

Bat-Friendly Forestry Workshop

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Aitkin, Minnesota

Discussion of Research Gaps & Needs

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Some Background

- Forest-Dwelling Bats (Tim Sichmeller), Bat-Friendly Forestry (Mark Jacobs), Private Sector Research Findings (Jennifer Griggs), MN DNR Research Findings and Future Research (Rich Baker), Findings from Forest Certification Review (John Owen & Katie Fernholz)
- USFWS 2004 Interim Conference & Planning Guidance
- Literature review
- Specimen search
- Online data gathering
- Association of Fish and Wildlife Agencies (MAFWA) 2014 letter to USFWS

Overview

- Questions, Understanding, Info Needs
- Questions & Research Activities

What is the specific distribution in northern Minnesota – can it be predicted with a model?

Which summer locations are associated with which hibernacula?

What forest cover types does NLEB use for roosting and foraging?

What is the seasonal cycle of NLEB in northern Minnesota?

What is a reasonable “special management area” around known or predicted roosts and hibernacula?

What management practices create suitable roosting and foraging habitat?

Implications of White-nosed Syndrome?

Questions, Understanding, Info Needs

Question	Understanding	Information Needs
<i>What is the specific distribution in northern Minnesota – can it be predicted with a model?</i>		
<ul style="list-style-type: none"> Regional/county distribution related to geology and mining—can it predict hibernacula? 	No summary mapping. Data exist.	Predict regional distribution of hibernacula by modeling, using geology and mine locations
<ul style="list-style-type: none"> Local distribution related to regional forest cover amount, types, and condition—can it predict summer roosting/maternity areas? 	No mapping. Little data on cover type affinities from Minnesota studies, although studies elsewhere indicate what to expect	Stratify sampling and collect acoustic monitoring or mist-netting data in forest cover types with the greatest potential to provide roosting and foraging habitat, based on literature.
<i>Which summer locations are associated with which hibernacula?</i>		
<ul style="list-style-type: none"> Are 50 or 100 miles as suggested by USFWS the right distance between summer locations and hibernacula? 	Distances based on two studies. No studies in N. Great Lakes.	Telemetry or banding studies needed.

Questions, Understanding, Info Needs

Question	Understanding	Information Needs
<i>What forest cover types does NLEB use for roosting and foraging?</i>		
<ul style="list-style-type: none"> Optimal percent tree canopy cover? 	<p>Several studies varied. All were >50% tree canopy cover.</p>	<p>Literature provides general but non-local information. Stratify sampling and collect acoustic monitoring or mist-netting data in forest cover types with the greatest potential to provide roosting and foraging habitat, and document conditions.</p>
<ul style="list-style-type: none"> Suitable tree species (durable as dead, dying or snags, with cavities, cracks, and peeling bark)? 	<p>Several studies identified many species. Snags preferred somewhat over live? Local data limited.</p>	<p>Similar to above, with radio-tracking to roosts.</p>
<ul style="list-style-type: none"> Density of snags or mature trees in roost area? 	<p>Limited data. One study (Owen et al. 2002) found higher snag density at roost site than surrounding forest.</p>	<p>Similar to above.</p>

Questions, Understanding, Info Needs

Question	Understanding	Information Needs
<i>What forest cover types does NLEB use for roosting and foraging (continued)?</i>		
<ul style="list-style-type: none"> What is the frequency-size distribution of roost trees? 	<p>Lower limit defined by USFWS as 3 inches dbh. Literature suggests larger sizes are more typical.</p>	<p>Existing data can be analyzed—using northern N. American studies, graph level of bat use of roost trees by size class and define 90%, 95% and 99% levels. To gather additional data, conduct field studies as above.</p>
<ul style="list-style-type: none"> What is the complexity of understory (leaf-area index)? 	<p>General concurrence that greater understory complexity is preferred, but some data conflict.</p>	<p>Literature provides general but non-local information. Stratify sampling and collect acoustic monitoring or mist-netting data in forest cover types with the greatest potential to provide roosting and foraging habitat, and document conditions.</p>

Questions, Understanding, Info Needs

Question	Understanding	Information Needs
<i>What is the seasonal cycle of NLEB in northern Minnesota?</i>		
• Hibernation season?	Defined by USFWS. Overlaps summer.	Seasonal acoustic monitoring near hibernacula to determine dates of activity.
• Summer roosting/ maternity season?	Defined by USFWS. Overlaps hibernation.	Seasonal acoustic monitoring near summer roosts to determine dates of activity.
• Timing of staging, swarming, migration	Defined across entire range of species. No local data.	Similar to above

Oct 1 - Hibernation (USFWS 2014, Appx. D) - May 15												
						Apr 1 - Staging & Migration - May 15						
						Apr 1 - Roosting & Maternity - Sep 30						
Aug 15 - Migration & Swarming - Nov 15									Aug 15 - Migration & Swarming - Nov 15			
Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	

Questions, Understanding, Info Needs

Question	Understanding	Information Needs
<i>What is a reasonable “special management area” around known or predicted roosts and hibernacula?</i>		
<ul style="list-style-type: none"> What is a roost site? 	Defined by USFWS from a few studies: 3-16 trees in few hundred meter radius.	Mist-netting to capture bats at known roost locations, with radio-tracking of some individuals to roosts, then mapping and analysis of roost habitat extent.
<ul style="list-style-type: none"> Is 1.5 miles around roosts (USFWS 2014) right distance to manage? 	Defined by USFWS from a few studies.	Mist-netting to capture bats at known roost locations, with radio-tracking of some individuals to foraging areas, then mapping and analysis of area around roost warranting special management.
<ul style="list-style-type: none"> Is 5 miles around hibernacula (USFWS 2014) right distance to manage? 	Defined by USFWS by one study.	Similar to above.

Questions, Understanding, Info Needs

Question	Understanding	Information Needs
<i>What is a reasonable “special management area” around known or predicted roosts and hibernacula (continued)?</i>		
<ul style="list-style-type: none">• How does using a radius compare to using defined cover types and specific locations?	No information. USFWS assumes circular use area around hibernacula and roost.	Use telemetry data to establish actual use areas around hibernacula and roosts.

Questions, Understanding, Info Needs

Question	Understanding	Information Needs
<i>What management practices create suitable roosting and foraging habitat?</i>		
<ul style="list-style-type: none"> Are selective harvest, shelterwood cuts, etc. useful? 	<p>Very few studies. Inference is that cutting is tolerated, but that cutting which opens up closed-canopy stands while leaving current and future roost sites has a more positive effect. Clear-cuts are negative.</p>	<p>Presence/absence data using acoustic monitoring or mist-netting from stratified samples of stands under different forest management regimes</p>
<ul style="list-style-type: none"> Forest stand type and age? 	<p>Variety of forest types used. Conifer component varies. Mature to old stand may provide better roost opportunities over time than younger stand.</p>	<p>Presence/absence data using acoustic monitoring or mist-netting from stratified samples of stands with varying deciduous/conifer cover in overstory and understory</p>
<ul style="list-style-type: none"> Increasing the density of shrubs & understory trees? 	<p>A few studies note complexity of understory, presumed to be related to foraging opportunity.</p>	<p>Presence/absence data using acoustic monitoring or mist-netting from stratified samples of stands with varying understory cover</p>

Questions, Understanding, Info Needs

Question	Understanding	Information Needs
<i>Implications of White-nosed Syndrome?</i>		
<ul style="list-style-type: none"> What will be effect on population size and distribution? 	<p>Inference of high fatality rate and subsequent large population reduction from other locations affected by WNS. Detection becomes more challenging.</p>	<p>1) Estimate location and number of hibernacula and project current population size; calculate mortality rate from WNS and estimate future population location and size; 2) Establish permanent acoustic monitoring or mist-netting stations in current centers of distribution in Minnesota and monitoring change over time to estimate population declines from observed abundance.</p>
<ul style="list-style-type: none"> On long-term persistence in Minnesota? 	<p>Inference from other locations affected by WNS.</p>	<p>Population viability analysis using assumed future population size and distribution</p>
<ul style="list-style-type: none"> Survival rate? Will resistant populations rebound? 	<p>Inference from other locations affected by WNS.</p>	<p>Document over-wintering survival at hibernacula; observe over several years the persistence of colonies in hibernacula</p>

Research on Questions about NLEB

Question	Research Activity
<i>What is the specific distribution in northern Minnesota – can it be predicted with a model?</i>	Model regional distribution in Minnesota; and model local presence using forest cover type and landscape character (e.g., percent forest cover).
<i>Which summer locations are associated with which hibernacula?</i>	Conduct telemetry or banding studies tracking individuals from roosts to hibernacula.
<i>What forest cover types does NLEB use for roosting and foraging?</i>	Characterize forest cover types (percent canopy cover, size and density of trees, understory, snags, etc.) which the species is known to use in summer.
<i>What is the seasonal cycle of NLEB in northern Minnesota?</i>	Establish dates of hibernation, roosting/maternity, swarming/staging, etc. in which 90%, 95% and 99% of individuals are observed.
<i>What is a reasonable “special management area” around known or predicted roosts and hibernacula?</i>	Conduct telemetry studies to determine actual extent of areas used around roosts and hibernacula.
<i>What management practices create suitable roosting and foraging habitat?</i>	Correlate presence and abundance of bats with stand characteristics resulting from different forest management practices.
<i>Implications of White-nosed Syndrome?</i>	Establish mortality and survivorship due to WNS and predict future population distribution and size in MN