United States Department of the Interior

FISH AND WILDLIFE SERVICE
East Lansing Field Office (ES)
2651 Coolidge Road, Suite 101
East Lansing, Michigan 48823-6316

IN REPLY REFER TO:

November 4, 2015

Mr. Robert West, District Ranger
Hiawatha National Forest
St. Ignace Ranger District
W 1900 West US-2
St. Ignace, MI 49781

Re: Formal Section 7 Consultation and Biological Opinion on the East Red Pine 3 Project, Hiawatha National Forest – Log # 15-R3-ELFO-07

Dear Mr. West:

This letter transmits the U.S. Fish and Wildlife Service's Biological Opinion for the East Red Pine 3 project on the Hiawatha National Forest (HNF) in accordance with Section 7 of the Endangered Species Act of 1973, as amended (16 U.S.C. 1531 et seq.) (Act). The HNF determined that the proposed actions were "Likely to Adversely Affect" the Northern long-eared bat (*Myotis septentrionalis*; NLEB), and "Not Likely to Adversely Affect" the Canada lynx (*Lynx canadensis*), gray wolf (*Canis lupis*), Hine's emerald dragonfly (*Somatochlora hineana*), and designated Hine's emerald dragonfly critical habitat.

We base the enclosed Biological Opinion on information provided in several documents, including your Biological Assessment and Environmental Assessment, the Programmatic Biological Assessment and Opinion for the HNF's Land and Resource Management Plan (Forest Plan), and our May 1, 2015, Biological Opinion for NLEB from Ongoing and Planned Activities on the HNF. Other sources of information include previous telephone conversations and e-mails. A complete administrative record of this consultation is on file at our East Lansing Field Office.

Species Not Likely To Be Adversely Affected By the Proposed Action

Canada lynx

Currently, the best available information, including historic records and recent surveys, indicates that Canada lynx, if present, in the Upper Peninsula are likely limited to a small number of dispersing individuals. There is no indication of recent or current lynx breeding. In November of 2003, a lynx was incidentally captured in a bobcat trap in the eastern Upper Peninsula on the HNF. The Michigan Department of Natural Resources confirmed a lynx on Sugar Island, Chippewa County in January of 2010. Recent tracking efforts have not detected any additional signs of lynx on the HNF or elsewhere in the Upper Peninsula. However, detection of a very low number of dispersing individuals may be difficult and project assessment for potential effects to lynx on the HNF may be prudent.

You determined that the proposed action is "not likely to adversely affect" Canada lynx. We concur with that determination for the following reasons:

- No Canada lynx den sites are known within the project area.
- Canada lynx may be present in areas of suitable habitat throughout the action area. Given the large amount of suitable lynx habitat available throughout the Eastern Upper Peninsula of Michigan, the temporary nature of the project, and the small number of individuals potentially present, any lynx active on the landscape would be able to avoid project activities without incurring adverse impacts. Personnel will not likely encounter this species during construction activities, and any potential disturbance would be short-term and insignificant.
- The proposed construction would not result in further fragmentation or elimination of lynx habitat.

Based on this information, we expect any potential effects from this project on Canada lynx to be insignificant.

<u>Gray wolf</u>

You determined that the proposed action is "not likely to adversely affect" gray wolf. We concur with that determination for the following reasons:

- Gray wolf may be present throughout the action area. Given the large amount of suitable wolf habitat available throughout the Eastern Upper Peninsula of Michigan, any wolves active on the landscape would be able to avoid project activities without incurring adverse impacts. Personnel will not likely encounter this species during construction activities, and any potential disturbance would be short-term and insignificant.
- Any construction activities conducted in proximity to a den site will be subject to timing and distance restrictions, reducing the risk of direct or indirect effects to insignificant levels.
- The proposed action would not result in further fragmentation or elimination of wolf habitat.

Based on this information, we expect any potential effects from this project on cray wolf to be insignificant.

<u>Hine's emerald dragonfly</u>

You determined that the proposed action is "not likely to adversely affect" Hine's emerald dragonfly. We concur with that determination for the following reason:

- No management is proposed in known Hine's emerald dragonfly breeding or foraging habitat.

Based on this information, we expect any potential effects from this project on Hine's emerald dragonfly to be discountable.

Hine's emerald dragonfly critical habitat

You determined that the proposed action is "not likely to adversely affect" Hine's emerald dragonfly critical habitat. We concur with that determination for the following reasons:

- No management is proposed in known Hine's emerald dragonfly breeding or foraging habitat.
- Vegetation management and use of chemical non-native invasive plant treatments are proposed within designated critical habitat and may have the potential to alter the local hydrology. However, Forest Plan standards and guidelines, best management practices, and other protection measures would limit the impact of any potential changes to hydrology.

Based on this information, we expect any potential effects from this project on Hine's emerald dragonfly critical habitat to be discountable and insignificant.

Species Likely To Be Adversely Affected By the Proposed Action

Northern long-eared bat

After reviewing the current status of the Northern long-eared bat, 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 species.

With respect to the Act's compliance, all aspects of the project description are binding. Reasonable and Prudent Measures and the accompanying Terms and Conditions provided within the enclosed biological opinion are nondiscretionary and are designed to minimize incidental take of listed species.

We appreciate the opportunity to cooperate with the Hiawatha National Forest in conserving endangered species. If you have any questions, please contact Chris Mensing of this office at 517-351-8316 or chris_mensing@fws.gov.

Sincerely,

Scott Hicks
Field Supervisor

cc: Ms. Jennifer Szymanski, USFWS, Onalaska WI

BIOLOGICAL OPINION

Effects to the
Northern Long-Eared Bat
from the proposed
East Red Pine 3 Project
Hiawatha National Forest,
Michigan

Prepared by:
U.S. Fish and Wildlife Service
East Lansing Field Office
East Lansing, Michigan 48823

Log # 15-R3-ELFO-07

November 4, 2015

INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (BO) on the proposed East Red Pine 3 project 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 Hiawatha National Forest (HNF) determined that the proposed project was "likely to adversely affect" the northern long-eared bat (*Myotis septentrionalis*; NLEB), and was "not likely to adversely affect" Canada lynx (*Lynx canadensis*), gray wolf (*Canis lupis*), Hine's emerald dragonfly (*Somatochlora hineana*), and Hine's emerald dragonfly critical habitat. The USFS' June 16, 2015, request for formal consultation was received on June 22, 2015.

CONSULTATION HISTORY

On March 2, 2006, the Service issued a programmatic Biological Opinion (programmatic BO) for the HNF revised 2006 Land and Resource Management Plan (Forest Plan). In the programmatic BO, we evaluated the effects of HNF Forest Plan activities on American hart's tongue fern *(Asplenium scolopendrium var. americanum),* bald eagle *(Haliaeetus leucocephalus),* Canada lynx *(Lynx canadensis*), dwarf lake iris *(Iris lacustris),* gray wolf *(Canis lupis),* Great Lakes piping plover *(Charadrius melodus),* and designated piping plover critical habitat, Hine's emerald dragonfly *(Somatochlora hineana),* Houghton's goldenrod *(Solidago houghtonii),* Kirtland's warbler *(Dendroica kirtlandii),* lakeside daisy *(Hymenoxys herbacea),* and Pitcher's thistle *(Cirsium pitcheri).* We concurred that implementation of the Forest Plan was *likely to adversely affect* these species and critical habitat.

The programmatic BO established a two-level consultation process for activities completed under the Forest Plan. Evaluation of the Forest Plan at the plan level represented a Level 1 consultation and all subsequent project-specific evaluations for future actions completed under the Forest Plan are Level 2 consultations. Under this approach, the Level 1 programmatic opinion established guidelines and conditions that each individual future project must adhere to and operate within to remain consistent with the scope of the Level 1 opinion; these individual projects are subject to Level 2 consultations. Projects that are *likely to adversely affect* listed species or designated critical habitat are reviewed to determine: 1) whether they were contemplated in the Level 1 programmatic opinion and 2) if they are consistent with the guidelines established in the Level 1 programmatic opinion and whether the reasonable and prudent measures and terms and conditions provided in the incidental take statement are applicable. This ensures that the effect of any incidental take resulting from individual projects is minimized. In response, a Level 2 opinion is prepared and appended to the original programmatic opinion. Future projects that are likely to adversely affect listed species or critical habitat, and do not adhere to the guidelines and conditions evaluated during the programmatic consultation, or any future projects that are considered to be outside the scope of the proposed action or Forest Plan, may require separate formal consultations.

We base this opinion on information provided in several documents, including the HNF Biological Evaluation (BE), Northern Long-Eared Bat Listing Supplement BE, and Environmental Assessment (EA) for the East Red Pine 3 project (project), the Programmatic BA and March 2, 2006, programmatic BO for the HNF Forest Plan, and the May 1, 2015, BO for effects to the NLEB from Ongoing and Planned Activities on the HNF. Other sources of information include telephone conversations and e-mails with the HNF. A complete administrative record of this consultation is on file at the Service's East Lansing Field Office (ELFO).

While the proposed action incorporates and maintains consistency with the applicable standards and guidelines as outlined in the Forest Plan and as provided in your BE, the Programmatic BO did not address effects of the Forest Plan on NLEB. Therefore, this consultation is not considered a Level 2 project-level consultation; instead, it is a "stand-alone" consultation.

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

On April 2, 2015, the Service 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 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. Capture, handling, and related activities for NLEB for one year following publication of the interim rule.

Thus any take of NLEB occurring in conjunction with these activities that comply with the conservation measures, as necessary, is exempted from section 9 prohibitions by the 4(d) rule, and does not require incidental take authorization. We distinguish these activities from other actions throughout the accompanying BO.

However, 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 a 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 actions 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.

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.

Action Area

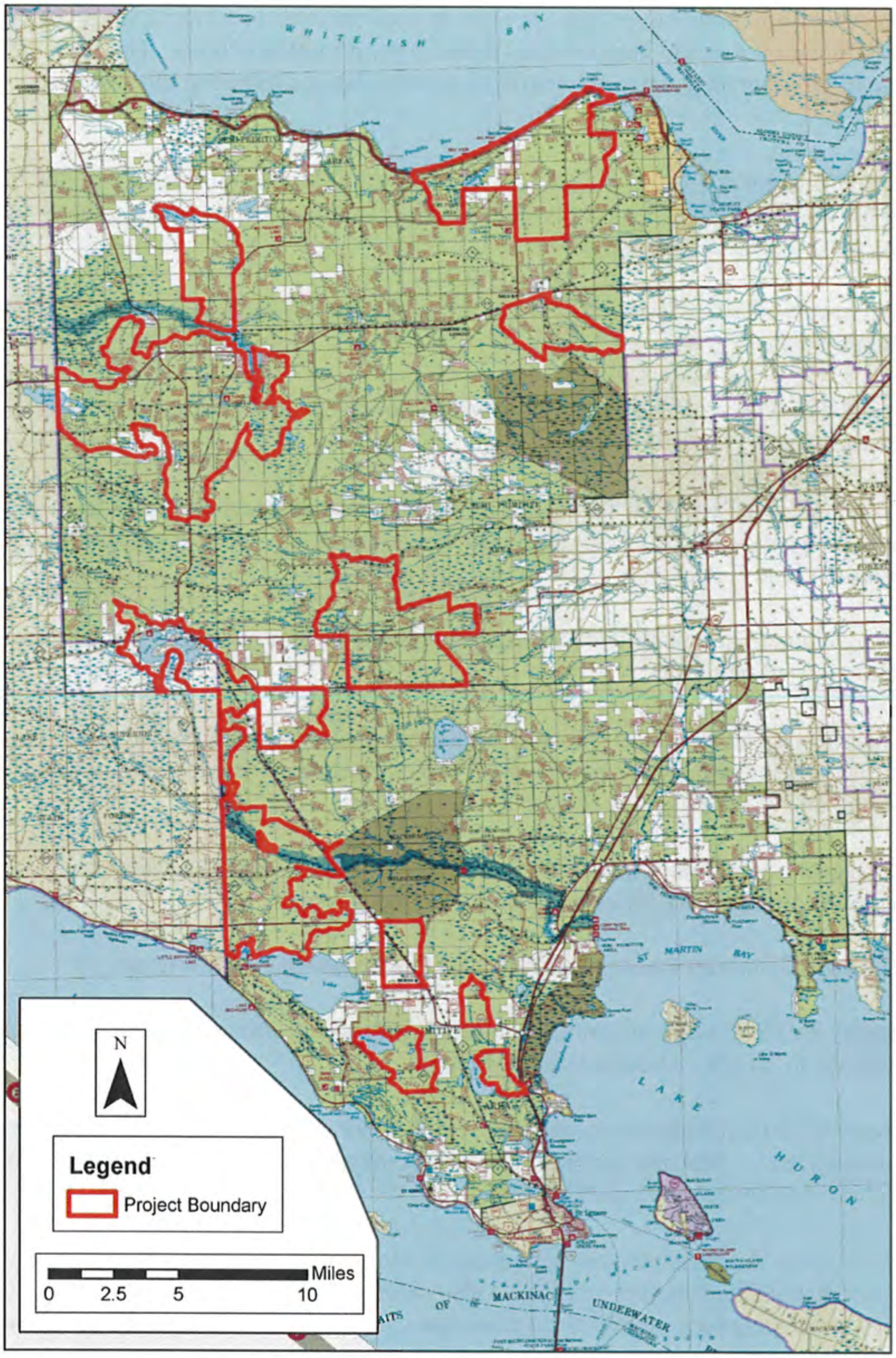
The proposed East Red Pine 3 project area is located within the St. Ignace and Sault Ste Marie Ranger Districts of the HNF in Chippewa and Mackinac Counties, Michigan (Figure 1). The proposed management would occur over a 15 year period on approximately 4,744 acres out of the total 394,462 acres of National Forest System lands within the two Ranger Districts (i.e., The Action Area includes less than 2% of the Forest Service lands within the two Ranger Districts).

Proposed Action

The HNF proposes to conduct vegetation management, non-native invasive plant (NNIP) treatments, and transportation system management on approximately 4,744 acres of the next 15 years. The specific actions and approximate acreage are as follows:

	Approx. Acres
Vegetation Management	
Commercial thin red pine plantations (with a variable hardwood component)	3,704
Prescribed burn	410
Maintain existing fuel break corridors	186
Create shaded fuel break	70
Non-Native Invasive Plant Treatments	
Roadside – chemical and/or mechanical	13
Forest – chemical	65
Forest – mechanical	20
Transportation system management	
Construct system roads	9
Reconstruct existing roads	267
Total	4,744

In addition to the actions listed above, 1,792 acres of snag creation and 1,205 acres of white pine underplanting are proposed within the 3,704 acres of commercial thinning, and four log landings would be constructed.



Map Created: August 14, 2013
Created By: gis/kjw
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Figure 1: Map of the Action Area

Conservation Measures

Conservation Measures are those actions taken to benefit or promote the recovery of the species. These actions taken by the Forest Service serve to minimize or compensate for project effects on the species under review and have been included in the proposed actions. The HNF has been pro-active in incorporating measures into their actions that contribute to the conservation of forest bats.

To provide protection to NLEB and for specific projects to be in compliance with the interim 4(d) rule for NLEB, the HNF has committed to the following conservation measures/design criteria as part of the project description:

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

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

- 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).

- Snag creation and white pine underplanting would occur outside of the non-volant period (June 15 – August 1)

- Application of herbicide and other pesticides should be planned to avoid or minimize direct and indirect effects to known, occupied threatened, endangered, or sensitive bat hibernacula and maternity roosts.

- Designate caves and mines that are occupied by bats as smoke-sensitive targets. Avoid smoke entering these hibernacula when bats are present.

The HNF currently has no known, occupied NLEB hibernacula or roost trees.

Additionally, the HNF will continue implementing Forest Plan direction in an effort to minimize adverse effects to NLEB. These actions include:

- The Forest Plan includes a standard to protect "all known populations of threatened and endangered ... nest and denning sites." This standard is applicable to NLEB maternity roosts if and when they are discovered.

- The Forest Plan also contains guidelines to maintain snags and mast/den trees which provide wildlife structure and would also serve to maintain NLEB roost trees. Individual project descriptions include these guidelines as design criteria and will be followed unless the prescriptions are not feasible or prudent.

- The HNF will continue their acoustic mobile survey transects as funding is available. The Forest is also planning to establish fixed acoustical stations to better understand presence and distribution of bats across their forest.

- The HNF will continue to incorporating design criteria and other management restrictions used for protection of Regional Forester Sensitive Species, watershed management, and other resource considerations. Many of these design criteria include actions that may also be beneficial to NLEB.

- Of the HNF's 895,000 acres, approximately 344,788 acres of Old Growth (51,190 ac.), Research and Candidate Natural Research Areas (18,326 ac.), lands unsuited for timber management (211,677 ac.), Wilderness (38,637 ac.), and Wild and Scenic Rivers (24,957 ac.) have suitable habitat for NLEB. These areas would experience infrequent disturbance or where disturbance would be virtually absent. Continuing to minimize management in those areas benefits the NLEB by providing large tracts of suitable habitat where direct or indirect effects would be unlikely to occur.

- The HNF will continue to provide a diverse, productive, healthy, and sustainable forest that is resilient to natural and human-caused disturbances. Non-native invasive species are at low levels and do not alter ecosystem processes. Vegetation composition and structure provide plant and animal species habitats, including NLEB. This is accomplished by managing different land areas within the HNF; called management areas (MAs). Each MA has a prescription that emphasized conditions or features such as; community types (e.g. early vs. late successional), timber management strategies (e.g. even vs. uneven aged), appearance (e.g. predominately forested vs. forest openings), recreational environment (e.g. semi-primitive non-motorized), wilderness character and experience, special interest areas, river corridors, etc. Through the diverse management of multiple MAs, the HNF provides a diverse array of habitat that is continually renewed through prescribed activities which would provide a long-term benefit to NLEB.

The HNF evaluated the practicability of avoiding / minimizing adverse effects to NLEB by implementing additional seasonal work restrictions for timber harvest / thinning, prescribed burning, road construction, and NNIP treatments. However, implementing design criteria to avoid the NLEB summer occupancy and non-volant time periods would impact the ability to meet the purpose and need for the project for the following reasons:

- Restricting timber harvest / thinning activities and road construction to avoid the summer occupancy or non-volant periods would result in a decrease in the ability to create the desired conditions due to seasonal load limits, restrictions for other threatened, endangered, and sensitive species, snow depths, industry capacity, and avoidance of snowmobile trails.

- Prescribed fire implementation windows are limited due to seasonal weather and fuel conditions.

- NNIP treatments must be conducted when it is most effective to treat the targeted species.

STATUS OF THE SPECIES

This section will provide an overview of the biology and conservation needs of the NLEB and that is pertinent to the "Effects of the Action" section (e.g., a description of the annual life cycle, spring emergence habitat, fall swarming habitat, etc.).

Additional information on the NELB's life history, biology, current range-wide population and trends, and threats are thoroughly described in the final rule (80 FR 17974).

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. Throughout the species' range, the NLEB will hibernate between mid-fall through mid-spring each year. The spring migration period likely runs from mid-March to mid-May each year, as females depart shortly after emerging from hibernation and are pregnant when they reach their summer area. Young are typically born in late-May or early June, with nursing continuing until weaning, which is shortly after young become volant in mid- to late-July. Fall migration likely occurs between mid-August and mid-October. These dates are variable depending on weather conditions and latitude.

Summer habitat and ecology

Suitable summer habitat 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. NLEBs seem to be focused in upland, mature forests (Caceres and Pybus 1997) with occasional foraging over forest clearings, water and along roads (Van Zyll de Jong 1985). However, most NLEB hunting occurs on forested hillsides and ridges, rather than along riparian areas (Brack and Whitaker 2001; LaVal et al. 1977).

Many species of bats, including the NLEB, consistently avoid foraging in or crossing large open areas, choosing instead to use tree-lined pathways. Further, wing morphology suggests that the species is 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.

For purposes of this consultation, the NLEB's summer occupancy period is defined as the time when bats are reasonably expected to be present at their summer home range. In Michigan, the summer occupancy period is between May 1 and September 1 in the Lower Peninsula (LP) and between May 15 and September 1 in the Upper Peninsula (UP).

Maternity colonies and roosts

Upon emergence from the hibernacula in the spring, females seek suitable habitat for maternity colonies. Coloniality is a requisite behavior for reproductive success. NLEB maternity colonies range widely in size, although 30-60 bats/colony may be most common (USFWS 2013). Maternity colonies contain networks of approximately 10-20 roost trees often centered around one or more primary or central-node roost trees. NLEB show some degree of interannual fidelity to single roost trees and/or maternity areas. Male and non-reproductive female NLEBs may also roost in cooler places, like caves and mines. NLEB roost in cavities, underneath bark, crevices, or hollows of both live and dead trees and/or snags (typically ≥3 inches dbh). The bats 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 and have also been occasionally found roosting in structures like barns and sheds (particularly when suitable tree roosts are unavailable).

Reproduction

Throughout the species' range, young NLEB are typically born in late-May through mid-June, with females giving birth to a single offspring. Lactation then lasts 3 to 5 weeks, with pups becoming volant (able to fly) between early July and early August. In Michigan the non-volant period occurs between June 15 and August 1.

Migration

Males and non-reproductive females may summer near hibernacula, or migrate to summer habitat some distance from their hibernaculum. NLEB are not considered to be a long distance migrant, typically migrating up to 40-50 miles. However, some NLEB detections have been documented in areas further than 100 miles from any known hibernacula. Migration may be stressful for 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. The species hibernates from October to April depending on local weather conditions (November-December to March in southern areas and as late as mid-May in some northern areas). In Michigan, hibernation typically occurs from October 15 to May 15 in the LP, and from October 1 to May 31 in the UP.

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 (USFWS 2013), with hibernating population sizes ranging from a just few individuals to around 1,000 (USFWS 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, NLEBs "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. 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 bats migrate to summer roosts. Female 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.

Spring staging in Michigan occurs between April 1 and May 15 in the LP, and between April 15 and May 31 in the UP. Fall swarming occurs between August 15 and November 1 in the LP, and between August 15 and October 15 in the UP.

Threats

No other threat is as severe and immediate for 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 2006, WNS has spread rapidly to 29 states and four Canadian Provinces throughout the Northeast, to the Midwest and the Southeast. Population numbers of NLEB have declined by up to 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. Impacts to hibernacula (e.g. human disturbance, changes in the hibernacula's microclimate) and loss or degradation of summer habitat (e.g. highway and commercial development, timber harvest, forest management) are additional stressors that may affect NLEB on two levels. First, individual NLEBs 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.

Species 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). In the United States, the species' range reaches from Maine west to Montana, south to eastern Kansas, eastern Oklahoma, Arkansas, and east to the Florida panhandle (Whitaker and Hamilton 1998, Caceres and Barclay 2000, Wilson and Reeder 2005, Amelon and Burhans 2006). The species' range includes the following 38 States: Alabama, Arkansas, Connecticut, Delaware, the District of Columbia, 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). More than 1,100 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, p. 100). Known hibernacula (sites with one or more winter records) include: Alabama (2), Arkansas (41), Connecticut (8), Delaware (2), Georgia (3), Illinois (21), Indiana (23) Kentucky (119), Maine (3), Maryland (8), , Massachusetts (7), Michigan (103), Minnesota (11), Missouri (more than 269), Nebraska (2), New Hampshire (9), New Jersey (8), New York (58), North Carolina (22), Oklahoma (7), Ohio (7), Pennsylvania (112), South Carolina, (2), South Dakota (7), Tennessee (58), Vermont (14), Virginia (8), West Virginia (104), and Wisconsin (67).

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 widespread surveys and research projects, primarily focused on Indiana bat (*Myotis sodalis*) or an array of other bat species. 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 also reporting 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.

Conservation Needs of the Species

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, and restoring microhabitat conditions in hibernacula that have been altered. Efforts should also be made to protect and restore adequate fall swarming habitat around hibernacula. Occupied maternity habitat should be maintained, and the removal of occupied roost trees, particularly when 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.

Critical Habitat

Critical habitat has not been proposed for the NLEB.

ENVIRONMENTAL BASELINE

The Environmental Baseline describes the species status and trend information, and 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. Additional detailed information is available in the Forest Plan that is hereby incorporated by reference.

Status of the NLEB in Michigan and the Action Area

In Michigan, NLEB have been captured or physically detected (i.e., observed in winter hibernacula counts) in 38 of 83 total counties and acoustically identified in 4 additional counties (See Figure 2). The species appears to be more abundant in the UP and northern LP than in southern parts of the state (Kurta 1982, Kurta and Smith 2014). For instance, during 1968-1980, NLEB represented 15.3% of 111 bats of 6 species submitted for rabies testing north of 44° north latitude; whereas the species comprised only 0.3% of bats submitted from south of the 44th Parallel (Kurta 1982). Likely, the species' higher density in the north is a result of most known and potential hibernacula being contained in the UP (predominantly abandoned copper and iron mines in Dickinson and Ontonagon Counties; Kurta 1982, Winhold 2007, Kurta 2008a). Although NLEB have been identified at 3 LP hibernacula (Bear Cave in Berrien County, Rockport Quarry in Alpena County, and Tippy Dam in Mason County), it is suspected that a majority of the bats that summer in the southern LP may hibernate in adjacent states (Kurta 1982).

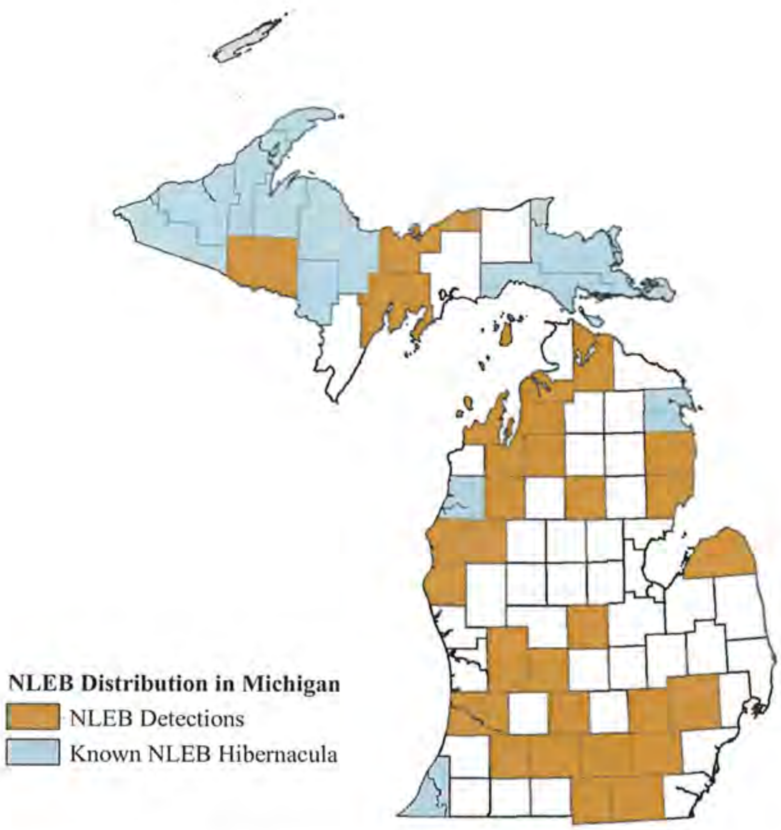

Figure 2: Map of NLEB detections and known hibernacula in Michigan

Upper Peninsula

Some of the earliest records of the species in Michigan include sightings from Isle Royale, Mackinac Island (Burt 1946) and Big Summer Island (Long 1978, as cited in Kurta 1982) in the UP. Between 1904 and 1968, the University of Michigan collected a total of 15 NLEB specimens from 7 UP counties (Baraga, Chippewa, Dickinson, Mackinac, Marquette, Keweenaw and Ontonagon; University of Michigan Mammal Research Department Museum Records), and Michigan State University has collected 116 NLEB specimens from 7 UP counties (Chippewa, Delta, Dickinson, Iron, Mackinac, Marquette, and Ontonagon) to date (Michigan State University Mammal Research Department Museum Records).

Although few bat surveys have been conducted in the UP, evidence suggests that NLEB occur there in relatively high densities. During the summer of 1979, NLEB represented 81.7% of the total bats captured outside 4 Mackinac County caves in the eastern UP (Kurta 1980). In 2009, Kurta and Smith examined 25 mines in the Ottawa National Forest and concluded that 4 of the sites likely harbor hibernating bats (Kurta and Smith 2009). Finally, during 2010-2014, prior to the arrival of white-nose syndrome (WNS), the team observed bats hibernating in 82 of 119 UP mines, including 91 copper mines, 26 iron mines, 1 dolomite mine, and 1 putative gold mine (Kurta and Smith 2014). Overall, NLEB was the second most commonly observed species, representing almost 10% of the 244,341 total hibernating bats observed.

Hiawatha National Forest

During 2012, NLEB comprised 59% of summer mist net captures in the Hiawatha National Forest (Cuthrell et al. 2012, Gehring and Klatt 2013). One positive mist nest site was approximately ¼ mile away from a stand proposed for thinning. Additionally, mobile acoustic surveys during 2009-2012 and 2014 yielded several potential NLEB detections, although the results are considered preliminary.

Habitat Conditions in the Action Area

Of the HNF's total ownership, the 2006 Forest Plan indicates 26% is northern hardwoods, 17% is spruce-fir/swamp conifer, 13% is aspen, 13% is red/white pine, 8% is jack pine, 9% is cedar, and 14% is non-forested. Approximately 793,500 acres of the HNF is forested. It is assumed that NLEB roost habitat is not limited on the HNF. Some of the non-forested habitat consists of aquatic habitats of open and emergent wetlands, savannas, and grasslands. Karst geology is present on the East Unit of the HNF in Mackinac County. There are locations with exposed and weathered limestone. However, there are no known bat hibernacula on the HNF.

Conservation Needs of the Species in the Action Area

The conservation needs of the species in the action area are similar to the needs range-wide. The HNF provides habitat for swarming, migrating, and summering NLEB. WNS has not been detected on the HNF; however the fungus has been detected in six counties in Michigan and suspected in another and mortality has been detected in six counties. It is likely the bat's population on the HNF will experience significant declines over the next several years directly attributable to WNS. Therefore, within the action area the conservation needs include: 1) reducing WNS-related mortality and injury; 2) conducting research to discover ways to prevent bats from being infected with WNS or treat bats who are infected; 3) providing suitable habitat conditions for NLEB; 4) maintaining suitable habitat conditions in identified maternity areas and reducing the removal of occupied roost trees; 5) searching for previously unidentified areas of maternity and hibernation activity; and 6) conducting research to understand the migration patterns of NLEB that use the area during the summer or winter.

Ongoing Stressors in the Action Area

In early 2015, the HNF formally consulted on ongoing and planned activities in response to the April 2, 2015 final rule listing the NLEB as a threatened species. The HNF reviewed all their ongoing and planned actions and determined that a total of 772 project activities and 350 special use permits were likely to continue beyond the time when the NLEB would be listed. They then reviewed these projects, including their previous consultation documents, to determine how these projects would affect the NLEB. The HNF included conservation measures to minimize potential adverse impacts of various activities as part of their project description. The Service analyzed the effects of the proposed actions, considering that the projects will be implemented as proposed (including all conservation measures).

Proposed and ongoing actions included 23 categories of actions including:

- Timber harvest, non-commercial cutting, and timber stand improvement
- Prescribed fire
- Openings, barrens, savannahs, and fuel break maintenance
- Site preparation
- Firewood cutting, Christmas tree cutting, tree pruning, and hazard tree removal
- Road closures

- Minor activities with tree removal (e.g., special use permits, landline surveys, etc.)
- Insect and disease destructive surveys and herbicide treatments
- Building maintenance or demolition
- Wildlife and fisheries structural habitat improvements

In the May 1, 2015 biological opinion, we determined that the actions consulted on were not likely to jeopardize the continued existence of the species. Due to the difficulty of detecting incidental take of NLEB, we used the areal extent of potential roosting and foraging habitat affected as a surrogate to determine the level of take that may occur from the proposed actions. A total of 78,515 acres and 435 structures containing potential NLEB habitat was determined to be adversely effected by the proposed actions. Of the total, 78,021 acres were exempted through the interim 4(d) rule, and the resulting 494 acres and 435 structures were addressed through the Incidental Take Statement. Project activities would primarily occur over the next 1-5 years; however, some activities may extend over the next ten years.

In addition, the Service believes the following State, local, and private actions are currently occurring within the Action Areas and are likely to be adversely affecting some percentage of NLEB to variable degrees, and are likely to continue into the reasonably foreseeable future.

- Loss and degradation of roosting and foraging habitat – Most of the forest habitat within the Action Area is on Forest Service lands and is being maintained and available for use by NLEB. However, on lands outside of the Forest Service's ownership, an unknown amount of forest habitat is being lost and/or degraded by private and public, commercial and residential developments, which are converting, fragmenting, or otherwise degrading forest habitat available for roosting and foraging, especially near incorporated areas centers and along primary and heavily traveled secondary roadways and their main intersections.

- Commercial and private timber harvesting – Some private timbering likely occurs on private lands within the Action Area while bats are roosting in trees. Therefore, some unknown number are likely exposed to this stressor and may be directly killed, harmed, or displaced as trees are felled in the summer.

- Cutting of Snags - While most primary and many alternate roost trees are dead snags that are ephemeral/short-lived, some small proportion are likely to be cut down before they would naturally fall in order to reduce safety risks (i.e., hazard tree removal), to provide firewood, or to improve aesthetics.

- Degraded water quality – Point and non-point source pollution and contaminants from agricultural, commercial, and residential areas are likely present in waterways within the Action Area and may at times reduce aquatic insect biomass that form a portion of the NLEB prey base and/or have direct or other indirect adverse effects on the bats themselves (e.g., females may have reduced reproduction in heavily contaminated areas).

EFFECTS OF THE ACTION

This BO evaluates the effects of the proposed East Red Pine 3 on the northern long-eared bat. These projects will affect a total of approximately 4,744 acres of potential NLEB habitat on the

HNF. Potential effects to the NLEB include direct effects 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.

We deconstructed the proposed activity into its various project elements and determined the direct and indirect environmental consequences that NLEB would be exposed to. We conducted various exposure analyses for each proposed activity that may directly or indirectly affect the bats and determined the likely responses of the bats to each potential stressor. The following project elements were determined to have effects on NLEB:

- Low to Moderate Intensity Prescribed Burning
- Fuel Break Creation and Maintenance
- Roadside Construction and Maintenance
- Non-Native Invasive Plant Herbicide Treatments

While analyzing direct and indirect effects of the proposed action on NLEB, we considered the following factors:

- proximity of the action to known occupied or likely suitable habitat,
- distribution of the disturbances and impacts,
- timing of the effects in relation to sensitive periods in the species' lifecycle,
- nature of the effects - how the effects of the action may be manifested in elements of a species' lifecycle, population size or variability, or distribution, and how individual animals may be affected,
- duration of effects - short-term, long-term, permanent,
- disturbance frequency - number of events per unit of time, and
- disturbance severity - what is the relative impact in comparison to unimpacted individuals.

In addition, our analysis of effects for northern long-eared bat entails integrating those individual effects to discern the consequences to the populations to which those individuals belong, and determining the consequences of any population-level effects to the species rangewide. If, at any point, we demonstrate that the effects are unlikely, we conclude that the agency has insured that their action is not likely to jeopardize the continued existence of the species and our analysis is completed.

Timber Harvest / Thinning / Timber stand improvement

Description of Action

The actions that will be analyzed in this section include commercial timber harvest/thinning, and timber stand improvement activities (TSI). This action also includes the construction of temporary roads and landings for the removal of timber products. Approximately 4,909 acres of forest are proposed for treatment, including 3,704 acres of commercial thinning and 1,205 acres of underplanting white pine. A total of 85 red pine stands would be thinned, however some stands include a component of aspen and hardwoods that would also be managed in order to achieve the desired condition.

Commercial timber harvest includes all tree felling activities where trees are felled and removed. A number of silvicultural techniques may be used including clearcutting, thinning, shelterwood and seed tree harvest. These techniques are used most often to regenerate or manage a stand that will remain forested over the long term. Sometimes timber harvest is used to create openings, barrens and fuelbreaks, roads, or other permanent openings.

Timber Stand Improvement (TSI) activities typically include forest management practices that improve the vigor, stocking, composition, productivity, and quality of forest stands. Approximately 1,205 acres of white pine will be underplanted to increase species diversity. Snags and wildlife (e.g. relict) trees are retained according to Forest Plan standards and guidelines. The HNF Forest Plan allows for more than 10 snags per acre as reserve trees where additional snags would be beneficial to rare species, unless they present a safety concern or interfere with mechanical site preparation. This provides for additional benefits to NLEB on the HNF. Approximately 1,792 acres of snag creation is proposed within the 3,704 acres of commercial thinning. White pine underplanting and snag creation would be conducted outside the NLEB's non-volant period (June 15 – August 1)

HNF Structural Guidelines:

- When determining reserves for even-aged managed stands on ELTs 10/20, method A or B, or a combination of both should be used. For all other ELTs, either method A or method B should be used.
    - Two to four live trees with diameters greater than or equal to the average stand diameter per acre should be reserved. Preference should be given to live den trees.
    - Variable size reserve islands/clumps that total up to a half-acre for every 10 acres should be reserved.
- For uneven-aged managed stands:
    - Up to five live den trees per acre should be reserved, unless they present a safety concern.
    - Live den trees felled for safety reasons should be left as coarse woody debris.

- For reserve snag and down logs in managed stands:

  - Two to 10 snags per acre should be reserved, except where additional snags would be beneficial to rare species or unless they present a safety concern or interfere with mechanical site preparation. Additional snags should be recruited from live trees where there are fewer than two snags per acre.

  - Snags felled for safety reasons should be left as coarse woody debris.

  - Two or more down logs per acre that are equal to or greater than 10 inches in diameter and 8 feet long, should be maintained. In stands where tree diameters are less than 10 inches, down log diameters equal to or greater than the average stand diameter should be provided.

<u>Environmental Baseline</u>

Timber harvest, non-commercial cutting, and timber stand improvement activities are ongoing activities on National Forest System with the objective of supplying timber products, promoting forest health, enhancing wildlife, plant and fish habitat, reducing fire risk, providing recreational opportunities, and meeting other resource management objectives in Forest Plan.

A majority of NLEB roosts reported were in deciduous (i.e. hardwood) forest types (e.g., Mumford and Cope 1964, Sasse Thesis 1995, Foster and Kurta 1999, Lacki and Schwierjohann 2001, Schultes Thesis 2002, Broders and Forbes 2004, Jackson Thesis 2004, Carter and Feldhamer 2005, Ford et al. 2006, Bales Thesis 2007, Winhold Thesis 2007, Garroway and Broders 2008, Kurta 2008, Dickinson et al. 2009, Johnson et al. 2009, Lacki et al. 2009, Krynak Thesis 2010, Timpone et al. 2010, Silvis et al. 2012, Sinander 2012, Bohrman and Fecske 2013, Brown 2013, Lereculeur Thesis 2013, Badin Thesis 2014). Broders and Forbes (2004) reported that female NLEB roosts in New Brunswick were 24 times more likely to be in shade-tolerant, deciduous trees than conifers. These data suggest that hardwood trees most often provide the structural and microclimate conditions preferred by maternity colonies and groups of females, which have more specific roosting needs than solitary males (Perry and Thill 2007), although softwood snags may occasionally offer more suitable roosting habitat for both sexes than hardwoods (e.g., Perry and Thill 2008, Cryan et al. 2001).

In a study of red pine plantations on the Manistee National Forest in Michigan, found that "red pine plantations, even after thinning, most likely are too structurally complex and have low insect abundance, making them a largely unsuitable habitat for bats." However, Lacki et al. 2009 reported that although NLEBs in Kentucky roosted preferentially in hardwoods, they foraged in or near pine-dominated stands more often than hardwood-dominated stands. Tibbels and Kurta (2003) believe that the lower vegetative clutter observed in pine stands improved foraging. Additionally, they suggested that coniferous habitats are likely to provide poor habitat for many species of bats. In their study, they found that the majority of bat activity was in openings within red pine plantations. Given the availability of deciduous trees in the Action Area that more commonly provide the structural features used by roosting NLEB, in particular maternity colonies, the likelihood of this species roosting in coniferous stands in the Action Area is relatively low.

Additionally, it has been suggested that NLEB does not often forage in intensively managed stands (Patriquin and Barclay 2003, Ford et al. 2005, Sheets et al. 2013). However, Owen et al. (2002) and Menzel et al. (2002) concluded that intensively managed hardwood forests in the central Appalachians provide adequate roosting habitat for NLEB. Badin (Thesis, 2014) found that NLEB roosted at greater abundances in undisturbed forest (n = 65) than harvested forests, with a few roosts in patch-cuts (n = 4), and none in larger clear-cuts. When using disturbed areas, NLEB were found to use plots with more trees (i.e. vegetative clutter) than random locations (Cryan et al. 2001, Owen et al. 2002, and O'Keefe 2009).

Direct and Indirect Effects

Although the probability is relatively small (based on total forest size), some of the trees harvested or felled may be roosting habitat for the NLEB. While the probability of this is difficult to quantify, it may vary depending on the extent of trees removed (i.e. size of harvest area and treatment type, as well as age, size, and condition of tree). Trees may be felled in the spring, summer, and fall when NLEBs may be present. Harvesting or felling trees during this period may directly affect NLEBs because of the possibility of a tree containing roosting bats. Bats may leave a roost tree prior to it being felled due to the noise, vibration and disturbance from saws or other equipment. However, some bats might remain in a tree and could be injured or killed if the tree strikes the ground. If bats are present in trees adjacent to the tree being felled, these bats may be disturbed by the activity, however, the bats are not likely to be injured or killed, unless the felled tree damages the roost site on the retained tree. The design criteria for retention of snags and den trees offer additional protection because many potential roost trees would be protected from cutting.

Potential adverse effects are reduced during the spring staging and fall swarming periods. During spring staging, most bats would be expected to be staging near their hibernaculum or migrating to their summer range and during swarming, most NLEBs would be expected to be migrating to or swarming near their hibernaculum.

If a roost tree is felled any time of year, it could cause a local loss of roosting habitat. The roost tree would no longer be available to NLEBs and cause the bats that were occupying it to find an alternate roost tree. However, depending on the prescribed treatment for the specific treatment area, the bats may find suitable habitat in adjacent trees or neighboring stands. The size of the treatment areas may impact the social structure of bats in maternity colonies by losing preferred roost trees and the loss of roost trees may also potentially affect home ranges of bats using the treated areas. Silvis et al. (2014) used simulations to demonstrate that >20% roost removal was required to fragment social networks for maternity colonies in Kentucky. While harvests are generally concentrated to localized landscape types or ecological regions, the timber harvests are generally conducted in smaller blocks of payment units (anywhere from 5-100 acres in size) over the course of several years (duration of the timber contract). This incremental timber removal may help minimize loss of habitat by dispersing it over time and space.

In the short term, coniferous stands that are clearcut or have other types of regeneration treatments could have a minor indirect effect on NLEBs because of changes in forest structure. These stands would transition from poorly suited NLEB habitat to unsuitable habitat. In the long term, the coniferous stands that are clearcut would be regenerated and would mature in approximately 60 years. These stands would transition back from unsuitable habitat to poorly suited NLEB habitat and could offer some foraging or roosting habitat for the NLEB. Although retained snags would not last 60 years, retained live den trees could provide habitat over the long term.

Some areas of coniferous timber harvest used to create openings, barrens, fuelbreaks, roads or other permanent openings would not be reforested. These actions could result in a minor loss of roosting and foraging habitat over the long term. The impact depends on the size and density of the trees removed, and size and shape of the permanent openings created. Areas where the trees are large (> 3" dbh) and not densely stocked could be roosting and foraging habitat for NLEBs; coniferous timber harvest in these areas may result in habitat loss. Harvest that creates large or wide openings could result in a loss of foraging habitat for NLEBs, while harvest that creates small or narrow openings could provide foraging habitat.

In the short term, thinning coniferous stands could improve NLEB habitat by making the stands less dense, improving forest structure for foraging. Retained snags and den trees could provide roosting habitat. In the long term, thinning coniferous stand would promote larger trees and an increase in vegetative diversity. This could have beneficial effects on northern long-eared bat habitat because the stand structure would be more conducive to NLEB foraging and the increase in vegetative diversity may improve insect diversity and abundance. Retained snag would not likely provide habitat in the long term because they would likely fall within 10 years of harvest. Live den trees could provide habitat in the long term.

Timber Stand Improvement

The planting of small diameter white pine trees to improve the diversity of species would likely have a very limited indirect effect on NLEBs due to the changes in species composition. TSI activities most likely would have insignificant effects on prey abundance or habitat.

Determination

Underplanting white pine on approximately 1,205 acres is not likely to adversely affect the NLEB due to avoiding the bat's non-volant period. These effects are discountable. Timber harvest, thinning and timber stand improvement activities on the remaining 3,704 acres is likely to adversely affect the NLEB because of the potential for injury and death from felling trees, and harassment due to social structure changes and roost tree removals. Some individual actions may occur outside the summer occupancy period and therefore would not likely to adversely affect the NLEB because the bats would not be present on the landscape. However, the HNF was not able to specify which actions, if any, would occur during that timeframe so it is assumed that all 3,704 acres of commercial harvest / thinning would adversely affect NLEB.

Low to Moderate Intensity Prescribed Burning

Description of Action

The actions that will be analyzed in this section include all low to moderate intensity prescribed burning activities where the flame lengths are generally 2 to 4 feet, and no greater than 6 feet. Low to moderate intensity prescribed burns are typically intended to consume ground level litter and vegetation, and usually have little to no impact on overstory trees. Approximately 410 acres are proposed for low to moderate intensity prescribed burning treatments.

Environmental Baseline

Prescribed fire activities in hardwood forest types are used to improve forest health and restoration, reduce fuel loading, manage invasive species, conduct site preparation, and meet other objectives in the Forest Plan.

In a study of red pine plantations on the Manistee National Forest in Michigan, Tibbels and Kurta (2003) found that "red pine plantations, even after thinning, most likely are too structurally complex and have low insect abundance, making them a largely unsuitable habitat for bats." Additionally, they suggested that coniferous habitats are likely to provide poor habitat for many species of bats. In their study, they found that the majority of bat activity was in openings within red pine plantations. Given the availability of deciduous trees in the Action Area that more commonly provide the structural features used by roosting NLEB, in particular maternity colonies, the likelihood of this species roosting in coniferous stands in the Action Area is relatively low.

The literature suggests that coniferous trees (especially live, healthy ones) are rarely used as roosts by female NLEBs, with solitary male NLEB using them a greater extent (Broders and Forbes 2004, Jung et al. 2004, Henderson et al. 2008, Lausen 2009). Lacki et al. 2009 reported that although NLEB in Kentucky roosted preferentially in hardwoods, they foraged in or near pine-dominated stands more often than hardwood-dominated stands and in burned habitats more than unburned habitats. They argued that the lower sub-canopy clutter observed in both pine stands and burned habitats were preferred for foraging.

Hardwood forests are important habitats that NLEB use for foraging, roosting, pup rearing and social interactions. Lacki et al. (2009) reported that although NLEB in Kentucky roosted preferentially in hardwoods, they foraged in or near pine-dominated stands more often than hardwood-dominated stands and in burned habitats more than unburned habitats. They argued that the lower subcanopy clutter observed in both pine stands and burned habitats were preferred for foraging. In a large majority of NLEB telemetry studies, roost tree species reported were hardwoods. Of 1,443 total roost trees described in 30 studies across the species' range (Sasse 1995, Foster and Kurta 1999, Cryan et al. 2001, Lacki and Schwierjohann 2001, Schultes 2002, Scott 2007, Swier 2003, Broders and Forbes 2004, Jackson 2004, Carter and Feldhamer 2005, Ford et al. 2006, Bales 2007, Henderson 2007, Perry and Thill 2007, Winhold 2007, Garroway and Broders 2008, Dickinson et al. 2009, Johnson et al. 2009, Lacki et al. 2009, Krynak 2010, Timpone et al. 2010, Olson 2011, Silvis et al. 2012, Sinander 2012, Park and Broders 2012, Bohrman and Fecske 2013, Brown 2013, Lereculeur 2013, Badin 2014, George and Kurta 2014), 1185 (84.6%) were reported as deciduous, and 882/1005 (87.8%) of total female NLEB roosts were deciduous. Broders and Forbes (2004) reported that female NLEB roosts in New Brunswick were 24 times more likely to be shade-tolerant, deciduous trees than conifers. In Newfoundland, even though approximately 83% of forests are dominated by coniferous species, female NLEB were tracked to nearly the same number of deciduous as coniferous roosts (Park and Broders 2012). However, these pooled data were skewed toward the preferences of reproductive female bats (which were targeted by most of the telemetry studies), and it appears that solitary male NLEB may use coniferous roosts to a greater extent (Broders and Forbes 2004, Jung et al. 2004, Henderson et al. 2008, Lausen 2009).

A summary of NLEB roost trees (USFWS unpublished) shows a range of roost heights from 16 to 52 feet, well above the height of flames of a low to moderate intensity prescribed burn.

Direct and Indirect Effects

Trees potentially containing NLEB may be burned or felled as part of the preparation (fire line creation and maintenance) or burning process resulting in a direct effect on the bats. Areas may be treated at any time in the spring, summer, and fall when NLEBs may be present. When conducted in the summer occupancy period, particularly the non-volant period, some pups might not be capable of flight or have enough experience to safely relocate from fire related dangers.

Fire line creation or maintenance may include felling and cutting of standing woody materials greater than 3 inches. Burning during this period may also directly affect NLEBs primarily due to smoke, heat and possible flame length. Some bats may remain in the trees and may potentially be injured or killed. Additionally bats may leave a roost tree prior to the area being burned due to the noise, vibration and disturbance from chainsaws or other equipment. If bats are present in stands adjacent to an area being burned, those bats may be disturbed by the activity though the risk would be varied by factors such as wind direction and speed. Bats may also avoid the burned area for a short period after the burn, causing them to relocate to other suitable areas. Temporary relocation is not considered harmful because suitable habitat is not a limiting factor.

To meet the low to moderate intensity objectives within a prescribed burn prescription, burn plans only allow burning when weather and vegetation conditions are favorable. Conservation measures from the NLEB Interim Conference and Planning Guidance (D-5) states "direct effects to NLEB are minimized when prescribed burns are of low/moderate intensity during the summer maternity season" (USFWS 2014).

If a roost tree is rendered unusable by burning, it could cause a local loss of roosting habitat. The roost tree would no longer be available to NLEBs and cause the bats that were occupying it to find an alternate roost tree. Depending on the location and quantity of roost trees rendered unusable, the social structure of the NLEBs may also change. Additionally, if the burn area is large enough it could cause a temporary change in home range. Using simulations, researchers found that NLEB colony social structure is robust to fragmentation from small, random loss of roosts, suggesting >20% roost trees could be removed before network breakdowns occurred (Silvis et al. 2014). Loss of roost trees is unlikely though given the low intensity of the fire. The intended action is to remove low level vegetation, not large structures like roost trees.

In the long term, burning in hardwood stands with low to moderate intensity fire may benefit the NLEB by making the stands less dense and improving stand structure for foraging (Humes et al. 1999, Menzel et al. 2002, Erikson and West 2003, Owen et al. 2003). Stand structure may be more conducive to NLEB foraging because of an expected increase in vegetative diversity that may improve insect diversity and abundance (Lacki et al. 2009). Burning may thin portions of hardwood stands, promoting larger trees, reducing stem density, and increasing solar exposure for potential roost trees. Some trees may be killed or damaged by fire; the exfoliating bark, crevices, cavity, or cracks in the damaged or dead trees could provide new roosting habitat. Lacki et al. (2009) reported a higher number of NLEB roosts in burned habitats in Kentucky (74.3%) after fires than in unburned habitats (25.7%). Similarly, Johnson et al. (2009) found that NLEB were more likely to establish maternity colonies in stands with a higher percentage of fire-killed stems than random trees, corresponding with their observation that suitable roosts were disproportionately higher in fire-treated areas.

Determination

Low to moderate intensity prescribed burning projects on approximately 410 acres is likely to adversely affect the NLEB because of potential adverse impacts to individuals, especially non-volant bats, due to injury and death from smoke, heat, flame length, and felling roost trees, and harassment due to social structure changes and roost tree impacts

Fuel Break Creation and Maintenance

Description of Action

The actions analyzed in this section include implementing prescribed fire operations and using mechanical and hand tools to burn, mow and fell vegetation fuel breaks. Fuel breaks are created and maintained to mimic natural fire disturbance and reduce hazardous fuels. A variety of methods including whole tree harvesting, piling and burning, or chipping could be used to maintain areas in the desired conditions. An estimated 186 acres of fuel break maintenance and 70 acre of fuel break creation are proposed.

Fuel breaks are complexes characterized by herbaceous and shrub cover and may contain scattered live and dead trees. Maintenance is directed towards fuels management and restoration of habitat. Areas proposed for maintenance are typically non-forested and contain very little large material or coarse woody debris. Fuel break creation consists of treating post-harvest activity fuels and removal of ladder fuels.

Management techniques will include activities such as:

- Prescribed fire
- Mechanical maintenance (brush hog, roller-chop, disc, etc.)
- Hand tool use, such as axe, brush-saw and chainsaw or axe
- Site preparation and planting of native grasses, forbs and seedlings

A small tractor or other vehicle with rubber tires might be used to pull mechanical implements, such as a brush mower, seed drill, or seed harvester. Periodically, a larger machine might be used to operate a rotating drum cutter, or plow. Project areas will be accessed from the existing transportation system in the area. Therefore, no new road construction or reconstruction will occur.

Environmental Baseline

Fuel break maintenance and creation is conducted with the objective of creating / maintaining openings that will mimic natural fire disturbance and reduce hazardous fuels. Since fire frequency and extent have been reduced over time, active management is needed to restore fire-ecosystem components and maintain species viability. Fuel breaks may provide important breeding and foraging habitat for many animal species, including sharp-tailed grouse, sandhill crane, upland sandpiper, eastern bluebird, black-backed woodpecker, eastern wild turkey, and others. Fire breaks may constitute suitable habitat for NLEB. Individual trees, equal to and greater than 3" dbh, may be considered habitat when they exhibit characteristics of roost trees and are within 1000 feet of forested or wooded habitat (FWS 2014, Interim NLEB Guidance). Bats have been documented to follow linear features on the landscape, such as an edge between forest and openings. The features of this interface may increase commuting and foraging opportunities, and afford greater protection from predators than crossing an open area (Erickson and West 2003).

Direct and Indirect Effects

In openings and fuel breaks, consisting of shrubs and trees less than 3" dbh and herbaceous cover, there would be minimal direct and indirect effects, since these areas are not considered to be roosting, maternity or winter habitat. However, they could function as foraging habitat, especially areas adjacent to forest boundaries. Mechanical maintenance, such as use of a mower or brush hog would have transient effects from noise and movements that may disturb bats roosting in nearby wooded edge or briefly affect insect availability. However, these effects are expected to be minimal and very short-term in duration to the point of not being measurable. Similar effects are expected for prescribed burning in areas devoid of snags and live trees greater than or equal to 3" dbh. Smoke, radiant heat and convective heat might briefly disturb bats in adjacent wooded habitat and temporarily decrease insect abundance and alter foraging opportunities. However, the effects would be limited in area and duration.

In openings where trees greater than or equal to 3" dbh are present, conducting tree felling, mechanical maintenance, and prescribed burning outside of the non-volant period would limit impacts, since all bats would likely vacate roosting areas before individuals might be injured or killed from smoke, heat or mechanized operations. By reserving snags and den trees according to Forest Plan guidelines, and protecting trees with features beneficial to the NLEB, habitat would be retained in the area for future roosting and maternity use. Retaining snags that catch fire, by extinguishing the flames, rather than felling, would preserve the location for roosting and maternity purposes. These actions would reduce the duration of impacts to the short time period of the burn. Any risk of injury or mortality to individual NLEBs is expected to be very low and discountable. Not implementing design criteria where trees and snags greater than or equal to 3" are present would increase both the risk of injury and mortality to individuals, especially non-volant bats in the immediate project area. Bats without flight capabilities could be injured or killed if maternity trees were felled, burned, inundated with smoke, or struck with heavy equipment. Roosting bats could also be affected if suitable trees are rendered unusable by burning or felled by mechanical equipment. The roost trees would no longer be available to NLEBs. Consequently, individual bats would be displaced and forced to find alternate roost trees. However, the magnitude of risks for all of the effects would be small in scale in any given year relative to the total habitat available for NLEB as foraging, roosting and maternity habitat. Overall, adverse impacts caused by felling trees, implementing mechanical treatments, and prescribed burning would be small in scale and temporary. The beneficial impacts from maintaining openings across the forest system lands could be long-term. It is expected that maintaining openings will augment insect numbers and insect diversity which could lead to increases in NLEB fitness and greater productivity.

Determination

Constructing and maintaining fuel breaks by felling trees, implementing mechanical maintenance, and prescribed burning where trees or snags greater than or equal to 3" dbh are present, incorporating no temporal design criteria, is likely to adversely affect the NLEB because of potential adverse impacts to individuals due to injury and death from felling trees, and heat and fire from burning vegetation. Implementing mechanical maintenance and burning where trees greater than or equal to 3" are present is not likely to adversely affect the NLEB if working outside of the non-volant period, extinguishing rather than felling snags, reserving snags and den trees according to Forest Plan guidelines, and retaining trees with features beneficial to the species. This is because the risk of injury or mortality to individual NLEBs is expected to be very low and discountable. Felling trees, implementing mechanical maintenance and prescribed burning where trees and snags less than 3" dbh are present is not likely to adversely affect the NLEB. This is because NLEBs are not likely to be present in the described areas.

While some fuel break creation or maintenance may occur in areas with trees less than 3"dbh or outside the non-volant period, the HNF was not able to specify which actions, if any, would be considered to be not likely adversely affect NLEB. Therefore, it is assumed that all 25 miles of fuel break maintenance and 70 acres of fuel break creation are likely to adversely affect NLEB.

Roadside Construction and Maintenance

Description of Action

The actions analyzed in this section include the construction and improvement of National Forest System roads to allow vegetation management to occur and to reduce damage from unneeded roads. Approximately 1.4 miles of new permanent road is proposed to be constructed and approximately 44 miles of road are proposed for maintenance including culvert replacement and capacity improvements.

Delimbing, brushing, or felling of trees, snags, and shrubs on National Forest System lands is conducted to construct new roads and to maintain existing roads. Constructing new permanent roads requires clearing corridors by removing all existing vegetation through a variety of habitat types. Road maintenance needs require removing vegetation to aid in the daylighting of roads, improving visibility for vehicle operators, increasing public safety by reducing hazard trees and limbs, reducing vehicle damage by overgrown vegetation, and allowing for easier, future road maintenance. Equipment used may consist of commercial timber harvest equipment, bulldozers, chainsaws, shears, tractor powered mowers, or line-fed mowers.

Environmental Baseline

Locations may occur in any forest type and along any roadway. Although large highways or interstates may deter roosting bats, pose barriers to movements and restrict home ranges, there is a lack of evidence that minor roads and trails are avoided by NLEB. On the HNF, most forest roads are not considered large enough and/or contain enough traffic use to be considered a deterrent to the NLEB roosting. Numerous studies have reported high NLEB activity on or near minor roads (Krusic and Neefus 1996, Lacki and Schwierjohann 2001, Owen et al. 2003, Broders et al. 2006, Brooks 2009) suggesting they may be important foraging and commuting corridors. Roosting near forested roads may thus enhance accessibility to foraging areas. Perry et al. (2008) and O'Keefe (2009) found that NLEB roosts were closer to unpaved, forested roads than random.

Direct and Indirect Effects

Most of the road maintenance and construction proposed would occur during the summer occupancy period due to a limited operating window because of favorable weather and generally dry conditions. If roost trees were to be encountered, some direct effects could occur. Use of equipment or activities by personnel may cause NLEB to displace away from noise and vibrations. Bats may leave a roost tree prior to it being felled or contacted because of noise, vibration and disturbance from saws or other equipment. However, some bats could remain in a tree and be injured or killed if the tree strikes the ground. If bats are present in trees adjacent to the tree felled, these bats may be disturbed by the activity, however, the bats are not likely to be injured or killed, unless the felled tree damages the roost site on the retained tree. Displacement would not be expected to result in mortality, but could elevate short-term stresses. However, these stresses should be short in duration as the equipment and treatment progress down the roadway away from the area just treated. These risks may be slightly higher during spring emergence when fat reserves can be low or during summer occupancy when pups may be exposed. Trees felled during the non-volant period would have a higher potential for adverse effects than other periods because non-volant pups could be present and unable to avoid disturbances or physical harm. Any NLEB that becomes expelled from a roost site would face some unplanned exposure to climate, predators, or extra caloric expenditures. On the HNF, suitable roosting is assumed to be abundant, therefore minimizing the amount of time and effort needed to relocate in most instances.

Some vegetation cut during road construction and maintenance would be small diameter shrubs and young trees unsuitable for roosting, and there would be no direct loss of habitat associated with these kinds of woody materials. At other treatment sites, however, larger diameter (=> 3" DBH) trees, shrubs, or snags would be cut or de-limbed. These could be structurally suitable (e.g. loose or furrowed bark, broken limbs, snags) as roosting habitat.

Felling a roost tree could cause a local loss of roosting habitat. If a roost tree is felled any time of year, it would no longer be available and cause the bats that were occupying it to find an alternate roost tree. Depending on the location of the maternity roosting colony, the social structure of the NLEBs may be affected. Silvis et al. (2014) used simulations to demonstrate that >20% roost removal was required to fragment social networks for maternity colonies in Kentucky. However, roadside maintenance generally does not extend beyond 15 feet from the edge of roads, so the chance of removing >20% of roost trees is unlikely. Alternatively, effects from new road construction are similar to those resulting from timber harvest with a greater potential for impacts to roost trees and social networks.

Foraging bat behavior would not be directly affected by roadside maintenance because this type of cutting and mowing would occur when bats would be inactive. Indirectly, foraging spaces may be maintained which provides some foraging benefits. Potential changes to prey abundance and availability may or may not change per treatment site, depending on many variables such as; insect type or species present, drainage, and weather variables. These roadside vegetation areas are also routinely treated. As the vegetation grows and fills in along the roadside it is cut back and the cycle is repeated. So it is not often that trees grow to maturity along these road shoulders. These vegetation treatment actions are not expected to have any measurable indirect effect to NLEB. New road construction may provide some beneficial effects to NLEB by providing more foraging opportunities through the creation of new travel corridors and edge habitat.

Determination

Constructing 1.4 miles of new, permanent road, and maintaining 44 miles of existing roads during the summer occupancy period is likely to adversely affect the NLEB due to adverse impacts to individuals in the form of injury and death, or harassment and /or displacement due to social structure changes and roost tree removals.

Non-Native Invasive Plant Herbicide Treatments

Description of Action

The actions analyzed in this section include application of herbicide to manage infestations of non-native invasive plants (NNIP). Approximately 85 acres and 3.5 miles of potentially suitable NLEB habitat would be treated with herbicide.

Herbicides could be applied using numerous methods. Examples include dabbing the chemical on the cut stump, brushing it on the basal bark of woody shrubs, injecting a liquid or capsules into the plant trunk or stem, and wand (or glove) application directly to foliage. For foliar spray applications, a backpack or hand-held apparatus that can direct controlled spray of chemical on target plants with minimal drift will be used. Truck, tractor, off-highway vehicle-mounted (or similar vehicle) or hose spray devices may be used to cover large areas. Herbicides will not be applied using airplanes or helicopters. Generally there would be one chemical application per site per year. It is anticipated multiple years of herbicide treatment might be required to gain adequate control or eradication at many sites. The timing of treatments will vary by NNIP species and to avoid negative impacts on non-target species. All herbicides will be applied according to label directions by applicators that hold a current Commercial Pesticide Applicator certification from the Michigan Department of Agriculture. The chemicals to be used are listed in Table 1.

Table 1: Herbicides to be used for controlling non-native invasive plants (NNIP)

Common Chemical Name	Some Examples of Trade Names	Application Method & Chemical Selectivity	Example Targeted NNIP Species *
Triclopyr	Garlon3A, Brush-B-Gone Habitat, Vine-X	Stump and/or basal bark treatment, foliar spot spray; broadleaf-selective	Buckthorn, barberry, honeysuckle, wild parsnip, crown vetch
Glyphosate	Roundup Pro, Roundup, Accord	Stump treatment, foliar spray; non-selective	Honeysuckle, buckthorn, barberry, garlic mustard, wild parsnip, St. Johnswort, crown vetch
Glyphosate aquatic formulation	Rodeo	Foliar treatment, weeds near open water; non-selective	Purple loosestrife, swamp thistle, reed canary grass, common reed grass, and any species near open water
Dicamba	Banvel, Clarity, Vanquish	Foliar treatment, typically applied as mix with other herbicides; broadleaf selective	Knapweed, leafy spurge, thistle, tansy
Imazapic	Plateau, Plateau Eco-Pak, Cadre	Foliar treatment; non-selective	Leafy spurge
Clopyralid	Transline, Stinger, Confront	Foliar spray; broadleaf-selective	Canada thistle, swamp thistle, spotted knapweed, common burdock, crown vetch
2,4-D	Weedar 64	foliar spray; selective for broad-leaved plants	Bull thistle, Canada thistle, common burdock
Imazapyr	EZ-Ject herbicide shells	injection into woody NNIP	Privet, Lombardy poplar
Sethoxydim	Poast, Poast-Plus	foliar spray; broad-spectrum	NNIP grasses

* Note: The label for each herbicide provides a list of plants that can be treated.

Environmental Baseline

Herbicide spraying is an ongoing activity on National Forest System lands. Non-native invasive plants are not known to be adversely affecting NLEB on the Michigan National Forests. However, NNIP can be aggressive invaders of disturbed habitats and native plant communities. When left untreated, some NNIP may become the dominant component of the vegetative community, thus reducing native plant survivorship, dispersal and diversity and impacting wildlife habitat, visual resources and future management of infested sites. Aggressive, non-native shrubs in the forest can also reduce growth rates of native overstory trees (Hartman and McCarthy 2007). Infestations are generally treated once annually by licensed applicators, using approved chemicals and following label mixing and application directions. Applications are conducted during daylight hours. The majority of treatments are in upland herbaceous areas not considered NLEB habitat. However, some treatments may be in, or near, areas NLEB use for foraging, roosting, pup rearing and social interactions. Approximately 1,364 acres of NNIP treatments have occurred in 2013 and 2014, respectively, on the HNF.

Herbicide Toxicity Information for NLEB

Tables 2 and 3 provide herbicide information relevant to NLEB. Thus, they preface the effects analysis.

Table 2 presents mammalian toxicity data for the herbicides used on the Michigan Forests. There is no data specific to NLEB. Rather, the data reflect the potential for toxicity to terrestrial mammalian wildlife exposed to areas treated with the herbicides. The data consist of LD50, LC50, and NOEL values. A LD50 (Lethal Dose50) represents the dose (amount supplied orally) to a test animal species in a controlled laboratory experiment that causes 50 percent mortality. An LC50 (Lethal Concentration50) represents the concentration causing 50 percent mortality when a test animal species is externally exposed to the chemical in a controlled laboratory experiment. A NOEL (No Observed Effects Level) represents the highest dose or concentration (expressed as mg per kg body weight per day) observed not to cause noticeable effects in a test animal in a controlled laboratory experiment. For all three parameters, a higher value indicates a safer (less toxic) chemical.

Data are presented for two categories of toxicity: acute and chronic. Acute toxicity results from exposure to the chemical for a short time, for example when an animal enters an area immediately after herbicide application when the foliage is still wet. Chronic toxicity results from continuous exposure to the chemical over an extended time, for example should an animal inhabit an area that is repeatedly sprayed with a herbicide at regular intervals over multiple years. Because the proposed program would consist mostly of single applications, or at most, an initial application and one to three subsequent over approximately five years, the acute toxicity data is most relevant. For each herbicide separate rows of data are provided for the technical product (unformulated active ingredient) and for several common formulations. How a product is formulated can significantly affect its toxicity. Because it is the formulations and not the technical product that are used in the field, formulation data are more relevant, if available. While data based on exposure of mammalian test organisms are a useful predictor of toxicity to mammalian wildlife, they are less useful as a predictor of toxicity to birds, fish, and other wildlife whose physiology substantially differs from that of mammals.

Table 3 includes information related to minimum, average and maximum application rates, when available, for the chemicals used on the Michigan Forests. The table presents summarized ecological risk assessments, considering potential toxicity of herbicides to ecological receptors, such as the data presented in Table 4, but also the likelihood of exposure of receptors to the herbicides. Thus, they provide a more realistic assessment of risk to ecological receptors from herbicide use than do toxicity data alone.

Herbicides on the market today are generally regarded as safe to both humans and to wildlife if used in accordance with the manufacturer label. For purposes of comparison against data in Table 2, the oral LD50 for rats exposed in their diet to table salt (sodium chloride) is reported at 3,000 mg/kg body weight (BW) (Mallinckrodt Baker Inc. 2004).

Table 2: Mammalian toxicity data for herbicides used for invasive plant (NNIP)

Herbicide	Acute Toxicity						Chronic Toxicity		
(Technical product unless specific formulation noted)	Oral LD_{50} (rat)	Dermal LD_{50} (rabbit)	4-Hour Inhalation LC_{50} (rat)	Skin Irritation (rabbit)	Skin Sensitization (guinea pig)	Eye Irritation (rabbit)	24-Month Dietary NOEL (mouse)	24-Month Dietary NOEL (rat)	12-Month Dietary NOEL (dog)
	mg/kg BW		mg/L				mg/kg BW/day		
Glyphosate									
Glyphosate acid	5600	>5000	NA	None	No	Slight	4500	400	500
Glyphosate isopropylamine salt	>5000	>5000	NA	None	No	Slight	Chronic toxicity data available only for technical glyphosate acid		
Glyphosate trime-thylsulfonium salt	748	>2000	>5.18 (unspec.)	Mild	Mild	Mild			
ROUNDUP	>5000	>5000	3.2	None	No	Moderate			
RODEO	>5000	>5000	1.3	None	No	None			
Imazapic									
Imazipic acid	>5000	>5000	NA	None	No	Slight	Long-term dietary administration produced no adverse effects in mice and rats.		
Imazipic ammonium salt	>5000	>5000	2.4	None	No	None	Chronic toxicity data available only for technical imazipic acid		
PLATEAU	>5000	>5000	2.4	None	No	None			
CADRE	>5000	>5000 (rat)	2.4	None	No	None			
Triclopyr									
Triclopyr acid	713	>2000	NA	None	Positive	Mild	5.3 (22mo)	3	NA
GARLON 3A	2574	>5000	>2.6 (unspec.)	NA	NA	Severe	Chronic toxicity data available only for technical triclopyr acid		
GARLON 4	1581	>2000	>5.2 (unspec.)	Moderate	Positive	Slight			
Clopyralid									
Clopyralid acid	>5000	>2000	>1.3 (unspec.)	V. Slight	No	Severe	500 (18mo) (mouse)	50 (rat)	100 (dog)

Herbicide	Acute Toxicity						Chronic Toxicity		
(Technical product unless specific formulation noted)	Oral LD_{50} (rat)	Dermal LD_{50} (rabbit)	4-Hour Inhalation LC_{50} (rat)	Skin Irritation (rabbit)	Skin Sensitization (guinea pig)	Eye Irritation (rabbit)	24-Month Dietary NOEL (mouse)	24-Month Dietary NOEL (rat)	12-Month Dietary NOEL (dog)
	mg/kg BW		mg/L				mg/kg BW/day		
STINGER	>5000	NA	NA	NA	NA	NA	Chronic toxicity data available only for technical clopyralid acid		
Dicamba									
Dicamba acid	1707	>2000	9.6	Slight	Possible	Extreme	115 (18mo)	125	60
BANVEL	2629	>2000	>5.4	Moderate	No	Extreme	Chronic toxicity data available only for technical dicamba acid		
BANVEL 720	2500	NA	NA	NA	NA	NA			
BANVEL SGF	6764	>20000	>20.23	Slight	N/A	Minimal			
WEEDMASTER Dicamba+2,4-D	>5000	>20000	>20.3	Minimal	N/A	Minimal			
Imazapyr									
Isopropyl or isopropylamine salt	>5000	>2000	>1.3 – >4.62	Mildly irritating	No	Mildly to irritating	>100	>100	>100
ARSENAL™	>5000	>2000	>4.62	Mildly irritating	No	Non-irritant	Long-term studies in rats and mice produced no carcinogenic effect.		NA
CHOPPER™	>5000	>5000	1.58	Irritating	Slightly sensitizing	Moderately irritating			
HABITAT™	>10000	>2000	4.62	Mildly	No	Non-irritating	NA	NA	NA
Sethoxydim									
Sethoxydim	2676	>5000 (rat)	6.1	None	No	None	18	NA	8.86
POAST™	4.1	>5000 (rat)	>4.6	Moderate	No	Moderate	Chronic toxicity data available only for technical sethoxidim		
POAST PLUS™	>2200	>2000 (rat)	>7.6	Slight	No	Slight	Chronic toxicity data available only for technical sethoxidim		
2,4-D									
2,4-D acid	639	>2000	1.79	None	No	Severe	5	5	1

Herbicide	Acute Toxicity						Chronic Toxicity		
(Technical product unless specific formulation noted)	Oral LD_{50} (rat)	Dermal LD_{50} (rabbit)	4-Hour Inhalation LC_{50} (rat)	Skin Irritation (rabbit)	Skin Sensitization (guinea pig)	Eye Irritation (rabbit)	24-Month Dietary NOEL (mouse)	24-Month Dietary NOEL (rat)	12-Month Dietary NOEL (dog)
	mg/kg BW		mg/L				mg/kg BW/day		
2,4-D Dimethylamine salt	>1000	909	3.5	None	No	Severe	Chronic toxicity data available only for technical 2,4-D acid		
2,4-D Isooctyl ester	1045	>5000	5.7	None	Yes	Moderate			

Source: Herbicide Handbook (WSSA 2002, 2006), Greenbook (2006); Cornell University (1986); NA = Not Available

Table 3: Risk assessment information for herbicides used for invasive plant (NNIP) control on the HNF

Risk Assessment Application Rate	Terrestrial Mammals	Birds	Insects	Fish & Other Aquatic Receptors
Glyphosate (Source: SERA 2003a; Tu et al. 2001, USDA Forest Service 2003b)				
2 lb a.e./acre (average rate) 7 lb a.e./acre (maximum rate)	Effects resulting from average application rate are minimal. Some risk exists for large mammals consuming foliage for an extended period of time in areas treated with maximum application rate.	Effects resulting from average application rate are minimal. Some risk exists for small birds consuming insects for an extended period of time from areas treated with maximum application rate.	Effects resulting from average application rate are minimal. Some risk from maximum application rate to bees exposed to direct spray.	Effects resulting from average application rate are minimal. Some risks exists to fish near areas treated with maximum application rate using some of the more toxic formulations not labeled for use in aquatic settings.
Imazipic (Source: SERA 2004c, Tu et al. 2004, USDA Forest Service 2004c)				
0.100 lb a.e. /acre (average rate) 0.1875 lb/acre (maximum rate)	No substantial risk to small mammals at maximum rates. Some risk exists for large mammals, if consumed over long period (i.e. 2 years).	No substantial risk at maximum rates.	No substantial risk at maximum rates. Non-toxic to bees	No substantial risk at maximum rates. However, limited toxicological data available. Potential for risk to aquatic plants from maximum rates is border-line.
Imazapyr (as Arsenal, Chopper, Stalker) (Source: USDA Forest Service 2004d)				

Risk Assessment Application Rate	Terrestrial Mammals	Birds	Insects	Fish & Other Aquatic Receptors
0.45 lb a.i. /acre	Available toxicity studies are relatively complete, including studies in three mammalian species (dogs, rats, and mice) and several reproduction studies in two mammalian species (rats and rabbits) indicate that imazapyr is not likely to be associated with adverse effects at relatively high-dose levels.	While toxicity studies on birds are less extensive than those on mammals, no adverse effects have been noted in birds.	Limited toxicological data is available. However, the toxicity of imazapyr to insects may be similar to the toxicity of this compound to mammals, that is, relatively non-toxic.	Limited toxicological data is available. There exists some research that suggests imazapyr is moderately toxic to other fish species.
Sethoxydim (Source: USDA Forest Service 2001b)				
0.09375 lb/acre (minimum rate) 0.375 lb/acre (maximum rate)	No substantial risk at maximum rates.	No substantial risk at maximum rates.	Studies on beetle larvae suggest that rates exceeding maximum rates are relatively non-toxic.	No substantial risk at maximum rates. However, limited toxicological data available. Potential for risk to aquatic plants from maximum rates is borderline.
Triclopyr (Source: SERA 2003b, Tu et al. 2003, USDA Forest Service 2003c)				

Risk Assessment Application Rate	Terrestrial Mammals	Birds	Insects	Fish & Other Aquatic Receptors
1 lb a.e./acre (average rate) 10 lb a.e./acre (maximum rate)	No substantial risk at average rate. Some risk for mammals exposed via direct spray or consuming sprayed vegetation when applied at maximum rate.	No substantial risk at average rate. Some risk for large bird exposed via direct spray or consuming sprayed vegetation when applied at maximum rate.	No substantial risk to terrestrial vertebrates and invertebrates from salt and ester formulations. Risk to aquatic invertebrates when if exposed to the butoxyethyl ester (BEE) formulation.	No substantial risk when triethylamine (TEA) salt formulations are applied at average rate. Some risk to aquatic species when butoxyethyl ester (BEE) formulations are applied at average rate. Substantial risk when BEE formulations applied at maximum rate.
Clopyralid (Source: SERA 2004b, Tu et al. 2001, USDA Forest Service 2004a)				
0.1 lb a.e./acre (typical rate) 1.0 lb a.e./acre (maximum rate)	Reported to be relatively non-toxic, with little potential for adverse effects.	Reported to be relatively non-toxic, with little potential for adverse effects.	Reported to be relatively non-toxic to bees, with little potential for adverse effects. Low toxicity to soil invertebrates and microbes	Reported to be relatively non-toxic, with little potential for adverse effects.
Dicamba (as Vanquish, diglycolamine salt of dicamba) (Source: SERA 2004a, Cornell 1993, USDA Forest Service 2004b)				

Risk Assessment Application Rate	Terrestrial Mammals	Birds	Insects	Fish & Other Aquatic Receptors
2 lb a.i./acre (foliar application) 1.5 lb a.i./acre (cut surface application)	No plausible and substantial hazard under normal conditions of Forest Service use.	No plausible and substantial hazard under normal conditions of Forest Service use.	Reported to be non-toxic to bees.	No plausible and substantial hazard under normal conditions of Forest Service use.
2,4-D (Source: USDA Forest Service 2006a)				
1.0 lb a.i./acre (average rate) 2.0 lb a.i./acre (maximum rate)	Except for accidental exposures, applications at average or maximum rates are not likely to cause adverse effects. Small mammals exposed to direct spray could display subclinical toxic effects. If foliage treated with 2,4-D is the sole diet of a mammal, subclinical toxic effects are possible.	Except for accidental exposures, applications at average or maximum rates are not likely to cause adverse effects. Acute toxicity studies suggest that birds are somewhat less sensitive than mammals. Studies suggest that 2,4-D sprayed directly onto avian eggs at rates up to 10 lb/Ac. (substantially higher than label rate) have no effect.	Bees exposed to direct sprays could experience substantial mortality.	Direct application of 2,4-D to water at rates used by the Forest Service could cause mortality of aquatic receptors (including MIS brook trout or mottled sculpin).. Formulations approved for aquatic use would be used for Eurasian water-milfoil control.

Direct and Indirect Effects

Chemical Treatment

The mammalian toxicological data presented in Table 2 suggests that the toxicity of the herbicides used to treat infestations would be low. Bats, and specifically NLEB, are insectivorous, capturing prey by hawking and gleaning behaviors (Ratcliffe and Dawson 2003). Gleaning behaviors could expose bats to chemicals or to insect treated with chemicals. Some research indicates demonstrated that glyphosate is toxic to aquatic invertebrates at doses lower than those expected to be present in the environment and toxicity to aquatic invertebrates might have been underestimated in the past (Cuhra et al. 2013). Since NLEB may use aquatic insects as a food source the information suggests that glyphosate may pose more of an indirect threat than previously assumed. Gleaning also increases NLEB's risk of pesticide exposure because they are thought to consume a particularly high proportion of spiders, in which chemical concentrations can accumulate to higher levels than in lower-trophic-level invertebrates (Dodd et al. 2012). However, these risks are considered very small on Michigan National Forests since the low intensity of herbicide spraying, generally one application per site per year, points to a very low probability of NLEB exposure through food resources. Also, upland herbaceous plants are the frequent targets for spraying, not wetland plants and habitats or canopy trees and shrubs. While herbaceous areas can be foraging locations, NLEB foraging is most likely to occur in upland and lowland woodlots and tree-lined corridors, where they catch insects in flight using echolocation and by gleaning insects from vegetation and water surfaces (FWS, 2014, NLEB Interim Guidance). Thus any risk from foraging exposure to chemicals is very low. Bats could theoretically experience dermal toxicity by brushing against recently treated NNIP foliage or through direct spray. However, as evidenced by the dermal LD50 data in Table 2, the dermal exposure pathway is of low hazard. Furthermore, NLEB would not be roosting in herbaceous areas where most treatments occur and would not be actively foraging until the crews depart for the day, giving the sprayed foliage a chance to dry. Because herbicides would be applied directly to target foliage in a manner that prevents drift or runoff (i.e. label directions), the risk of herbicides contaminating drinking waters sources for bats would be low. NLEB could potentially be affected if herbicide treatment results in a reduction in numbers of insects. However, in the low probability this were to occur, the effect is expected to be temporary, as insect populations would likely recover within a short period of time after treatment of an area. While there is no specific risk information for bats in Table 3, overall ecological risk of the studied herbicides at rates commonly used by the Forest Service pose little or no risk to terrestrial mammals. Control of invasive species would have the effect of preserving native plant diversity and abundance, which could be beneficial for retaining native insect populations consumed by NLEB.

Northern long-eared bats do not utilize any of the NNIP weed species or the plant species that they displace. None of the NNIP herbicide treatments would fragment habitat for NLEB. No permanent human intrusions would result from the NNIP control program. The low level of vegetation change in suitable bat habitat would have no detectable impact on the NLEB.

Determination

Implementing herbicide treatment is not likely to adversely affect the NLEB. By using approved herbicides and following manufacturer's product label with application by Michigan certified personnel, the effects to NLEB would be insignificant and discountable because: 1) NLEBs are not likely to be present in these areas, and 2) if present, not likely to be exposed to the herbicide treatments either directly or indirectly through eating prey that has come in contact with the herbicide, and 3) if present in areas treated with bio-control insects would be unaffected by the activity.

Effects to Hibernating Bats and Hibernacula

No effects are anticipated to wintering NLEB or their hibernacula from the proposed action.

Effects Related to White-nose Syndrome

This BO assumes that WNS will affect all NLEB present within the action area over the proposed life of the project. 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. Affected bats may also be more likely to stay closer to their hibernation site for a longer time period following spring emergence.

No known hibernacula are present within the action area. However, due to the proximity of the action area to known hibernacula, there is a potential that bats affected by WNS may be more likely to use portions of the action area for at least temporary foraging and roosting rather than migrating longer distances to established summer home ranges.

While none of the HNF's proposed actions will alter the amount or extent of mortality or harm to NLEB resulting directly from WNS, the proposed action does have the potential to increase or decrease the chances that WNS-affected bats present in the action area will survive and recover. For example, WNS-affected bats roosting in the area immediately after emerging from hibernation may have damaged wings and therefore could be less able to quickly fly away from fire and smoke during a prescribed burn. As a result, there may be an increased chance of WNS-affected bats being killed or harmed as a result of the project, particularly if burns are conducted early in the spring (April –May). However, research into how WNS affects bat physiology and behavior is ongoing, and current information is not sufficient to quantify or predict the full range and scope of potential effects, or compare the relative likelihood and significance of the potential adverse and beneficial effects described above.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur within the action area. 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 act.

When considered with future State, county, tribal and private actions that are reasonably certain to occur in the future, the proposed action would have minor adverse cumulative effects on the NLEB. Non-federal tree cutting activities would have the greatest potential to have a cumulative effect on the NLEB because of potential for bats to be injured or killed during summer occupancy, loss of roost trees, or loss of forested habitat. Other public, tribal and commercial lands within the analysis area may or may not be managed similar to HNF lands. Tree cutting activities on non-commercial private lands is estimated to be substantially lower than federal lands because many private landowners lack interest in forest management, small parcels may not be economical to manage, or activities remove very few trees annually (ex. ROW maintenance). Therefore, when considering tree cutting activities on all ownership annually, it is estimated that no more than two percent of the analysis area would receive a treatment, providing substantial forest habitat and roost trees over the long term. In addition, some timber harvest activities on the HNF would occur outside of the summer occupancy period, further reducing the risk NLEBs could be injured or killed while in a roost. Tree cutting activities on non-Federal lands may retain snags and den trees that could be roost trees for NLEBs. Snag creation activities may improve roosting habitat. Thinning of hardwood and conifer stands would likely improve NLEB foraging habitat. Furthermore, considerable areas on the HNF exist where disturbance would be infrequent or absent. These areas also provide substantial forested habitat and roost trees for NLEBs over the long term.

Prescribed burning on other lands within the analysis area is estimated to be minor when compared to burning on the HNF, and is almost always low intensity. Low intensity burning would pose a lower risk to roosting NLEBs because roosts generally occur much higher than flame heights. At the landscape level, prescribed burning would likely be a source of new roost trees for NLEBs because some trees within a burn area are likely to be killed by fire. Therefore, prescribed burning activities would have a minor cumulative effect on the northern long-eared bat.

Site preparation activities would have an extremely small adverse cumulative effect on the NLEB. State, county, tribal and private site preparation activities within the analysis area is estimated to be small when compared to Forest Service actions on an annual basis. As stated in the direct/indirect effects, the likelihood of NLEBs being impacted on by site preparation activities on the HNF would be remote and similar effects would be expected on State, county, tribal and private activities.

Building maintenance and demolition occurs on non-federal lands annually, but to a greater degree on lands in private ownership simply because more structures are present. Maintenance and demolition activities would have a potential to disturb, injure or kill NLEBs in buildings and could cause a loss of roosting habitat. However, when considering these potential impacts to NLEBs across the landscape, buildings are much less commonly used for roosts than trees with cracks, crevices or holes. Therefore, although these effects would be cumulative to activities on the HNF, the loss of roosting habitat would be extremely small on an annual basis, and therefore would have a minor adverse cumulative effect on the northern long-eared bat.

State, county, tribal and private herbicide use and biocontrol would likely have a cumulative effect when considered with Forest Service use of herbicides and biocontrol. Herbicide use by non-federal entities within the analysis area likely equals or exceeds use by the Forest Service, primarily to control woody vegetation under powerlines and along roadways, and to control non-native invasive species. Considering the size of the analysis area, the limited amount of herbicide used annually by the Forest Service and the non-federal entities, and the limited exposure of NLEBs, herbicide use and biocontrol would have minor adverse cumulative effects on NLEBs.

Many activities would implement design criteria that would help protect NLEBs.
Therefore, when considered with future State, county, tribal and private actions that that have occurred in the past, those occurring in the present, and those that are reasonably certain to occur

in the future, the forest management and other actions listed in the Matrix would have a minor adverse cumulative effect on the NLEB. This is based on the low level of vegetation management on the HNF (<2% of land base, annually), the presence of considerable areas where disturbance would be infrequent or absent (approximately 344,788 acres, 43.4% of total land base), and the implementation of design criteria to protect NLEBs.

Summary of Effects

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. The conservation measures included through the Forest Plan and associated programmatic BO and individual project decisions will serve to reduce the potential for direct effects to the NLEB. However, direct effects to NLEB including mortality, injury, harm, or harassment as a result of the removal, burning, or modification of occupied or established roost trees remain. The potential for direct effects to NLEB are greatest when activities are conducted during the species' non-volant period.

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 portion of the proposed action on habitat suitability may be neutral to potentially beneficial. 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.

Throughout the course of conducting the above actions, the NLEB may also experience disturbance from other project-related activities such as, increased noise during the day, artificial lighting and increased noise at night, increased presence of people, etc. These effects are typically short-term and temporary in nature, and limited in size compared to the amount of available habitat and NLEB home range size. We expect that the response of NLEB to these disturbances to be minor (e.g. startle, alarm, possible temporary abandonment of roost site, etc.) and do not anticipate that the level of disturbance would have a significant effect on individuals or the local NLEB population.

In any given year, approximately only 1% of HNF lands receive any type of treatment, some of which occur outside the summer occupancy period.

While the HNF's proposed action will not alter the amount or extent of mortality or harm to NLEB resulting directly from WNS, the proposed action does have the potential to both increase and decrease the chances that WNS-affected bats present in the action area will survive and recover.

Based on the analysis above, the proposed action should not significantly reduce the ability of the action area to meet the conservation needs of the species. The proposed action will not affect any hibernating NLEB and the project area will continue to provide suitable roosting and foraging habitat during the spring staging, summer occupancy, and fall swarming periods. While there is potential for direct take of the species, given the small-scale of the proposed action in relation to the action area, and the current distribution and abundance of the NLEB on the HNF, the NLEB should be able to continue to survive and reproduce on the HNF.

There is no proposed critical habitat for the NLEB, and thus, none will be adversely affected.

CONCLUSION

WNS is the primary threat to species continued existence. All of the other (non-WNS) threats, including forestry management, combined did not lead to imperilment of the species. However, in those areas of the country impacted by WNS, the conservation measures in the interim 4(d) rule for NLEB, and adopted as a part of these proposed actions, focus on protecting individual bats in known roosts and hibernacula to minimize needless and preventable deaths of bats during the species' most sensitive life stages. Although not fully protective of every bat, these conservation measures help protect some roosting and hibernating individuals.

According to the interim 4(d) rule, the Service projected that forest management activities will affect approximately 2 percent of all forests in States within the range of the northern long-eared bat to (Boggess et al. 2014). Further, only a portion of this forested habitat will actually be harvested during the NLEB active season (April–October), and a smaller portion yet would be harvested during the pup season. Given these estimated impacts to suitable habitat (i.e., forest within the range of the species), the Service estimated that a number of NLEB will be directly affected by forest management activities during the active season. Implementation of the interim 4(d) rule conservation measures should further reduce the take of those individual bats where there are known roost trees. When occupied roosts are cut during the active season (outside of the pup season) or if undocumented NLEB roosts are cut while occupied, some portion of these individuals will flee the roost and survive. The conservation measures will further protect known NLEB hibernacula, including a portion of the surrounding habitat. Thus, the Service, in the interim 4(d) rule, anticipated only a small percentage (estimated less than 1 percent) of NLEB will be directly impacted by forestry management activities. While much of the proposed project's implementation will occur during the summer occupancy and non-volant periods, the amount of habitat potentially impacted (4,744 acres) is small in relation to the amount of available habitat in the surrounding landscape.

Impacts to NLEB through direct injury/mortality, loss of roost trees, and maternity colony structure changes are unlikely to result in net reductions in the number of maternity colonies as well as associated wintering population fitness. In fact, we find that some 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. Thus, no component of the proposed action is expected to reduce the reproduction, numbers, or distribution of the NLEB rangewide. 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 found that the proposed project is unlikely to have population-level impacts, and thus, is also unlikely to decrease the reproduction, numbers, or distribution of the NLEB.

Based on the analysis above, despite the anticipated loss of individuals and population impacts, given the analysis in the interim 4(d) rule, the proposed action should not decrease the reproduction, numbers, or distribution of the NLEB. Therefore, we do not anticipate an appreciable reduction in the likelihood of both survival and recovery of the species as a whole.

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.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act 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 northern long-eared bat (80 FR 17974). The Service's interim 4(d) rule for northern long-eared bat exempts the take of northern long-eared bat 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. Capture, handling, and related activities for northern long-eared bats for 1 year following publication of the interim rule.

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 identified in Appendix A. 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, habitat clearing, prescribed fire, 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 extent 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 area of forested habitat is a complex and arduous task. Unless every individual tree that contains suitable roosting habitat is inspected by a knowledgeable biologist before management activities begin, it would be impossible to know if a roosting NLEB is present in an area proposed for harvest or prescribed burn. Inspecting individual trees is not considered by the Service to be a practical 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.

A total of 4,744 acres of potential NLEB may be affected by the proposed action. The Service anticipates that no more than 4,646 acres of potential NLEB habitat will be adversely affected as a result of the proposed action. The commercial thinning, prescribed burning, existing fuel break corridor maintenance, and system road reconstruction activities occurring on 4,567 acres are exempted through the interim 4(d) rule. The remaining 79 acres of fuel break creation and new road construction are addressed through the ITS. Project activities would primarily occur over the next 15 years.

If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation. In this case, the HNF must also immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures provided.

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

The following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize incidental take of NLEB:

1. Protect hibernacula from disturbance.

2. Avoid the removal of known NLEB maternity roost trees.

3. Report on the progress of project activities on the Forest and the impact on the species as required pursuant to 50 CFR 402.14 (i) (3).

TERMS AND CONDITIONS

Exemption from the prohibitions of section 9 of the ESA requires the Forest Service to comply with the following terms and conditions, which implement the RPMs described above and outline required reporting and monitoring requirements. These RPMs with their implementing terms and conditions are non-discretionary.

The following term and condition implements the first RPM:

1.1 No woody vegetation removal or soil disturbance will occur within 100 feet of known or assumed NLEB hibernacula entrances and associated sinkholes, fissures, or other karst features.

The following term and condition implements the second RPM:

2.1 If any NLEB maternity roost trees are identified within the project area, these roosts will be marked and not felled during any project-related activities, unless required to address public or worker safely. The HNF will evaluate planned activities around the roosts and establish appropriate buffers or protective measures in coordination with the USFWS so that project-related activities are not likely to damage or destroy the roosts, or make them unsuitable.

The following terms and conditions implement the third RPM:

3.1 Due to the difficulty to detect and quantify the actual incidental take of NLEB, the areal extent of potential roosting and foraging habitat affected will be used as surrogate to monitor the level of take. To track the amount of take that occurred during the year and cumulatively to date, the HNF will provide the Service with a report that identifies the number of acres where project activities were implemented and if any timing restrictions were followed. The annual report, to be provided by April 1 of each year, will also include the number of live or dead NLEB encountered and the results of any NLEB surveys conducted.

3.2 The Forest Service shall immediately notify the Service upon locating an injured or dead NLEB. Report the discovery of an injured or dead NLEB within 24 hours (48 hours if discovered on a Saturday) to the East Lansing Field Office (517) 351-2555.

CONSERVATION RECOMMENDATIONS

Section 7(a) (1) of the ESA directs federal agencies to utilize 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 adverse effects of a proposed action on listed species or critical habitat, to help implement recovery plans, or to develop information. As described in the Conservation Measures section, the HNF has already been pro-active in participating in a number of efforts to contribute to the conservation of the NLEB and other forest bat species. These efforts contribute to the conservation and recovery of the NLEB consistent with Section 7(a) (1) of the ESA. The Service strongly supports these efforts and encourages the HNF to continue these efforts in the future.

The Service has identified the following additional actions that, if undertaken by the Forest Service, would further the conservation and assist in the recovery 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.

- Northern long-eared bats would benefit from minimizing activities with adverse effects during the period of summer occupancy (May 15 – September 1). Bats cannot be directly injured or killed if they are not present when the activities are in progress. Summer occupancy (First Tier) is defined as the time reasonably to be expected for bats to arrive at their summer home range until when most have migrated from the summer home range. If an activity with potential adverse effects cannot avoid the summer occupancy period, consideration should be made for implementation outside of the important non-volant period (Second Tier) when NLEB pups are born to the time they are flying (June 15 – August 1). Once bats are capable of flight, their ability to flush and evade injury and mortality from certain USFS actions is enhanced. Adverse effects to NLEB would be minimized by following these timing restrictions.

- To protect swarming and staging areas, the HNF should emphasize the conservation of NLEB habitat within 5 miles of hibernacula. Incorporating NLEB habitat features into other activities compatible with NLEB conservation, where feasible or practical, would benefit the species. In addition, where feasible or practical, project activities should occur at times when impacts to the bat would be minimized.

- Continue to gather information on the NLEB's distribution and use of the HNF during the spring, summer, and fall. For example:
    - Conduct inventory surveys
    - Conduct radio telemetry to monitor status of NLEB colonies
    - Participate in North American Bat Monitoring Program (NABat) surveys
    - Investigate habitat characteristics of the forest in areas where post-WNS NLEB occurrences have been documented (e.g. forest type, cover, distance to water)
    - Investigate NLEB use (acoustics, radio telemetry) of recently managed areas of different prescriptions

- Provide support to expand on scientific studies and educational outreach efforts on NLEB and White Nose Syndrome. For example:
  - Monitor the status/health of the known colonies
  - Collect samples for ongoing or future studies
  - Provide funding for WNS research activities (on or off USFS lands)
  - Allow USFS staff to contribute to administrative studies (on or off of USFS lands)

- Continue to assess (through Biological Assessments and/or NEPA associated assessments) the potential for activities (e.g., mining, drilling, fill, timber management, prescribed fire, etc.) to influence hibernacula or their microclimate

- Continue to assess (through Biological Assessments and/or NEPA associated assessments) human access near hibernacula (e.g., trails and roads) that may increase the accessibility of hibernacula and evaluate for evidence of human access to hibernacula and the need for additional protective measures.

- The HNF should continue to work with the Service to reassess these Conservation Recommendations using best available science.

In order to be kept informed of actions minimizing or avoiding adverse effects, or benefitting listed species or their habitats, the HNF should notify the Service if any of these additional conservation actions are planned or if additional measures consistent with these conservation recommendations are implemented.

REINITIATION NOTICE

This concludes formal consultation for the HNF actions outlined in your request dated June 16, 2015. 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, as measured by acres of potential habitat, 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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