

# Forest Management Guidance For Woodchip Plant Harvest Reviews Northern Long-eared Bats

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## Vermont Agency of Natural Resources Woodchip Plant Forest Management Guidance Northern Long-eared Bats October 2017

### **Purpose**

Information in this document is intended to guide forest management activities associated with woodchip biomass to energy facilities permitted by the Public Service Board and requiring review for impacts to state endangered species. The goal of this guidance is to practically avoid take or harm of northern long-eared bats (*Myotis septentrionalis*), hereinafter referenced as MYSE. While this goal applies specifically to lands associated with woodchip plant harvests, it may also serve as guidance for other forest management purposes.

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 significant loss of roosting habitat; and
2. Maintain suitable hibernating, roosting and foraging habitat to support populations of MYSE where they exist on the landscape.

Standards for avoiding take of MYSE on private lands must reflect the reality that pre-harvest surveys for MYSE, whether it be through acoustic or mist-net surveys, are generally unrealistic at this time. In the future, the potential for effective, efficient, and less costly acoustic surveys may enable landowners to better determine the level of risk of their forest management activities on the species.

The Vermont Agency of Natural Resources, however, does not have those same limitations in the management of its land. 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 all Vermont land. 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. 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.

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2. A 1% rule, as explained below, is recommended to decrease the likelihood of take of MYSE to a negligible or “discountable effect” where there is no evidence of the presence of MYSE. 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. For ease of implementation, the 1% rule is standardized in this guidance to assume a completely forested landscape within a SMZ of a one-mile radius, thereby equaling 20 acres. Harvest 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 20 acres must adequately address the increased likelihood of take through seasonal restrictions on management activities, and/or the implementation of potential roost tree retention practices.
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.
4. 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 colony may exist. 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.
5. 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.

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6. In lieu of using specific silvicultural terms (e.g., even-aged management) desired forest habitat conditions specifically for the MYSE 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). Initially, other correlates such as minimum basal area (40 square feet) or the C-line of stocking guides could serve as a sufficient surrogate for canopy closure and efforts will be made to evaluate such standards over time.
7. 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 during leaf-on conditions 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 or forest conversions to non-forest land uses.

*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 MYSE.

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## **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 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 VFWD staff 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 from the take provisions of the Endangered Species Act. *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:*

- Forest management activities within this SMZ are allowed, provided:
  1. No activities that will impair the integrity of the hibernacula are allowed. Avoid tree harvesting, road construction, or landings directly adjacent to hibernacula entrances.
  2. 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>
  3. Maintain 60% canopy closure throughout the harvest area to maintain bat roosting, migration, and movement within the Special Management Zone.

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4. Apply 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>3,6</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 20 acres* are allowed within the SMZ, provided:
  1. 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>
  2. 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 observable potential roost trees.<sup>3,6</sup>
- Forest management activities *greater than 20 acres* within the SMZ are allowed, provided:
  1. 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>
  2. Maintain some forest connectivity of areas above 60% canopy closure to maintain bat migration and movement within the Special Management Zone.
  3. Apply 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>3,6</sup>
  4. Limit acreage below 60% canopy closure to 40 acres of forested habitat and preferably distribute it among numerous, smaller patches.

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5. Acreage below 60% canopy closure exceeding 40 acres within the SMZ should only occur if:
  - 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>
  - An evaluation of the SMZ demonstrates sufficient acreage of *contiguous* suitable habitat exists.
  - 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>7</sup>

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## **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. In most cases, captured reproductive females are likely to be transmitterd 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.

Documentation of known, occupied summer habitat is valid for 5 years, after which acoustic and/or mist-net surveys may be conducted that confirm or deny their presence within the Special Management Zone. Verifying the status of known, occupied summer habitat may require more intensive survey efforts than required by USFWS guidelines for determining presence/probable absence.

*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

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by the VFWD 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 the conservation measures differ based on the evidence (e.g., acoustic calls, known maternity colony) that established the area as known, occupied summer habitat.

- Forest management activities within 0.25 miles of a known maternity colony (i.e., known maternity roost trees and captured reproductive females) will be allowed, provided:
  1. 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.
  2. All tree cutting is prohibited during the period April 15 – September 30.<sup>4</sup>
  3. Apply potential roost tree retention guidelines (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>3,6</sup>
  4. Maintain 60% canopy closure throughout the harvest area to maintain bat roosting, migration, and movement within the Special Management Zone.
  
- Forest management activities within 0.25 miles of a known summer occurrence (i.e., captured non-reproductive MYSE or acoustic call) will be allowed, provided:
  1. Prohibit tree harvesting during the period April 15 – September 30.<sup>4</sup>
  2. 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>
  3. Maintain forest connectivity.
  4. When limited acreage is 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.



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5. Limit acreage below 60% canopy closure to 5 acres of forested habitat and preferably distribute it among numerous, smaller patches. Exceptions to this limit may be considered based on the type of occurrence (e.g., juvenile female vs. male MYSE) and the amount of forested habitat in the SMZ.

Special Management Zone 2: This zone is between 0.25 and 1.0-mile radius from the known, occupied summer habitat, regardless of the type of occurrence (e.g., known maternity colony vs. acoustic call), and is designed to maintain suitable roosting and foraging habitat during the maternity season.

- Forest management activities *less than 20 acres* are allowed within the SMZ, provided:
  1. All tree cutting is prohibited during the period April 15 – September 30.<sup>4</sup>
  2. 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 20 acres* are allowed within the SMZ, provided:
  1. All tree cutting is prohibited during the period April 15 – September 30.<sup>4</sup>
  2. 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 are predominantly characterized by cavities, crevices, and exfoliating bark.<sup>3,6</sup>
  3. Maintain forest connectivity.
  4. Limit acreage below 60% canopy closure to 40 acres of forested habitat and preferably distribute it among numerous, smaller patches.
  5. Acreage below 60% canopy closure exceeding 40 acres within the SMZ should only occur if:
    - Seasonal restrictions are applied so that all tree harvesting is prohibited during the period April 15 – October 31, when bats

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are either active or concentrated in the forested area around hibernacula. <sup>2</sup>

- An evaluation of the SMZ demonstrates sufficient acreage of *contiguous* suitable habitat exists.
- 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>7</sup>

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## Potential Summer Habitat

*Definition:* This encompasses the remainder of the state where no known, occupied summer habitat or hibernacula currently exist. While no known occurrences have been documented in this region since 2010, historical inventory data indicate that all forested portions of the state serve as potentially suitable habitat for MYSE.

*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 avoid all practical take of the species. On larger parcels limited to summer logging, acoustic surveys conducted during the months of June-July may be very helpful to determine probable absence of MYSE and, as a result, avoid all restrictions outlined 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 the center of a project site 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 center point of the forest management activity:

- Forest management activities *less than 40 acres* within a 1.0-mile radius of the forest management activity are allowed with no conservation measures required. Guidance to advocate for the retention of potential roost trees should be given where residual canopy closure exceeds 60%.
- Forest management activities greater than *40 acres* within a 1.0-mile radius of the forest management activity:
  1. Harvests outside of the peak maternity colony season can occur during the period August 16 – May 31 with no conservation measures necessary. Guidance to advocate for the retention of potential roost trees should be given where residual canopy closure exceeds 60%.
  2. Summer harvests can occur during the peak maternity colony season (June 1 – August 15), provided the following:<sup>5</sup>
    - Apply potential roost tree retention guidelines (see VFWD Forest Management Guidelines for Endangered Bats) where residual canopy closure exceeds 60%.<sup>3,6</sup>
    - Limit acreage harvested to below 60% canopy closure to 40 acres within a 0.3-mile radius during the period (June 1 –

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August 15), preferably distributed among numerous, smaller patches.<sup>7</sup> Additional acreage may be harvested below 60% canopy closure outside of this period.

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<sup>1</sup> Applying a radius from a cave/mine entrance adds acreage to the zone exponentially. A 1.0-mile radius equates to 2,010-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 every 20 acres, respectively, and should satisfy the standard of not likely to adversely affect the local population. A 1.6-mile radius equates to 5,146 acres and the same 10 to 100 MYSE, or one MYSE every 515 or every 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 nearly all cavity trees are identifiable, potential roost tree retention guidelines, when applied, should reduce the likelihood of take by at least that proportion.

<sup>4</sup> Because evidence exists for the presence of adult female MYSE, seasonal restrictions on cutting trees should encompass the entire period 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. However, if present, 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 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.

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Northern

Habitat Type		Conservation Measure	State Lands
<b>Known, Occupied Hibernacula</b>	<b>Special Management Zone 1 (128 Acres)</b>	Special Management Zone (SMZ)	0.25-mile radius from cave/mine entrance
		Prohibited Activities	Tree clearing without USFWS approval; Impact integrity of hibernaculum
		No conservation measures necessary	Habitat Not Suitable
		Forest management	Seasonal Restrictions: No tree harvesting April 15 – October 31
			Apply potential roost tree retention guidelines
			Maintain > 60% canopy closure
		<b>Special Management Zone 2 (2010 Acres)</b>	Special Management Zone (SMZ)
	Prohibited Activities		Impact integrity of hibernaculum
	No conservation measures necessary		Habitat Not Suitable
	Forest management < 20 acres		Seasonal Restrictions: No tree harvesting April 15 – October 31
	Forest management > 20 acres		Seasonal Restrictions: No tree harvesting April 15 – October 31
			Apply potential roost tree retention guidelines
			Limit acreage below 60% canopy closure to 40 acres Maintain forest connectivity
	Acreage below 60% canopy closure > 40 acres	Acreage below 60% canopy closure limited to 40 acres per 0.3-mile radius	

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Northern

Habitat Type		Conservation Measure	State Lands
			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
		Known maternity colony (i.e., maternity roost trees or captured reproductive female)	Seasonal Restrictions: No tree harvesting April 15 – September 30
			Retain all trees within 150 feet of known roost trees
			Apply potential roost tree retention guidelines
		Known male captures or acoustic calls	Maintain > 60% canopy closure
	Seasonal Restrictions: No tree harvesting April 15 – September 30		
	Apply potential roost tree retention guidelines		
		Limit acreage < 60% canopy closure to 5 acres	
<b>Special Management Zone 2 (2010 Acres)</b>	Special Management Zone (SMZ)	1.0-mile radius from roost trees, colony location	
	No conservation measures necessary	Habitat Not Suitable <sup>1</sup>	

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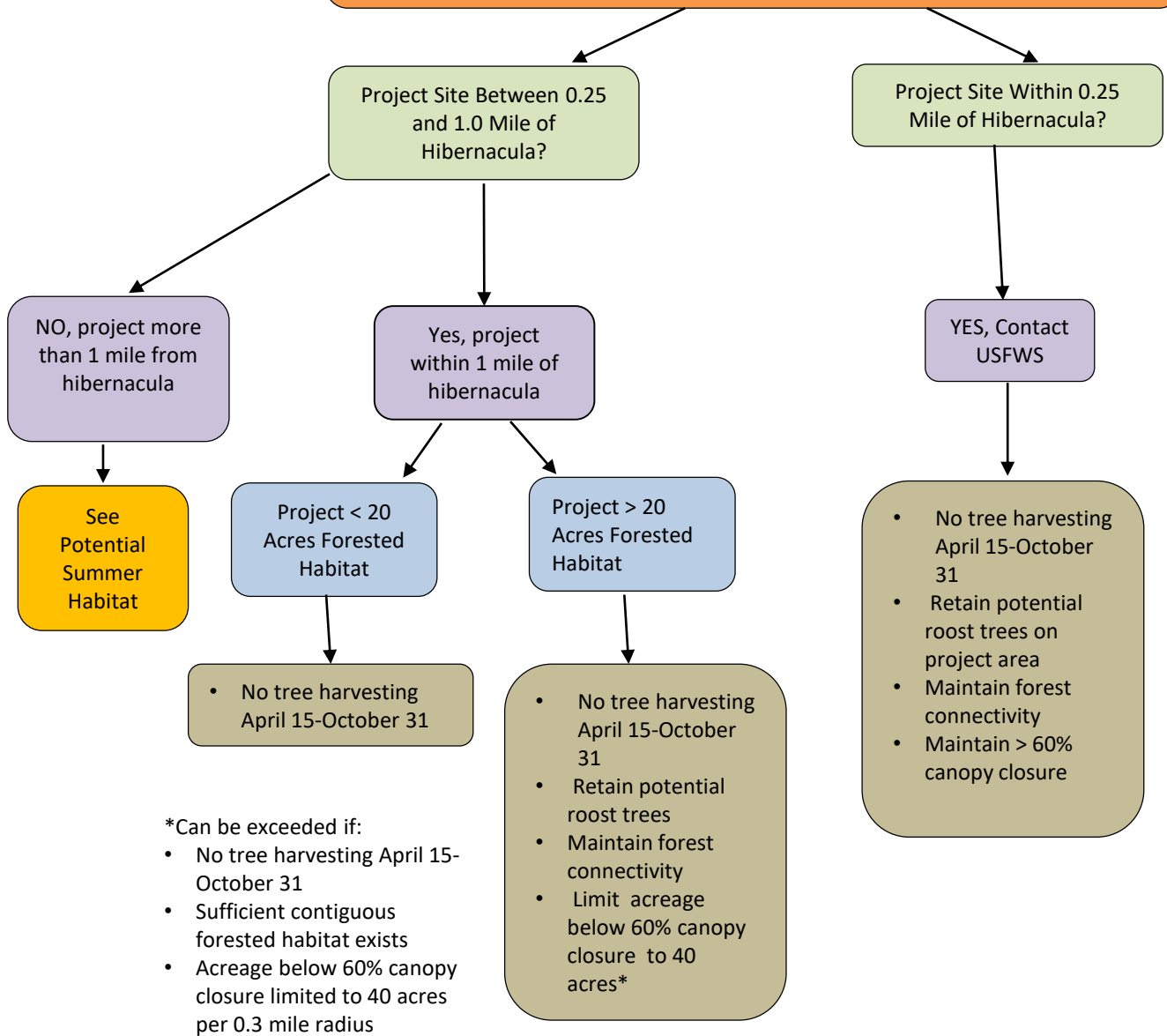
Northern

Habitat Type		Conservation Measure	State Lands
		Forest management < 20 acres	Seasonal Restrictions: No tree harvesting April 15 – September 30 <sup>4</sup> ;
		Forest management > 20 acres	Seasonal Restrictions: No tree harvesting April 15 – September 30
			Limit acreage below 60% canopy closure to 40 acres
			Apply potential roost tree retention guidelines
		Acreage below 60% canopy closure > 40 acres	Maintain forest connectivity
			Acreage below 60% canopy closure limited to 40 acres per 0.3-mile radius
			Only if evaluation of SMZ demonstrates sufficient habitat condition and acreage
<b>Potential Summer Habitat</b>	<b>Special Management Zone (2010 Acres)</b>	Special Management Zone (SMZ)	1.0-mile radius from center of forest management site
		No conservation measures necessary	Habitat Not Suitable; Forest management < 40 acres
		Forest management > 40 acres <u>AND</u> Harvesting during August 16 – May 31	No conservation measures necessary
			Provide guidance on potential roost tree retention
		Forest management > 40 acres <u>AND</u> Harvesting during June 1 – August 15	Apply potential roost tree retention guidelines
	Limit acreage < 60% canopy closure to 40 acres within a 0.3-mile radius		

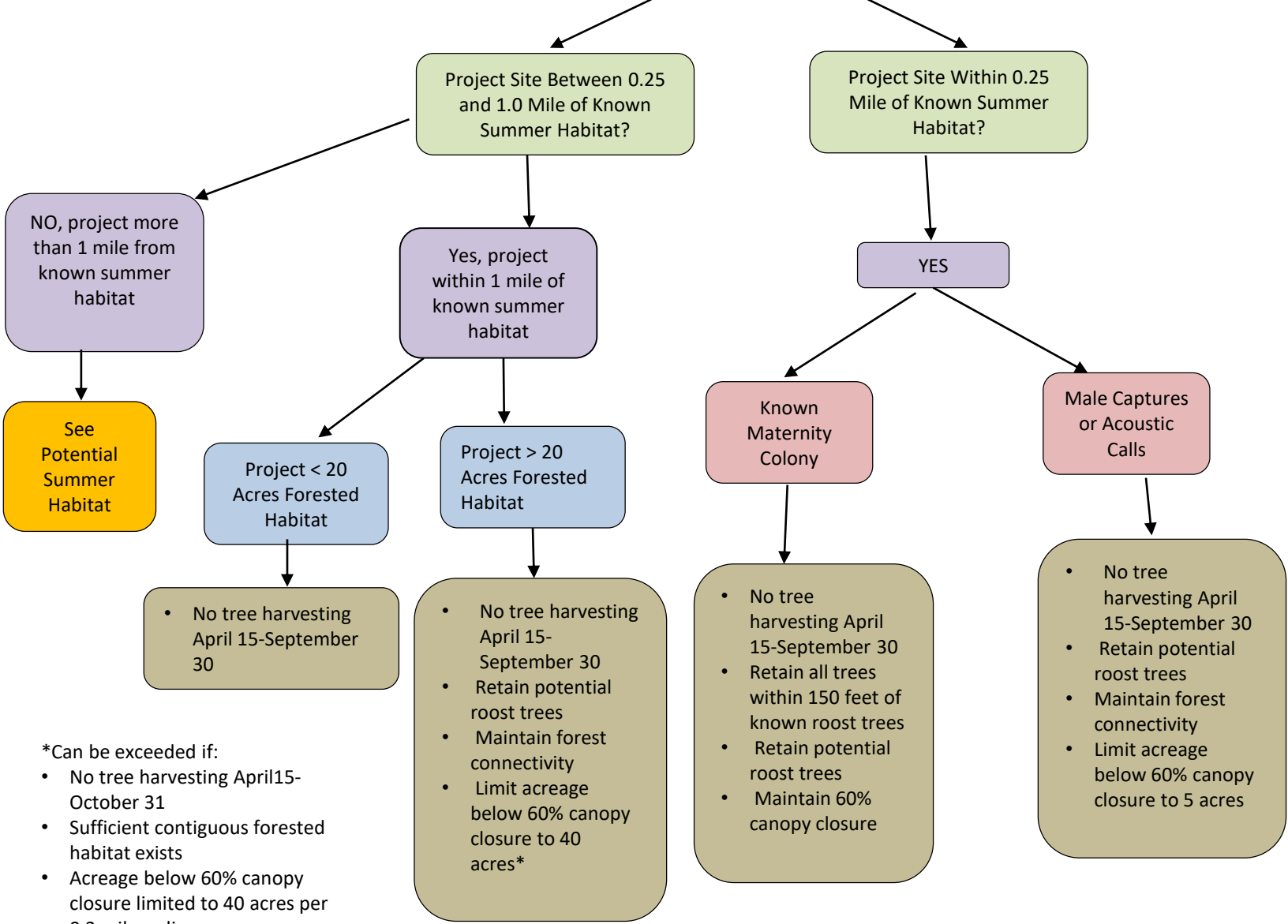




Vermont Fish and Wildlife Department  
Bed/Ryegate Review Guidance - October 2017  
**MYSE Hibernacula**



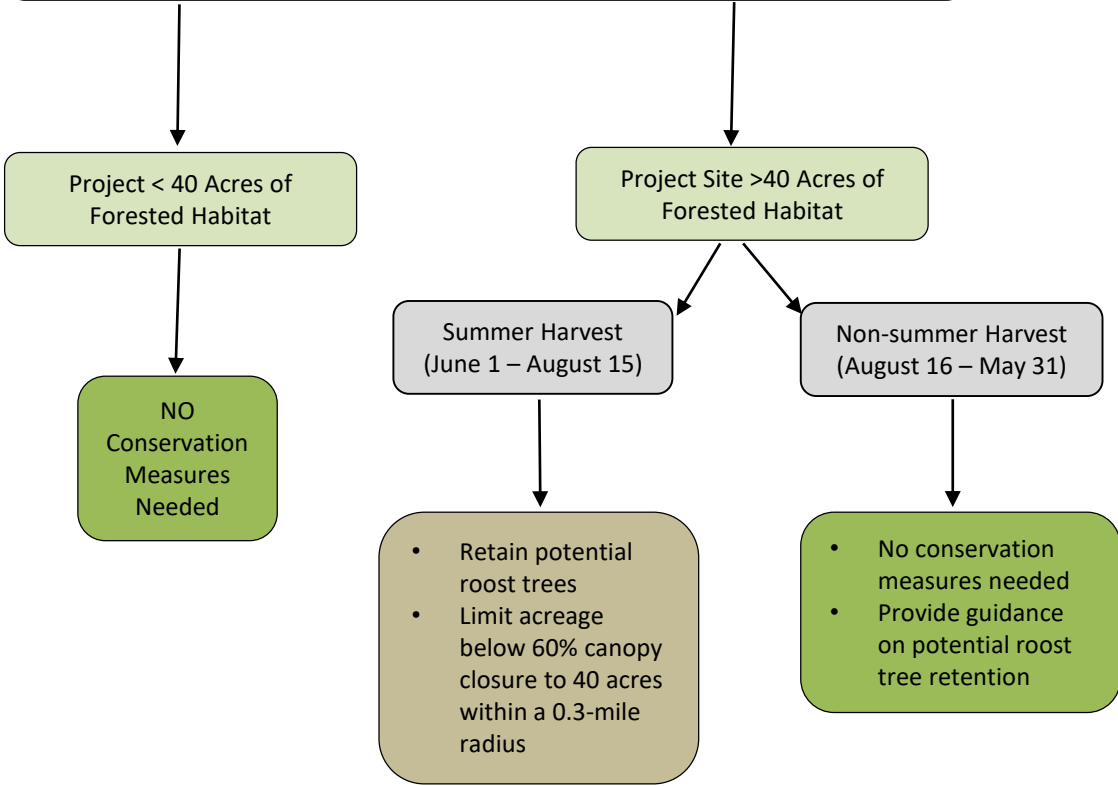
Vermont Fish and Wildlife Department  
 BED/Ryegate Review Guidance - October 2017  
**MYSE Summer Habitat**



\*Can be exceeded if:

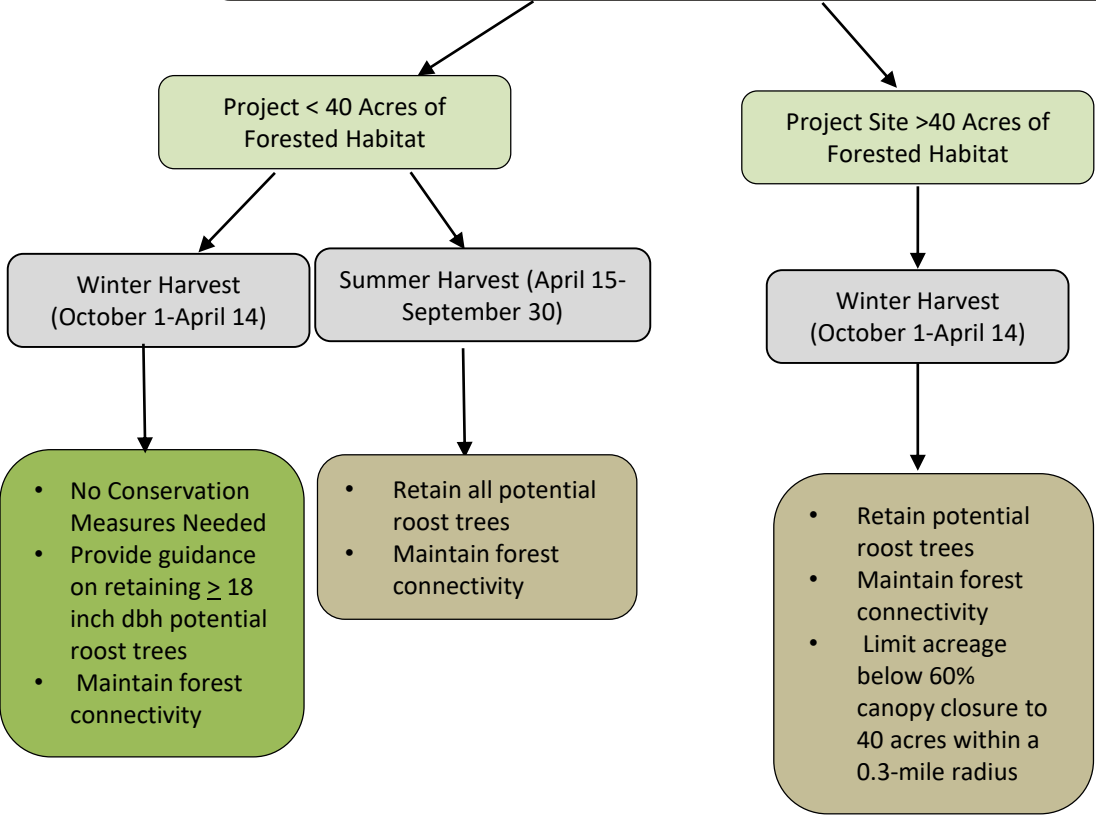
- No tree harvesting April 15-October 31
- Sufficient contiguous forested habitat exists
- Acreage below 60% canopy closure limited to 40 acres per 0.3 mile radius

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**Potential MYSE Summer Habitat\***



\* No conservation measures necessary if acoustic monitoring demonstrates probable absence

Vermont Fish and Wildlife Department  
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**Champlain Valley Indiana Bat Range**  
**MYSE and MYSO Habitat**



Project < 40 Acres of  
Forested Habitat

Project Site >40 Acres of  
Forested Habitat

Winter Harvest  
(October 1-April 14)

Summer Harvest (April 15-  
September 30)

Winter Harvest  
(October 1-April 14)

- No Conservation Measures Needed
- Provide guidance on retaining  $\geq 18$  inch dbh potential roost trees
- Maintain forest connectivity

- Retain all potential roost trees
- Maintain forest connectivity

- Retain potential roost trees
- Maintain forest connectivity
- Limit acreage below 60% canopy closure to 40 acres within a 0.3-mile radius