

# Forest Management Guidance For State Lands Northern Long-eared Bats

---

## Vermont Agency of Natural Resources State Lands Forest Management Guidance Northern Long-eared Bats March 2016

### **Purpose**

Information in this document is intended to guide forest management activities on land owned by the Vermont Agency of Natural Resources (VANR) with a goal of avoiding take or harm of northern long-eared bats (*Myotis septentrionalis*), hereinafter referenced as MYSE. While this goal applies specifically to lands owned by VANR it may also serve as guidance for other lands.

The purposes of this guidance are to:

1. Avoid all practical direct take of MYSE during implementation of forest management activities and indirect take of maternity colonies from loss of roosting habitat; and
2. Maintain suitable hibernating, roosting and foraging habitat to support current populations of MYSE.

Standards for avoiding take of MYSE on VANR lands reflect the ability for state agencies to plan and inventory sites proposed for forest management activities. State agencies have a responsibility to apply the best available science, information, and technology to evaluate potential impacts on state and federally endangered species and seek opportunities to avoid them. In the case of MYSE, VANR has established these management guidelines to inform vegetation management activities, which include seasonal harvest restrictions, acoustic monitoring, and habitat considerations. This information will enable VANR to avoid take or harm to MYSE through informed decision-making. This sets a high standard for protecting this extremely rare species on VANR land and can be used as a model for others.

In addition, the application of surveys, particularly acoustic surveys, on state land across Vermont will enable the Vermont Fish and Wildlife Department to greatly increase inventory information and improve techniques to evaluate the level of risk to MYSE when implementing forest management activities on VANR State Lands (See Appendix A). Survey results over the next 2-3 years will enable the Vermont Fish and Wildlife Department to re-assess the risks of forest management activities to MYSE and to inform any necessary revisions to these guidelines.

### **Considerations**

1. First, current MYSE population levels in Vermont are unknown, but comprehensive survey data since 2010 indicate that MYSE populations are approximately less than 10% of what they were prior to White-nose Syndrome (WNS). This alone greatly reduces the likelihood of take by any forest management activity in Vermont. As a result, the focus of the guidance is primarily on known, occupied habitats.

# Forest Management Guidance For State Lands

## Northern Long-eared Bats

---

2. A 1% rule, as explained below, is recommended to decrease the likelihood of take of MYSE to a negligible or “discountable effect”. The 1% rule is based on the concept that removal of less than or equal to 1% of the existing contiguous forested area (including both suitable and unsuitable MYSE habitat) within each Special Management Zone (SMZ) at any one time represents a 99% chance that the activity will not damage or remove any trees with roosting MYSE. Where identified in the guidelines, activities meeting such thresholds are considered to have a discountable effect and may not need to take certain special precautions to avoid take. Forest management activities impacting more than the 1% rule must adequately reduce the likelihood of take through surveys to determine the probable absence of MYSE, seasonal restrictions on management activities, and/or the implementation of potential roost tree retention practices. In some instances, potential roost tree retention practices will call for the retention of all identified potential roost trees located on the project area.
3. The guidance is slightly more restrictive at known, occupied hibernacula and summer habitats due to evidence of presence of MYSE and the value of consistency with the USFWS 4 D rule. At such sites, the guidelines are intended to both limit potential take of MYSE and maintain suitable habitat conditions. At sites lacking any evidence of MYSE, presence of MYSE is still assumed, albeit at a lower likelihood, and as such the guidelines focus on reducing the likelihood of take on only the larger forest management activities.

These measures focus on avoiding take of roosting bats during the summer season when they are active throughout the landscape. In addition, the measures address harvest treatments during winter where harvest prescriptions would result in large acreages (>40 acres) of unsuitable habitat where a maternity may have existed. While no direct take of MYSE would occur in such situations, the elimination of most, if not all of a colony’s roost trees will likely result in indirect take by displacing returning colonies, thereby impacting their survival and productivity.

4. The guidance applies only to forest management activities within *suitable* MYSE roosting habitat. While more research is needed to develop the specific variables associated with unsuitable habitat, for the purposes of this guidance, unsuitable roosting habitat for MYSE includes:
  - Forest stands with all tree diameters less than 4 inches DBH.
  - Forest stands predominantly (i.e., > 90%) composed of spruce-fir
  - Forest stands with less than 50% canopy closure
  - Individual trees isolated by more than 100 feet from forest habitat

At the same time, forest management activities that result in the conditions above will be viewed as unsuitable habitat, but in the near term only.

## Forest Management Guidance For State Lands Northern Long-eared Bats

---

5. In lieu of using specific silvicultural terms (e.g., even-aged management) desired forest habitat conditions specifically for the northern long-eared bat are applied. Canopy closure is an important feature to maintain suitable habitat conditions for the species and data from New Hampshire offer a reasonable, scientifically-based threshold for this variable (Sasse 1996). Ideally, some other correlate such as basal area could serve as a sufficient surrogate for canopy closure and efforts should be made to establish the standards for such.
6. Finally, terms frequently used in this document are defined below to clarify the extent of their meaning relative to this guidance document:

*Canopy Closure:* The proportion of the sky hemisphere obscured by vegetation when viewed from a single point. Scientific literature supports the conclusion that canopy closure is a significant factor in MYSE use of habitats.

*Forest Management Activity:* Activities associated with the cutting of standing trees, whether it be for commercial or non-commercial activities, for any purpose, including timber or wildlife habitat management and recreation management. It is anticipated that nearly all recreation management activities will fall below the 1% rule threshold, thereby relieving such activities of any seasonal restriction on cutting trees.

*Potential Roost Trees (PRT):* Potential roost trees include all trees greater than 4 inches in diameter that exhibit cavities, cracks or crevices, or exfoliating bark located at least 10 feet in height from the ground. While research demonstrates the use of such features even on live trees by roosting MYSE, it is understood that the majority of roosts used by the species are dead and dying trees and that no visual survey method will be able to effectively identify all potential roost trees.

*Special Management Zones (SMZ):* Special management zones are the areas surrounding either known, occupied sites (e.g., hibernacula, known summer habitat) or forest management activity sites, within which specified conservation measures are expected to avoid take of NLEB.

# Forest Management Guidance For State Lands

## Northern Long-eared Bats

---

### **Known, Occupied Hibernacula**

*Definition:* Both historic and/or current documentation of one or more MYSE is considered a known, occupied hibernaculum. It must be noted that MYSE are particularly difficult to observe during hibernation due to their preference for roosting in cracks and crevices in cave/mine walls. Therefore, this species may be underestimated or go undetected during some winter hibernacula surveys. In addition, MYSE bats visit and swarm at multiple hibernacula during the fall, making the forested area directly surrounding hibernacula important for species conservation.

*Population Status:* In Vermont, there are currently 23 known, occupied hibernacula with historic presence of hibernating northern long-eared bats.

*Special Management Zones:* The literature suggests that the majority of the roost trees used during the fall swarming period are located within 1.6 miles of the hibernaculum entrance. Given the very low abundance of MYSE within each hibernaculum, it is recommended that the impacts of forest management activities be evaluated at distance thresholds for two zones with radii of 0.25 miles and 1.0 miles from the cave/mine entrance.<sup>1</sup> Forest management activities must also consider the likelihood that male bats and perhaps some female colonies may reside within the SMZ throughout the summer months. Any forest management activity proposed within the SMZs of known, occupied hibernacula should be specifically reviewed by the District Stewardship Team, including the State Lands Ecologist, and the VFWD small mammals biologist for consistency with this guidance or to identify alternative measures that adequately address the purposes of the guidance.

- Special Management Zone 1: This zone is within a 0.25-mile radius of the cave/mine entrance and is designed to maintain the physical and environmental integrity of the hibernacula as well as sufficient roosting habitat. This distance is identical to the USFWS 4 D rule under which no tree cutting activities are exempt. Any forest management activity considered within this zone must first contact the USFWS to assure that the following conservation measures will result in no adverse effect on the species:
  - No activities that will impair the integrity of the hibernacula are allowed. Avoid tree harvesting, road construction, or landings directly adjacent to hibernacula entrances.
  - Hazard tree removal does not require prior contact with the USFWS, yet every effort should be made to conduct hazard tree removal during the winter season (November 1-April 14). In cases where this is not feasible due to concerns about immediate public safety, hazard trees may be cut as needed.
  - Forest management activities less than 1% of the existing forested acreage (i.e., 1.25 acres in a completely forested landscape) within the SMZ are allowed, provided all tree harvesting is prohibited during the period April 15 – October 31, when bats are active and concentrated in the forested area around hibernacula.<sup>2</sup>

# Forest Management Guidance For State Lands

## Northern Long-eared Bats

---

Because of the limited acreage involved, activities may allow for such seasonal restrictions to be waived upon completion of a survey for potential roost trees by a trained, certified forester or biologist that identifies, marks, and retains all potential roost trees.

- Forest management activities greater than 1% of the existing forested acreage within the SMZ should maintain a canopy closure of 60% and include *both*:
  - Seasonal restrictions so that all tree harvesting is prohibited during the period April 15 – October 31, when bats are either active or concentrated in the forested area around hibernacula.<sup>2</sup>
  - Potential Roost Tree (PRT) retention measures (see VFWD Forest Management Guidelines for Endangered Bats) implemented by a forester or biologist trained and certified in potential roost tree identification and management. The literature documents the use of both dead/dying and live trees by roosting MYSE. Roost trees; however, are predominantly characterized by cavities, crevices, and exfoliating bark.<sup>3</sup>
- Special Management Zone 2: This zone is between 0.25 and 1.0-mile radius from the cave/mine entrance and is primarily designed to maintain suitable roosting and foraging habitat during the swarm and emergence periods. While 1.0 mile is less than the 1.6-mile radius documented for all roosts used by MYSE, the limited number of MYSE at known, occupied hibernacula in Vermont allow for a smaller radius for Zone 2.
  - Forest management activities less than 1% of the existing forested acreage within the 1-mile SMZ (i.e., 20 acres in a completely forested landscape) are allowed, provided all tree harvest is prohibited during the period April 15 – October 31, when bats are active and concentrated in the forested area around hibernacula.<sup>2</sup> Because of the limited acreage involved, forest management activities may allow for such seasonal restrictions to be waived upon completion of a survey for potential roost trees by a trained, certified forester or biologist that identifies, marks, and retains all potential roost trees.
  - Forest management activities greater than 1% of the existing forested acreage within the SMZ should:
    - Limit acreage below 60% canopy closure to no more than 2% of the existing forested acreage within the SMZ (i.e., 40 acres in a completely forested landscape) and, preferably, distribute it among numerous, smaller patches.
    - Include potential roost tree retention measures (see VFWD Forest Management Guidelines for Endangered Bats). The literature documents use of both dead/dying and live trees by roosting MYSE. Roost trees; however, are predominantly characterized by cavities, crevices, and exfoliating bark.<sup>3</sup>

## Forest Management Guidance For State Lands Northern Long-eared Bats

---

- Apply seasonal restrictions so that all tree harvesting is prohibited during the period April 15 – October 31, when bats are either active or concentrated in the forested area around hibernacula. <sup>2</sup>
- Acreage below 60% canopy closure exceeding 2% of the forested habitat within the SMZ (i.e., 40 acres in a completely forested landscape) should only occur if:
  - Such acreage is distributed among smaller (< 40 acres) patches to reduce the likelihood of removing a majority or all of the roost trees used by a potential summer colony. In any single year, no more than 40 acres of unsuitable habitat should be created within a 0.3-mile radius. <sup>8</sup>
  - An evaluation of the Special Management Zone by the state lands ecologist demonstrates sufficient acreage of *contiguous* suitable habitat exists.
  - Apply seasonal restrictions so that all tree harvesting is prohibited during the period April 15 – October 31, when bats are either active or concentrated in the forested area around hibernacula. <sup>2</sup>
- Maintain forest connectivity of areas above 60% canopy closure to maintain bat migration and movement within the Special Management Zone.

# Forest Management Guidance For State Lands

## Northern Long-eared Bats

---

### **Known, Occupied Summer Habitat**

*Definition:* Known, occupied summer habitat consists of:

- Known, occupied maternity roost trees used by adult females or juveniles. The USFWS 4 D rule applies only to known, occupied roost trees and a 150-foot buffer.
- Documented reproductive adult female MYSE captured during the maternity season (May 1 – August 15) are considered confirmation of a maternity colony. Such animals documented since 2010 are considered locations of known, occupied MYSE maternity colonies as well. In most cases, captured reproductive females are likely to be transmittered to determine the exact locations of the maternity colony's roost trees and the size of the maternity colony.
- Captured MYSE regardless of sex or age are considered known, occupied summer habitat, but without any evidence of a maternity colony.
- Locations documenting MYSE acoustic calls are considered known occupied summer habitat.

*Population Status:* There are 71 known historic locations of adult female MYSE captured during the summer months in Vermont. Since 2010, after the full population effects of WNS in Vermont, MYSE have been difficult to capture through a very limited survey effort - only 11 adult female MYSE have been observed at 7 sites statewide since 2010. In none of those instances have bats been telemetered to identify any maternity roost trees. In addition, there are currently 7 locations at which multiple acoustic MYSE calls have been detected since 2010. It is anticipated that a substantial survey effort will be initiated that will identify several other locations of known, occupied summer habitat in the coming years.

*Special Management Zones:* The literature suggests that the roost trees associated with a maternity colony of MYSE are more concentrated in area than other species such as Indiana bats. Given the mean distance between roosts for a single bat approximates 0.42 miles and research showing maximum distances ranged from 1.2 to 2.4 miles apart, it is recommended that the impacts of forest management activities be evaluated at distance thresholds for two zones with radii of 0.25 and 1.0 miles from the location of the known maternity colony roost trees, the capture site (if no roost trees are known), or the acoustic call. Any forest management activity proposed within the SMZs of known, occupied summer habitat should be specifically reviewed by the District Stewardship Team, including the State Lands Ecologist, and the VFWD small mammals biologist for consistency with this guidance or to identify alternative measures that adequately address the purposes of the guidance.

- Special Management Zone 1: This zone is within a 0.25-mile radius of the known, occupied summer habitat and is designed to be more sensitive of the increased likelihood that additional roost trees may be proximate to the known sites.

# Forest Management Guidance For State Lands

## Northern Long-eared Bats

---

- The removal of any known, occupied roost trees and any trees within 150 feet are prohibited. The 150-foot buffer is a result of the final USFWS 4 D rule.
- Hazard tree removal outside of the 150-foot buffer of any known roost trees may occur, yet every effort should be made to conduct hazard tree removal during the fall and winter season (October 1-April 14). In cases where this is not feasible due to concerns about immediate public safety, hazard trees may be cut as needed.
- Forest management activities less than 1% of the existing forested acreage within the SMZ (i.e., 1.25 acres in a completely forested landscape) will be allowed, provided all tree cutting is prohibited during the period April 15 – September 30.<sup>4</sup> Where no known maternity colony exists (i.e., only male MYSE have been captured or acoustic calls have been documented), because of the limited acreage involved, forest management activities may allow for such seasonal restrictions to be waived upon completion of a survey for potential roost trees by a trained, certified forester or biologist who identifies, marks, and retains all potential roost trees.
- Forest management activities greater than 1% of the existing forested acreage within the SMZ should maintain a canopy closure of 60% and include:
  - Prohibit tree harvesting during the period April 15 – September 30.<sup>4</sup>
  - Apply potential roost tree retention guidelines (see VFWD Forest Management Guidelines for Endangered Bats) where canopy closure exceeds 60%.<sup>2</sup> The literature documents use of both dead/dying and live trees by roosting MYSE. Roost trees; however, are predominantly characterized by cavities, crevices, and exfoliating bark.<sup>3</sup>
- Special Management Zone 2: This zone is between 0.25 and 1.0-mile radius from the known, occupied summer habitat and is designed to maintain suitable roosting and foraging habitat during the maternity season.
  - The removal of any known, occupied roost trees and any trees within 150 feet are prohibited. The 150-foot buffer is a result of the final USFWS 4 D rule.
  - Forest management activities impacting less than 1% of the existing forested acreage within the SMZ (i.e., 20 acres in a completely forested landscape) will be allowed, provided all tree cutting is prohibited during the period April 15 – September 30. <sup>4</sup> Because of the limited acreage involved, forest management activities may allow for such seasonal restrictions to be waived upon completion of a survey for potential roost trees by a trained, certified forester or biologist that identifies, marks, and retains all potential roost trees.
  - Forest management activities impacting greater than 1% of the existing forested acreage within the SMZ should:
    - Prohibit tree harvesting during the period April 15 – September 30.<sup>4</sup>



## Forest Management Guidance For State Lands Northern Long-eared Bats

---

- Limit acreage below 60% canopy closure no more than 2% of the existing forested acreage within the SMZ (i.e., 40 acres in a completely forested landscape) and, preferably, distribute it among numerous, smaller patches.
- Apply potential roost tree retention guidelines (see VFWD Forest Management Guidelines for Endangered Bats) on the remainder of the project area.<sup>3</sup>
- Acreage below 60% canopy closure exceeding 2% of the forested habitat within the SMZ (i.e., 40 acres in a completely forested landscape) should only occur if:
  - Such acreage is distributed among smaller (< 40 acres) patches to reduce the likelihood of removing a majority or all of the roost trees used by the summer colony. In any single year, no more than 40 acres of unsuitable habitat should be created within a 0.3-mile radius.<sup>8</sup>
  - An evaluation of the Special Management Zone by the State Lands Ecologist demonstrates sufficient acreage of *contiguous* suitable habitat exists.
  - Apply seasonal restrictions so that all tree harvesting is prohibited during the period April 15 – September 30, when bats are concentrated in summer habitat.<sup>4</sup>
- Maintain forest connectivity of areas above 60% canopy closure to maintain bat migration and movement within the Special Management Zone.

# Forest Management Guidance For State Lands

## Northern Long-eared Bats

---

### Potential Summer Habitat

*Definition:* This encompasses the remainder of the state where no known, occupied summer habitat or hibernacula exist. While no known occurrences have been documented in this region since 2010, historical inventory data indicate that all of the state serves as suitable habitat for the northern long-eared bat.

*Population Status:* Until such time that Vermont can compile significant additional acoustic and capture data on the statewide distribution and abundance of MYSE, one should assume that the presence of maternity colonies on the summer landscape is less than 10% of pre-WNS numbers. Following this logic, every activity has less than a 10% chance of impacting a maternity colony compared to prior to WNS. However, without data to the contrary, the presence of MYSE on forest management sites should be assumed given the purpose is to eliminate take of the species. Acoustic surveys conducted during the months of June-July may be conducted to determine probable absence of MYSE and, as a result, avoid all restrictions provided below.

*Special Management Zone:* Given the mean distance between roosts for a single bat approximates 0.42 miles and research showing maximum distances ranged from 1.2 to 2.4 miles apart, a radius of 1.0 miles from a potential maternity colony should be sufficient to include most of the roost trees used by a colony should it be present.

Within the 1.0-mile radius of the forest management activity:

- Forest management activities less than 1% of the existing contiguous forested acreage within a 1.0-mile radius of the forest management activity (i.e., 20 acres in a completely forested landscape) are allowed without any conservation measures necessary.
- The percentage and acreage thresholds for the harvest area and the area made unsuitable for MYSE habitat is calculated on an annual basis. Cumulative (i.e., multiple-year) impacts are not considered.
- Forest management activities conducted *during the fall or winter season* (i.e., September 1-April 14) impacting greater than 1% of the existing contiguous forested acreage within a 1.0-mile radius of the forest management activity should:
  - Apply seasonal restrictions so that all tree harvesting is prohibited during the period April 15 – August 31, when bats are most concentrated in summer habitat.<sup>4</sup>
  - Apply potential roost tree retention guidelines (see VFWD Forest Management Guidelines for Endangered Bats).<sup>3</sup>
  - Where canopy closure will be reduced below 60%, limit such treatment to 2% of the contiguous forested acreage (i.e., 40 acres in a

## Forest Management Guidance For State Lands Northern Long-eared Bats

---

completely forested landscape), preferably distributed among more, smaller patches.<sup>7</sup>

- In any single year, when such treatment (i.e. canopy closure below 60%) exceeds 2% of the contiguous forested habitat (i.e., 40 acres in a completely forested landscape):
  - Such acreage should be distributed among smaller (< 40 acres) patches to reduce the likelihood of removing a majority or all of the roost trees used by a potential summer colony. In any single year, no more than 40 acres of unsuitable habitat should be created within a 0.3-mile radius.<sup>8</sup>
  - If such acreage includes more than 40 acres of unsuitable habitat being created within a 0.3-mile radius, acoustic surveys should be conducted to demonstrate the probable absence of MYSE on the project area.
- Forest management activities to be conducted *during the spring or summer season* greater than 1% of the existing contiguous forested acreage within a 1.0-mile radius of the forest management activity should conduct acoustic monitoring during the months of June or July to determine the probable presence or absence of MYSE (results are valid for up to 5 years from the survey date):
  - If acoustic surveys determine the probable absence of MYSE on the forest management site, no conservation measures are necessary.
  - If acoustic surveys determine the probable presence of MYSE on the forest management site, refer to the guidance for Known, Occupied Summer Habitat.

# Forest Management Guidance For State Lands

## Northern Long-eared Bats

---

<sup>1</sup> Applying a radius from a cave/mine entrance adds acreage to the zone on an exponential basis. A 1.0-mile radius equates to 2010 acres. If one assumes 10 or even 100 MYSE per hibernacula (numbers exceeding observations, but still plausible), this equates to 1 MYSE every 200 or 20 acres, respectively, and should satisfy the standard of not likely to adversely affect. A 1.6-mile radius equates to 5146 acres and the same 10 to 100 MYSE, or one MYSE every 515 or 52 acres, respectively – a likelihood that is unnecessarily low.

<sup>2</sup> Some studies demonstrate the presence of male and female MYSE around the hibernacula in the summer months (Whittaker 1992). August 15 is considered the period when maternity colonies begin to break up and MYSE numbers at fall swarm surveys increase dramatically. The literature also supports MYSE presence at fall swarm sites dropping off considerably by mid-October. Data from Whittaker (1993) shows this timeline and recent Vermont fall swarm captures demonstrate female MYSE bats are present at hibernacula by August 29.

<sup>3</sup> Studies have shown as high as 65% of the roost trees used by MYSE were cavity trees. Assuming that nearly all cavity trees are identifiable, potential roost tree retention guidelines, when applied, may reduce the likelihood of take by at least that proportion. Hence, even a forest management activity impacting 2% of the forested habitat approaches a 99% chance of not taking any roosting bats.

<sup>4</sup> Because evidence exists for the presence of adult female MYSE, seasonal restrictions on cutting trees should encompass the entire period of time when bats may be present. The April period assumes most bats migrate directly to their maternity sites and fall swarming data suggests that all MYSE have arrived at the hibernacula by early October.

<sup>5</sup> The more limited seasonal restriction (April 15 – August 31) is justified based on the reduced likelihood of presence. If present; however, a significant portion of the bats in a summer colony will have departed for the hibernacula by August 31.

<sup>6</sup> Potential roost trees include all trees exhibiting any number and degree of cavities, crevices, or exfoliating bark.

<sup>7</sup> The requirement to implement seasonal restrictions on harvesting eliminates the likelihood of take. In addition, the 2% limitation on acreage below 60% canopy closure, in concert with the implementation of potential roost tree retention guidelines, maintains nearly 99% of the existing potential roost trees on the site, even when 2% of the forested habitat is converted into unsuitable habitat.

<sup>8</sup> The single year 40-acre limit on acreage below 60% canopy closure assures that any possible maternity colony on site will not have greater than 25% of its roost trees removed, a figure at which research suggests the colony will remain intact (Silvis 2015). The 40-acre patch size limit is also approximately 25% of 180 acres, the largest reported mean concentration of maternity roost trees. The allowable concentration of 40 acres of unsuitable habitat created (per 0.3-mile radius) assumes a 180-acre concentration of roost trees.

# Forest Management Guidance For State Lands Northern Long-eared Bats

---

## Appendix A:

### **Projected timeline for conducting and reporting on presence/probable absence surveys for northern long-eared bats on state lands**

**Last Updated: February 2016**

**Vermont Fish and Wildlife Department**

Based on the Vermont Agency of Natural Resources' (VANR) "Forest Management Guidelines for Northern-long Eared Bats on State Lands", when summer surveys for northern long-eared bats are conducted to avoid take in potential northern long-eared bat range, the following will apply:

#### **Criteria:**

Parcels with tree cutting that is scheduled for the summer months (April 15 through August 31) or fall/winter-season harvests resulting in more than 2% of the forested habitat becoming unsuitable habitat at any one time should be surveyed using the VFWD's latest acoustic survey methods for presence/probable absence surveys for northern long-eared bats at least one year, but up to five years, before the scheduled harvest will take place. Survey results will be stored in a GIS based layer enabling users to locate survey sites and results.

#### **Workflow Timeline:**

A list of summer harvests that require surveys must be provided either in the Annual Stewardship Plan or directly to Alyssa Bennett **by May 1 (at the latest)** at least **one year preceding scheduled harvest activity** on state lands so that VFWD staff can coordinate an acoustic survey schedule that will take place **between June 1 and July 31**.

Ideally, staff are encouraged to submit harvest plans more than one year, and up to five years, ahead of time for projects that are highly likely to require summer harvest allowances.

The VFWD will complete acoustic field surveys by July 31 of each year. Data will be analyzed and presence/probable absence of northern long-eared bats will be reported for each parcel **by December 1** of that same year, but possibly sooner depending on the number of parcels that require surveys.

The VFWD anticipates that acoustic surveys and analysis will be conducted either with trained seasonal staff or with a contractor, and will no longer require district staff assistance.

# Forest Management Guidance For State Lands

## Northern Long-eared Bats

---

### **Expectations:**

Planning and conducting acoustic surveys can be streamlined and assured of completion if the following details are provided by May 1:

- Anticipated harvest year
- Map of the parcel and the harvest area
- Total number of acres being treated
- A contact person.

The contact person will need to provide directions to parking for/access to the parcel and highlights of features that are suitable for setting up acoustic surveys to detect bat activity (e.g., any wetland features such as vernal pools, streams, ponds, lakes, rivers, marshes, etc. and any foraging zones such as logging or access roads and log landings) based on their knowledge of the parcel.

### **Field Survey Methods:**

At a minimum, the VFWD will follow the acoustic methods approved by the US Fish and Wildlife Service (USFWS 2015) for presence/probable absence surveys for Indiana bats, which was extended to include northern long-eared bats following their federal listing as threatened under the Endangered Species Act in 2015.

#### *Survey Timing and Number of Nights/Sites per Acre*

USFWS Presence/Probable Absence Acoustic Survey Guidelines for Indiana and northern long-eared bats (see Resources) requires the minimum level of effort as follows for non-linear projects:

- A minimum of 4 detector nights per 123 acres (0.5 square km) of suitable summer habitat. For example:
  - 2 detectors for 2 nights each (can sample the same location or move within the site) or
  - 1 detector for 4 nights (must sample at least 2 locations)
- The recording session must start at sunset and end at sunrise each night
- Another night must be added if the following weather conditions, which each cause a notable reduction in bat activity, exist during the first 5 hours of the survey period:
  - Temperatures fall below 50 deg F

# Forest Management Guidance For State Lands

## Northern Long-eared Bats

---

- Precipitation, including rain and/or fog, that exceeds 30 minutes or continues intermittently
- Sustained wind speeds greater than 9 miles/hour (3 on Beaufort scale)

### **Acoustic Equipment and Analysis**

The field of acoustic bat surveys is rapidly advancing through hardware improvements (i.e., acoustic detectors, microphones, data storage abilities), software for viewing spectrograms of call sequences and/or automated species identification, and the technical expertise involved in selecting survey sites, deploying equipment, choosing the appropriate equipment settings, and manually vetting call data.

There are several possible detector models that could be used for this type of survey work, but for consistency among sites and years, the VFWD has invested in a small fleet of Pettersson detectors for the majority of this work. The VFWD chose Pettersson D500x detectors based on prior experience with this model but also for their suitability for passive stationary surveys, their long-standing microphone reliability compared to some of the other detector models available, and their ability to record full-spectrum call data, which would allow for the visualization of more features of each call for manual vetting. Similarly, the VFWD's prior experience with the software Sonobat (v. 3.2.2 NE), which includes the ability to visibly display full spectrum data for manual vetting and process full spectrum data, including scrubbing noise, are reasons for choosing this as a starting software.

Due to the complexity and variability of this survey method, the VFWD will conduct a more rigorous analysis of acoustic data than is required by the USFWS. The final processing of acoustic data will include at least two software programs for automated species identification, including a zero-cross program currently approved by the US Fish and Wildlife Service (e.g., EchoClass, BCID), or at least one software program and manual vetting of all high-frequency call sequences.

### **Use of Results:**

Acoustic survey presence/probable absence results will be valid for **up to five years** after the survey was conducted (or up to four years after the harvest is scheduled, assuming that it is scheduled for the summer immediately following the acoustic survey), as significant population increases and recolonization into vacant habitat is not expected to occur quickly for the northern long-eared bat.

Under the Vermont Endangered Species Act and the Federal Endangered Species Act, threatened and endangered species' location information is protected. Therefore, specific locations where the northern long-eared bat or any other state and/or federally listed species has been

## Forest Management Guidance For State Lands Northern Long-eared Bats

---

demonstrated to occur should be used for planning purposes only and not shared outside the VT Agency of Natural Resources unless a specific information request or data sharing agreement has been granted.

### **Resources:**

USFWS. 2015. Range-wide Indiana bat summer survey guidelines 2015. Available and updated at <http://www.fws.gov/midwest/Endangered/mammals/inba/inbasummersurveyguidance.html>



Habitat Type		Conservation Measure	State Lands
Known, Occupied Hibernacula	Special Management Zone 1 (128 Acres)	Special Management Zone (SMZ)	0.2- mile radius from cave/mine entrance
		Prohibited Activities	Tree clearing without USFWS approval; Impact integrity of hibernaculum
		No conservation measures necessary	Habitat Not Suitable <sup>1</sup>
		Forest management < 1% of forested habitat <sup>2</sup>	Seasonal Restrictions: No tree harvesting April 15 – October 31 without retention of all potential roost trees
		Forest management > 1% of forested habitat <sup>2</sup>	Seasonal Restrictions: No tree harvesting April 15 – October 31
			Apply potential roost tree retention guidelines
			Maintain > 60% canopy closure
	Special Management Zone 2 (2010 Acres)	Special Management Zone (SMZ)	1.0-mile radius from cave/mine entrance
		Prohibited Activities	Impact integrity of hibernaculum
		No conservation measures necessary	Habitat Not Suitable <sup>1</sup>
		Forest management < 1% of forested habitat <sup>3</sup>	Seasonal Restrictions: No tree harvesting April 15 – October 31 <sup>4</sup> without retention of all potential roost trees
		Forest management > 1% of forested habitat <sup>3</sup>	Seasonal Restrictions: No tree harvesting April 15 – October 31
			Apply potential roost tree retention guidelines
			Limit acreage below 60% canopy closure to < 2% of forested habitat <sup>5</sup>

Habitat Type		Conservation Measure	State Lands
			Maintain forest connectivity
		Acreage below 60% canopy closure > 2% of forested habitat	Acreage to be distributed among small (< 40 acre) patches
			Only if evaluation of SMZ demonstrates sufficient habitat condition and acreage
			Seasonal Restrictions: No tree harvesting April 15 – October 31
<b>Known, Occupied Summer Habitat</b>	<b>Special Management Zone 1 (128 Acres)</b>	Special Management Zone (SMZ)	0.25-mile radius from roost trees, colony location
		Prohibited Activities	Harvest of known, occupied roost trees; Harvest of any trees within 150 feet of known, occupied roost trees
		No conservation measures necessary	Habitat Not Suitable <sup>1</sup>
		Forest management < 1% of forested habitat <sup>3</sup>	Seasonal Restrictions: No tree harvesting April 15 – September 30 without retention of all potential roost trees <sup>6</sup>
		Forest management > 1% of forested habitat <sup>3</sup>	Seasonal Restrictions: No tree harvesting April 15 – September 30
		Apply potential roost tree retention guidelines	
		Maintain > 60% canopy closure	
		<b>Special Management Zone 2 (2010 Acres)</b>	Special Management Zone (SMZ)
	Prohibited Activities	Harvest of known, occupied roost trees; > 2% of forested	

Habitat Type		Conservation Measure	State Lands
			habitat below 60% canopy closure
		No conservation measures necessary	Habitat Not Suitable <sup>1</sup>
		Forest management < 1% of forested habitat <sup>3</sup>	<u>Maternity Colony:</u> Seasonal Restrictions: No tree harvesting April 15 – September 30 <sup>4</sup> ; Retain all known roost trees; Retain potential roost trees <u>Males &amp; Acoustic Calls:</u> No tree harvesting April 15 – September 30 <sup>4</sup> without retention of all potential roost trees
		Forest management > 1% of forested habitat <sup>3</sup>	Seasonal Restrictions: No tree harvesting April 15 – September 30 Limit acreage below 60% canopy closure to 2% forested habitat <sup>5</sup> Apply potential roost tree retention guidelines Maintain forest connectivity
		Acreage below 60% canopy closure > 2% of forested habitat	Acreage to be distributed among small (< 40 acre) patches
			Only if evaluation of SMZ demonstrates sufficient habitat condition and acreage
			Seasonal Restrictions: No tree harvesting April 15 – September 30

Habitat Type		Conservation Measure	State Lands
Potential Summer Habitat	Special Management Zone (2010 Acres)	Special Management Zone (SMZ)	1.0-mile radius around forest management site
		No conservation measures necessary	Habitat Not Suitable; Forest management < 1% of forested habitat; Acoustic surveys demonstrate probable absence
		Forest management > 1% of forested habitat <sup>3</sup>	Seasonal Restrictions: No tree harvesting April 15 – August 31
			Limit acreage below 60% canopy closure to 2% of forested habitat <sup>5</sup>
		<i>Fall/Winter Harvests</i> where canopy closure below 60% >2% of forested habitat <sup>5</sup>	Seasonal Restrictions: No tree harvesting April 15 – August 31
			Apply potential roost tree retention guidelines
			Acreage to be distributed among small (< 40 acre) patches not to exceed 40 acres in a 0.3-mile radius. If > 40 acres in a 0.3-mile radius, acoustic surveys should first determine probable absence
<i>Spring/Summer Harvests</i> where canopy closure below 60% >2% of forested habitat	Conduct acoustic surveys to determine presence/probable absence		

<sup>1</sup> Habitat suitability includes tree diameters, tree species, canopy closure, and habitat isolation

<sup>2</sup> 1% of the 0.25-mile radius Special Management Zone equates to 1.25 acres in a completely forested Special Management Zone

<sup>3</sup> 1% of the 1.0-mile radius Special Management Zone equates to 20 acres in a completely forested Special Management Zone

<sup>4</sup> Seasonal restrictions may be waived upon completion of a survey for potential roost trees by a trained, certified forester or biologist that identifies, marks, and retains all potential roost trees

<sup>5</sup> 2% of the 1.0-mile radius Special Management Zone equates to 40 acres in a completely forested Special Management Zone

<sup>6</sup> The ability to harvest trees during the summer season by retaining all potential roost trees only applies to documented captures of males or acoustic calls (i.e., not known maternity colonies)

Forest Management  
VANR State Lands  
**MYSE Hibernacula**

Project Site Between 0.25  
and 1.0 Mile of  
Hibernacula?

Project Site Within 0.25  
Mile of Hibernacula?

NO, project more  
than 1 mile from  
hibernacula

Yes, project  
within 1 mile of  
hibernacula

YES, Contact  
USFWS

See  
Potential  
Summer  
Habitat

Project < 1%  
Forested Habitat

Project > 1%  
Forested Habitat

Project < 1%  
Forested  
Habitat

Project > 1%  
Forested  
Habitat

- No tree harvesting April 15-October 31 without retention of all potential roost trees

- No tree harvesting April 15-October 31
- Retain potential roost trees
- Maintain forest connectivity
- Limit acreage below 60% canopy closure to 2% forested habitat\*

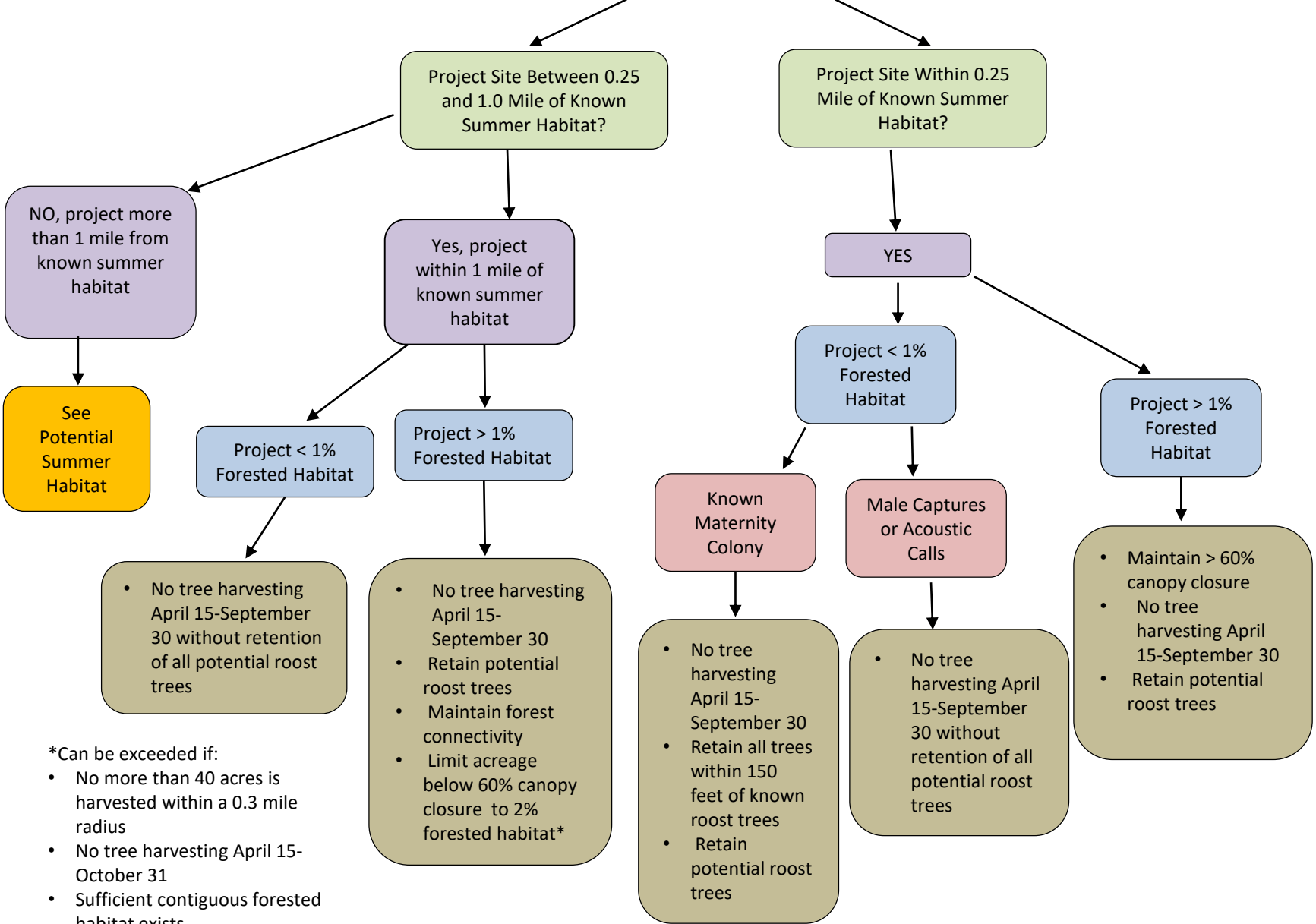
- No tree harvesting April 15-October 31 without retention of all potential roost trees

- Maintain > 60% canopy closure
- No tree harvesting April 15-October 31
- Retain potential roost trees

\*Can be exceeded if:

- No more than 40 acres is harvested within a 0.3 mile radius
- No tree harvesting April 15-October 31
- Sufficient contiguous forested habitat exists

**Forest Management  
VANR State Lands  
MYSE Summer Habitat**



- \*Can be exceeded if:
- No more than 40 acres is harvested within a 0.3 mile radius
  - No tree harvesting April 15-October 31
  - Sufficient contiguous forested habitat exists

Forest Management  
VANR State Lands  
**Potential MYSE Summer Habitat**

