

# Wind Energy and the Ecology of Bats of Montana

Montana Wildlife & Wind Energy Virtual Workshop

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Dan Bachen - Senior Zoologist

Montana Natural Heritage Program

406-546-4302 DBachen@mt.gov

MTNHP.org



# Data Available from MTNHP

- Precise data on occurrence of rare animal and plant species
  - Consultants can request
  - Available on-demand to agency staff through Map Viewer
- Species status assessments and conservation ranks
- Predictive Habitat suitability models
- Taxa specific reports
- Much more

The screenshot shows the Montana Natural Heritage Program website. The header includes the mt.gov logo and navigation links for Home, Animals, Plants, Wetlands, Publications, Data, About, and Quick Data. The main content area is divided into several sections: 'Announcements' with links to new journal articles, field guides, and status updates; 'Recent Publications' with links to distribution checklists and health assessments; 'Montana Natural Heritage Program' with a 'Species Snapshot' and links to field guides, concern reports, and information on animals, plants, ecology, and wetlands; and 'Our Partners' listing the Montana State Library, University of Montana, and NatureServe. A featured article titled 'A Montana Species of Concern' features a photo of 'Dense-leaved Pussytoes' (*Antennaria densifolia*) with a note that the image is from the Montana Field Guide.

The screenshot shows the 'NATURAL HERITAGE MAP VIEWER' interface. The title bar indicates 'Single Species Overview' and provides map coordinates (Scale 1:288,896, Lat: 45.34010, Long: -108.79781, Spz: 855025.70, Spy: 121404.41). The interface includes a 'Tools' panel with 'Filter by:' set to 'Species' and a list of 'Mammals' including Gray Wolf, Grizzly Bear, Hayden's Shrew, Hispid Pocket Mouse, Hoary Bat, Hoary Marmot, and House Mouse. The main map area displays a distribution map with yellow and orange shaded regions and several circular overlays. A 'Map Title and Filters' panel at the bottom shows 'Single Species Overview for Species: Mammals = Hoary Bat ("Hoary Bat")' and lists report options: 'Charts and Graphs', 'Observation Details', 'Species Occurrences', and 'Structured Surveys'.



# Bats of Montana



**Pallid Bat**  
(*Antrozous pallidus*)



**Townsend's Big-eared Bat**  
(*Corynorhinus townsendii*)



**Big Brown Bat**  
(*Eptesicus fuscus*)



**Spotted Bat**  
(*Euderma maculatum*)



**Silver-haired Bat**  
(*Lasionycteris noctivagans*)



**Eastern Red Bat**  
(*Lasiurus borealis*)



**Hoary Bat**  
(*Lasiurus cinereus*)



**California Myotis**  
(*Myotis californicus*)



**Western Small-footed Myotis**  
(*Myotis ciliolabrum*)



**Long-eared Myotis**  
(*Myotis evotis*)



**Little Brown Myotis**  
(*Myotis lucifugus*)



**Northern Myotis**  
(*Myotis septentrionalis*)



**Fringed Myotis**  
(*Myotis thysanodes*)



**Long-legged Myotis**  
(*Myotis volans*)



**Yuma Myotis**  
(*Myotis yumanensis*)

Discover Montana's Wildlife  
**discover, preserve, protect**



For more information on all of Montana's native species visit the Montana Field Guide  
<http://fieldguide.mt.gov>



Michael Durham/Minda Adves/Bat Conservation International



Montana Fish, Wildlife & Parks



The University of Montana

Thanks to the contributing photographers, editors, and sponsors that made this poster possible!



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Discover Montana's Wildlife

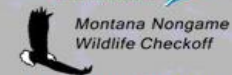
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Michael Durham/Minden Pictures/Bat Conservation International



Montana Fish, Wildlife & Parks



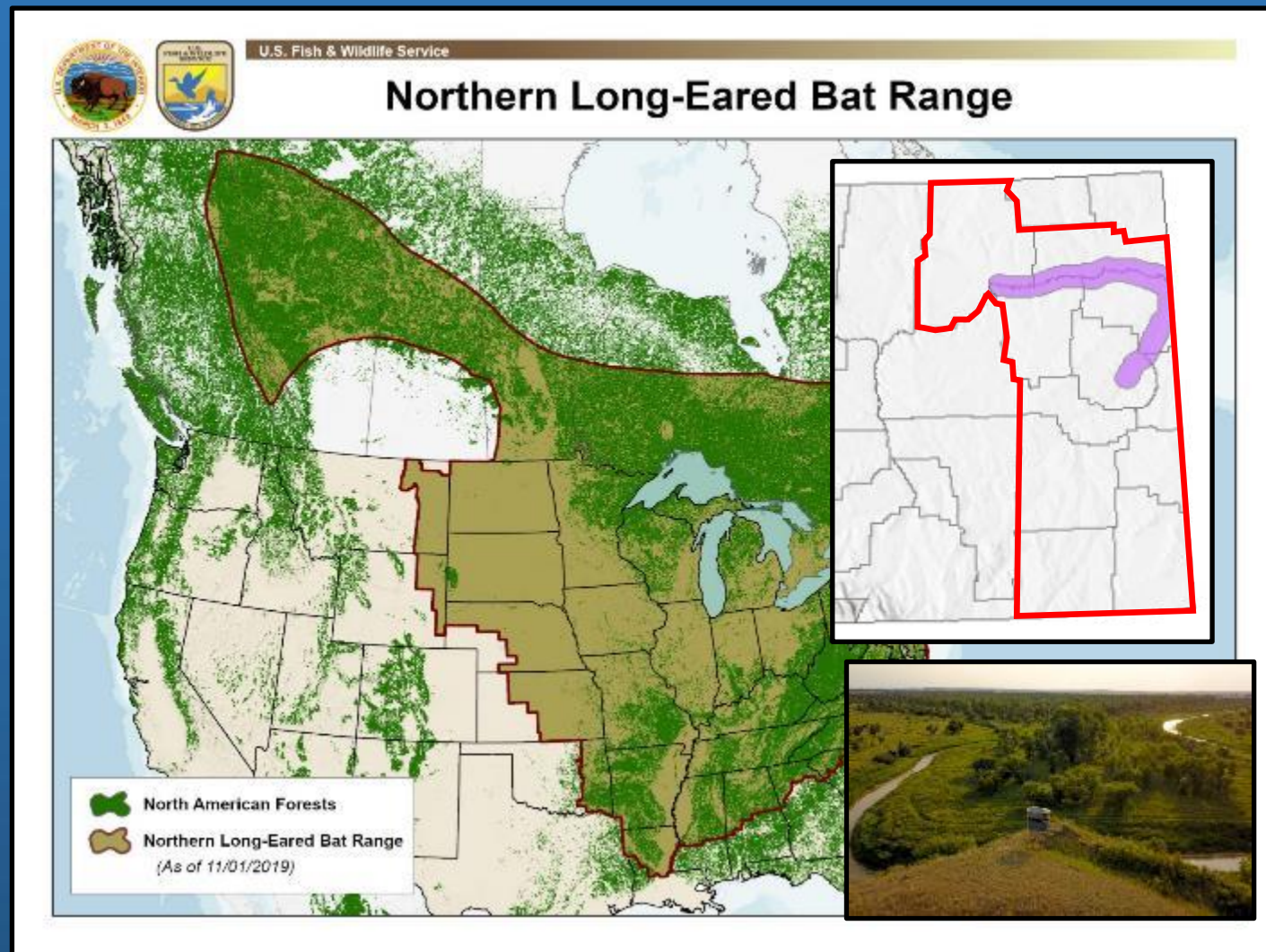
The University of Montana

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# Federally Listed Bats in Montana

- Northern Myotis
  - Listed as Threatened
  - Status under review
  - Tree roosting in active season
  - Hibernates in outcrops or mines
  - Not suited to survey with acoustics in MT
  - [http://mtnhp.org/Reports/ZOO\\_MYSE\\_MT\\_RangeStatus\\_Bachen\\_2019.pdf](http://mtnhp.org/Reports/ZOO_MYSE_MT_RangeStatus_Bachen_2019.pdf)
- Little Brown Myotis
  - Status under review



# Wind Impacts and Why we are Concerned

- Bat are long lived with low reproduction
- Tree Roosting bats suffer mortality at turbines
- Increasing evidence that mortality at turbines is/ will have population level impacts
- Increasing footprint will exacerbate these issues

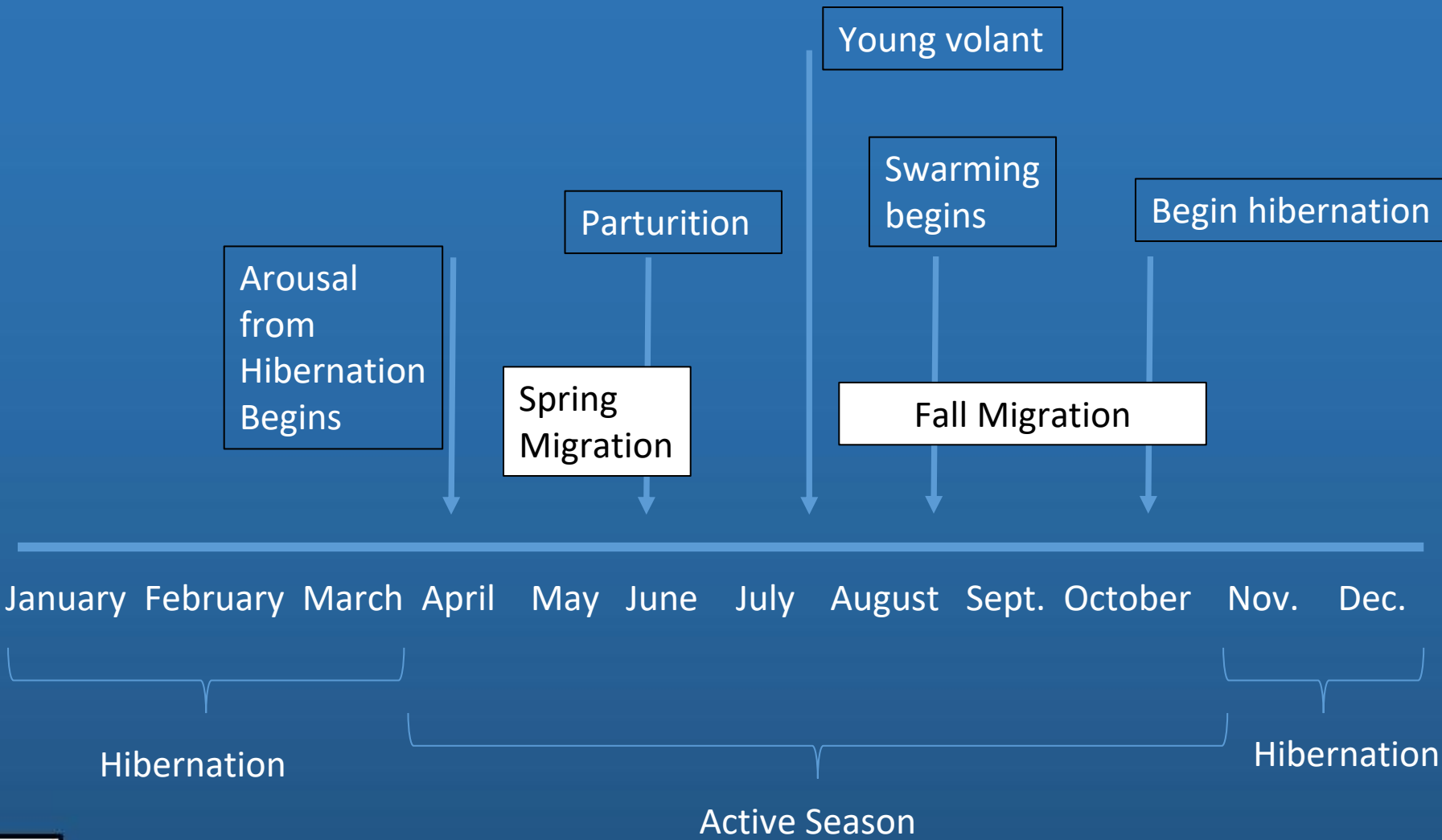


**Table 4.** Number and percentage of bat fatality incidents from all available scheduled searches. Frequency is the number of studies reporting fatality incidents of each species.

Species	Number of incidents	Percentage of incidents	Frequency
hoary bat	5571	30.8	259
eastern red bat	4936	27.3	151
silver-haired bat	2545	14.1	192
Mexican free-tailed bat	1311	7.3	64
big brown bat	1251	6.9	126
little brown myotis	756	4.2	79
evening bat	379	2.1	49
tri-colored bat	379	2.1	45
northern yellow bat	195	1.1	6
southern yellow bat	55	0.3	7
western red bat	18	0.1	10
big free-tailed bat	13	0.1	8
Seminole bat	9	<0.1	7
cave myotis	8	<0.1	5
canyon bat	5	<0.1	3

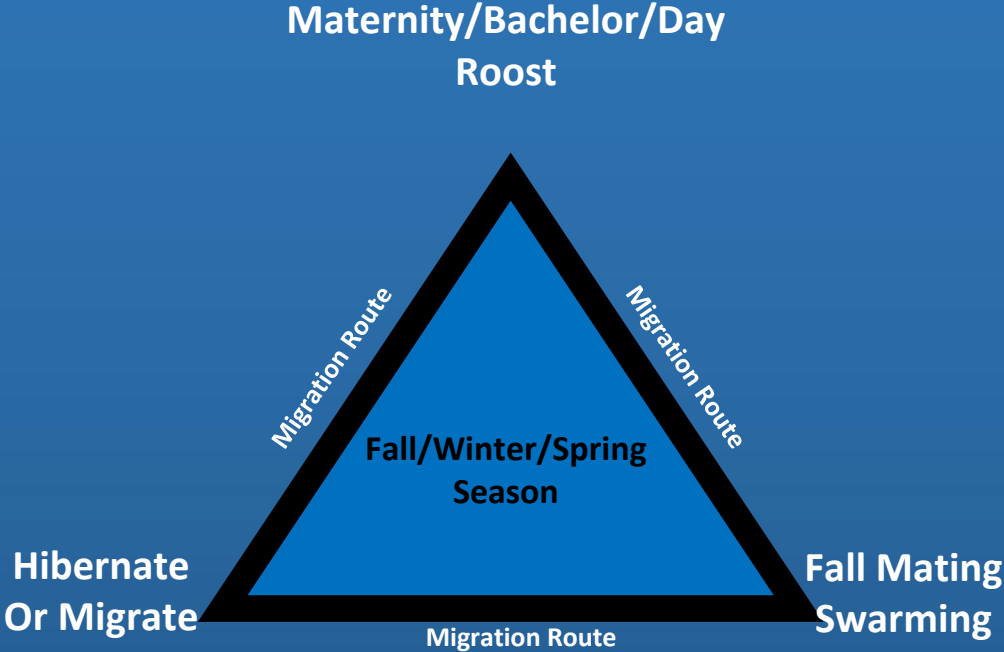


# Life History of Montana Bats





# Landscape Considerations for Bats



# Features that Increase Bat Use

- Rugged landscapes and trees
  - Roost structures
- Waterbodies
  - Foraging and drinking



# Ecology of Wind Impacted Species

## Active season roosts

- Trees

## Commuting distances

- Hoary Bat up to 20 km
- Eastern Red Bat up to 7km
- Silver-haired Bat up to 3.5 km

## Foraging habitat

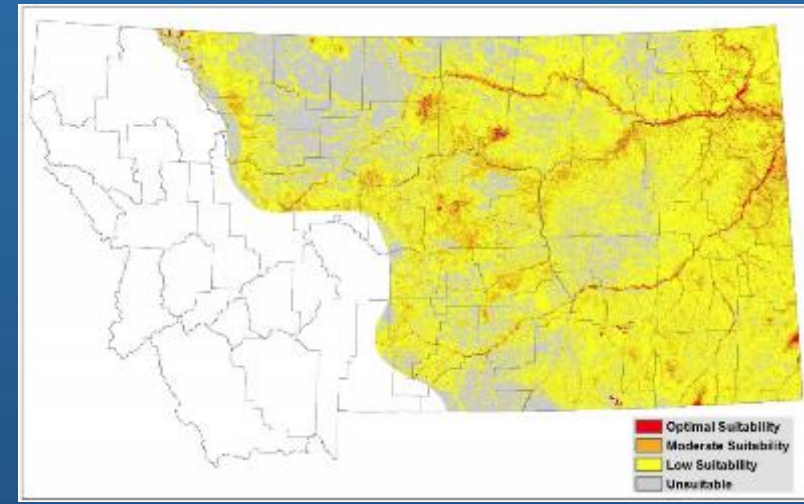
- Hoary Bat: open areas, forests above canopy
- Eastern Red Bat and Silver-haired Bat: forests and adjacent areas



Hoary Bat and Silver-haired Bat\*



Eastern Red Bat



# Seasonal activity

Aggregated Bat Passes by Month across acoustic network  
Species determinations from Sonobat autoclassifier



Relative Act

Hoary Bat

Eastern Red Bat

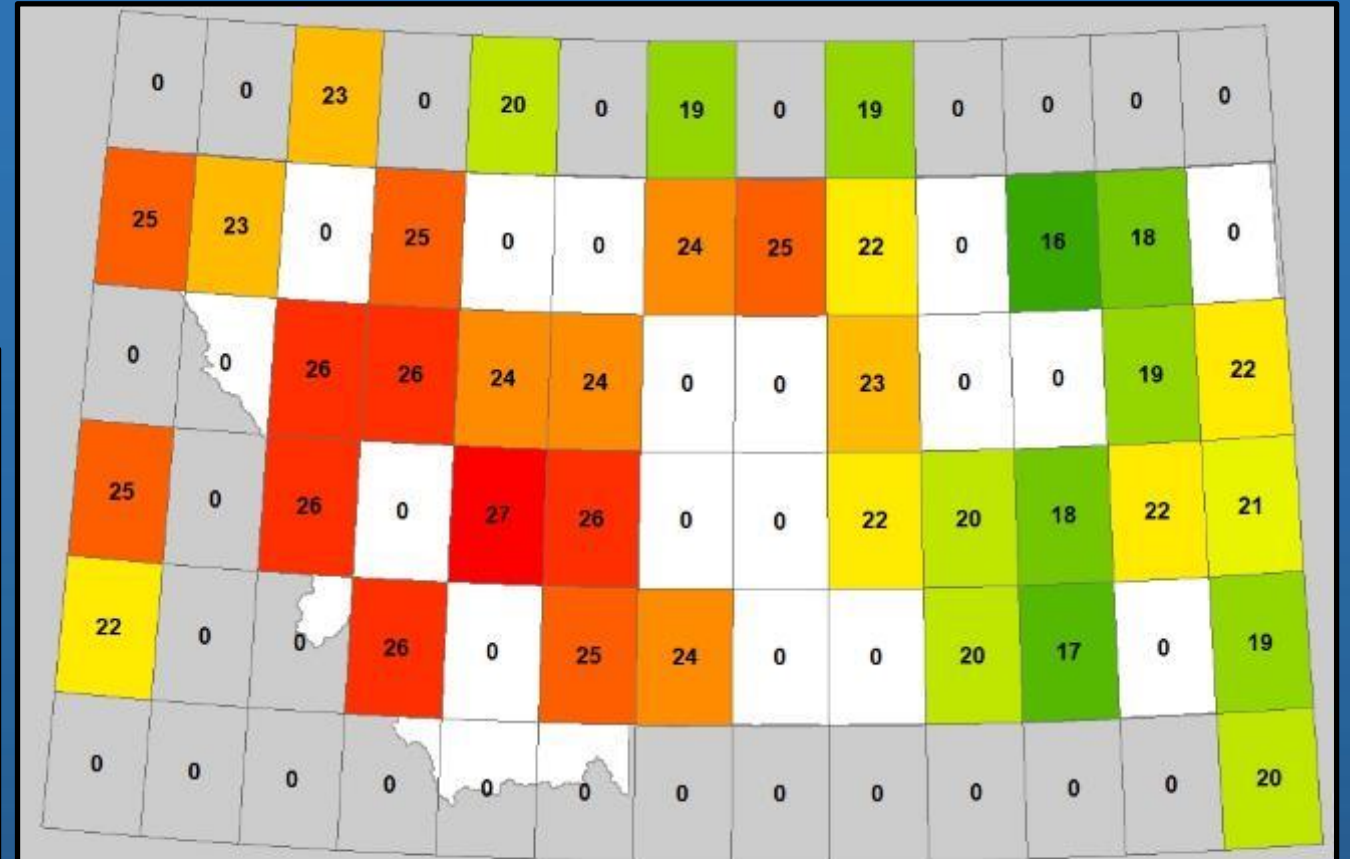
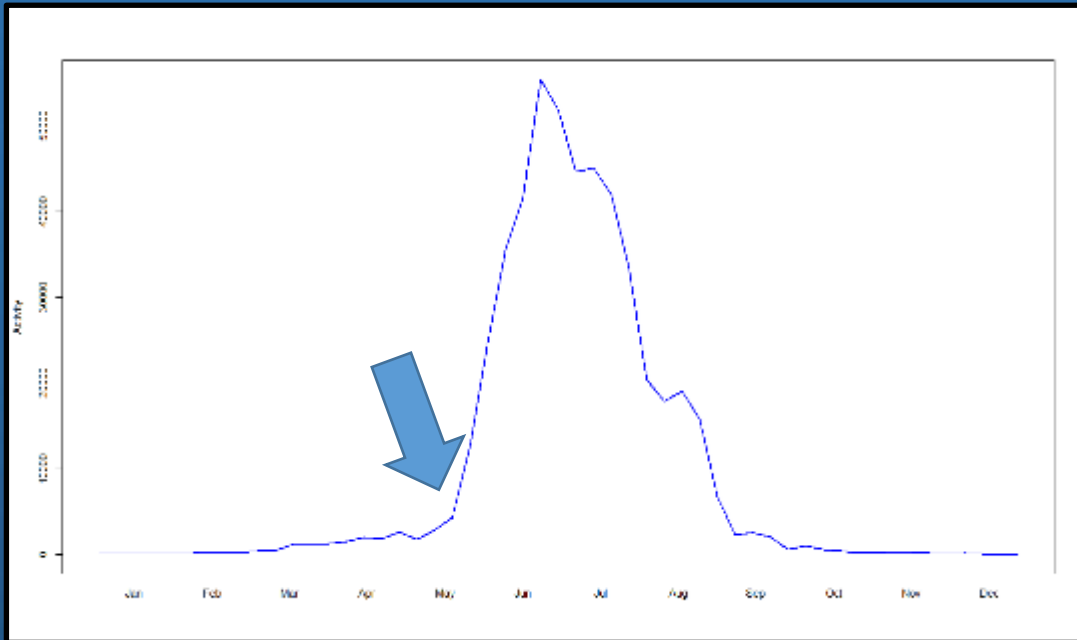
Silver-haired Bat

Jan Feb Mar Apr May June July Aug Sep Oct Nov Dec

# Seasonal Activity is Variable

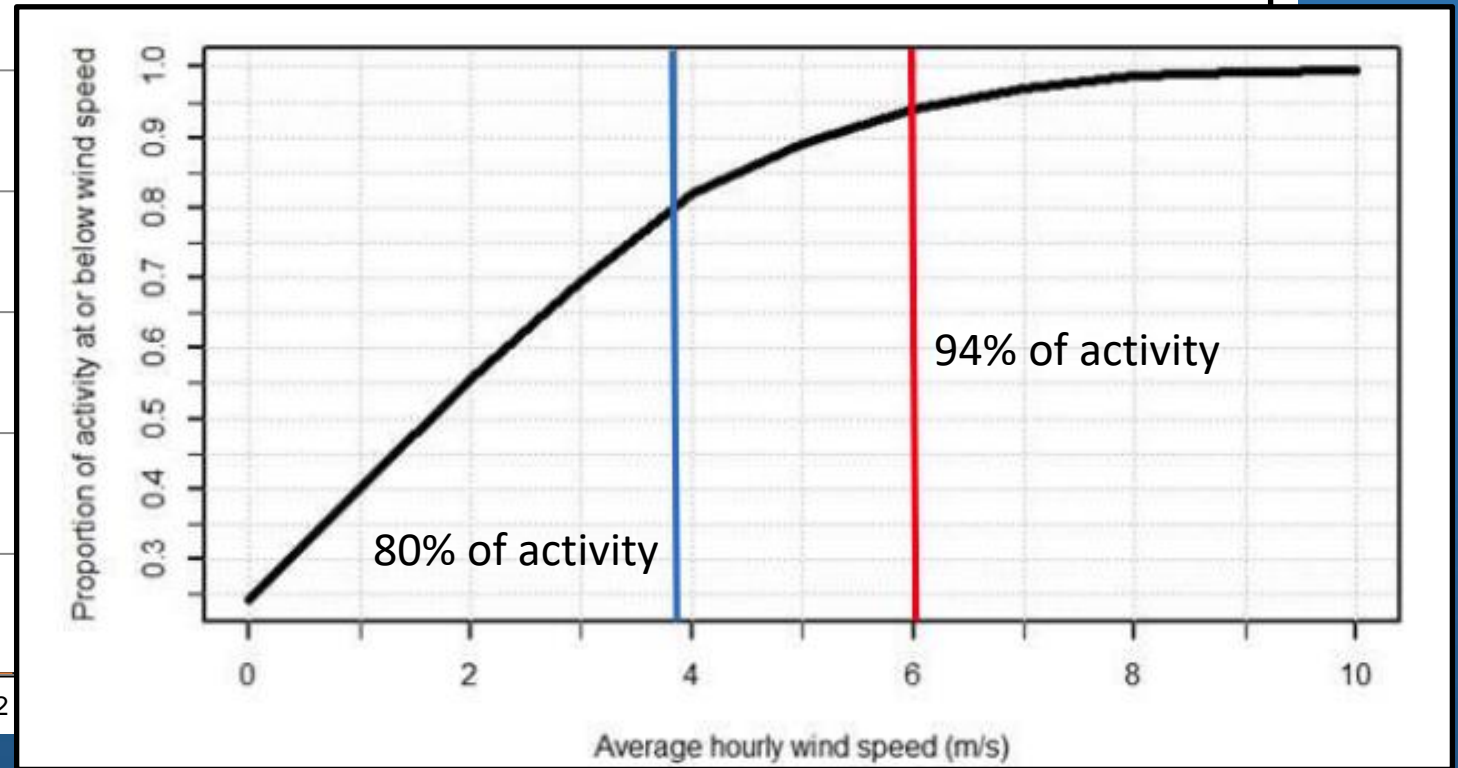
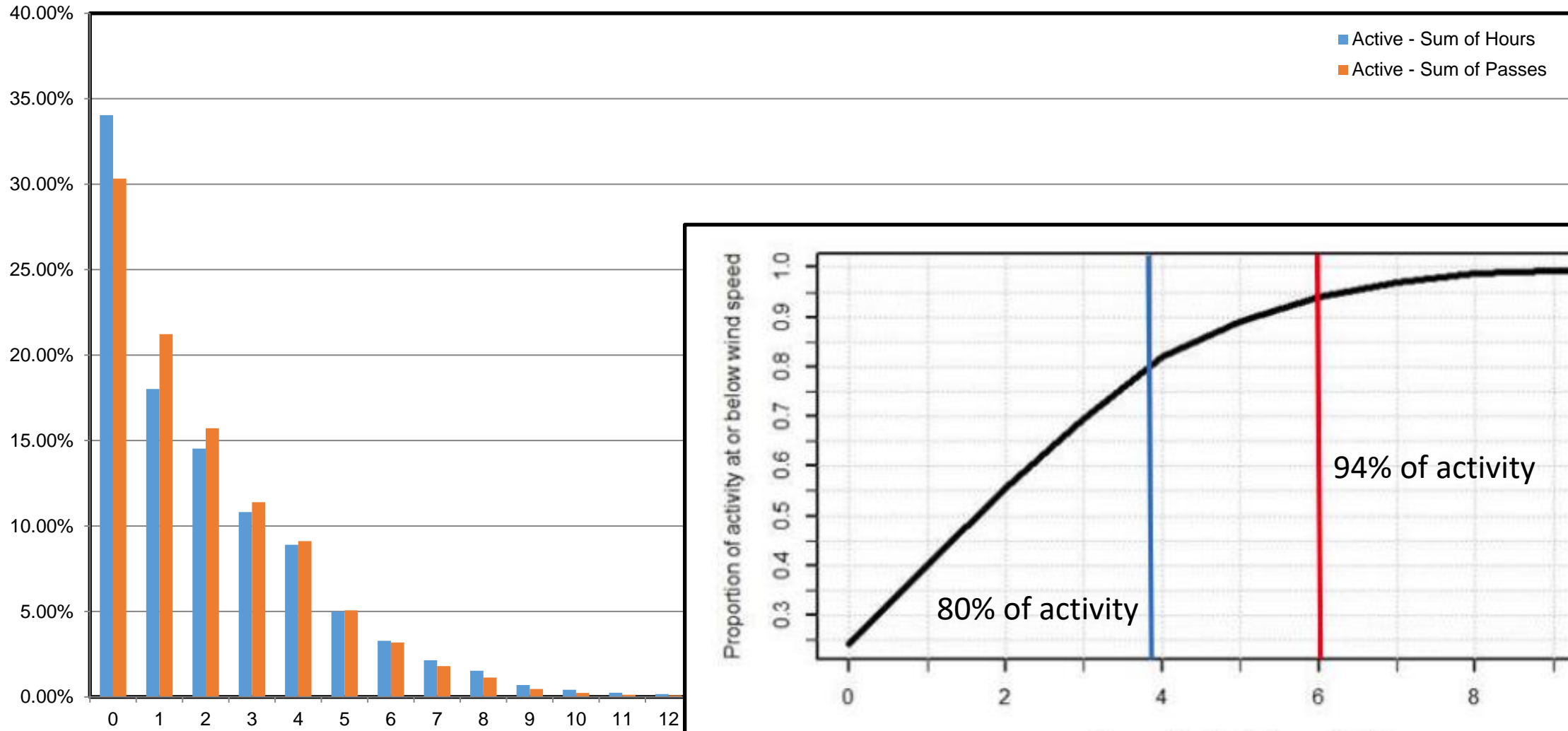


## Average start of peak activity by week and QLL

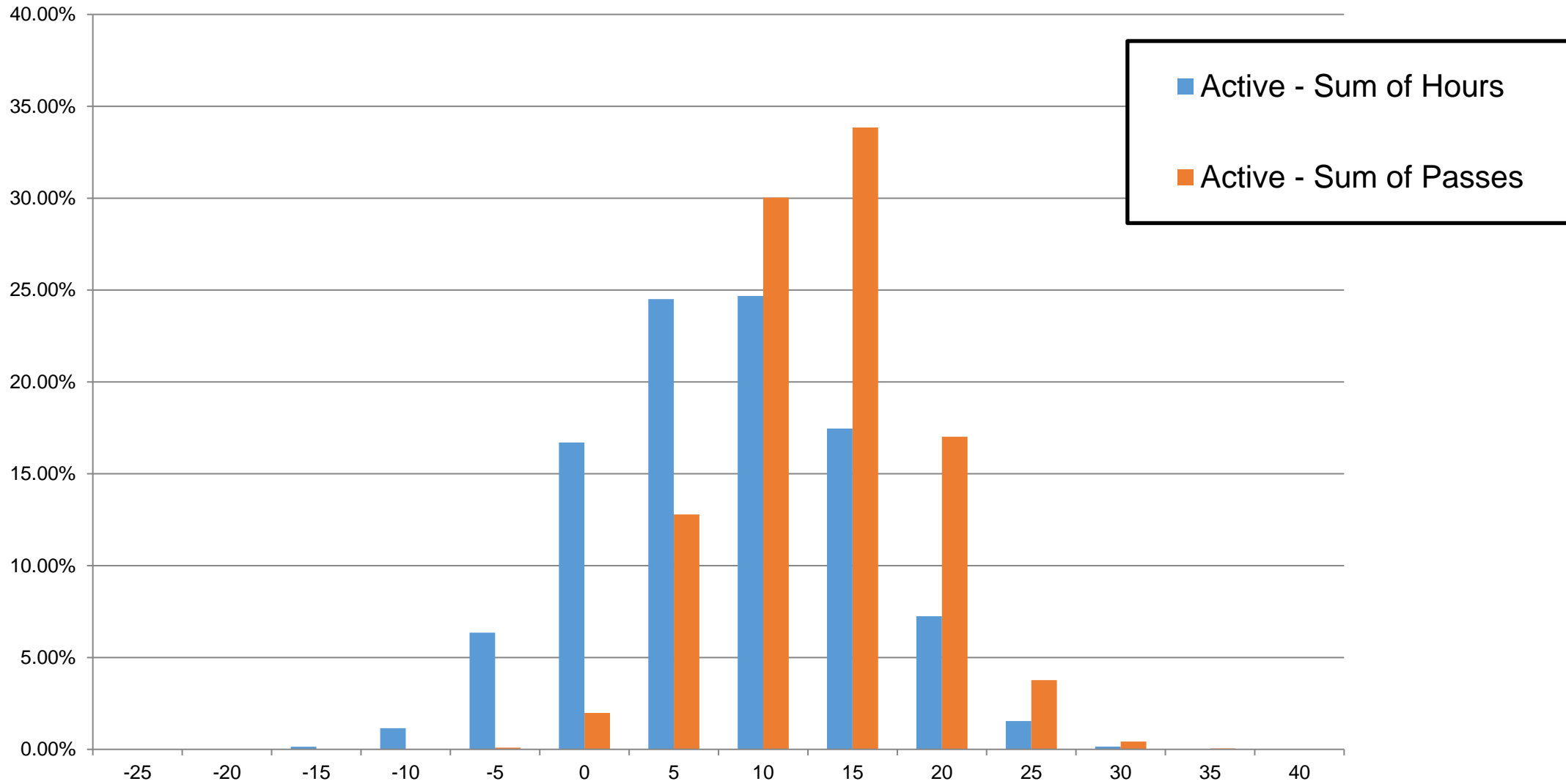


Numbers show week activity increases. Earlier weeks are shown in green, later in red. Cells without data are noted by a "0"

## Average Background Wind Speeds vs. Average Wind Speeds Associated with Bat Passes (m/s - Wind Site 1)



# Average Background Temperature vs. Average Temperatures Associated with Bat Passes (°C - Weather Station)



# Summary

- Species vulnerable to wind energy development found across Montana
- Rugged landscapes, forested areas, and waterbodies are associated with higher bat activity than grassland and areas with little topographic relief
- Bats are most active between late-May and September
  - Migration appears to begin in August and continue through October
- Susceptible bat species may forage up to 20 km from roost trees
- Bats are most active at low wind speeds (<6ms) and warm temperatures (>10° C)



# Future Directions

- More research is needed!
  - Migratory pathways
  - Better data on demographic parameters for impacted species
  - Continued assessment of which species suffer mortalities at wind energy facilities in Montana
  - Continued research on operational mitigation, smart curtailment and deterrents

# Resources

## Reports:

- State-wide acoustic detector reports:  
[http://mtnhp.org/Reports/Zoo\\_Bat\\_Acoustic\\_Directory\\_Bachen2020.pdf](http://mtnhp.org/Reports/Zoo_Bat_Acoustic_Directory_Bachen2020.pdf)
- Features Used as Roosts by Bats in Montana:  
[http://mtnhp.org/Reports/ZOO\\_Bat\\_Roost\\_Features\\_Bachen\\_2019.pdf](http://mtnhp.org/Reports/ZOO_Bat_Roost_Features_Bachen_2019.pdf)
- Bats of Montana Identification and Natural History  
[http://mtnhp.org/Reports/ZOO\\_Montana\\_Bat\\_ID\\_Bachen\\_2018.pdf](http://mtnhp.org/Reports/ZOO_Montana_Bat_ID_Bachen_2018.pdf)

**NHP Website:** [http:// mtnhp.org](http://mtnhp.org)

**Request Data:** <http://nris.mt.gov/reqapp/userMain.asp>

**Predicted Habitat Suitability Models:** <http://mtnhp.org/models/>

**Montana Field Guide:** <http://fieldguide.mt.gov/>

**Map Viewer:** <http://mtnhp.org/mapviewer/>

Map Viewer account: email Bryce Maxell at [bmaxell@MT.gov](mailto:bmaxell@MT.gov)

