United States Department of the Interior

FISH AND WILDLIFE SERVICE
Twin Cities Field Office
4101 American Blvd E.
Bloomington, Minnesota 55425-1665

May 14, 2015

Ms. Brenda Halter
Forest Supervisor
Superior National Forest
8901 Grand Avenue Place
Duluth, Minnesota 55808-1102

Re: FWS Nos. 03E19000-2014-F-014, 03E19000-2015-E-00127
Formal Consultation on Northern Long Eared Bat

Dear Ms. Halter:

This document transmits the U.S. Fish and Wildlife Service's (Service) biological opinion and is based on our review of the Superior National Forest's (Forest) proposed Pearl Vegetation Management Project Biological Assessment and potential effects to the northern long-eared bat (*Myotis septentrionalis*, NLEB).

The biological assessment, dated August 6, 2014, and letter requesting formal conferencing on the Pearl Vegetation Management Project were received in our office on August 8, 2014. The Service and Forest agreed upon delaying conferencing until additional NLEB information and guidance became available.

Subsequently, the Forest provided the Service with a letter dated March 23, 2015, which was also on behalf of the Chequamegon-Nicolet and Chippewa National Forests, initiating conferencing/consultation for NLEB. The three Forests requested that if conferencing could not be completed by April 2, 2015, the date for listing NLEB under the Endangered Species Act of 1973, as amended, that conferencing be concluded to move into formal consultation. The Service agreed to prepare a biological opinion to conclude formal consultation on the Pearl Project.

This biological opinion is based on the best available scientific and commercial data including meetings, electronic mail and telephone correspondence with Superior National Forest officials, Service files, pertinent scientific literature, discussions with recognized species authorities, and other scientific sources. A complete administrative record is on file at the Twin Cities Ecological Services Field Office.

Please contact the Service if the project changes or new information reveals effects of the proposed action to proposed or listed species or critical habitat to an extent not covered in your biological assessment. If you have any questions or comments on this biological opinion, please contact Ms. Tamara Smith, Fish and Wildlife Biologist, at 612-748-3548, extension 2219, or via email at *tamara_smith@fws.gov*.

Sincerely,

Peter Fasbender
Field Supervisor

Enclosure

cc: Susan Catton, Forest Biologist
Sarah Malick-Wahls, Wildlife Biologist
Dan Ryan, Wildlife Biologist

BIOLOGICAL OPINION

Effects to the
Northern Long-eared Bat
from
Pearl Vegetation Management on the
Superior National Forest
Pearl Vegetation Management Project

FWS TAILS Code: 03E19000-2014-F-0147

FWS Event Code: 03E19000-2015-E-00127

Prepared by:
U.S. Fish and Wildlife Service
Twin Cities Field Office

May 14, 2015

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INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (BO) based on our review of the U.S. Forest Service's (USFS) proposed activities on the Superior National Forest, and their effects on the northern long-eared bat (*Myotis septentrionalis;* NLEB) in accordance with Section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The USFS' August 6, 2014, request for formal conferencing was received on August 8, 2014, along with the Biological Assessment (BA) on the proposed activities on the Superior National Forest (SNF). On the same date, the USFS requested concurrence with a "may affect but not likely to adversely affect" determination for Canada lynx (*Lynx canadensis*) and its critical habitat in accordance with section 7 of the Act. The Service concurred with the USFS determination for Canada lynx and its critical habitat on October 3, 2014, and also sent a conference report for the NLEB on the same date. The gray wolf (*Canis lupus*) was re-listed as a Threatened species under the ESA on December 19, 2014, resulting in the Forest's reinitiation of consultation for the Pearl Project (Project). On January 12, 2015, the Service received the Biological Assessment - Gray Wolf Supplement and letter dated January 8, 2015, for the proposed USFS Pearl Project, with Alternative 2 effects analyses on gray wolf and designated critical habitat for wolf. The Forest requested consultation on its "may affect, not likely to adversely affect" determination for gray wolf and designated gray wolf critical habitat in accordance with section 7 of the ESA. The Service concurred with the USFS determinations on gray wolf and its critical habitat on January 23, 2015. Therefore, this BO addresses one species, the NLEB.

This BO is based on information provided in the BA. A complete administrative record of this consultation is on file at the Service's Twin Cities Field Office in Bloomington, Minnesota.

Interim 4(d) for the northern long-eared bat

On April 2, 2015, the Service has published a species-specific rule pursuant to section 4(d) of the ESA for NLEB (80 FR 17974). Section 4(d) of the ESA states that:

> *Whenever any species is listed as a threatened species ... the Secretary shall issue such regulations as he deems necessary and advisable to provide for the conservation of such species* (16 U.S.C. 1533(d)).

The Service's interim 4(d) rule for NLEB exempts the take of NLEB from the section 9 prohibitions of the ESA, as follows:

(1) Take that is incidental to forestry management activities, maintenance/limited expansion of existing rights-of way, prairie management, projects resulting in minimal (<1 acre) tree removal, provided these activities:
    a. Occur more than 0.25 mile (0.4 km) from a known, occupied hibernacula;
    b. Avoid cutting or destroying known, occupied roost trees during the pup season (June 1–July 31); and
    c. Avoid clearcuts (and similar harvest methods, *e.g.*, seed tree, shelterwood, and coppice) within 0.25 (0.4 km) mile of known, occupied roost trees during the pup season (June 1–July 31).
(2) Removal of hazard trees (no limitations).
(3) Purposeful take that results from
    a. Removal of bats from and disturbance within human structures and
    b. Take resulting from actions relating to capture, handling, and related activities for northern long-eared bats by individuals permitted to conduct these same activities for other species of bat until May 3, 2016.

Thus, any take of NLEB occurring in conjunction with these activities that complies with the conservation measures, as necessary, is exempted from section 9 prohibitions by the interim 4(d) rule, and does not require incidental take authorization. Note that no conservation measures are required as part of the interim 4(d) rule for actions that would affect only areas with no known roost trees and no known hibernacula. While the Pearl Project area currently contains no known roost trees or hibernacula, the SNF will incorporate each of the conservation measures into its proposed action in the event that a new roost tree or hibernacula is identified in the future.

However, the interim 4(d) rules do not afford exemption from the ESA's section 7 procedural requirements. Therefore, consultation remains appropriate when actions (even those within the scope of the interim 4(d) rule) are funded, authorized or carried out by a federal agency. This is because the purpose of section 7 consultation is broader than the mere evaluation of take and issuance of an Incidental Take Statement; such consultations fulfill the requirements of section 7(a) (2) of the ESA, which directs that all federal agencies insure that their actions are not likely to jeopardize the continued existence of any listed species, or result in the destruction or adverse modification of designated critical habitat.

Consultation History

The Forest initially requested formal conferencing and submitted the Pearl Project BA on August 6, 2014. The Service notified the Forest that we would delay conferencing until additional Service guidance on NLEB was available. The Forest then provided the Service with a letter, dated March 23, 2015, which was also on behalf of the Chequamegon Nicolet and Chippewa National Forests, requesting initiation of conferencing/consultation for NLEB. Specifically, the three Forests requested that if conferencing could not be completed by April 2, 2015, the date for listing NLEB under the ESA, that conferencing be concluded to move into formal consultation. The Service agreed and is issuing this final BO on May 14, 2015, concluding formal consultation on the Pearl Project. The BA, meetings, telephone discussions, and email transmissions with Dan Ryan, District Biologist, Sarah Malick-Wahls, District Biologist, and Linda Merriman, Resource Information Specialist, form the basis for this BO.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

As defined in the ESA Section 7 regulations (50 CFR 402.02), "action" means "all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by federal agencies in the United States or upon the high seas." The "action area" is defined as "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." The direct and indirect effects of the actions and activities must be considered in conjunction with the effects of other past and present federal, state, or private activities, as well as the cumulative effects of reasonably certain future State or private activities within the action area.

The USFS reviewed all their ongoing actions and determined that several actions were likely to continue beyond the time when the NLEB would likely be listed. They then reviewed these projects, including their previous consultation documents, to determine how these projects would affect the NLEB. The USFS included conservation measures to minimize potential adverse impacts of various activities as part of their project description. The Service has analyzed the effects of the proposed actions considering that the projects will be implemented as proposed (including all conservation measures).

The following project background and area descriptions are summarized from the BA. Additional information on Pearl Project background and description can be found in the BA and is incorporated by reference. The Pearl Project is anticipated to be completed by 2030.

The proposed actions in the Pearl Project (described further in the BA and the Pearl Project Environmental Assessment in Appendix A) include:

1. Timber harvest treatments – includes clear cut with reserves, coppice cut, shelterwood, thinning, and uneven aged cut.

2. Fire treatments – includes prescribed fire (broadcast burn and underburn), site preparation burns, and some fuels treatment.

3. Herbicide treatments – encompasses timber stand improvement (TSI) herbicide hand application and broadcast application, as well as site preparation broadcast herbicide application.

4. Reforestation – includes natural regeneration and diversity planting, and as well as conversion planting and seeding.

5. Road management – encompasses road decommissioning, as well as construction and subsequent removal of temporary access roads.

6. Mechanical site preparation – includes activities that prepare an area for regeneration and reduce competition from brush and undesirable tree species currently on site.

7. Other associated activities – these activities may involve a variety of the above treatments and include release, riparian, mechanical timber stand improvement, some fuels treatment, and browse shearing (see below for detailed descriptions).

More specifically, the proposed action includes the following types of harvest, fire, and other treatments (described further in the BA and the Pearl Project Environmental Assessment in Appendix A; see Tables 4 and 5 below for acres of proposed harvest and fire by treatment type):

1. Clear-cut/Coppice – This is a regeneration method that removes all trees except for areas where reserve trees or patches are retained. This method is considered even-aged management and forest stand ages are reset to zero post-harvest.

2. Patch Cut – This even-aged management technique involves harvesting most merchantable trees within small patches (typically 3-7 acres) or strips within a stand. Over time, the remaining portions of the stand would be also harvested in smaller patches.
3. Uneven Aged Harvest- A planned sequence of harvests designed to maintain and regenerate a stand composed of three or more distinct age classes by removing some trees in all age classes either singly, or in groups.
4. Commercial Thinning – This method removes approximately 25 to 35 percent of the trees; stand density is decreased but the stand remains structurally the same; stand age is not reset.
5. Fuels treatment– Manipulation or removal of fuels to reduce the likelihood of ignition and/or to lessen potential damage or resistance to control. Fuels treatment may take place in the form of cutting of trees, removal of biomass, or burning (pile or underburn).
6. Broadcast Burn – Prescribed fire allowed to burn across the entire treatment area with varying intensities.
7. Site Preparation Burn – A broadcast burn applied across entire harvest unit.
8. Under Burn – A low intensity fire that burns beneath the canopy of live trees.
9. Riparian – Treatments intended to establish and promote long-lived conifers species along lakes and streams. Treatment includes retaining most of the overstory; regeneration of red pine, white pine, white spruce, and jack pine; and possible brushing of the understory.
10. Release – Treatment designed to free young trees from undesirable, competing vegetation by removal by hand or saw.
11. Browse shearing – This method is used to regenerate species of trees and shrubs that typically sprout from roots or stumps, but can also be used as a site preparation tool.

The Forest determined that three general categories of activities are likely to affect the NLEB: timber harvest, road construction, and fire treatments (Table 1). Other associated activities will not likely adversely affect the NLEB or will have no effect to the species (Table 1). All of the management activities are expected to take place in the next ten years. The time period covered by the cumulative effects analysis is from 2015 to approximately 2030.

Table 1: General categories of actions and overall determinations to the NLEB. Some components of each action may have different determinations than the overall determination given here. In some cases the same location is being treated by multiple treatments. Further breakdowns of these actions are given in subsequent tables in this BO.

Actions	**Total affected area (acres)**	**Overall general determination**
Timber harvest	17,855	LAA
Fire treatments	7,406	LAA
Road construction	173	LAA
Herbicide treatments	865	LAA
Fuels treatment	2,014	LAA
TSI - mechanical	72	NLAA
Mechanical site preparation	2,891	NLAA
Other treatments[1]	1,148	NLAA or NE
Forest regeneration	11,576	NLAA or NE
Road decommissioning	3	NLAA

1 Other treatments are given in Table 3 below.

Projects/Actions that Will Have No Effect or Are Not Likely to Adversely Affect the NLEB

Actions that would have no effect on NLEB under Alternative 2 of the Pearl Project are actions that involve no tree clearing and/or no removal of vegetation, and would not alter the suitability of any potential NLEB habitat, including known NLEB hibernacula or any cave habitats. These actions, all of which consist of natural generation reforestation activities, include both harvest and non-harvest regeneration methods. Approximately 11,576 acres are proposed to be affected by forest regeneration practices (see Table 2). A full list and description of these activities are found in the Pearl Project BA and Appendix A of the Environmental Assessment (EA). The

USFS determined that these projects would have no effect on the NLEB. The Service acknowledges this determination. Activities with no further effect on NLEB will not be discussed further.

The USFS determined that several ongoing and planned actions are not likely to adversely affect the NLEB. These activities include hand scalping, mechanical site preparation, and road decommissioning. Approximately 2,891 acres are proposed for mechanical site preparation, 72 acres are proposed for mechanical timber stand improvements, and 1,148 acres are proposed other treatments (Table 3). The potential effects from hand scalping may include temporary disturbance or displacement due to human presence in the vicinity of roost trees. While there are no known NLEB roost trees or maternal roosting colonies on the Pearl Project area, there is abundant habitat and we anticipate one or both will be identified in the future. Because this activity is conducted by hand and will minimally disturb vegetation that is already on the ground, no roost trees would be affected. Based on the abundance of available habitat across the Project area, the probability of a NLEB being disturbed by hand scalping is discountable. Mechanical site preparation, road decommissioning, and other forest regeneration activities (planting, seeding, and underplanting) may also temporarily disturb or displace NLEB due to human presence and activity, but none of these activities will result in removal of trees or other permanent disturbance to NLEB. Approximately 3 acres (0.8 miles) of roads will be decommissioned (0.8 miles of existing road x 5,280 feet/mile = 4,224 ft. x 30 ft. width /43,560 ft2 per acre = 3 acres), but no tree removal is expected with decommissioning. As a result of the above explanations, the Service concurs that these activities are not likely to adversely affect the NLEB.

No further consultation or coordination under the ESA is required for the above-listed projects that will have no effect or are not likely to adversely affect the NLEB. Should project plans change, or if additional information on listed and proposed species become available, this determination may be reconsidered.

Table 2: Acres of each forest regeneration type.

Regeneration Description	**Total (acres)**
Natural regeneration	8,088
Diversity planting on even-aged harvests	1,851
Diversity planting on uneven-aged harvests	498
Conversion planting or seeding	1,139
Total	**11,576**

Table 3: Acres of other treatments type and its association with harvest or non-harvest.

Treatment Type	Post-Harvest (acres)	Non-harvest (acres)	Total (acres)
Mechanical site preparation	2,891		2,891
TSI- mechanical		72	72
Release		296	296
Riparian	96	681	777
Browse Shearing		75	75
Total	**2,987**	**1,124**	**4,111**

Projects/Actions that Are Likely to Adversely Affect the NLEB

The USFS determined that several actions are likely to adversely affect the NLEB. These projects include timber harvest (described above and displayed in Table 4), fire treatments (listed in Table 5), herbicide treatments (Table 6), and construction of temporary roads, totaling 21,380 acres. All these actions have the potential to adversely affect NLEB roosting and/or foraging habitat. The interim 4(d) rule (80 FR 17974) states that in areas affected by

WNS, all incidental take prohibitions apply except that take attributable to forest management practices, maintenance and limited expansion of transportation and utility rights-of-way, removal of trees and brush to maintain prairie habitat, and limited tree removal projects shall be excepted from the take prohibition, provided these activities protect known maternity roosts and hibernacula. The proposed types of timber harvest and other associated activities are all included under the definition of forest management used for the rule, which states:

> "(F)orestry management is the practical application of biological, physical, quantitative, managerial, economic, social, and policy principles to the regeneration, management, utilization and conservation of forests to meet specific goals and objectives (Society of American Foresters (SAF)(a), *http://dictionaryofforestry.org/dict/term/forest_management*). Forestry management includes the suite of activities used to maintain and manage forest ecosystems, including, but not limited to: timber harvest and other silvicultural treatments, prescribed burning, invasive species control, wildlife openings, and temporary roads."

Therefore, all proposed activities in the Pearl Project that may adversely affect NLEB are within the scope of activities covered by the interim 4(d) rule. Moreover, any incidental take that results from their implementation is exempt from the section 9 prohibitions as long as they include the interim 4(d) rule's conservation measures. The Service concurs that these activities are likely to adversely affect the NLEB and the remainder of the BO will address these activities.

Conservation Measures

Conservation measures are those actions taken to benefit or promote the recovery of the species. These actions taken by the federal agency or the applicant that serve to minimize or compensate for project effects on the species under review and are included as an integral portion of the proposed action.

To be in compliance with the interim 4(d) rule for NLEB, the USFS has committed to the following conservation measures as part of the project description:

1) All proposed activities will occur more than 0.25 miles (0.4 km) from a known, occupied hibernacula.

2) The USFS will avoid cutting or destroying known, occupied roost trees during the pup season (June 1–July 31).

3) The USFS will avoid clearcuts (and similar harvest methods, *e.g.*, seed tree, shelterwood, and coppice) within 0.25 (0.4 km) mile of known, occupied roost trees during the pup season (June 1–July 31).

Per the 2004 Forest Plan (USDA 2004), the Forest incorporates and is consistent with the following applicable Objectives, Standards, and Guidelines that also function to conserve and protect northern long-eared bat and their habitat:

- O- WL-4: Maintain or improve habitat.
- O-WL-5: Seek opportunities to benefit threatened and endangered species.
- O-WL-6: Reduce or eliminate adverse effects to threatened and endangered species. Operational standards and guidelines call for 6-12 snags retained per acre in clearcut areas.
- O-WL-7: Minimize building or upgrading roads in threatened and endangered species areas.
- G-TM-5: In stands 20 acres or larger that were regenerated with clearcuts, retain a minimum of 5% of the stand in legacy patches of live trees where no harvest occurs. Wherever possible these should be at least two acres in size. These legacy patches will protect soil organic matter and associated organisms and remaining vegetation will aid in the re-colonization of the adjacent managed area.
- G-WS-15: Wetlands will be managed to prevent the reduction of wildlife habitat.
- WN-WL-2: Provide for the protection of known summer roost sites and hibernacula.
- WN-TM-1:In general, all standing live cedar, white pine, yellow birch and tamarack are designated as leave trees and are not to be cut except for trees needed to be removed because of safety hazard concerns or where specified on the unit card. These trees would count towards the 6-12 leave trees except where jack pine or black spruce are required for the Three-Toed Woodpecker (0-WL-23).
- S-VG-4: In mature or older red and white pine forest types managed to maintain patch sizes of >100 acres, vegetation management treatments that maintain a sixty percent minimum canopy closure and maintain large diameter trees are allowable.

The following two project design criteria (Pearl EA, Appendix A) that will serve to specifically protect northern long-eared bat habitat in the Pearl project are:

- RT-NB1 = Designate suitable maternity roost trees for retention as they are encountered during cruising and layout operations. Suitable maternity roost trees may include live trees with visible crevices or cavities. Consult a wildlife biologist for guidance on identifying suitable roost trees.
- RT-NB2 = If an occupied bat roost tree is discovered, retain a suitable buffer around the tree to minimize disturbance to the maternity colony and retain connectivity to sufficient foraging habitat. This buffer should be designated in consultation with a wildlife biologist, and should be maintained until the roost tree naturally falls to the ground or becomes unsuitable for bat use.

In addition, Minnesota Forest Resources Council guidance is incorporated as follows:

- MFRC-TM-1: Legacy patches should be no less than 1/4 acre in size (MFRC 2013). When locating legacy patches or leave tree clumps consider including important features such as wetland inclusions, seasonal ponds, riparian areas, forested corridors, den trees, cavity trees, trees with stick nests, large mature white pine, rare plant locations and rare native plant communities (MFRC 2013). Patches should be in representative habitats throughout the site (MFRC 2013).
- MFRC-TM-2: In general, retain a minimum of 6-12 1ive leave trees per acre to provide present and future benefits including shelter, resting sites, cavities, perches, rest sites, foraging sites, mast, and coarse woody debris. The trees will be at least six inches in diameter and include at least two trees per acre from the largest size classes available on site. A variety of species would be selected for within-stand species and structural diversity. Retain leave trees based on species, size, condition, and economic value. Retaining leave trees to benefit one resource may simultaneously fulfill guidelines focused on another resource. (MFRC 2013).
- MFRC-TM-3: Leave trees may be left individually or in clumps ranging from 1/4ac and larger. Minimal harvest within clumps is acceptable (down to a minimum of 80 BA) as long as the integrity of the clump or key leave trees is not disturbed, and as long as the clump is not doubling as a legacy patch (MFRC 2013).
- MFRC-TM-4: Unmerchantable trees, dead standing trees and trees not designated for harvest will be left. The operator will be allowed to fell (and leave in place) a portion of

these trees in areas where deemed necessary to facilitate the logging operations, as well as for safety reasons (MFRC 2013).

- MFRC-TM-5: Consider retaining more than the recommended number of leave trees in harvest sites of greater than 100 acres. This practice would better mimic natural disturbances, such as fire and windstorm" (MFRC 2013).
- MFRC-WS-1 (applied to foraging habitat): Seasonal ponds and other lowland inclusions provide important habitat for woodland insects, amphibians and other species. In upland stands, seasonal (vernal) ponds and other small lowland inclusions identified during layout will be protected with a minimum filter strip.

Action Area

The action area is defined as all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action. For the purposes of this BO, the action area includes the Pearl Project Area. The Pearl Project Area (Figure 1) is in both Lake and St. Louis Counties, Minnesota, and encompasses approximately 127,000 acres, of which around 57 percent (~72,000 acres) are National Forest System lands. The project lies approximately five miles east of Babbitt, Minnesota, and two miles south of Birch Lake. Its eastern edge is in the vicinity of Dragon and Gander Lakes. The southern extent is near Sand Lake along Hwy 2. The project area falls within Townships 59, 60 and 61 North and Ranges 9, 10, 11 and 12 West. All of the proposed Pearl Project activities would occur only on National Forest System lands.

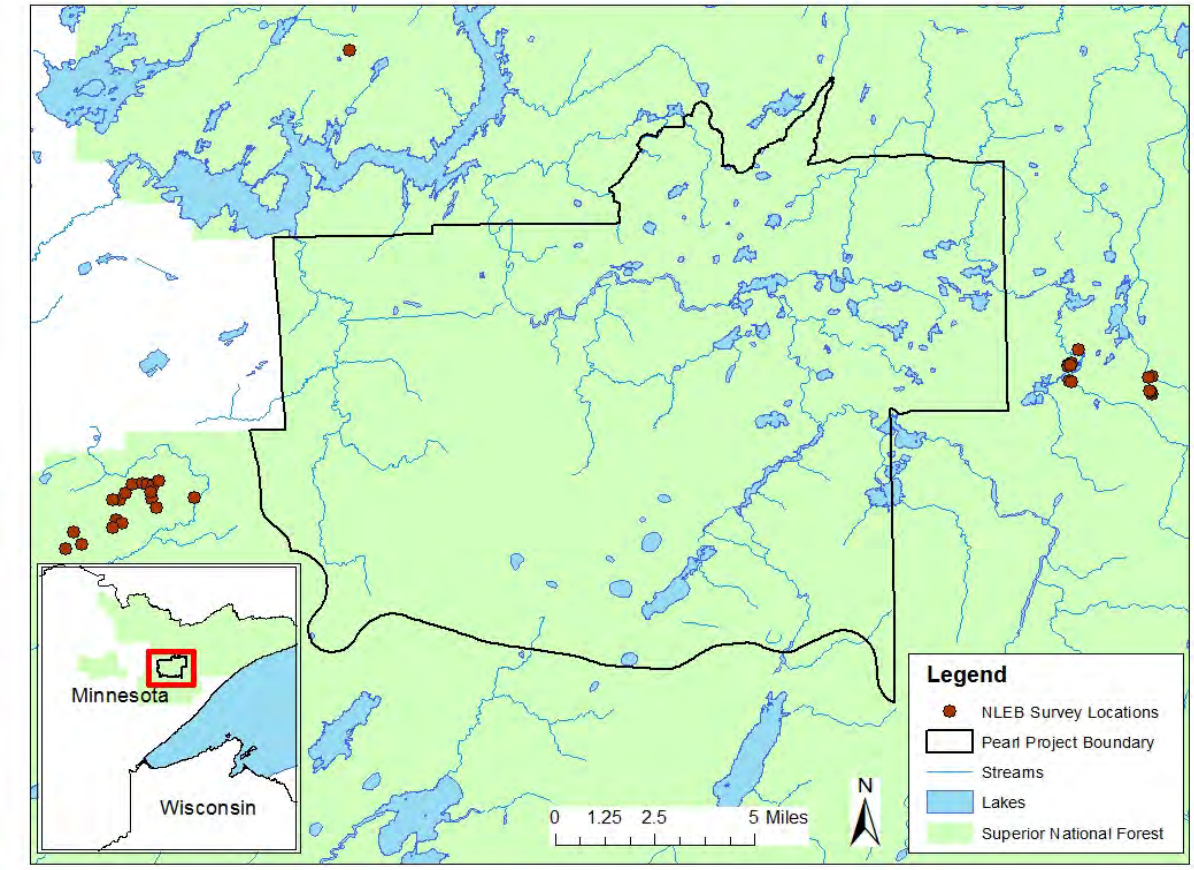

Figure 1. Pearl Project area on the Superior National Forest, including NLEB survey locations based on surveys conducted in 2013-2014. The NLEB data are not based on an exhaustive inventory of the area shown; the lack of data for any geographic area shall not be construed to mean that no NLEB are present.

STATUS OF THE SPECIES

Refer to the final rule (80 FR 17974) for the best available information on NLEB life history and biology, threats, distribution and overall status. The following is summary from that rule.

Life History and Biology

The NLEB is a temperate, insectivorous, migratory bat that hibernates in mines and caves in the winter and spends summers in wooded areas. The key stages in its annual cycle are: hibernation,

spring staging and migration, pregnancy, lactation, volancy/weaning, fall migration and swarming. NLEB generally hibernate between mid-fall through mid-spring each year. Spring migration period likely runs from mid-March to mid-May each year, with timing varying depending on the portion of the range. Females depart shortly after emerging from hibernation and are pregnant when they reach their summer area. Parturition (birth) likely occurs in late May or early June (Caire et al. 1979, Easterla 1968, Whitaker and Mumford 2009), but may occur as late as July (Whitaker and Mumford 2009). Females give birth to a single offspring. Lactation lasts 3 to 5 weeks and pups are weaned shortly after becoming volant (able to fly). Pups become volant typically between early July and early August. Fall migration likely occurs between mid-August and mid-October.

Summer habitat and ecology

Suitable summer habitat[1] for NLEB consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts, 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.

Many species of bats, including the NLEB, consistently avoid foraging in or crossing large open areas, choosing instead to use tree-lined pathways or small openings (Patriquin and Barclay 2003, Yates and Muzika 2006). Further, wing morphology of the species suggests that they are adapted to moving in cluttered habitats. Thus, isolated patches of forest may not be suitable for foraging or roosting unless the patches are connected by a wooded corridor.

Upon emergence from the hibernacula in the spring, females seek suitable habitat for maternity colonies (typically consisting of females and young). NLEB actively form colonies in the summer (Foster and Kurta 1999) and exhibit fission-fusion behavior (Garroway and Broders 2007), where members frequently coalesce to form a group (fusion), but composition of the group is in flux, with individuals frequently departing to be solitary or to form smaller groups (fission) before returning to the main unit (Barclay and Kurta 2007). As part of this behavior,

[1] See the Service's current summer survey guidance for our latest definitions of suitable habitat – http://www.fws.gov/midwest/Endangered/mammals/inba/surveys/pdf/2015IndianaBatSummerSurveyGuidelines01April2015.pdf. Note that although the title of this document mentions only Indiana bat, it does contain a definition of potential summer habitat for the northern long-eared bat.

NLEBs switch tree roosts often (Sasse and Pekins 1996), typically every 2 to 3 days (Foster and Kurta 1999; Owen et al. 2002; Carter and Feldhamer 2005; Timpone et al. 2010). NLEB maternity colonies range widely in size, although a maximum of 30-60 individuals may be most common early in the season, with the colony size decreasing post-lactation of young (Service 2014). NLEB show some degree of interannual fidelity to single roost trees and/or maternity areas. Male NLEB are routinely found with females and young in maternity colonies. NLEB use networks of roost trees often centered around one or more central-node roost trees (Johnson et al. 2012). NLEB roost networks also include multiple alternate roost trees and male and non-reproductive female NLEB may also roost in cooler places, like caves and mines (Barbour and Davis 1969, Amelon and Burhans 2006).

NLEB roost in cavities, underneath bark, crevices, or hollows of both live and dead trees and/or snags (typically ≥3 inches dbh). NLEB are known to use a wide variety of roost types, using tree species based on presence of cavities or crevices or presence of peeling bark. NLEB have also been occasionally found roosting in structures like barns and sheds (particularly when suitable tree roosts are unavailable).

Parturition (birth) likely occurs in late May or early June (Caire et al. 1979, Easterla 1968, Whitaker and Mumford 2009), but may occur as late as July (Whitaker and Mumford 2009). Females give birth to a single offspring. Lactation lasts 3 to 5 weeks and pups are weaned shortly after becoming volant (able to fly). Pups become volant typically between early July and early August. Fall migration likely occurs between mid-August and mid-October.

Migration

Males and non-reproductive females may summer near hibernacula, or migrate to summer habitat some distance from their hibernaculum. NLEB is not considered to be a long distance migrant (typically 40-50 miles). Migration is an energetically demanding behavior for the NLEB, particularly in the spring when their fat reserves and food supplies are low and females are pregnant.

Winter habitat and ecology

Suitable winter habitat (hibernacula) includes underground caves and cave-like structures (e.g. abandoned or active mines, railroad tunnels). There may be other landscape features being used by NLEB during the winter that have yet to be documented. Generally, NLEB hibernate from

October to April depending on local climate (November-December to March in southern areas and as late as mid-May in some northern areas).

Hibernacula for NLEB typically have significant cracks and crevices for roosting; relatively constant, cool temperatures (0-9 degrees Celsius) and with high humidity and minimal air currents. Specific areas where they hibernate have very high humidity, so much so that droplets of water are often seen on their fur. Within hibernacula, surveyors find them in small crevices or cracks, often with only the nose and ears visible.

NLEB tend to roost singly or in small groups (Service 2014), with hibernating population sizes ranging from a just few individuals to around 1,000 (Service unpublished data). NLEB display more winter activity than other cave species, with individuals often moving between hibernacula throughout the winter (Griffin 1940, Whitaker and Rissler 1992, Caceres and Barclay 2000). NLEB have shown a high degree of philopatry to the hibernacula used, returning to the same hibernacula annually.

Spring Staging and Fall Swarming habitat and ecology

Upon arrival at hibernacula in mid-August to mid-November, NLEB "swarm," a behavior in which large numbers of bats fly in and out of cave entrances from dusk to dawn, while relatively few roost in caves during the day. Swarming continues for several weeks and mating occurs during the latter part of the period. After mating, females enter directly into hibernation but not necessarily at the same hibernaculum as they had been mating at. A majority of bats of both sexes hibernate by the end of November (by mid-October in northern areas).

After hibernation ends in late March or early April (as late as May in some northern areas), most NLEB migrate to summer roosts. Females emerge from hibernation prior to males. Reproductively active females store sperm from autumn copulations through winter. Ovulation takes place after the bats emerge from hibernation in spring. The period after hibernation and just before spring migration is typically referred to as "staging," a time when bats forage and a limited amount of mating occurs. This period can be as short as a day for an individual, but not all bats emerge on the same day.

In general, NLEB use roosts in the spring and fall similar to those selected during the summer. Suitable spring staging/fall swarming habitat consists of the variety of forested/wooded habitats where they roost, forage, and travel, which is most typically within 5 miles of a hibernaculum.

This includes forested patches 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. Isolated trees are considered suitable habitat when they exhibit the characteristics of a suitable roost tree and are less than 1,000 feet from the next nearest suitable roost tree, woodlot, or wooded fencerow.

Threats

No other threat is as severe and immediate for the NLEB as the disease white-nose syndrome (WNS). It is unlikely that NLEB populations would be declining so dramatically without the impact of WNS. Since the disease was first observed in New York in 2007 (later biologists found evidence from 2006 photographs), WNS has spread rapidly in bat populations from the Northeast to the Midwest and the Southeast. Population numbers of NLEB have declined by 99 percent in the Northeast, which along with Canada, has been considered the core of the species' range. Although there is uncertainty about how quickly WNS will spread through the remaining portions of these species' ranges, it is expected to spread throughout their entire ranges. In general, the Service believes that WNS has significantly reduced the redundancy and resiliency of the NLEB.

Although significant NLEB population declines have only been documented due to the spread of WNS, other sources of mortality could further diminish the species' ability to persist as it experiences ongoing dramatic declines. Specifically, declines due to WNS have significantly reduced the number and size of NLEB populations in some areas of its range. This has reduced these populations to the extent that they may be increasingly vulnerable to other stressors that they may have previously had the ability to withstand. These impacts could potentially be seen on two levels. First, individual NLEB sickened or struggling with infection by WNS may be less able to survive other stressors. Second, NLEB populations impacted by WNS, with smaller numbers and reduced fitness among individuals, may be less able to recover making them more prone to extirpation. The status and potential for these impacts will vary across the range of the species.

Bats affected but not killed by WNS during hibernation may be weakened by the effects of the disease and may have extremely reduced fat reserves and damaged wing membranes. These effects may reduce their capability to fly or to survive long-distance migrations to summer roosting or maternity areas.

In areas where WNS is present, there are additional energetic demands for northern long-eared bats. For example, WNS-affected bats have less fat reserves than non-WNS-affected bats when they emerge from hibernation (Reeder et al. 2012; Warnecke et al. 2012) and have wing damage (Meteyer et al. 2009; Reichard and Kunz 2009) that makes migration and foraging more challenging. Females that survive the migration to their summer habitat must partition energy resources between foraging, keeping warm, successful pregnancy and pup-rearing, and healing and may experience reduced reproductive success. In addition, with wing damage, there may be an increased chance of WNS-affected bats being killed or harmed as a result of proposed action. Again, this is particularly likely if timber harvest or burns are conducted early in the spring (April – May) when bats have just returned, have damaged wings, and are exposed to colder temperatures when torpor is used more frequently.

Over the long-term, sustainable forestry benefits NLEB by maintaining suitable habitat across a mosaic of forest treatments. However, forest practices can have a variety of impacts on the NLEB depending on the quality, amount, and location of the lost habitat, and the time of year of clearing. Depending on their characteristics and location, forested areas can function as summer maternity habitat, staging and swarming habitat, migration or foraging habitat, or sometimes, combinations of more than one habitat type. Impacts from tree removal to individuals or colonies would be expected to range from indirect impact (e.g., minor amounts of forest removal in areas outside NLEB summer home ranges or away from hibernacula) to minor (e.g., largely forested areas, areas with robust NLEB populations) to significant (e.g., removal of a large percentage of summer home range, highly fragmented landscapes, areas with WNS impacts).

Lastly, there is growing concern that bats, including the NLEB (and other bat species) may be threatened by the recent surge in construction and operation of wind turbines across the species' range. Mortality of NLEB has been documented at multiple operating wind turbines/farms. The Service is now working with wind farm operators to avoid and minimize incidental take of bats and assess the magnitude of the threat.

Rangewide Status

The NLEB ranges across much of the eastern and north central United States, and all Canadian provinces west to the southern Yukon Territory and eastern British Columbia (Nagorsen and Brigham 1993; Caceres and Pybus 1997; Environment Yukon 2011) (Figure 2). In the United States, the species' range reaches from Maine west to Montana, south to eastern Kansas, eastern Oklahoma, Arkansas, and east through the Gulf States to the Atlantic Coast (Whitaker and

Hamilton 1998; Caceres and Barclay 2000; Amelon and Burhans 2006). The species' range includes the following 37 States (plus the District of Columbia): Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming. Historically, the species has been most frequently observed in the northeastern United States and in Canadian Provinces, Quebec and Ontario, with sightings increasing during swarming and hibernation (Caceres and Barclay 2000). However, throughout the majority of the species' range it is patchily distributed, and historically was less common in the southern and western portions of the range than in the northern portion of the range (Amelon and Burhans 2006).

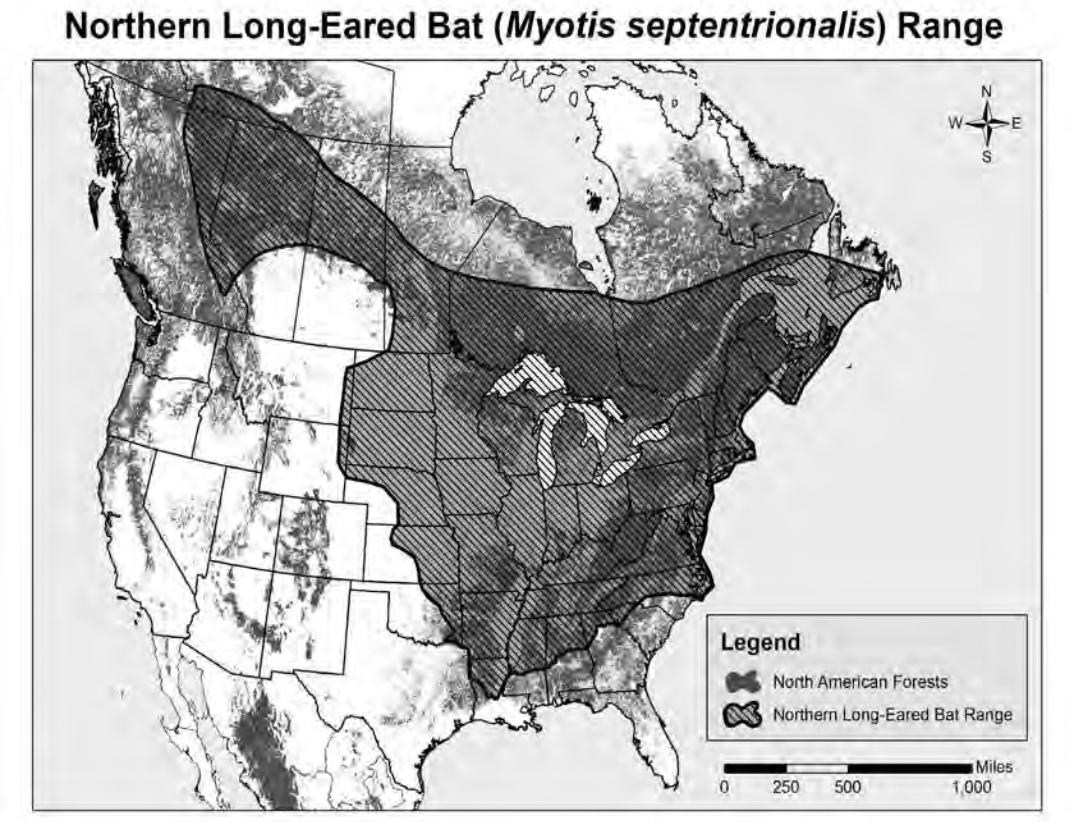

Figure 2. Range of the Northern long-eared bat.

Although they are typically found in low numbers in inconspicuous roosts, most records of NLEB are from winter hibernacula surveys (Caceres and Pybus 1997). More than 780 hibernacula have been identified throughout the species' range in the United States, although many hibernacula contain only a few (1 to 3) individuals (Whitaker and Hamilton 1998). Known hibernacula (sites with one or more winter records of northern long-eared bats) include: Alabama (2), Arkansas (41), Connecticut (8), Delaware (2), Georgia (3), Illinois (21), Indiana (25), Kentucky (119), Maine (3), Maryland (8), Massachusetts (7), Michigan (103), Minnesota (11), Missouri (more than 269), Nebraska (2), New Hampshire (11), New Jersey (7), New York (90), North Carolina (22), Oklahoma (9), Ohio (7), Pennsylvania (112), South Carolina (2), South Dakota (21), Tennessee (58), Vermont (16), Virginia (8), West Virginia (104), and Wisconsin (67). NLEB are documented in hibernacula in 29 of the 37 States in the species' range. Other States within the species' range have no known hibernacula (due to no suitable hibernacula present, lack of survey effort, or existence of unknown retreats).

The current range and distribution of NLEB must be described and understood within the context of the impacts of WNS. Prior to the onset of WNS, the best available information on NLEB came primarily from surveys (primarily focused on Indiana bat or other bat species) and some targeted research projects. In these efforts, NLEB was very frequently encountered and was considered the most common myotid bat in many areas. Overall, the species was considered to be widespread and abundant throughout its historic range (Caceres and Barclay 2000).

WNS has been particularly devastating for NLEB in the northeast, where the species was believed to be the most abundant. There are data supporting substantial declines in NLEB populations in portions of the Midwest due to WNS. In addition, WNS has been documented at more than 100 NLEB hibernacula in the southeast, with apparent population declines at most sites. WNS has not been found in any of the western states to date and the species is considered rarer in the western extremes of its range. We expect further declines as the disease continues to spread across the species' range.

Status of the Northern Long-eared Bat in Minnesota

Prior to 2014, there was little information on NLEB summer populations in the state. In 2014, passive acoustic surveys conducted at a new proposed mining area in central St. Louis County detected the presence of NLEB at each of 13 sites sampled. Calls that were assigned to NLEB accounted for approximately 14 percent of all recorded bat calls (Smith *et al*. 2014). Mist-net surveys in 2014 at 7 sites on Camp Ripley Training Center, Morrison County, resulted in capture

of 4 NLEB (5 percent of total captures); mist-net surveys at 5 sites on the Superior National Forest, Lake and St. Louis Counties, resulted in the capture of 24 NLEBs (Fig. 1; 55 percent of total captures) (Catton 2014). The Superior National Forest has been conducting acoustic surveys since 2009 on five permanent driving transects – those data should be analyzed by approximately June of 2015 (Catton, pers. comm. 2015). Acoustic and mist-net data were collected by a pipeline project proponent in 2014, which surveyed an approximately 125-feet wide and 300-mile-long (483-km) corridor through the northern third of the state. Positive detections were recorded in Hubbard, Cass, Crow Wing, Aitkin, and Carlton counties, and NLEBs were the most common species captured by mist-net (Fig. 1; Merjent 2014). Mist-net surveys were conducted the previous year (2013) on the Kawishiwi District of the Superior National Forest, and resulted in capture of 13 NLEBs (38 percent of total captures) over 9 nights of netting at 8 sites (Grandmaison *et al*. 2013).

The NLEB is known from 11 hibernacula in Minnesota; however, the status of most is unknown. An estimated 3,000 northern long-eared bats are thought to hibernate within the largest known hibernacula in Minnesota, the Soudan Mine in St. Louis County. WNS has not been detected in Minnesota; however, the fungus that causes WNS was first detected in 2011–2012. Currently, only Soudan Mine and Mystery Cave in Minnesota are known to harbor the fungus that causes WNS and to our knowledge, the fungus has not actually caused WNS in bats within the state.

Critical Habitat

Critical habitat has not been proposed for the NLEB.

Conservation Needs of the Species

The species' conservation needs define what is needed in terms of reproduction, numbers, and distribution to ensure the species is no longer in danger of extinction. The conservation needs should be defined in the species' recovery outline or plan. Since there is no recovery plan or recovery outline available at this time, we will outline the conservation needs based on our current understanding of the species.

We find that the primary conservation need of the NLEB is to reduce the threat of WNS. This includes minimizing mortality in WNS-affected areas, and slowing the rate of spread into currently unaffected areas. In addition, NLEB that continue to exist within WNS-affected areas need to be able to continue to survive and reproduce in order to stabilize and/or increase the populations. This can be done by reducing the other threats to the species, as listed above.

Therefore, efforts to protect hibernacula from disturbances need to continue. This should include restricting human access to hibernacula particularly during the hibernation period, constructing and maintaining appropriately designed gates where appropriate, and restoring microhabitat conditions in hibernacula that have been altered. Efforts should also be made to protect and restore (in some cases) adequate fall swarming habitat around hibernacula. Known maternity habitat should be maintained, and the removal of known roost trees, particularly when pregnant females and/or young are present should be reduced. Research to identify important hibernacula and summer areas and to delineate the migratory relationship between summering and wintering populations should also be pursued.

ENVIRONMENTAL BASELINE

The Environmental Baseline analyzes the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and the ecosystem within the action area.

Action Area

Action area, as defined by the ESA's implementing regulations (50 CFR 402.02), is defined as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (our emphasis). Action is defined in the regulations as "…all activities or programs of any kind authorized, funded, or carried out, in whole or in part, by Federal agencies in the United States or upon the high seas. Examples include, but are not limited to: (a) actions intended to conserve listed species or their habitat; (b) the promulgation of regulations; (c) the granting of licenses, contracts, leases, easements, rights-of-way, permits, or grants-in-aid; or (d) actions directly or indirectly causing modifications to the land, water, or air.

For the Forest's Pearl Project, the area where "land, water, or air" that is likely to be affected is land administered by the USFS where timber harvest and associated actions authorized by the Forest would occur. The proposed Pearl Project harvest units are dispersed throughout the 127,000 acre Pearl Project area, therefore, we consider the lands within the entire Pearl boundary as the action area. The Pearl Project boundary encompasses 127,000 acres (includes Federal, state, county, and other ownerships) – of which approximately 72,000 acres are managed specifically by the Forest.

Status of the Species in the Action Area

NLEB are assumed to occur throughout the Forest; however, the population trend in the Forest and the Pearl Project area is unknown and no project-specific surveys have been conducted. There is a forest-level bat acoustic monitoring survey route that runs through the Pearl project area.

NLEB have been detected in six locations along the North Shore of Lake Superior and within the SNF boundary (MN DNR 2012). During the summer of 2013, SNF conducted mist-net surveys, confirming the presence of northern long-eared bats at five of the eight sites surveyed in St. Louis and Lake Counties (Grandmaison et al. 2013). Since 2009, annual surveys have occurred along six acoustic monitoring routes on the SNF - these surveys have failed to detect the species but the data has not been fully analyzed. Thirteen northern long-eared bats were captured during maternity season (22 June – 23 July) mist-net surveys in 2013 - the species comprised 38.2% of the total bat numbers (Grandmaison et al. 2013). Northern long-eared bats were captured in 2014 surveys, and comprised 55% of the total bats captured (Catton 2014). While these data are far from providing an estimate of abundance on the SNF, they do suggest that northern long-eared bats can be detected, albeit at low numbers, across much of the forest where surveys are conducted. The Forest is also working with the Minnesota Department of Natural Resources, the Superior National Forest, and the Service to increase our collective knowledge of NLEB distribution and habitat use in northern Minnesota. Currently, there are no known hibernacula in the action area – the two closest hibernacula are Soudan Mine, which is approximately 40 miles away and the Section 30 mine, which is approximately 13 miles away from the project area; suitable hibernacula sites would not be affected by the Pearl Project.

We assume NLEB presence throughout the Pearl Project area; however, because survey data analyses are from a very limited area and not yet complete, we cannot estimate roost tree density or the proportion of the Project area that is inhabited by NLEB within a useful level of precision.

As stated above, there are also no known roost trees in the Pearl Project area, although if NLEB are captured and radio-tracked on or near the Pearl Project, we would expect occupied roost trees to be found within the Project boundaries. Results of mist-net surveys conducted in 2013 and 2014 in Minnesota found a range of relative abundance for NLEB. Based on the frequency and proximity to the Project of positive NLEB detections in Minnesota and the prevalence of suitable habitat for the species on the Pearl Project, it is reasonable to assume that the species is widespread in the action area.

Habitat Conditions in the Action Area

Habitat conditions at the Pearl Project area remain approximately the same as described in the project BA. Approximately 37 percent of the Pearl Project area is within the dry mesic red (*Pinus resinosa*) and white pine (*Pinus strobus*) landscape ecosystem, 27 percent of the area is within the jack pine (*Pinus banksiana*)- black spruce (*Picea mariana*) landscape ecosystem, with another 22 percent of the Pearl Project area in the lowland conifer landscape ecosystem. The remainder of the Pearl Project area consists of 5 percent mesic birch-aspen -spruce-fir, and the remaining 8 percent of other landscape systems.

The Forest used upland forest greater than nine years old (MIH1) as an indicator for NLEB because this habitat indicator includes the broad range of live and dead trees that may be used for roosting greater than 3 inches dbh. Approximately 61 percent (45,981 acres) of the entire Pearl Project area under SNF ownership is upland forest greater than 9 years old and is likely to be suitable summer roosting habitat for the NLEB (USDA 2014).

Additionally, there is another 16,748 acres of lowland forest in the Pearl Project area that may also provide roosting or foraging habitat for NLEB. Similar to MIH1, the habitat Indicator used for northern long-eared bat (NLEB) in Pearl is lowland forest greater than nine years old (MIH 9). Approximately 22 percent (16,598 acres) of the entire Pearl Project area under SNF ownership lowland forest greater than nine years old and is likely to be suitable summer roosting or foraging habitat for the NLEB (USDA 2014, p. 24).

Therefore, the suitable habitat within in the Pearl Project area under SNF ownership is approximately 62,729 (49 percent) of the entire 127,000 acre project area.

Currently unsuitable habitat, defined as forested habitats less than 10 years old and non-forested areas, covers approximately 12,421 (17 percent) in the Pearl Project area on SNF lands. In addition to SNF lands, 54,942 acres (43 percent) of the lands in the project area are state/county/private lands - the suitability of those lands for NLEB roosting is unknown.

Conservation Needs of the Species in the Action Area

The conservation needs of the species in the action area are similar to the needs rangewide. The Pearl Project area provides habitat for summering and, potentially, migrating NLEB. Therefore, within the action area the conservation needs include: 1) providing suitable habitat conditions for NLEB foraging and roosting; 2) reducing the removal of roost trees; 3) searching for previously

unidentified areas of maternity and hibernation activity; and 4) conducting research to understand the migration patterns of NLEB that use the area during the summer or winter.

The BA indicated that the Forest has initiated NLEB acoustic monitoring routes to identify baseline bat activity levels and observe how those levels change over time. The Forest is also working in partnership with the Minnesota Department of Natural Resources, the Chippewa National Forest, and the Service to further their knowledge of NLEB distribution and habitat use in northern Minnesota. These measures, in addition to the continued implementation of conservation measures required under the Forest Plan, will contribute to conservation needs of the NLEB in general and within the action area.

EFFECTS OF THE ACTION

This BO evaluates the anticipated effects of Alternative 2 of the Pearl Vegetation Management project on the Superior National Forest. These projects will affect a total of approximately 22,331 acres of potential NLEB habitat on the SNF, including 17,855 acres from timber harvest, 7,406 acres from fire treatments, 2,014 acres of fuels treatments, 865 acres from herbicide treatment types, and 173 acres from temporary road construction (47.5 miles of temporary road x 5,280 feet/mile = 250,800 ft. x 30 ft. width /43,560 ft2 per acre = 173 acres). Some of these treatment types may overlap in certain areas. Potential effects to the NLEB include direct and indirect effects. Direct effects occur when bats are present while the activities are being conducted; indirect effects occur later in time. Effects will vary based on the type of the proposed activity.

Our analysis of effects for NLEB entails: (1) evaluating individual NLEB exposure to action-related stressors and the bats' likely responses; (2) integrating those individual effects (exposure risk and subsequent response) to discern the consequences to the populations to which those individuals belong; and (3) determining the consequences of any population-level effects to the species rangewide. If we find that the actions are unlikely to affect the rangewide numbers, reproduction and distribution of the species in a way that can be measured or described, we conclude that the agency's actions are not likely to jeopardize the continued existence of the species.

Direct and Indirect Effects

Effects to Hibernating Bats at or Near Hibernacula

Neither direct nor indirect effects are anticipated to affect wintering NLEB or their hibernacula from the proposed action. The nearest known hibernaculum is over 13 miles from the Pearl Project area.

Fall swarming typically occurs within 5 miles of a hibernaculum. Because the nearest known hibernaculum is approximately 13 miles away, neither direct nor indirect effects are anticipated to fall swarming and/or to fall swarming habitat from the proposed action.

Effects to Bats during Spring/Summer and/or to Spring/Summer Habitat

Tree Removal Associated with Timber Harvest and Other Activities

The Pearl Project area will affect up to 22,331 acres of potential NLEB habitat on the SNF, including 17,855 acres from various types of timber harvest (Table 4), 7,406 acres from fire treatments (Table 5), 2,014 acres from fuels treatments, 650 acres of herbicide application, and 173 acres from road construction. Activities conducted during the summer maternity season (April 1 – September 30) and winter season (October 1- March 31) will result in direct tree and slash removal through clearcuts with reserves, shelterwood, uneven aged cut, precommercial thinning, some fire treatments, some fuels treatments, and herbicide treatments applied by hand. Fire treatments, such as broadcast burns and underburns, may cause some tree loss (additional effects are discussed later in this BO). Approximately 47.5 miles of temporary roads are expected to be constructed with timber harvest activities, resulting in up to 173 acres of tree removal (additional effects are discussed later in this BO) (47.5 miles of temporary road x 5,280 feet/mile = 250,800 ft. x 30 ft. width /43,560 ft2 per acre = 173 acres). Fuels treatments may result in some tree loss on 1,133 acres during the summer and 881 acres during the winter. Additionally, some trees will be removed as a result of herbicide treatments via hand application, which is proposed on 650 acres (Table 6).

Approximately 2,953 acres will be clearcut, 1,638 coppice cut, 430 shelterwood, 195 uneven aged cut, and 112 acres will be thinned during the winter, with no expected direct effects (Table 4). The timing of some harvest activities is unknown at this time, so for the purposes of this BO, we assume that those activities will take place during the summer maternity season. Therefore,

we assume that 2,235 acres will be clearcut with reserves, 2,625 acres of coppice cut, 1,197 acres of shelterwood, 291 acres of uneven aged cut, and 6,179 acres will be thinned during the summer season (Table 4).

The proposed action includes several fire treatments (Table 5); however, the proposed fire treatments do not include intentional felling of standing live or dead overstory trees. The occasional tree to remove hazards to firefighters; the felling of trees to construct fire breaks; and the occasional felling of trees incidental to the removal of dead and down fuels may occur, however. In a similar project on the Chippewa National Forest, they estimate that about one hazard tree is felled for each five acres of upland burned (K. Kirshbaum pers. comm. 2015). The extent of tree removal that is anticipated to occur as a result of fire break construction may not be predicted with a reasonable level of precision, but a conservatively high figure could be estimated by multiplying the width of fire breaks by the anticipated perimeter. Some overstory trees that get burned may fall and some hazard trees may be removed before or after burning, particularly in the 354 acres affected by proposed broadcast burns, and 6,888 acres of underburns (at least 5,781 acres of underburn overlaps with harvest acres).

Table 4: Acres of each timber harvest type proposed by season. Summer is defined as April 1- September 30 and winter is October 1- March 31.

Timber Harvest Type	**Summer (acres)**	**Winter (acres)**	**Either (acres)**	**Total (acres)**
Clearcut with reserves	26	2,953	2,209	5,188
Coppice Cut	0	1,638	2,625	4,263
Shelterwood	13	430	1,184	1,627
Thinning	0	112	6,179	6,291
Uneven aged cut	0	195	291	486
Total	**39**	**5,328**	**12,488**	**17,855**

Table 5: Acres proposed to be treated by various prescribed fire treatment types by season. Summer is defined as April 1- September 30 and winter is October 1- March 31.

Burn Type	**Summer (acres)**	**Winter (acres)**	**Year Round (acres)**	**Total (acres)**
Broadcast burn	354			354
Under Burn	1,067			1,067
Site Prep Burn- young forest (post-harvest)	164			164
Underburn - older forest (post-harvest)[1]	5,781			5,781
Underburn -older forest (post non-harvest)	40			40
Total	**7,406**			**7,406**

1 Harvest in this case is thinning or riparian treatment.

Table 6: Herbicide treatment type areas by harvest type.

	Post-Harvest - older forest (acres)	**Non harvest - older forest (acres)**	**Post-Harvest - younger forest (acres)**	**Total (acres)**
TSI* – herbicide broadcast application	191	39		230
TSI – herbicide hand application	258	141	236	635
Total	**449**	**180**	**236**	**865**

Death/Injury Due to Tree Removal

Risk of death or injury of individual NLEB from timber harvest or other tree removal from associated activities, such as road construction or fire treatments, varies depending on the timing of activities, their location, type of harvest, and extent of the area affected.

The timing of forest management activities greatly influences the likelihood of exposure and the extent of impacts on individual bats and their populations. Female NLEB typically roost colonially, with their largest population counts occurring in the spring or early summer, presumably as one way to reduce thermal costs for individual bats (Foster and Kurta 1999). Although bats may flee their roosts during tree removal, removal of occupied roosts during the active season while bats are present (spring through fall) is likely to cause injury or mortality to some roosting bats. Bats are also likely to be killed or injured during early to mid-summer (approximately June-July) when flightless pups or inexperienced flying juveniles are present. Removal of trees outside these periods is less likely to result in direct injury or mortality when the majority of bats can fly and are more dispersed.

Lastly, the likelihood and extent of impacts are influenced by the type of the timber harvest or tree removal relative to the amount of remaining suitable roosting and foraging habitat from which affected bats may select. Within a home range, NLEBs use multiple roosts throughout the season. Therefore, only a certain number of roosts are anticipated to be occupied in a single day or year. Therefore, the risk of a NLEB being exposed to the effects of a forest treatment is related positively with the percentage of home range impacted and also affected by the type of forest treatment. Larger areas of treatment have greater risk than when smaller areas are affected. Similarly, clearcuts have greater risk than selective harvest treatments (individual or group) because more trees will be removed in the treatment area.

The timing of some harvest and associated activities is unknown at this time, so for the purposes of this BO, we assume that those activities will take place during the summer maternity season. Therefore, we assume that 2,235 acres will be clearcut with reserves, 2,625 acres of coppice cut, 1,197 acres of shelterwood, 291 acres of uneven aged cut, and 6,179 acres will be thinned during the summer season (Table 4). We expect no direct effects due to the 2,953 acres of clearcut with reserves, 1,638 acres of coppice cut, 430 acres of shelterwood, 195 acres of uneven aged cut, and 112 acres of thinning that is proposed to occur during the winter season.

Similarly, the timing of road construction and herbicide application uncertain, so for the purposes of this BO, we assume that those activities will take place during the summer maternity season. Road construction may cause up to 173 acres of tree removal and some tree removal may occur due to fire treatments. Most of the fire treatments will occur during the summer months, however, tree felling associated with fire treatments is expected to be minimal and is likely to only affect up to approximately 7,406 acres with proposed fire treatments (354 acres of broadcast burns, and 6,888 acres of various under-burns).

The timing of 1,133 acres of fuels treatment is uncertain, so we analyzed it as if it will occur during the summer season. Mature tree loss is expected to be minimal but there may be significant loss of small diameter trees. The timing of the remaining 881 acres will undergo primary and secondary fuels treatments during the winter, with no direct effects.

According to the Pearl Project BA (Table on p. 24), there are currently 45,981 acres of upland forest in the action area, of which 95 percent are currently considered suitable for northern long-eared bat suitable summer roost habitat (upland forest greater than 9 years old). Approximately 5 percent are unsuitable. Alternative 2 of the Pearl Project would result in approximately 38,000 acres (79 percent of upland forest) of suitable roosting habitat by project completion in 2030.

There are approximately 16,748 acres of lowland forest in the Pearl Project Area. Lowland forest may also provide roosting or foraging habitat for NLEB, and was also used as an indicator in the Pearl Project BA. According to the Pearl Project BA (Table on p. 24), there are currently 16,598 acres of lowland forest in the action area, of which 99 percent are currently considered suitable for northern long-eared bat suitable summer roost habitat (lowland forest greater than 9 years old). Approximately 1 percent is unsuitable. Alternative 2 of the Pearl Project would result in approximately 15,000 acres (87 percent of total lowland forest) of suitable lowland foraging habitat by project completion in 2030.

In addition, tree removal will not occur simultaneously in all treatment areas, but will be distributed both spatially and temporally. The direct effects of harvest activities, including associated actions and human presence, could harm, harass, or kill northern long-eared bat, but direct effects will not occur in winter harvest areas and northern long-eared bats may continue to use uneven-aged and commercially thinned areas during or immediately after harvest.

Response to Removal or Alteration of Roosting/Foraging Habitat

The best available data indicate that the NLEB shows a varied degree of sensitivity to timber harvesting practices (Menzel et al. 2002, Owen et al. 2002). In central Arkansas, the three classes of mixed pine-hardwood forest that supported the majority of the roosts were partially harvested or thinned, unharvested (50–99 years old), and group selection harvest (Perry and Thill 2007). Forest size and continuity are also factors that define the quality of habitat for roost sites for NLEB. Lacki and Schwierjohann (2001) stated that silvicultural practices could meet both

male and female roosting requirements by maintaining large-diameter snags, while allowing for regeneration of forests.

In addition to impacts on roost sites, timber harvest practices can also affect foraging and traveling habitat, and thus, NLEB fitness. In southeastern Missouri, the NLEB showed a preference for contiguous tracts of forest cover (rather than fragmented or wide open landscapes) for foraging or traveling and, different forest types (rather than monoculture) interspersed on the landscape increased likelihood of occupancy (Yates and Muzika 2006). Similarly, in West Virginia, female NLEBs spent most of their time foraging or travelling in intact forest, diameter-limit harvests (70–90 year-old stands with 30–40 percent of basal area removed in the past 10 years), and road corridors, with no use of deferment harvests (similar to clearcutting) (Owen et al. 2003). In Alberta, Canada NLEB avoided the center of clearcuts and foraged more in intact forest than expected (Patriquin and Barclay 2003). On Prince Edward Island, Canada, female NLEBs preferred forested areas more than open areas, with foraging areas centered along forest-covered creeks (Henderson and Broders 2008). In general, NLEBs prefer intact mixed-type forests with small gaps (i.e., forest trails, small roads, or forest covered creeks) in forests with sparse or medium vegetation for foraging and traveling, rather than fragmented habitat or areas that have been clearcut.

Sustainable timber harvest activities do not typically lead to permanent losses of suitable roosting, foraging, or traveling habitat for NLEB. On the contrary, sustainable timber harvest activities are compatible with the long-term maintenance of suitable forested habitat for the species. Many sustainable timber harvest practices will result in little change in terms of the amount or quality of roosting or foraging habitat for NLEB. For example, selective harvest regimes are not anticipated to result in alterations of forest to the point where NLEB would be expected to significantly alter their normal behaviors within the affected areas. The treatment areas will still be forested with only small openings left by the harvest treatment. Similarly, small patch cuts, wildlife openings, and forest roads would be expected to serve as foraging areas or travel corridors and not as barriers to movement. Therefore, the only impacts of concern from many forest treatments are the potential for death or injury during active season tree removal.

However, localized long-term reductions in suitable roosting and/or foraging habitat can occur from various forest practices. For example, large clearcuts (that remove a large portion of a known or assumed home range) would result in a temporary "loss" of forest for NLEB. In these cases, "temporary" would be for many years (amount of time to reproduce suitable

roosting/foraging habitat, approximately 9 years on the SNF). Foraging would be possible prior to roosting depending on the juxtaposition of cuts to other forest regimes.

As stated above, NLEB have been found in forests that have been managed to varying degrees and as long as there is sufficient suitable roosting and foraging habitat within their home range and travel corridors between those areas, we would expect NLEB colonies to persist in managed landscapes.

In addition to the type of timber harvest, the extent of impact from timber harvest related habitat modifications is influenced by the amount of suitable habitat available within and nearby NLEB home ranges. Some portions of the NLEB's range are more forested than others. In areas with little forest or highly fragmented forests (e.g., western U.S. edge of the range, central Midwestern states; see Figure 2), impact of forest loss would be disproportionately greater than similar sized losses in heavily forested areas (e.g., Appalachians and northern forests). Also, the impact of habitat loss within a northern long-eared bat's home range is expected to vary depending on the scope of removal. Silvis et al. (2014) modeled roost loss of NLEBs and Silvis et al. (2015) removed known NLEB roosts during the winter in the field to determine how this would impact the species. Once removals totaled 20–30 percent of known roosts, a single maternity colony network started showing patterns of break-up. As explained in the Status of Species section, sociality is hypothesized to increase reproductive success (Silvis et al. 2014); thus, smaller colonies are expected to have lower reproductive success.

Clearcutting and similar harvest methods that result in low density of potential roost trees may prompt the need for longer flights and increased energetic demands by NLEB at a time when they may already be energetically challenged. NLEB emerge from hibernation with their lowest annual fat reserves and soon thereafter must return to their summer home ranges. The spring staging period precedes migration to summer habitats. During this period, NLEB remain near hibernacula. They feed and reenter hibernacula daily, where they enter torpor to minimize energy loss during the day. Individuals may increase fat reserves during this period, but are unlikely to regain the large amounts of fat lost during hibernation.

For several reasons, winter tree harvest that substantially alters summer roosting habitat for NLEB could result in adverse effects to affected individuals. NLEBs have summer home range fidelity (Foster and Kurta 1999; Patriquin et al. 2010; Broders et al. 2013). Activities that take place during the winter that render summer habitats unsuitable may force NLEB to rely on low energy reserves to find new roosts or foraging areas. This may put additional stress on females

that are often pregnant. Hibernation and reproduction are the most energetically demanding periods for temperate-zone bats, including the NLEB (Broders et al. 2013). Bats may reduce metabolic costs of foraging by concentrating efforts in areas of known high prey profitability, a benefit that could result from the bat's local roosting and home range knowledge and site fidelity (Broders et al. 2013). Cool spring temperatures provide an additional energetic demand, as bats need to stay sufficiently warm or enter torpor (state of mental or physical inactivity). Entering torpor comes at a cost of delayed parturition, which may affect the fitness of yearling NLEB. Bats born earlier in the year have a greater chance of surviving their first winter and breeding in their first year of life (Frick et al. 2009). Delayed parturition may also be costly because young of the year and adult females would have less time to prepare for hibernation (Broders et al. 2013). Female NLEB typically roost colonially, with their largest population counts occurring in the spring or early summer, presumably as one way to reduce thermal costs for individual bats (Foster and Kurta 1999). Therefore, similar to other temperate bats, NLEB have multiple high metabolic demands (particularly in spring), and must have sufficient suitable roosting and foraging habitat available in relatively close proximity to allow for successful reproduction.

In summary, timber harvests and tree clearing associated with timber harvest, road construction and associated activities could have both adverse and beneficial effects on habitat suitability for the NLEB. The maximum of 22,331acres (17, 855 acres of harvest, 7,406 acres of fire treatments, 173 acres of road construction, and 635 acres of hand herbicide treatments – some areas will have overlapping primary and secondary treatments) of habitat that will be affected by these harvest, fire, and associated activities are scattered throughout the 127,000 acre Pearl Project Area (see Figure 1), so there will be large amounts of unaffected, intact forested habitat adjacent to each treatment area. Furthermore, the potential for effects from timber harvest/other tree removal will be minimized by temporal restrictions (winter harvest only) on at least 30 percent of proposed harvest acres. In addition, NLEBs may be affected by the immediate loss of suitable habitat on significantly less than 127,000 acres (the total Pearl Project area) proposed for treatments because tree removal will not occur simultaneously in all treatment areas, but will be distributed both spatially and temporally across the Forest over a period of approximately 10 years. Tree clearing associated with temporary road construction activities will occur on no more than approximately 173 acres. Tree loss associated with fire treatments is expected to be minimal, and may affect up to 7,406 acres with proposed fire treatments. Fuel treatments may result in minimal loss of mature trees on an additional 2,014 acres. Tree loss from hand application of herbicide treatments may result in some tree loss on up to 635 acres. Furthermore, there is likely overlap between harvest acres and acres of other treatment types (e.g., fire, herbicides). As a result, we conclude that the overall habitat suitability or availability for NLEB

foraging and roosting within the action area should be minimally affected by timber harvest and associated treatment activities under the proposed action. The potential for effects from timber harvest/other tree removal will be minimized by the SNF conservation measures, discussed above.

Prescribed Burning

Approximately 7,406 acres are proposed to undergo various fire treatments over the life of the project. Approximately 8,539 acres will undergo fire treatments during the active summer season or year round (Table 5), including 354 acres of broadcast burns and 1,067 acres of underburn, 5,781 acres of post-harvest underburn, and 40 acres of post non-harvest underburn. Some of these fire treatments areas may overlap with timber harvest areas, but we have analyzed them separately because the proposed fire treatments may have some different effects to the NLEB than timber harvest.

Death/Injury by burning, heat exposure, or smoke inhalation

Conducting prescribed fires outside the hibernation period could result in direct mortality or injury to NLEB by burning, heat exposure, or smoke inhalation. Bats also may be exposed to elevated concentrations of potentially harmful compounds within the smoke (e.g., carbon monoxide and irritants) (Dickinson et al. 2009). Exposure risk depends on a variety of factors including height of roosts, timing and behavior of fire, winds, proximity of fire to roosts. Risk of direct mortality and injury to bats from prescribed fire is low as long as fire intensity and crown scorch height are low (Dickinson 2010). NLEB may be more likely to flush from trees to avoid injury as spring progresses, temperatures increase, and less time is spent in a state of torpor (Dickinson 2010). Burning in mid-summer (e.g., July) may increase the chances that adults will have pups that may be too heavy to carry and may increase the intensity of the pups' exposure to heat and smoke. Due to the anticipated timing of the burns and location of the project, torpid adults and non-volant young may be present during the majority of the burns (at least 7,406 acres, up to 8,539 acres) and bats may not be mobile during the burning activities. These areas that may be burned during the summer roosting season and NLEB may be directly disturbed, displaced, injured or killed during this time. Torpid adults are not expected to be near any burns that may occur during hibernation months since these burns are about 13 miles from the nearest hibernacula.

As a result of the proposed actions, NLEB could be exposed to smoke and heat while roosting and when foraging at night, although flame lengths for burns are expected to be limited to 2-4 feet, generally. NLEB may only be infrequently exposed to flames, but males may be more exposed due to tendency to roost in smaller trees. Non-volant pups may also be more likely to be exposed to the effects of smoke and heat because when they are too heavy to carry, they would be unable to leave the affected area – up to 100% of the burn treatments may occur during the non-volant period.

In summary, we expect some lethal take from prescribed fires and NLEB may be forced to flee from roosting and foraging areas. However, these adverse effects are expected to be short-term and localized. Approximately 12% (7,406 acres of the total 62,579 acres in MIH1 and MIH9) of the suitable roosting habitat in the action area would be exposed to smoke, heat, and flames and the exposure would occur only intermittently over the life of the project. At least 9 percent of the fire treatments (fuels treatments) will occur during the winter months. Some pile burning may occur on 1,133 acres of fuels treatment areas during the summer months.

Response to Removal or Alteration of Roosting/Foraging Habitat

Indirect effects to northern long-eared bat from prescribed fire may include short-term loss of roost trees and decreases in prey abundance, followed by long-term increases in roost abundance and suitability and in prey abundance (Boyles and Aubrey 2006, Dickinson 2010, Dickinson et al. 2009, Johnson et al. 2009, Johnson et al. 2010, Lacki et al. 2009, Timpone et al. 2009). In other words, effects of upland prescribed fires are expected to be adverse in the short term, but beneficial in the long term.

Prescribed fire can create a greater abundance of potential roost trees for NLEB because fires can cause bark of live trees to peel away from the sapwood creating the sloughing bark that is often used for roosting (Johnson et al. 2010). The availability of suitable roosts (including roosts with cavities and exfoliating bark) is greater in burned areas compared to unburned areas (Boyles and Aubrey 2006, Dickinson et al. 2009, Johnson et al. 2010). NLEB have been found to roost extensively in burned habitats immediately after prescribed burning (Lacki et al. 2009) with roosts shifting from primarily beneath bark before burning to inside cavities after burning.

Fires can also create a more open canopy structure that can improve roost quality by increasing the amount of solar radiation reaching the roost. Canopy light penetration was higher and

canopy tree density was lower in burned forest than in unburned forest (Boyles and Aubrey 2006). Additionally, canopy gaps in the burned area are associated with slightly higher maximum daily temperatures at roost trees (Johnson et al. 2009). Higher roost temperatures could facilitate more rapid growth of developing juvenile bats (Johnson et al. 2009). As a result, the abundance of trees with characteristics suitable for roosting, and the percentage of the forested area with suitable bat roosts, should be increased after fires (Boyles and Aubrey 2006).

Studies in West Virginia found that the NLEB responded favorably to prescribed fire by using new roost trees that were located in canopy gaps created as a result of the fire (Johnson et al. 2009). Conversely, fire may also destroy or accelerate the decline of existing roost trees, particularly of older snags, by burning the bases of the trees and weakening their structure, causing them to fall over quicker (Johnson et al. 2009, Dickinson et al. 2009). One study found that up to 20 percent of existing standing snags were lost post-fire, and that few new snags were created (Lacki et al. 2009).

In summary, prescribed fire may result in both adverse and beneficial effects on roosting habitat through immediate loss of existing roosts and creation of some new roosts, followed by short-term increases in the suitability of remaining and created roosts, and long-term changes in forest composition towards a greater abundance of trees likely to create suitable roosts in the future.

Prescribed fire may affect foraging habitat by changing the structure of the forest and by changing the abundance of prey within the affected area (Dickinson et al. 2009). NLEB have shown a preference for foraging in heavily forested mid-slope areas, regardless of burn condition, suggesting that they feed in and around closed canopies and are likely clutter-adapted (Lacki et al. 2009). The size of female NLEB home ranges and core areas, however, did not differ among bats radio-tracked before and after fires and home ranges of the monitored bats were located closer to burned habitats after fires than to unburned habitats (Lacki et al. 2009). NLEB may respond to the habitat alterations that result from prescribed fires by shifting the location of their foraging areas to take advantage of changes in insect prey availability (Lacki et al. 2009). Immediately after fires, insect abundance typically declines, but abundance of coleopterans (beetles), dipterans (flies), and all insects combined has been shown to increase after prescribed fires (Lacki et al. 2009). The increases among these prey taxa can occur within a year of the fire and may last for up to 16 years post-burn.

As a result, we conclude that the proposed fire treatments may have a short-term adverse and long-term beneficial effect on prey abundance, and thus foraging habitat suitability in the action

area. As a result of the proposed actions, fire may kill as many as 10% of overstory trees in affected stands. The death and collapse of the affected trees would likely occur over a span of several years. In the burned areas, NLEB may have fewer trees to select for roosting, but availability of trees for roosting is likely to be only marginally affected and the overall value of the stand as roosting habitat for the species will be little affected. In fact, the net effect of the prescribed burns may be to increase the suitability of the burned areas for NLEB. Regardless, the overall effects to NLEB in the action area will be localized – a maximum of 15% of the suitable roosting habitat in the action area will be burned over the life of the project. The beneficial effects of the fires treatments– increased thermal input to roosts and an increase in prey availability – are likely to at least offset the short-term negative effects.

Burning of slash piles as part of mechanical fuels treatments could result in localized exposure of roosting northern long-eared bat to smoke. Effects will be similar to those that result from the smoke exposure that results from prescribed burns, but will be much less extensive.

Given NLEBs frequent use of live trees and snags, multiple roosting structures, and ability to arouse and move during fires, and positive or neutral response for roosting and foraging within burned areas, NLEB are expected to experience minimal impacts from the fire treatments.
In summary, NLEB may be adversely affected by burns. The potential for effects from prescribed fire will be minimized by the Forest Plan conservation measures described above and in the Forest Plan (USDA 2004).

Effects from Temporary Road Construction

The USFS has proposed conducting temporary road construction and decommissioning over the life of the project. A maximum of 173 acres of trees may be cut due to temporary road construction (47.5 miles of temporary road x 5,280 feet/mile = 250,800 ft. x 30 ft. width /43,560 ft2 per acre = 173 acres). Approximately 0.8 miles of roads are expected to be decommissioned through this project; however no tree removal is expected with road decommissioning.

Tree clearing associated with road construction activities could have both adverse and beneficial effects on habitat suitability for the NLEB. Habitat is abundant and well distributed throughout the Pearl Project area and there will be large areas of intact forested habitat adjacent to each treatment area. Direct and indirect effects of potential tree loss are discussed in detail (in the Effects from Timber Harvest section) above.

In summary, we expect some lethal take from tree removal due to temporary road construction because NLEB may be forced to flee from roosting and foraging areas. Furthermore, tree clearing associated with temporary road construction activities could have both adverse and beneficial effects on habitat suitability for the NLEB. The approximately 173 acres of habitat that will be affected by tree removal are scattered throughout the 127,000 acre Pearl Project Area (see Figure 1), so there will be large amounts of unaffected, intact forested habitat adjacent to each treatment area. As a result, we conclude that the overall habitat suitability or availability within the action area should be minimally affected by temporary road construction under the proposed action. Similarly, the amount of lethal take due to temporary road construction is expected to be minimal. The potential for effects from temporary road construction will be minimized by the SNF conservation measures, discussed above.

Effects from Noise, Disturbance

Noise and vibration and general human disturbance are stressors that may disrupt normal feeding, sheltering, and breeding activities of the NLEB. Several activities associated with the Windy Project may result in increased noise/vibration/disturbance that may result in effects to bats, including the use of heavy equipment for road construction, fuels treatments, and mechanical site preparation. Bats may be exposed to noise/vibration/disturbance from various USFS activities near their roosting or foraging areas.

Significant changes in noise levels in an area may result in temporary to permanent alteration of bat behaviors. The novelty of these noises and their relative volume levels will likely dictate the range of responses from individuals or colonies of bats. At low noise levels (or farther distances), bats initially may be startled, but they would likely habituate to the low background noise levels. At closer range and louder noise levels (particularly if accompanied by physical vibrations from heavy machinery and the crashing of falling trees) many bats would probably be startled to the point of fleeing from their day-time roosts. For projects with noise levels greater than usually experienced by bats, and that continue for multiple days, the bats roosting within or close to these areas are likely to shift their focal roosting areas further away or may temporarily abandon these roosting areas completely.

There is limited literature available regarding impacts from noise (outside of road/traffic) on bats. Gardner et al. (1991) had evidence that an NLEB conspecific, Indiana bat, continued to roost and forage in an area with active timber harvest. Also see the timber harvest Section above regarding other similar studies for NLEB. They suggested that noise and exhaust emissions from

machinery could possibly disturb colonies of roosting bats, but such disturbances would have to be severe to cause roost abandonment. Callahan (1993) noted that the likely cause of the bats in his study area abandoning a primary roost tree was disturbance from a bulldozer clearing brush adjacent to the tree. However, his last exit count at this roost was conducted 18 days prior to the exit count of zero. Indiana bats have also been documented roosting within approximately 300 meters of a busy state route adjacent to Fort Drum Military Installation (Fort Drum) and immediately adjacent to housing areas and construction activities on Fort Drum (US Army 2014). Bats roosting or foraging in all of the examples above have likely become habituated to the noise/vibration/disturbance. Novel noises would be expected to result in some changes to bat behaviors.

In summary, NLEB currently present in the forest are expected to be tolerant to a certain degree of existing (prior to initiation of proposed activities) noise, vibration, and disturbance levels. However, temporary and novel noise/vibration/disturbance associated with heavy equipment operation and tree cutting may result in responses by bats that are roosting or foraging in these areas. We expect that affected bats are likely to shift their focal roosting areas further away or may temporarily abandon these roosting areas completely.

Herbicides

Herbicides may be used to control unwanted plant and tree species the Pearl Project area, such as thick monocultures of hazel that form in the absence of fire. Approximately 865 acres within the Pearl Project area are anticipated to be treated with herbicides (Table 6). Herbicides are used to control vegetation in site-specific areas and treatments typically occur in spring, early summer or fall. Herbicide application is generally applied once during the year either by hand via back-pack sprayers or squirt bottles to target individual trees or clumps of trees (635 acres of hand application, Table 6) or from a truck-mounted boom sprayer having spray heads designed to minimize drift (230 acres of broadcast application, Table 6). Application occurs during the day when bats are roosting, and often in the morning to avoid and minimize wind-induced drift. Since herbicide will be applied to vegetation growing at heights much lower than typical roosts for NLEB, no overspray is expected to reach locations where bats may be roosting.

Herbicides will lead to less understory diversity following treatment for a number of years but is expected to lead to well-stocked stands of birch and conifers, thereby increasing NLEB habitat. Approximately 865 acres of the Pearl Project is expected to undergo herbicide treatments. Some tree loss is expected due to hand application of herbicides which is applied to target trees or

clumps of trees competing with desired tree species. The effects of this tree loss are discussed above, and may overlap with areas of harvest areas. As a result, we conclude that the overall habitat suitability or availability within the action area should be minimally affected by herbicide treatments under the proposed action, and may be improved.

It is possible that some non-water safe herbicide could accidentally get into surface waters from either overspray or drift, which may affect bat's drinking water and/or cause bats to ingest chemicals through drinking or through bioaccumulation from eating affected insects. However, this is very unlikely due to the minimal amounts of herbicide (one treatment/year) generally used to remove unwanted vegetation. Herbicide application is only one of several methods used to control undesirable species. Alternative methods include manual and mechanical removal. In addition, all herbicides will be used in accordance to their label instructions and herbicides applicators will be appropriately licensed. Effects from herbicide exposure or indirect effects to insects (prey) consumed by the NLEB are insignificant and discountable, very unlikely to occur, or cannot be detected or measured.

In summary, herbicides spray is not expected to reach NLEB roosts, if present, habitat availability due to herbicide treatments is expected to minimally affect habitat availability, and herbicide exposure to NLEB or their prey is expected to be insignificant and discountable. Herbicide treatments could have both adverse and beneficial effects on habitat suitability for the NLEB. The approximately 865 acres of habitat that will be affected by herbicide treatments are scattered throughout the 127,000 acre Pearl Project Area (see Figure 1), so there will be large amounts of unaffected, intact forested habitat adjacent to each treatment area. As a result, we conclude that the overall habitat suitability or availability within the action area should be minimally affected by herbicide treatment activities under the proposed action. The potential for effects from herbicide treatments will be minimized by the SNF conservation measures, discussed above.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. Any actions conducted on SNF lands will either be conducted by the USFS, or will require approval by the USFS and thus

will require separate section 7 consultation. Therefore, cumulative effects, as defined in the ESA, are not expected to occur on SNF lands in the Pearl Project area.

Numerous state, county, and private land use activities that may affect the NLEB occur within the action area including: timber harvest, recreational use, road maintenance and construction, and residential, industrial and agricultural development and related activities. Private land development and road building will continue as will increased recreational demand. These activities could reduce snags and large trees used for summer roosting and increase the risk of mortality. Residential development around lakes may reduce habitat quality. The high percentage of federal lands in these areas will help offset the negative effects from development that northern long-eared bats may encounter on nonfederal lands. Based on the same rationale discussed above on Federal lands and that NLEB habitat is abundant and well distributed within the Pearl Project area, we anticipate state and county harvest activities will result in minimal cumulative effects to the species or its habitat.

The BA indicated (p.21) that there is a high probability that exploration for hardrock minerals on the federal lands within, and near, the Pearl Project Area will continue for years, and most likely for decades to come. On the northern margins of the project boundary, it is reasonably foreseeable that some form of exploration activity will continue within the Kawishiwi Minerals Exploration EA analysis area. Appendix A of the BA details the projects that may occur in or near the Pearl Project. Site-specific analysis and consultation on these projects will occur to address potential effects to NLEB.

Summary of Effects

Impacts to Individuals

Potential effects of the action include direct effects to NLEB present within the action area when activities are being conducted, and indirect effects as a result of changes in habitat suitability. Direct effects include mortality, injury, harm, or harassment as a result of removal or burning of roost trees, smoke, noise, herbicides, and general human presence.

The Forest's conservation measures, which include maintaining/increasing various sizes of large forested patches, retaining closed canopy structure in mature forest within 200 feet of seasonal ponds, and leaving all snags possible in harvest areas, retaining a variety of reserve trees and patches in harvest units, will reduce the potential for direct effects to the NLEB. However, the

potential for direct effects from timber harvests, road-related activities, and associated human presence is greatest during spring and summer (mid-April through July) when bats return from hibernation, spring temperatures result in periodic use of torpor, and non-volant young may be present. In addition, bats impacted by WNS have additional energetic demands and reduced flight capability. Again, to date, WNS has not been detected in Minnesota; however, the fungus that causes WNS was first detected in 2011–2012.

Indirect effects from the action may result from habitat modification and primarily involve changes to roosting and foraging suitability. Timber harvests and tree clearing associated with road-related activities could have both adverse and beneficial effects on habitat suitability for the NLEB. Prescribed fire may also result in both adverse and beneficial effects on roosting habitat through loss and creation of existing roosts, and long-term changes in forest composition towards a greater abundance of suitable roosts in the future. Prescribed fire may also have a short-term adverse and long-term beneficial effect on prey abundance, and thus foraging habitat suitability in the action area. The overall effect of the prescribed fire and herbicide treatments portions of the proposed action on habitat suitability may be neutral to potentially beneficial. Herbicide exposure or indirect effects to insects (prey) consumed by the NLEB are expected to be insignificant and discountable, if at all, herbicides spray is not expected to reach NLEB roosts, if present, and herbicide treatments is expected to minimally affect habitat availability. Given the scope of the projects in relation to the overall action area, these projects will not substantially alter the overall availability or suitability of NLEB roosting or foraging habitat in the action area.

While none of the USFS's proposed actions will alter the amount or extent of mortality or harm to NLEB resulting directly from WNS, the USFS's proposed action can be neutral, negative, or beneficial to bats. The continued implementation of the USFS's monitoring efforts will provide additional information on the effect of the USFS's actions on affected bats. Minimal cumulative effects are expected.

While analyzing the effects of the proposed action, we identified the life stages that would be exposed to the stressors associated with the proposed action, and analyzed how those individuals would respond upon exposure to the stressors. From this analysis, we determined that:

1) Neither hibernating bats nor their hibernacula will be exposed to the project stressors as there are currently no known hibernacula within the vicinity of the Pearl Project Action Area.

2) NLEB during the spring-fall period will be exposed to various project stressors and their responses to some of them are likely to be adverse.

We considered the possibility for NLEB to be exposed to the effects of project activities at currently unknown roost sites. If this should occur, we anticipate harassment of NLEB that may flush bats during daylight and cause them to temporarily or permanently abandon their roosts (which may have pups) and minor respiratory effects from burning. In addition, mortality of pups is possible from timber harvest and inhalation of smoke. In summary, there will be impacts to individual bats in terms of either reduced survival or reproduction.

Impacts to Populations

As we have concluded that individual bats are likely to experience reductions in either their annual or lifetime survival or reproductive rates, we need to assess the aggregated consequences of these effects to exposed individuals as they relate to the population to which these individuals belong.

The action area will continue to provide suitable habitat conditions for NLEB foraging and roosting during the summer while the proposed timber harvest and associated activities are implemented and after they are complete. There is potential for direct take of the species. Due to the small portions of the habitat within the action area where direct take is likely (and the current distribution and abundance of NLEB habitat in the Pearl Project area as described in the Environmental Baseline), the effects of the proposed activities are unlikely to reduce the likelihood that NLEB will continue to survive and reproduce on the Pearl Project area.

Impacts to the Species

Many of the proposed actions of the USFS are likely to result in benefits to the species over the long term due to the maintenance of a mosaic of forest types. While we recognize that the status of the species is uncertain due to WNS, given the environmental baseline, and the intensity, frequency, and duration of the project impacts, we find that the proposed project is unlikely to have appreciable impacts on the population that inhabits the action area. Thus, no component of the proposed action is expected to reduce the reproduction, numbers, or distribution of the NLEB rangewide. Therefore, we do not anticipate a reduction in the likelihood of both survival and recovery of the species as a whole.

CONCLUSION

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the northern long-eared bat. No critical habitat has been designated to date for this species; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering (50 CFR § 17.3). Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR § 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

On April 2, 2015, the Service published an interim species-specific rule pursuant to section 4(d) of the ESA for NLEB (80 FR 17974). The Service's interim 4(d) rule for NLEB exempts the take of NLEB from the section 9 prohibitions of the ESA, when such take occurs as follows (see the interim rule for more information):

(1) Take that is incidental to forestry management activities, maintenance/limited expansion of existing rights-of way, prairie management, projects resulting in minimal (<1 acre) tree removal, provided these activities:
    a. Occur more than 0.25 mile (0.4 km) from a known, occupied hibernacula;

b. Avoid cutting or destroying known, occupied roost trees during the pup season (June 1–July 31); and
c. Avoid clearcuts (and similar harvest methods, *e.g.*, seed tree, shelterwood, and coppice) within 0.25 (0.4 km) mile of known, occupied roost trees during the pup season (June 1–July 31).

(2) Removal of hazard trees (no limitations).

(3) Purposeful take that results from
a. Removal of bats from and disturbance within human structures and
b. Take resulting from actions relating to capture, handling, and related activities for northern long-eared bats by individuals permitted to conduct these same activities for other species of bat until May 3, 2016.

There are currently no known roost trees or hibernacula on the Pearl Project Area. However, we anticipate this will change as the SNF and others continue survey efforts. Therefore, at the time that known roost trees, maternity roosts, or hibernacula are identified, the incidental take will become effective, provided the above measures are implemented.

The incidental take that is carried out in compliance with the interim 4(d) rule does not require exemption in this Incidental Take Statement. Accordingly, there are no reasonable and prudent measures or terms and conditions that are necessary and appropriate for these actions because all incidental take has already been exempted. The activities that are covered by the interim 4(d) are as follows: forest management activities, including various types of timber harvest, road construction and decommissioning, associated noise and general human presence, burning, and site preparation. The remainder of this analysis addresses the incidental take resulting from those elements of the proposed action that are not covered by the 4(d) rule.

AMOUNT OR EXTENT OF TAKE

If NLEB are present or utilize an area proposed for timber harvest or other disturbance, incidental take of NLEB could occur. The Service anticipates incidental take of the NLEB will be difficult to detect for the following reasons: (1) the individuals are small and occupy summer habitats where they are difficult to find; (2) NLEB form small, widely dispersed maternity colonies under loose bark or in the cavities of trees and males and non-reproductive females may roost individually, which makes finding the species or occupied habitats difficult; (3) finding dead or injured specimens during or following project implementation is unlikely; (4) the precise

distribution and density of the species within its summer habitat in the action area is unknown; and, (5) in many cases incidental take will be non-lethal and undetectable.

Monitoring to determine actual take of individual bats within an expansive forested area is unlikely to produce useful information unless every individual tree that may contain suitable roosting habitat is inspected by a knowledgeable biologist when felled. To minimize or avoid take that is caused by felling trees with roosting bats, a similar tree-by-tree inspection would have to occur before trees are felled. Inspecting individual trees is not considered by the Service to be a reasonable survey method and is not recommended as a means to determine incidental take. However, the areal extent of potential roosting and foraging habitat affected can be used as a surrogate to monitor the level of take.

The Service anticipates that no more than 22,331 acres of potential NLEB habitat will be disturbed as a result of these ongoing project activities on the SNF, including 17,855 acres from timber harvest, 9,420 acres from fire treatments, 865 acres from herbicide treatments, and173 acres from road construction. Many of these areas may overlap with other treatment types (e.g., harvest with fire), so the actual acreage of disturbance will be 22,331. Furthermore, winter activities of the Pearl Project will not likely result in direct effects of death or injury.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to NLEB. No critical habitat has been designated for NLEB, so none would be impacted.

REASONABLE AND PRUDENT MEASURES

Since all anticipated incidental take will be from activities addressed by the 4(d) rule and are therefore already exempted, no reasonable and prudent measures will be required.

TERMS AND CONDITIONS

Since all anticipated incidental take will be from activities addressed by the 4(d) rule and are therefore already exempted, no terms and conditions will be required.

REPORTING REQUIREMENTS

1. The USFS shall provide report summarizing the activities (and acreages) described in this ITS annually and upon completion of the project(s).

2. The USFS shall make all reasonable efforts to educate personnel to report any sick, injured, and/or dead bats (regardless of species) located on the Pearl Project area in the Superior National Forest immediately to the Forest Biologist. The USFS point of contact will subsequently report to the Service's Twin Cities Field Office (TCFO) (612-725-3548) and/or the Minnesota Department of Natural Resources (MNDNR; see http://www.dnr.state.mn.us/wns/index.html or call 1-888-345-1730). No one, with the exception of trained staff or researchers contracted to conduct bat monitoring activities, should attempt to handle any live bat, regardless of its condition. If an injured bat is found, if possible, effort should be made by trained staff (with rabies vaccination) to transfer the animal to a wildlife rehabilitator. If needed, TCFO and/or MNDNR will assist in species determination for any dead or moribund bats. Any dead bats believed to be NLEB will be transported on ice to the TCFO or MNDNR. If an NLEB is identified, TCFO will contact the appropriate Service law enforcement office. Care must be taken in handling dead specimens to preserve biological material in the best possible state. In conjunction with the care of sick and injured fish or wildlife and the preservation of biological materials from dead specimens, the USFS has the responsibility to ensure that information relative to the date, time, and location of NLEB, when found, and possible cause of injury or death of each is recorded and provided to the Service. In the extremely rare event that someone has been bitten by a bat, please keep the bat in a container and contact the local health department.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the ESA directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid the adverse effects of a proposed action on listed species or critical habitat, to help carry out recovery plans, or to develop information.

The Service has identified the following actions that, if undertaken by the USFS, would further the conservation of the NLEB. We recognize that limited resources and other agency priorities may affect the ability of the USFS to conduct these activities at any given time.

1. Assist with WNS investigations, where feasible. For example:
   a. Monitor the status/health of known colonies;
   b. Collect samples for ongoing or future studies; and
   c. Allow USFS staff to contribute to administrative studies (on or off of USFS lands).

2. Monitor pre- and post-WNS distribution of NLEB on the Superior National Forest.
   a. Search for hibernacula within the Superior National Forest
   b. Conduct inventory surveys
   c. Conduct radio telemetry to monitor status of NLEB colonies
   d. Participate in North American Bat Monitoring Program (NABat; a national effort to monitor and track bats) through submission of survey data.

3. Encourage research and administrative studies on the summer habitat requirements NLEB on the Superior National Forest that.
   a. Investigate habitat characteristics of the forest in areas where pre- and post-WNS NLEB occurrences have been documented (acoustically or in the hand) (e.g. forest type, cover, distance to water).
   b. Investigate NLEB use (acoustics, radio telemetry) of recently managed areas of different prescriptions.

In order for the Service to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, the Service requests notification of the conservation recommendations carried out.

REINITIATION NOTICE

This concludes formal consultation for the USFS's actions outlined in your request dated August 6, 2014. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over an action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this

opinion; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such a take must cease pending reinitiation.

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