat 1/2 their body weight
in insects each night.

A 200 pound construction worker would have to eat 400 quarter lb. cheeseburgers each night!

Bats Pollinate and Spread Seeds

Bat Conservation International

The cocoa plant needs bats =chocolate

The agave plant also needs bats. Agave is used to make the most important ingredient in margaritas… tequila.

Bats eat fruits then disperse the fruit seeds as they fly through the air.

Bats have been tied to reforestation in some countries as they deposit seed (in their poop) as they fly over areas that have been logged.

Major Conservation Issues

Human intolerance

Alan Hicks

Collisions hazards, wind turbines

Loss of prey species (pesticides)

Lack of basic biological knowledge management

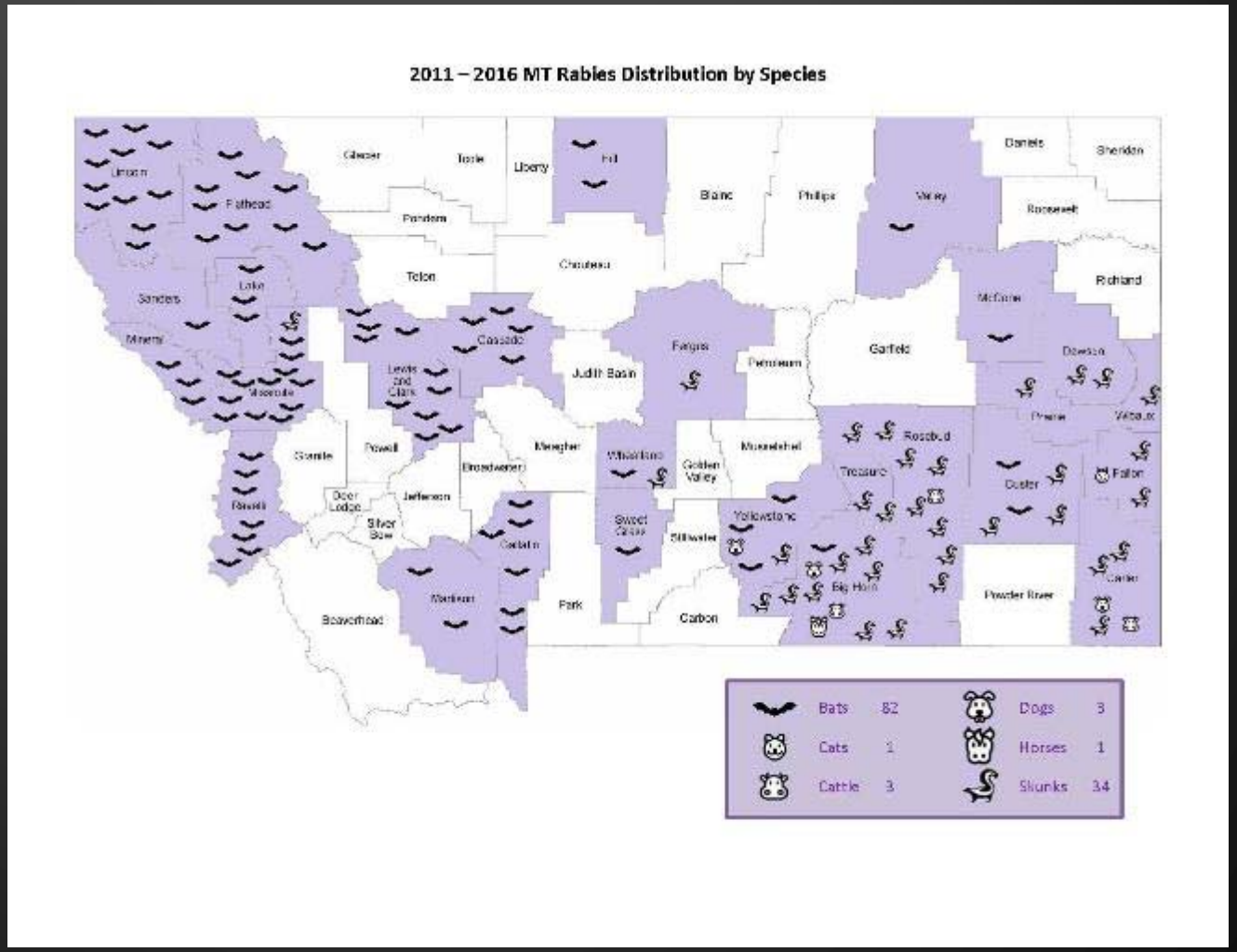
Disturbance of or loss of roost habitats – trees, rock outcrops, caves, buildings

Drowning hazards at artificial watering sites

White-Nose Syndrome

Human Intolerance/Misunderstanding

Fewer than .5% of all wild free flying bats have rabies.



Rabies distribution in Montana by species for 2011-2016

http://liv.mt.gov/ah/diseases/rabies/default.mcpx

Wind Energy Development and Bats

Of North America's 45 bat species, mortalities of 11 have been detected at wind energy facilities (Kunz et al. 2007)

7 Montana bat species have had documented mortalities at wind energy facilities in North America and at least 3 species have documented mortalities at Montana wind energy facilities (Kunz et al. 2007, Poulton and Erickson 2010, Judith Gap Final Report)

Most bats are killed on nights with low wind speed
(Arnett et al. 2008, JWM 72(1): 61-78)

Fatalities increase before or after storm fronts

(Arnett et al. 2008, JWM 72(1): 61-78)

Highest fatalities during late summer and early fall
(Arnett et al. 2008, JWM 72(1): 61-78)