



18 January, 2021

### Executive Summary

North East Ecological Services ('NEES') was retained by Save Forest Lake to provide an independent review of the Granite State Landfill, LLC wildlife impact documentation to determine whether the proposed landfill construction posed a potential adverse impact on the northern long-eared bat, *Myotis septentrionalis*. NEES reviewed the Habitat Assessment document submitted by B.H. Keith Associates, in addition to site maps and project descriptions submitted by the Applicant. Overall, I found five inadequacies that should be addressed before any impact to federally- and state-listed bat species can be effectively evaluated:

- i) Failure to incorporate pre-existing knowledge and current issues relevant to bats;
- ii) Failure to adequately assess 'potentially suitable summer habitat' for the northern long-eared bats
- iii) Inappropriate use of the 4(d) Rule given concern ii)
- iv) Failure to incorporate deforestation activity related to road expansion into the Habitat Assessment
- v) Failure to address the conservation concerns of the eastern small-footed bat

Overall, the Habitat Assessment provided by the Applicant does not reach a conclusion that is consistent with the data. Although I have not been to the proposed Project site, the information provided in the Applicant's Habitat Assessment clearly shows the presence of "potential suitable summer habitat" as defined by the U.S. Fish and Wildlife Service. Furthermore, the Habitat Assessment presumes an exemption from the seasonal tree-cutting restrictions of the 4(d) Rule based on a faulty premise regarding the priority of the Phase 2 Field Survey and the 4(d) Rule regarding 'known maternity roosts'. It is also unclear to what extent the Applicant addressed the potential impact of road widening on the existing forested landscape, and whether these activities would create *Incidental Take* by imposing harm to the northern long-eared bat by impairing further use of the Project sites. Lastly, the Applicant appears to have completely disregarded the potential impact of the proposed construction and blasting activities on the eastern small-footed bat, a State Endangered species. In my opinion, these deficiencies are consequential and prevent a reasonable determination of adverse impact for either of these imperiled species.

Sincerely,

D. Scott Reynolds, Ph.D., CWB, CSE

## **GSL Project Overview**

It is NEES' understanding that the Applicant proposes the construction of a solid waste landfill that would directly impact approximately 200 acres of forested habitat within a larger 1,279 acre parcel in Dalton, New Hampshire. In addition to tree-clearing activities, the landfill footprint is anticipated to result in the loss of multiple wetlands and five vernal pools. According to the NHDES Application documents (NHDES-W-06-013), palustrine scrub-shrub and forested wetlands that exist within the landfill footprint will be eliminated by the proposed project, with surface water runoff from the landfill being collected, filtered, and diverted back into the wetland complex to maintain hydrological continuity. In addition to these wetland complexes, two sections of intermittent streams will be permanently impacted by the landfill footprint and associated road access modifications. The Applicant also states that several vernal pools located within the landfill footprint will be eliminated. The NHDES Application states that this loss of wetland complexes and vernal pools would be offset by planned compensatory mitigation measures, including in-lieu fee payments; the details of the level of impact and the scale of the compensatory mitigation measures were not available for me to review. In addition to the physical footprint of the landfill, there will be road widening and upgrades along Douglas Drive.

It is also my understanding, based on the Applicant's Time Extension Request dated 15 January 2021, that there is the potential for additional blasting at the GSL Project site if "local bedrock highs exist", but to my knowledge no detailed blasting plans have been developed. Because I do not have specific information about the wetlands and vernal pool impacts, I will limit my review to forest habitat alterations, general wetland concerns, and potential impacts of blasting on bats.

## **The Habitat Assessment**

Most of the context for my review is based on Section 10.4 of the Site Impact Assessment prepared by B.H. Keith Associates (dated May 2020) titled the Northern Long-Eared Bat Phase I Bat Habitat Assessment (hereinafter, the "Habitat Assessment"). The Habitat Assessment was conducted by Barry Keith during the fall of 2019 and the spring of 2020 on the 1,279 acre parcel that contains the proposed Granite State Landfill Project Site in Dalton, New Hampshire. The Habitat Assessment was based on an evaluation of the 200-acre component of the parcel that will be deforested as part of the physical footprint of the landfill. The Habitat Assessment appears to focus on the 50 CFR Part 17 4(d) Rule for the Northern Long-Eared Bat (USFWS, 2016) that outlines restrictions for the incidental take of northern long-eared bats within parts of their range that are being impacted by White-nose Syndrome ('WNS'). In particular, the 4(d) Rule prohibits any activities that may alter winter hibernacula (regardless of seasonal timing), and places temporal restrictions on tree removal activities within 150 feet of a known summer maternity roost (see *Relevant Regulations and Guidance Documents* below). The Habitat Assessment states that the purpose was "intended to identify any potential long-eared bat habitat within the project area that may be subject to the above referenced tree clearing time restrictions". The Habitat Assessment states that under the 4(d) Rule, "tree cutting is generally restricted within 150 feet of a known maternity roost tree from June 1 to July 31<sup>st</sup>, of a given year, and within 0.25 miles of a known hibernaculum at any time of year".

The Habitat Assessment contains information on the historic land use of the Project site and incorporated forestry measurements (tree species identification, mean dbh, snag abundance, and canopy closure) at five locations within the 200-acre landfill footprint. In the Habitat Assessment, the Project site is described as having been extensively logged by both the Diamond Match Company and J.W. Chipping. However, the Habitat Assessment states that the Project site remains about 80% forested and surrounded by additional forested land, clearcuts, and mining activities. The Habitat Assessment also states that the Project Site is less than 0.25 miles from Forest Lake State Park, a 397-acre recreational area with extensive forested trails and open water.

In the context of potential long-eared bat habitat, the Habitat Assessment states that “[t]he northern long-eared bat utilize large live trees, typically with loose bark, and dead snags as summer maternity roost trees. The bats use various forested land cover types during the spring, summer and fall”. The Habitat Assessment further states that factors influencing habitat quality include “the size or maturity of the forest, the nature and extent of suitable roost trees and unfragmented forest cover”, and concludes the preferred habitat “has been typically found to consist of large contiguous forested areas with limited open areas such as fields, large cleared areas and clear cuts”. B.H. Keith Associates states that they followed the Phase I methodology of the 2020 Range-Wide Indiana Bat Survey Guidelines (hereinafter ‘USFWS Guidelines’: USFWS, 2020), which have been adopted for use the northern long-eared bat throughout the United States. For more details about the USFWS Guidelines, see ***Relevant Regulations and Guidance Documents*** below.

In their Phase I (Initial Project Screening) evaluation of the Project site, B.H. Keith Associates conducted a forestry survey of the Project Site to determine tree density and species diversity, as well as snag density, basal area estimates, and canopy closure. The 200-acre parcel that was examined under the “proposed tree cutting” is “adjacent to an existing rock quarry and existing asphalt plant”, with a proposed maintenance garage “to be sited within a former sand and gravel mining site”. The Habitat Assessment identified three primary forest types within the Project site; lowland spruce habitat; northern hardwood-spruce-fir habitat; and higher elevation northern hardwood habitat. In addition, the Habitat Assessment identified and sampled an extensive forested wetland that contained a variable mix of conifers and hardwood species. Across these three forested habitats, B.H. Keith specifically identified fifteen species of conifer and hardwood trees and identified northern hardwood forests as the primary forest type in the higher elevation sites. Overall, B.H. Keith characterized the Project Site “early successional” with a large proportion of trees falling between 3 – 5 inch dbh (estimated 3.75 inch mean tree diameter) with occasional remnant trees (i.e. larger, older trees) throughout the respective stands.

The Summary of the Habitat Assessment states that the absence of larger diameter trees and proximity of large open areas (i.e. gravel mining and clearcuts) “likely do not provide potentially suitable northern long-eared bat habitat”, also stating that the USFWS concurred through consultation that “there are not critical habitats within [the] project area under this office’s jurisdiction”. The conclusion referenced in the context of the 4(d) Rule is that “the Project is not subject to site tree clearing restrictions”.

## North East Ecological Services Review

North East Ecological Services ('NEES') was retained by Save Forest Lake to produce an independent review of documents provided by Granite State Landfill, LLC (hereinafter "the Applicant") that are pertinent to the potential impacts of the GSL Project on bats and bat habitat. Specifically, I reviewed Section 10.4 of the Site Impact Assessment prepared by B.H. Keith Associates (dated May 2020) titled the Northern Long-Eared Bat Phase I Bat Habitat Assessment (hereinafter, the "Habitat Assessment"), as well as application information pertaining to land cover alteration and impacts on wetlands and vernal pools. In addition to the review of this site-specific material, NEES conducted a desktop habitat review based on aerial photographs and Google Earth™ imagery. I have attempted to place this review, and my concerns about the GSL Project site, within the context of the status of the bat community in New Hampshire and our understanding of the key threats to their continued persistence in the State. In this review, I have identified five primary concerns related to the Applicant's work and offer remedies that may improve the accuracy of the impact assessments and provide more confidence in any decisions that are made with regards to the development of the Project site. Specifically, the concerns I have include:

- i) Failure to incorporate pre-existing knowledge and current issues relevant to bats;
- ii) Failure to adequately assess 'potentially suitable summer habitat' for the northern long-eared bats
- iii) Inappropriate use of the 4(d) Rule given concern ii)
- iv) Failure to incorporate deforestation activity related to road expansion into the Habitat Assessment
- v) Failure to address the conservation concerns of the eastern small-footed bat

## The Current Status of the Bat Community Within New Hampshire

An effective and complete impact analysis requires an understanding of the ecological of any potentially impacted species or communities, including the nature of any pre-existing threats to their continued viability. The community of bats found in New Hampshire contains up to eight species, all of which have been designed as Federally-Threatened, State-Endangered, or State Species of Concern (Table 1). Although there are multiple cumulative threats to the continued persistence of these species throughout their range (including habitat loss, physical exclusion, and wind energy development), the primary threat to the hibernating species is the presence of White-nose Syndrome, an emergent fungal disease that has decimated bat populations throughout the eastern half of North America (Blehert et al., 2009; Frick et al., 2010).

White-nose Syndrome ("WNS") is caused by the psychrophilic fungus *Pseudogymnoascus destructans* (Lorch et al., 2011; Langwig et al., 2015). WNS has been documented in almost all species of hibernating bats in the eastern United States (Locke, 2008; Reeder & Turner, 2008), including all five hibernating bat species known to occur in New Hampshire. Although the exact mechanisms of mortality are still uncertain, bats infected with WNS appear to have difficulty maintaining homeostasis during hibernation and generally die in early spring as a result of electrolyte imbalance, dehydration, and starvation (Cryan et al., 2010; Ehlman et al., 2013, Bohn et al., 2016). Within two years of being detected at a site, WNS typically causes from 40% - 99% mortality within the hibernaculum (Langwig et al. 2015). Since first being documented in 2006,

WNS has spread across 41 states and five provinces in Canada, causing the mortality of an estimated six million bats (USFWS, 2014) and dramatic shifts in both species' abundance and community structure throughout the northeast (Frick et al., 2010; Brooks, 2011; Nocera et al. 2019). This includes an estimated population reduction of up to 98% in northern long-eared bat (Turner et al., 2011). Prior to the emergence of WNS, the NHFG had conducted multiple surveys of the hibernating bat population within the state and all the evidence suggested a robust and growing population across all species. Since the outbreak of WNS in New Hampshire in 2009, the population of hibernating bats has experienced a 99.8% decline, with bats extirpated from three of our eight known hibernacula, and two of the remaining hibernacula having only a single bat as of 2015 (Reynolds, unpublished data).

**Table 1: Conservation Status of Bat Species in New Hampshire (NHFG, 2021)**

Common Name	Species	FE	FT	SE	SGCN	SC
<b>Northern long-eared bat</b>	<i><b>Myotis septentrionalis</b></i>		<b>X</b>	<b>X</b>		
<b>Little brown bat</b>	<i><b>Myotis lucifugus</b></i>			<b>X</b>		
<b>Eastern small-footed bat</b>	<i><b>Myotis leibii</b></i>			<b>X</b>		
<b>Tricolored bat</b>	<i><b>Perimyotis subflavus</b></i>			<b>X</b>		
<b>Big brown bat</b>	<i><b>Eptesicus fuscus</b></i>				<b>X</b>	
Silver-haired bat	<i>Lasionycteris noctivagans</i>				<b>X</b>	<b>X</b>
Eastern red bat	<i>Lasiurus borealis</i>				<b>X</b>	<b>X</b>
Hoary bat	<i>Lasiurus cinereus</i>				<b>X</b>	<b>X</b>

FE = Federally-Endangered, FT = Federally-Threatened, SE = State-Endangered, SC=Species of Special Concern, SGCN = Species of Greatest Conservation Need. **Species in bold hibernate throughout the winter**

### **Pre-Existing Knowledge of the Bat Community in Proximity to the GSL Project Site**

A critical component of any impact analysis is an investigation into the current state of knowledge of the impacted community. For bats, there is often very little pre-existing site-specific knowledge about species composition or abundance. For the GSL Project site, it is important to realize that half of the known bat hibernacula in the state are found within 25 miles of the Project site, with three hibernacula located in Grafton County within 14 miles west or southwest of the Project site. The farthest site (Mascot Mine: Coos County) has historically been the state's largest hibernaculum and the only known wintering site for the eastern small-footed myotis. The other three sites (Red Mine, Paddock Copper Mine, and Carter Mine) have historically contained multiple bat species, including the majority of the known northern long-eared bats. Although all of these sites were severely impacted by WNS by 2015, we do have documented fall swarming activity in proximity to three of these sites from 2017 for both the northern long-eared bats and eastern small-footed bats (Jessie Mohr, unpublished report). There are also documented evidence of both northern long-eared bats and little brown bats from Whitefield, approximately 10 miles northeast of the GSL Project site. These data, collected in August 2017 as part of the Northern Pass Project Habitat Impact Assessment, confirmed the presence of these species at both sampling sites (Segments 244 and 245) within Whitefield. It is also important to state that the GSL Project site is only a few miles from the White Mountain National Forest, where extensive research on bat communities has been conducted by the U.S. Forest Service (Leighlan Prout) for over two decades.

## **Documentation of Potential Suitable Summer Habitat for the Northern Long-eared Bat**

The Habitat Assessment conducted by B.H. Keith Associates states that “[t]he northern long-eared bat utilize large live trees, typically with loose bark, and dead snags as summer maternity roost trees” and that “[f]actors that influence habitat quality include the size or maturity of the forest, the nature and extent of suitable roost trees and unfragmented forest cover. Preferred habitat has been typically found to consist of large contiguous forested areas with limited open areas such as fields, large cleared areas and clear cuts.” Unfortunately, this is a very narrow description, one that may at best be termed ‘ideal conditions’. Further, this definition lacks any references and does not reflect our current understanding of the roosting ecology of this species.

The USFWS Guidelines Phase 1 Habitat Assessment should be conducted to determine if “suitable summer habitat and/or a potential hibernaculum(a) is present within the action area”. If neither suitable summer habitat or winter habitat are in the Project area, no further presence/absence surveys are necessary. A review of the pre-existing knowledge available through state and federal wildlife agencies, including the Natural Heritage Bureau, would have identified multiple known hibernacula in proximity to the Project site. A review of the known species distribution map for the northern long-eared bat (Figure 1) suggests the Project Site is within the core range of the species. Therefore, the primary purpose of the habitat assessment is to determine whether “potential suitable habitat” exists. For the northern long-eared bat, the USFWS Guidelines defines potential suitable summer habitat as:

*“a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forest habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e. live trees and/or snags  $\geq 3$  inches dbh that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested/wooded habitat.”*

The Habitat Assessment conducted by B.H. Keith Associates articulates key components of this definition, including “a wide variety of forested/wooded habitats” and “may include some adjacent and interspersed non-forested habitats” including wetlands and field edges. The Habitat Assessment also articulates the USFWS Guidelines definition for “potential roost (ie., live trees and/or snags greater than 3” dbh that have exfoliating bark, cracks, crevices, and/or hollows)”. The Habitat Assessment identified a wide variety of forested and wooded habitats and stated that Project Site “mean tree diameter was estimated to be 3.75 inches”. The Habitat Assessment identified fifteen distinct tree species at the Project site, but it did not identify whether any of these species represented potential roost trees. Despite providing generalized and detailed features of the habitat that are well within the range of conditions known for northern long-eared bat summer roosting habitat, B.H. Keith Associates concludes that the Project site “does not provide potentially suitable northern long-eared bat habitat.”

Northern long-eared bat roost trees are almost always found within 2.0 km of open water (Cryan et al., 2001) and many are found in forested wetlands (Foster and Kurta, 1999). There is also good evidence that northern long-eared bats preferentially roost in higher elevation sites, particularly upland hardwood forests (Lacki and Cox, 2009; Timpone et al., 2010). All of these conditions exist, and some even dominate, at the GSL Project Site. It is also well documented that maternity roosts, where females and the young spend the summer months, are primarily found in tree crevices, not under loose bark (Lacki and Schwierjohann, 2001; Perry and Thill, 2007). Therefore, the characterization of areas as “smooth bark forest” does not preclude potential suitable habitat, particularly when the tree species identified by the Habitat Assessment are known to be used by the northern long-eared bat.

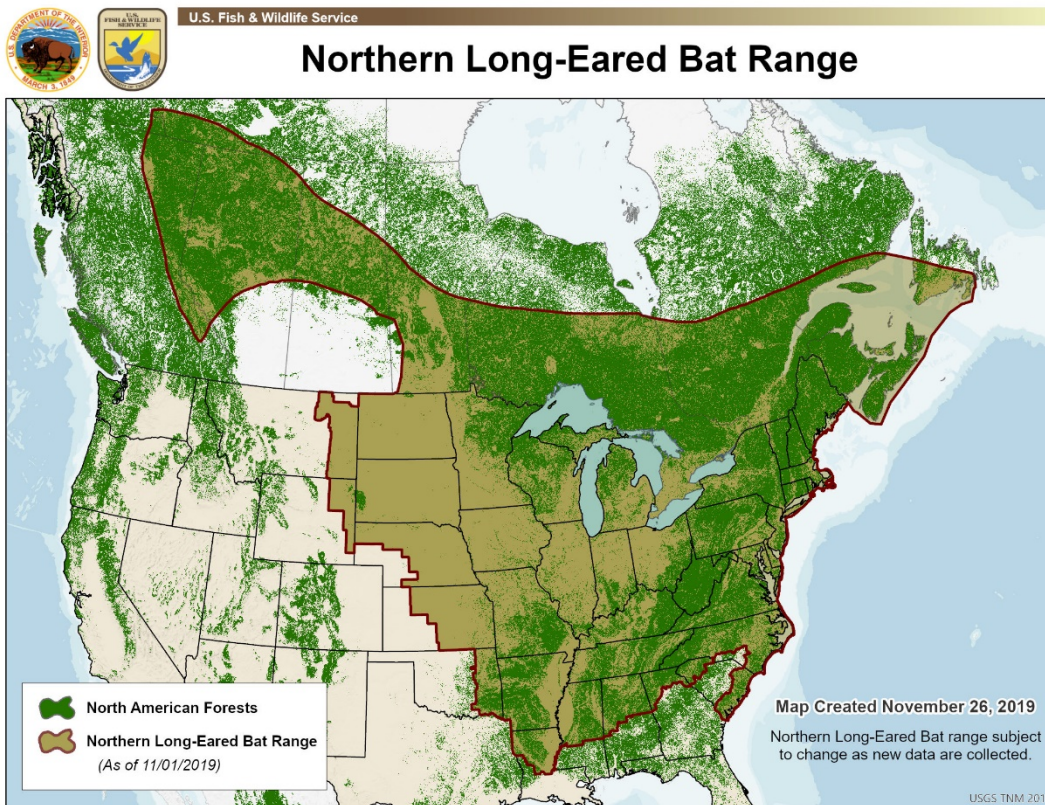


Figure 1. Species Distribution Map for the Northern Long-eared Bat  
<https://www.fws.gov/midwest/endangered/mammals/nleb/nlebRangeMap.html>

The following specific information provided by the Habitat Assessment are consistent with the USFWS Guidelines (in italics below) for northern long-eared bat habitat, and therefore suggests that potential suitable habitat exists at the GSL Project Site:

1. The GSL Project footprint is approximately 80% and contains three forest cover types, multiple forested wetlands, and multiple vernal pools.

*“a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forest habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures.”*

2. The mean diameter of trees on the Project site was 3.75 inches dbh and included multiple larger ‘remnant trees’ throughout the stands.  
*“This includes forests and woodlots containing potential roosts (i.e. live trees and/or snags  $\geq 3$  inches dbh that have exfoliating bark, cracks, crevices, and/or cavities)”*
3. The GSL Project site is located in close proximity to the White Mountain National Forest and the Fresh Lake State Park.  
*“Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested/wooded habitat.”*
4. The Habitat Assessment identified 15 specific coniferous and northern hardwood tree species at the Project Site, but did not place these species in the context of the tree-roosting preferences of the northern long-eared bat. In fact, 13 of the 15 species identified in the Habitat Assessment (the two exceptions were striped maple and red spruce) have been specifically identified as tree species used by northern long-eared bats.

B.H. Keith Associates focuses on the “overall lack of larger diameter trees, the extent of smaller diameter smoothed bark forest and proximity to large open areas (eg. gravel mining and clearcuts)” to conclude that the Project Site does not “provide potentially suitable northern long-eared bat habitat”. By reaching this conclusion, given their own characterization of the Project Site, the Habitat Assessment fails to incorporate much of what is known about the ecology of this species. Most critically, the northern long-eared bat is often found roosting in intensively managed forests (Menzel et al., 2002) and some of the highest levels of foraging activity occur in harvested sites (Titchenell et al., 2011). The northern long-eared bats frequently use small diameter trees (hence the USFWS Guidelines identifying any tree greater than 3.0 inches dbh as a potentially suitable roost tree), often as secondary roosts within a larger roost network (Johnson et al., 2012). This same study found that tree size, decay stage, or even bark characteristics were not predictive of use by northern long-eared bats. It is my opinion that the Habitat Assessment conducted by B.H. Keith, which was done under the USFWS Guidelines, should be interpreted in the context of the USFWS Guidelines. If this is done, it is clear that the GSL Project Area has “potential suitable summer habitat”.

### **Appropriate Use of the 4(d) Rule**

In the Habitat Assessment, B.H. Keith Associates concluded that the GSL Project Site “likely do no provide potentially suitable northern long-eared bat habitat”, and therefore “the Project is not subject to site tree clearing restrictions.”. However, the 4(d) Rule) temporal restriction is not based on the presence of potentially suitable habitat. The 4(d) Rule explicitly states that seasonal restrictions on tree removal is required only when those activities “1) Occurs within 0.25 miles (0.4 km) of known northern long-eared bat hibernacula; or (2) cuts or destroys known occupied maternity roost trees, or any other trees within a 150-foot (45-meter) radius from the known occupied maternity roost trees”. There is no information that B.H. Keith Associates could have discovered during their Phase 1 Habitat Assessment that would have revealed the presence of a



**known occupied** maternity roost tree; therefore, the Phase 1 Habitat Assessment cannot be used to assess the applicability of the 4(d) Rule. What should have happened is that the Phase 1 Habitat Assessment, which clearly shows the presence of potentially suitable northern long-eared bat habitat, should have triggered a Phase 2 Summer Presence/Absence Survey.

The Phase 2 Summer Presence/Absence Survey is a field-based survey that utilizes acoustic monitoring and/or mist-net capture to document the likely presence of northern long-eared bats within a project area. If the species is deemed *Absent* using a methodology of the appropriate scope and scale of effort, then no additional field work is necessary, and there is no likely impact on the species. If the species is deemed *Present* (based on capture or acoustic identification), then the focus of the USFWS consultation shifts to the potential for adverse effects. Tree removal is clearly a potential adverse effect. In my experience with USFWS consultation in the context of tree removal, the conclusion is usually that a) you presume the presence of maternity roost trees within the Project Site and restrict all tree removal activity under the guidance of the 4(d) Rule, or b) you conduct Phase 4 Radio-tracking to identify specific roost trees and you tailor the proximity features of the 4(d) Rule to your tree-removal activities.

B.H. Keith Associates was fully aware of this progression, as the Habitat Assessment states that “[t]his study did not conduct acoustic assessments or mist netting surveys to determine the presence or absence of this specie.” However, they cannot use a Phase 1 Habitat Assessment (which does not identify maternity roost trees) to justify an exemption to the 4(d) Rule based on lack of known maternity roost trees. In the six years since the Interim 4(d) Rule was published, I have never seen a Phase 1 Habitat Assessment used to justify a 4(d) Rule condition. Because the Applicant chose not to do a Phase 2 Survey, they by default, presumed *Presence* and therefore are bound to the restrictions of the 4(d) Rule.

### **Impact of Linear Landscape Features on Habitat Quality**

Based on my understanding of the Habitat Assessment, B.H. Keith Associates did not survey the impact of the road expansion and improvements that will occur at the GSL Project Site. These activities not only have an important impact on how bats utilize the landscape, they also typically increase the total acreage of impact substantially when you include an appropriate buffer zone. The value of roads and other linear features are specifically identified in the USFWS Guidelines for potential suitable habitat (“*includes .. linear features such as fencerows, riparian forests, and other wooded corridor*”) because they are known to be important for roosting and foraging bats. Linear features, such as wooded roads, are key foraging and commuting habitat for bats in general (Walsh and Harris, 1996), and the northern long-eared bat (Henderson and Broders, 2008) in particular. Although much of the literature has focused on field and forest edges, wooded corridors, including logging roads and two-lane rural roads, have been shown to be equally as important for bats (Verboom and Huitema, 1997). Trees on the edge of a forested corridor are also potentially critical roosting habitat, as the exposed edges create unique stresses on these trees that increase their potential for damage and disease, which increase the frequency and severity of cracks, crevices, and cavities that are used by tree-roosting bats. Given that many of these trees are also in unique insolation environments (particularly south- and south-western aspects), they can create important roosting habitat. Forested trails and roads also play an important role in maintaining connectivity between roosting sites (forested habitats) and foraging sites (field edges, open water). Given these facts, it is unclear whether the Habitat Assessment

identified the potential of road expansion to result in harm to the northern long-eared bat, and consequently, whether the proposed activities constitute potential *Incidental Take* of the species. The Habitat Assessment should have provided more detail on the impact of the road expansions on potential roost trees, as well as the impact of road expansion on future habitat suitability.

### **Potential Impact of the GSL Project Site on the Eastern Small-footed Bat**

The Habitat Assessment states that “the proposed infrastructure area is largely within an existing disturbed site adjacent to an existing rock quarry and existing asphalt plant” and that the proposed maintenance garage “is to be sited within a former sand and gravel mining site”. Based on our knowledge of the species distribution and habitat requirements of the bats of New Hampshire, it is my opinion that efforts should have been conducted to assess the presence of the eastern small-footed bat. The eastern small-footed bat has an extensive distribution from Ontario to New England, southward to Georgia and Westward to Oklahoma (Figure 2), although it is not considered common anywhere within its range. It has historically been considered one of the rarest bats in North America (Griffin, 1940) and ‘without doubt the least known of all northeastern bat species’ (Thomas, 1993). Although eastern small-footed bats are not federally protected, it has special status in most of the states within its’ range, and it has been listed as Endangered in New Hampshire for over 30 years.

The eastern small-footed bat is a saxicolous species that is dependent on rocky outcrops and talus material for summer roosting habitat. Although they typically use rocky hillside habitat in mountainous regions (LaGory et al., 2008), they also frequently use rock slabs, quarries, rocky outcrops, talus slopes, earthen dams, hollow trees, abandoned tunnels, and even human structures when available (Thomas, 1993; Best & Jennings, 1997; LaGory et al., 2008). Summer populations of small-footed bats appear to be patchy throughout their range, and summer activity is often concentrated around winter hibernacula (Thomas, 1993; Johnson & Gates, 2008; Reynolds et al., 2016). Therefore, potential summer roosting habitat in proximity to known winter hibernacula represent a particularly sensitive condition.

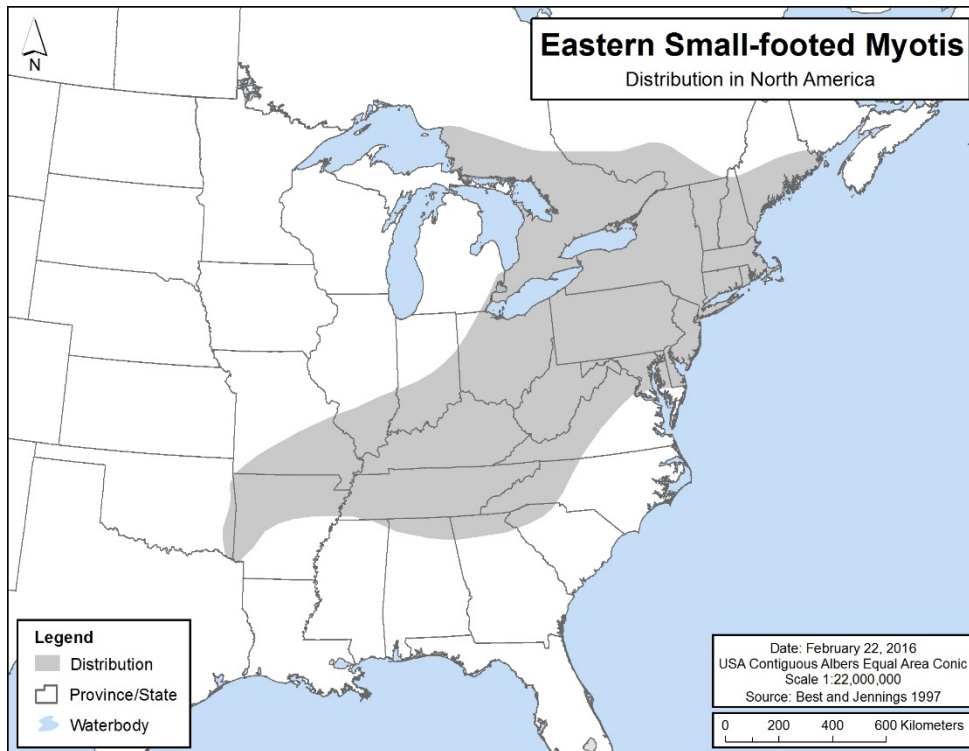


Figure 2. Species Distribution Map for the Eastern Small-Footed Bat (Best and Jennings, 1997)

Eastern small-footed bats have been documented hibernating in multiple sites in the region, including Mascot Mine (Coos County, NH: Reynolds, unpublished). Eastern small-footed bats are one of two species of hibernating bats that continue to persist in the presence of WNS (Langwig et al. 2012). Due to the severe decline of the other myotine bat species, the eastern small-footed bats have become one of the more critical myotine bat species in the northeast, and the only myotine species still known to hibernate in the state. Due to their continued persistence and their highly specialized roosting requirements, eastern small-footed bats should be considered a top conservation priority throughout their range.

The potential loss of existing roosting habitat in the current quarry and historic gravel mining habitats at the Project Site warrants additional review. Given that the proposed activities are likely to destroy both of these habitats, and that the Applicant has stated that blasting may be required at some locations, the conservation impacts of this project needs to be addressed. I therefore recommend the development of blasting monitoring plan to ensure that any construction activities address potential impacts to crevice-roosting small-footed bats.

## **Relevant Regulations and Guidance Documents**

### **50 CFR Part 17.40(o) 4(d) Rule for the Northern Long-Eared Bat**

The Final 4(d) Rule was published in 2016 in response to the April 2015 listing of the Northern long-eared bat as a Federally Threatened Species to ‘provide for the conservation of the northern long-eared bat (*Myotis septentrionalis*), a bat species that occurs in 37 States, the District of Columbia, and 13 Canadian Provinces’ (USFWS, 2016). The purpose of the 4(d) Rule was to develop prohibitions and exceptions that are tailored to the specific conservation needs of the species. In the 4(d) Rule, the U.S. Fish and Wildlife Service identify White-nose Syndrome as the primary threat to the species, and consequently prioritizes the protection of winter hibernacula within the WNS Zone relevant to the species. In addition to the protection of winter hibernacula, the 4(d) Rule identifies tree removal as the primary potential threat to the species during these most vulnerable life stages (“while in hibernacula or in maternity roost trees”: USFWS, 2016). The temporal restriction prohibits tree removal during the pupping season (June 01 through July 31). For clarification, the 4(d) rule identifies ‘tree removal’ as any cutting, harvesting, destroying, trimming, or manipulating of trees, saplings, snags or other woody vegetation likely to be used by northern long-eared bats.

### **2020 U.S. Fish and Wildlife Service Range-Wide Indiana Bat Survey Guidelines**

The 2020 Indiana Bat Survey Guidelines (“USFWS Guidelines”) represent the current iteration of the recommended survey and sampling protocols to determine the presence or absence of Indiana bats during the summer activity period (USFWS, 2020). Although Indiana bats are not found in New Hampshire, the USFWS Guidelines are also identified as the recommended assessment tool for northern long-eared bats. The USFWS Guidelines outline a multi-phase assessment tool designed to make accurate determinations of the presence or absence of a species. The USFWS Guidelines state that proposed projects should be completed by qualified biologists and that survey study plans should be developed in coordination with the appropriate USFWS Field Office to ensure “all parties fully understand which methods will be deployed, what assumptions will be made, and what the various outcomes would be based on the results of each step” (USFWS, 2020).

The first step following USFWS consultation is a Phase 1 Initial Project Screening. In Part 1 of the Phase 1 screening, consultation with the USFWS is conducted to determine if a project is within the known maternity colony home range or spring-staging/fall-swarmling zone of a known hibernaculum. Consultation with other federal and state wildlife agencies are also conducted to determine whether there are known occurrences (roost trees, capture location, or hibernaculum). If the project is within the known home range of the species, and the project area contains potentially suitable habitat, the USFWS Guidelines requires a Habitat Assessment to be completed. For the northern long-eared bat, the USFWS Guidelines defines potentially suitable summer habitat as

*“a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forest habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e. live trees and/or snags  $\geq 3$  inches dbh that have exfoliating bark, cracks, crevices, and/or cavities), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit characteristics of suitable roost trees and are within 1,000 feet of other forested/wooded habitat.”*

If the Habitat Assessment concludes that there is no likely adverse effect, a Phase 1 Report should be submitted to the USFWS and other federal action agencies (such as the USACE) that identifies the name and qualifications of the biologist, maps and detailed project descriptions, a description of the methods used to conduct the assessment, and a summary of the assessment findings, including completed Summer Habitat Assessment datasheets. If the Habitat Assessment concludes that suitable summer habitat and/or a potential hibernaculum is present within the project site, and that the proposed activities will impact this habitat, then a Phase 2 Presence/Absence Survey must be completed. The exception to this is when consultation with the USFWS determines that conservation measures can be developed to adequately minimize the impacts or both parties agree to pursue a Habitat Conservation Plan or Endangered Species Act Incidental Take Authorization.

The Phase 2 Presence/Absence Survey is a field-based survey that utilizes acoustic monitoring and/or mist-net capture to document the likely presence of northern long-eared bats within a project area. The sampling must be conducted during the summer active season and the total sampling effort is dictated by the size of the project area. For the GSL Project’s primary impact area (200 acres), minimum sampling would be 69 net-nights of mist-net sampling or 13 detector-nights of acoustic monitoring. If the Phase 2 P/A Survey suggested the presence of northern long-eared bats, then additional radiotelemetry and roost tree emergence sampling (Phase 4) would be needed to document specific roost trees.

## Bats of New Hampshire

There are eight species of bats that can be found in New Hampshire, all of which have been designed as Federally-Threatened, State-Endangered, or Species of Concern (Table 1).

**Table 1: Conservation Status of Bat Species in New Hampshire (NHFG, 2020)**

Common Name	Species	FE	FT	SE	SGCN	SC
Northern long-eared bat	<i>Myotis septentrionalis</i>		X	X		
Little brown bat	<i>Myotis lucifugus</i>			X		
Eastern small-footed bat	<i>Myotis leibii</i>			X		
Tricolored bat	<i>Perimyotis subflavus</i>			X		
Big brown bat	<i>Eptesicus fuscus</i>				X	
Silver-haired bat	<i>Lasionycteris noctivagans</i>				X	X
Eastern red bat	<i>Lasiurus borealis</i>				X	X
Hoary bat	<i>Lasiurus cinereus</i>				X	X

FE = Federally-Endangered, FT = Federally-Threatened, SE = State-Endangered, SC=Species of Special Concern, SGCN = Species of Greatest Conservation Need

### Northern Long-eared Bat

The northern long-eared bat (*Myotis septentrionalis*) is currently the only Federally listed species in New Hampshire. The northern long-eared bat was in a mild decline prior to the onset of WNS (Ingersoll et al. 2013), possibly due to habitat loss throughout the northeast region. However, this decline is insignificant in the context of WNS, as regional populations have declined over 98% based on winter population counts (Turner et al. 2011) and 95% based on summer capture rates (Reynolds et al. 2016). Historically, northern long-eared bats were known from each of the eight winter hibernaculum tracked by the NH Fish and Game; this includes Mascot Mine (Coos County, NH) and the three known hibernacula (Grafton County, NH) within 15 miles of the GSL Project site.

The northern long-eared bat ranges throughout the eastern United States and much of the lower Canadian provinces (Caceres & Barclay, 2000). During summer, females form small maternity colonies (usually less than 30 bats) within tree hollows, crevices, or under exfoliating bark (Foster and Kurta, 1999; Menzel et al., 2002; Owen et al., 2003). Tree species used as roosts are highly variable, but generally are taller and wider than randomly selected trees (Sasse & Pekins, 1996; Owen et al., 2002; Ford et al., 2006; Perry & Thill, 2007). Owen et al. (2003) found that the majority of roost trees used by northern long-eared bats were located in intact forests (70-90-year-old forests with no timber harvest activity within 10-15 years), and they are often close to open water (Larson et al., 2003). Less is known about the summer ecology of the males, although they are known to use tree roosts (more likely under exfoliating bark than in cavities: Perry & Thill, 2007) and caves (Whitaker & Rissler, 1992) during the summer period. Northern long-eared bats show a strong preference for foraging in and near forested habitats (Ford et al., 2005). They are commonly captured in managed forests along the edges (Hogberg et al., 2002), but are also found foraging over ponds and streams (Caceres & Barclay, 2000).

### **Eastern small-footed bat**

The eastern small-footed bat (*Myotis leibii*) has an extensive distribution (from Ontario to New England, southward to Georgia and Westward to Oklahoma), although it is not considered common anywhere within its range. Confusion about its species status prior to 1984 (van Zyll de Jong, 1984), has likely played a significant role in the lack of federal protection afforded to this species, considering the eastern small-footed bat is one of the rarest bats in North America (Griffin, 1940) and ‘without doubt the least known of all northeastern bat species’ (Thomas, 1993). Although eastern small-footed bats are not federally protected, it has special status in most of the states within its’ range, and it has been listed as Endangered in New Hampshire for over 30 years.

Summer capture data suggest that small-footed bats tend to use rocky hillsides as maternity roosts (Fenton et al., 1980; LaGory et al., 2008). Although this is typical habitat in mountainous regions, they appear to be more versatile throughout their range, using rock slabs, quarries, rocky outcrops, talus slopes, earthen dams, hollow trees, abandoned tunnels, and even human structures (Thomas, 1993; Best & Jennings, 1997; LaGory et al., 2008). Summer populations of small-footed bats appear to be patchy throughout their range, and summer activity is often concentrated around winter hibernacula (Thomas, 1993; Johnson & Gates, 2008; Reynolds et al., 2016). Most of the research suggests that eastern small-footed bats travel short distances between winter hibernacula and summer roost areas, with individuals remaining in the same vicinity year-round as long as they have access to both roosting and foraging habitat (Reynolds et al. 2016). Eastern small-footed bats have been documented hibernating in multiple sites in the region, including Mascot Mine (Coos County, NH: Reynolds, unpublished). Eastern small-footed bats are one of two species of hibernating bats that continue to persist in the presence of WNS (Langwig et al. 2012). Due to the severe decline of the other myotine bat species, the eastern small-footed bats have become one of the more common myotine bat species in the northeast, and the only myotine species still known to hibernate in the state. Due to their continued persistence and their highly specialized roosting requirements, eastern small-footed bats should be considered a top conservation priority throughout their range.

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