United States Department of the Interior

FISH AND WILDLIFE SERVICE
East Lansing Field Office (ES)
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IN REPLY REFER TO:

October 14, 2015

MEMORANDUM

To: Chief, Division of Wildlife and Sport Fish Restoration Programs, Region 3

From: Field Supervisor, East Lansing Ecological Services Field Office, East Lansing MI

Re: Wildlife and Sport Fish Restoration Program funding to the Michigan Department of Natural Resources for the Michigan Cooperative Endangered Species Program, State Wildlife Grant, Pittman-Robertson Wildlife Restoration Act Grant – Biological Opinion; Log No. 15-R3-ELFO-10

This memorandum transmits the U.S. Fish and Wildlife Service's (Service) biological opinion on the Federal Aid Division's Endangered Species, Wildlife Restoration, and State Wildlife grants to the Michigan Department of Natural Resources. The section 7 Phase 1 evaluation reviewed the effects of implementing the grants on several federally listed species, including the threatened northern long-eared bat (*Myotis septentrionalis*) in accordance with section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C., 1531 et seq.).

After reviewing the status and environmental baseline of the northern long-eared bat and analysis of the potential effects of the proposed action on the species, the Service concludes that the proposed action is not likely to jeopardize the continued existence of northern long-eared bats.

If you have any questions or comments on the biological opinion, please contact Scott Hicks, Field Supervisor.

INTRA-SERVICE BIOLOGICAL OPINION

for

U.S. Fish and Wildlife Service's Wildlife and Sport Fish Restoration Programs' Allocation of Federal Aid to the Michigan Department of Natural Resource

for

Habitat and Species Management, Restoration, and Maintenance Activities

October 2015

INTRODUCTION

This document is the U.S. Fish and Wildlife Service's (Service) biological opinion (BO) for the allocation of Federal Aid through the Wildlife and Sport Fish Restoration program (WSFR) to the Michigan Department of Natural Resources (Endangered Species, Habitat and Species Management, and State Wildlife Grant Programs). BO log number 15-R3-ELFO-10. The purpose of allocations to these program areas is to facilitate the creation, restoration, maintenance, and enhancement of wildlife habitats and to enhance public use and access to public lands.

The federally threatened northern long-eared bat (*Myotis septentrionalis*; NLEB) occurs throughout Michigan and uses forested habitat in the spring, summer, and fall for roosting and foraging. It also hibernates in caves and mines in the Upper and Lower Peninsulas of Michigan. The species uses both dead and live trees for roosting and rearing young and require one or more primary trees plus multiple alternate trees to meet their roosting needs during an annual cycle. Individuals, small colonies, or large maternity colonies can be present in forested habitats from April through October and exhibit high site fidelity for summer habitats. Populations of forest-dwelling bats benefit from restoration and management of degraded forest communities that facilitates an immediate and long term supply of roost trees in their summer ranges. Actions that will be implemented based on the allocation of Federal Aid to the Michigan Department of Natural Resources (MDNR) include activities related to management of openings, savannas, prairie, grasslands, wetlands, and forests throughout Michigan. These actions can provide a net benefit to the species but could be conducted during the active season when NLEBs are present in forested habitats.

This BO describes the effects of these actions on NLEBs pursuant to section 7(a)(2) of the Act. Project details were received on July 15 and August 19, 24, and 28, 2015. Formal consultation began on September 17, 2015.

Section 7(a)(2) of the Act states that Federal agencies must ensure that their activities are not likely to:

- Jeopardize the continued existence of any listed species, or
- Result in the destruction or adverse modification of designated critical habitat.

The Service has determined the proposed action may affect and is likely to adversely affect NLEBs. After reviewing the status and environmental baseline of NLEB and analysis of the potential effects of the proposed action on the species, the Service concludes the proposed action is not likely to jeopardize the continued existence of NLEB. Although adverse effects are likely, take caused by the implementation of some activities related to forest and prairie habitat management covered in this BO is exempted under the interim 4(d) rule currently in effect for the species. The action area is within the summer range of NLEB, as such we can assume that based on the species' habitat requirements and its status in Michigan, there is suitable habitat within the action area to support summer roosting and hibernation. Therefore conservation measures will be implemented for compliance with the NLEB bat interim 4(d) rule.

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

On April 2, 2015, the Service published a species-specific rule pursuant to section 4(d) of the Act for NLEB. Section 4(d) of the Act 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 bat exempts the take of NLEB from the section 9 prohibitions of the Act, 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 NLEBs for one year following publication of the interim rules.

Thus any take of NLEB occurring in conjunction with these activities that complies with the conservation measures, as necessary, is exempted from section 9 prohibitions by the 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 Act'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 Act, 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.

Conservation Measures Under Northern Long-eared Bat 4(d)

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

To be in compliance with the interim 4(d) rule for NLEB, the following conservation measures will be implemented as part of the project description where applicable:

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

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

3. MDNR 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).

DESCRIPTION OF THE PROPOSED ACTION

Section 7(a)(2) of Act requires that Federal agencies shall insure that any action authorized, funded, or carried out by such agency is not likely to jeopardize the continued existence of any threatened or endangered species, or result in the destruction or adverse modification of critical habitat. When the actions of a Federal agency may adversely affect a protected species, that agency (i.e., the action agency) is required to consult with either the National Marine Fisheries Service (NMFS) or the Service, depending upon the protected species that may be affected.

For the actions described in this document, the action agency is the Region 3 WSFR Program of the Service. WSFR is allocating Federal Aid to the MDNR for the Endangered Species, Habitat and Species Management, and State Wildlife Grant Programs. The Federal funding is the nexus for this consultation, which is being conducted as an intra-service consultation with the East Lansing, Michigan Ecological Services Field Office.

Action Area

The action area is that area in which the direct and indirect effects of the proposed actions may occur. The proposed activities will take place within the range of NLEB throughout Michigan on MDNR-managed lands, such as State Forests, State Parks and Recreation Areas, State Game Areas, State Fish and Wildlife Areas, State Wildlife Management Areas, and State Wildlife Research Areas. Management will also occur on private lands with MDNR-approved Landowner Agreements.

Project Action

This BO describes and evaluates two groups of actions within habitat management that will occur as a result of the proposed project. These actions are likely to adversely affect NLEB.

- Habitat management (maintain, establish, and/or restore wildlife habitat) within the categories of setting back succession, advancing succession, or improving the ecological integrity of existing habitat. These activities may occur during the NLEB's active season (defined here as spring migration, summer (maternity and non-maternity), and fall migration) and near hibernacula that involves:
    i. Tree removal in known habitat or in areas of suitable habitat where the species are likely to occur
    ii. Prescribed burning in suitable habitat for the NLEB

<u>Habitat Management</u>

Habitat management will occur year-round on state-owned land and on private lands with landowner agreements throughout Michigan. Areas that have suitable roosting habitat for the NLEB are those that include woodlands, upland forests, and bottomland forests. Prairies and savannas with scattered trees

and newly-created or woody-encroached wetlands might also possess suitable roosting habitat. Grasslands and openings are unlikely to provide suitable habitat for NLEB; however, these areas may occur adjacent to occupied habitat and management activities could affect bats occurring in adjacent areas. MDNR has and will continue to use this funding to maintain, establish, restore, and enhance over 27,000 acres of prairie, savanna, grasslands, and openings; restore, maintain, and manage over 4,000 acres of forest; and maintain, establish, and restore approximately 10,000 acres of wetlands.

Tree removal – In order to achieve habitat management objectives, tree removal for enhancement, restoration or maintenance can occur in any of the previously listed habitat types. Specific management actions or prescriptions will include forest understory thinning, overstory canopy reduction, timber stand improvement, intermediate cuts, regeneration cuts, and selective harvest. Bulldozers might also be used to remove large woody vegetation to prepare sites for native grass establishment, construct fire lines, or conduct major habitat restoration in wetlands.

Prescribed burning – Prescribed fire is used as a tool to eradicate invasive species, set back succession, and to achieve the desired plant species composition and structure. Prescribed fire can be used as a stand-alone method or used in conjunction with mechanical treatments.

STATUS OF THE SPECIES

This section presents the biological or ecological information relevant to formulating this BO. Appropriate information on the species' life history, its habitat and distribution, and other data on factors necessary to its survival are included to provide background for analysis in later sections. This analysis documents the effects of past human and natural activities or events that have led to the current range-wide status of the species. Portions of this information are also presented in listing documents.

Northern long-eared bat

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. NLEBs generally hibernate between mid-fall through mid-spring each year. Spring migration period likely runs from mid-March to mid-May each year. Females depart shortly after emerging from hibernation and are pregnant when they reach their summer area. Young are born between mid-June and early July, with nursing continuing until weaning, which is shortly after young become volant (able to fly) in mid- to late-July. Fall migration likely occurs between mid-August and mid-October.

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 inter-annual 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 three to five weeks, with pups becoming volant 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.

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.

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

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

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

Species Status and Distribution

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 37 States and the District of Columbia: Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming.

Historically, the species has been most frequently observed in the northeastern United States and in Canadian Provinces, Quebec and Ontario, with sightings increasing during swarming and hibernation (Caceres and Barclay 2000). However, throughout the majority of the species' range it is patchily distributed, and historically was less common in the southern and western portions of the range than in the northern portion of the range (Amelon and Burhans 2006).

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). 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). NLEB are documented in hibernacula in 29 of the 37 States in the species' range. Other States within the species' range have no known hibernacula (due to no suitable hibernacula present, lack of survey effort, or existence of unknown retreats).

The current range and distribution of NLEB must be described and understood within the context of the impacts of WNS. Prior to the onset of WNS, the best available information on NLEB came primarily from 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 species' conservation needs define what is needed in terms of reproduction, numbers, and distribution to ensure the species is no longer in danger of extinction. The conservation needs should

be defined in the species' recovery outline or plan. Since there is no recovery plan or recovery outline available at this time, we will outline the conservation needs based on our current understanding of the species.

We find that the primary conservation need of the NLEB is to reduce the threat of WNS. This includes minimizing mortality in WNS-affected areas, and slowing the rate of spread into currently unaffected areas. In addition, NLEB that continue to exist within WNS-affected areas need to be able to continue to survive and reproduce in order to stabilize and/or increase the populations. This can be done by reducing the other threats to the species, as listed above. Therefore, efforts to protect hibernacula from disturbances need to continue. This should include restricting human access to hibernacula particularly during the hibernation period, constructing and maintaining appropriately designed gates, and restoring microhabitat conditions in hibernacula that have been altered. Efforts should also be made to protect and restore (in some cases) adequate fall swarming habitat around hibernacula. Known maternity habitat should be maintained, and the removal of known roost trees, particularly when pregnant females and/or young are present should be reduced. Research to identify important hibernacula and summer areas and to delineate the migratory relationship between summering and wintering populations should also be pursued.

Critical Habitat

Critical habitat has not been proposed for the NLEB.

ENVIRONMENTAL BASELINE

Status of NLEB in Michigan

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 1). 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 2008*a*). Although NLEB have been identified at three 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).

Upper Peninsula

Some of the earliest records of the species in Michigan include sightings from Isle Royale, Mackinac (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 seven 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 seven UP counties (Chippewa, Delta, Dickinson, Iron, Mackinac, Marquette, and Ontonagon) to date (Michigan State University Mammal Research Department Museum records).

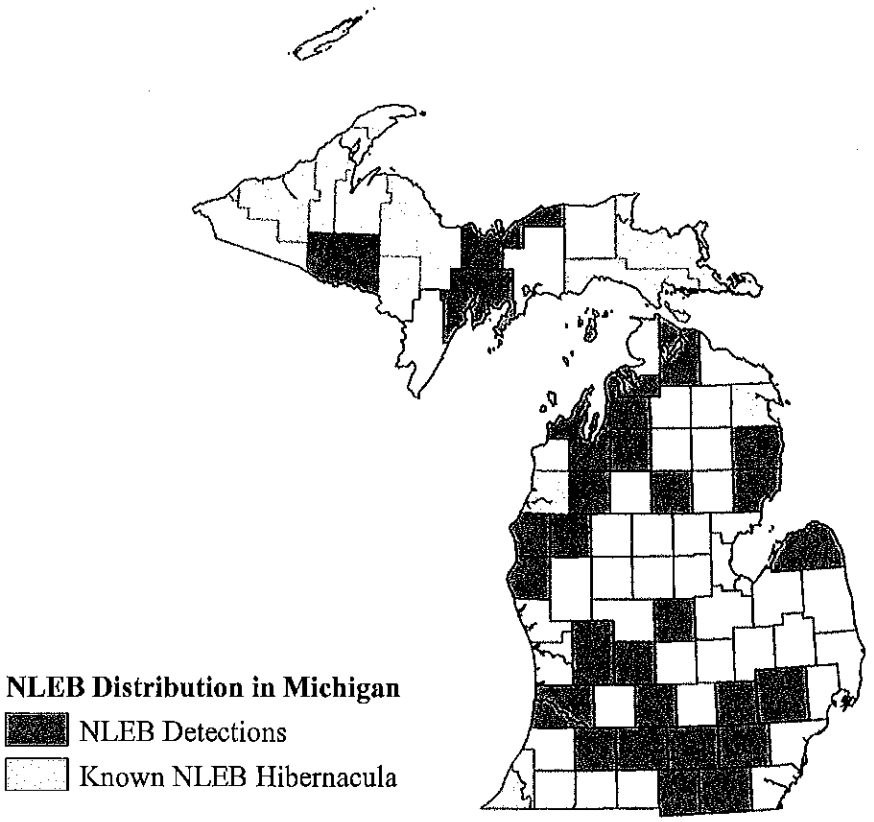

Figure 1. Michigan counties with known NLEB occurrences.

Although few bat surveys have been conducted in the UP, evidence suggests that NLEB occur there in the highest densities. During the summer of 1979, NLEB represented 81.7% of the total bats captured outside four Mackinac County caves in the eastern UP (Kurta 1980). NLEB were 24% of the bats captured in Gogebic County, Michigan (including sites on Ottawa National Forest) and Vilas County, Wisconsin in five rounds of mist netting (190 mist net nights) over vernal pools (Francl (2005)). NLEB were 59% (19 of 32) bats captured at 10 sites Hiawatha NF mistnetted July 28 to August 8, 2012 (Gehring and Klatt 2013). In 2009, Kurta and Smith examined 25 mines in the Ottawa National Forest and concluded that four of the sites likely harbor hibernating bats (Kurta and Smith 2009). Finally, during 2010–2014, prior to the arrival of 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.

Northern Lower Peninsula (north of 44°N latitude)

In the northern LP, NLEB appear to occur at somewhat lower densities but are still commonly detected at certain sites. During 1910–1939, the University of Michigan collected three NLEB specimens from two northern LP counties (Cheboygan and Charlevoix, and Michigan State University has collected a total of 14 specimens from 7 northern LP counties (Alpena, Antrim, Grand Traverse, Iosco, Kalkaska, and Roscommon) to date. In the Manistee National Forest, NLEB represented 6% (22 of 389) of the total bats captured during the summers of 1998 and 1999, and 27 NLEB roost trees were identified in

Lake, Manistee and Wexford Counties, including large maternity roosts (Kurta 2000). Additionally, mobile acoustic surveys conducted on the Huron-Manistee National Forests yielded NLEB detections during 2011–2012, although the results are considered preliminary.

NLEB are consistently found hibernating in Tippy Dam, a hydroelectric facility in Mason County, comprising an estimated 2.6% of the approximately 19,000 bats that hibernate there (Kurta et al. 1997). NLEB were 11.9% (203) of bats captured swarming at Tippy Dam during August 1995 and 3% (30) of the bats captured in September of the same year (Kurta et al. 1997). During 12 nights of sampling in the fall of 1998 and 1999, NLEB were 12.26% (1,037) of the total bats captured near the dam (Kurta 2000). In addition to Tippy Dam, NLEB have been observed hibernating in a surge tunnel in Rockport Quarry, an abandoned limestone quarry in Alpena County (Slider and Kurta 2011), although they appear to use the hibernaculum in relatively low numbers (Travis 2014).

Southern Lower Peninsula (north of 44°N latitude)

In the southern LP, NLEB are considered relatively uncommon (Winhold 2007). During 1910–1939, a single NLEB specimen was collected from Washtenaw County for the University of Michigan Museum, and Michigan State University has collected an additional 20 specimens from four southern LP counties (Berrien, Calhoun, Eaton, and Kent) to date. In Eaton County, NLEB were 1.8% (4 of 223) of bats captured along the Thornapple River during 1978–1979, 3% (4 of 120) of bats captured along the River in 1982 (Brack et al. 1984), and 4.6% (10 of 217) of bats captured there during 1993–1994 (Winhold 2007). Additionally, 32 NLEB roost trees were identified in Eaton County during 1993–1994 (Foster and Kurta 1999), including several large maternity roosts. During the summers of 2004–2006, NLEB represented only 0.6% (6 of 948) of bats captured in mist nets at 75 rural sites in Michigan's southern four county tiers (Winhold and Kurta 2008, Winhold 2007). However, in 2007, NLEB were 11% (50 of 457) bats captured in Lenawee County (Kurta 2007), and during 2007–2008, 35 NLEB were tracked to a total of 78 roost trees along Bear Creek, Black Creek, and the River Raisin in Lenawee County (Kurta 2008*b*). Moreover, NLEB comprised 24.4% of the bats captured at Bear Cave (a tufa cave in Berrien County) on 2 nights in September 1978 and 5 nights in September 1979 (Kurta 1980), and were 55.8% (91 of 163) of bats captured outside the hibernaculum in August of 2005 (Kurta et al. 2007, Winhold 2007).

In addition to Bear Cave, one more potential hibernaculum has been identified in the southern LP (Silas Doty Cave in Hillsdale County), although inspections in the fall of 2004 and spring of 2006 revealed a high degree of human disturbance and did not contain bats (Winhold 2007).

WNS was first confirmed in Michigan in the winter of 2013–2014. As of March 25, 2015, mortality has been documented at hibernacula in at least 5 counties (Alpena, Dickinson, Keweenaw, Mackinac, and Ontonagon); however, mortality has not been specifically confirmed for NLEB. Additionally, evidence of WNS was discovered in Tippy Dam in the winter of 2014–2015 and a case of WNS in a big brown bat (*Eptesicus fuscus*) was recently confirmed in Clare County.

Factors Affecting NLEB within the Action Area

The Service believes the following State, local, and private actions are currently occurring within the Action Area 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 intersection.

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

Activities by other entities in Michigan that have had an impact on the NLEB are discussed below.

Project Name & Agency	*Impacts*	*Estimated Incidental Take*
Bigelow-Newaygo Project on the Huron-Manistee National Forest – USFS (September 2015)	Direct & indirect, habitat loss	1,300 acres of potential habitat likely to be adversely affect; zero acres exempted under interim 4(d) rule; take authorized for 948 acres
Ongoing and Planned Activities on the HMNF – USFS (May 2015)	Direct & indirect, habitat loss	136,000 acres of potential habitat likely to be adversely affected; 131,000 acres exempted under interim 4(d) rule; take authorized for 4,599 acres
Ongoing and Planned Activities on the Hiawatha National Forest (May 2015)	Direct & indirect, habitat loss	78,515 acres of potential habitat likely to be adversely affected; 78,021 acres exempted under interim 4(d) rule; take authorized for 494 acres
Ongoing and Planned Activities on the Ottawa National Forest (May 2015)	Direct & indirect, habitat loss	92,608 acres of potential habitat likely to be adversely affected; 92,510 acres exempted under interim 4(d) rule; take authorized for 100 acres

We determined that the actions consulted on in these opinions were not likely to jeopardize the continued existence of the species.

EFFECTS OF THE ACTION

This BO evaluates the effects of proposed project activities within the project area, specifically, activities that are likely to occur in habitat that would support NLEB. 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 ongoing activities 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.

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 NLEB 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.

Effects to NLEBs from Active Season Tree Removal

Potential roosting habitat occurs throughout Michigan. Some roosting trees have been documented and in locations with potential roosting habitat without documented records, presence of NLEB will be assumed. All projects that involve tree removal outside the hibernation period or prescribed fire in forested areas have the potential to adversely affect individuals or colonies of NLEB.

Activities that involve tree removal and are likely to be conducted in habitat that could support NLEB include maintenance and restoration of savannas, forests, and wetlands. The primary impact to NLEBs from the action is direct impacts to colonies or individuals if an occupied roost tree is felled during the active season (April 1–September 30). Colonies could include maternity colonies or colonies of non-reproductive individuals whose roost trees are removed from April to late August.

To minimize effects to NLEB, the MDNR will implement the following conservation measures pursuant to the NLEB interim 4(d) rule:

1. Tree removal will not occur within 0.25 mile of a known, occupied hibernacula.
2. Cutting or destroying known roost trees will not occur during the pup season (June 1–July 1).

3. Clearcuts will not occur within 0.25 mile of known, occupied roost trees during the pup season.

Although the probability is relatively small (based on total forest size or habitat type), some of the felled trees 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.

Potential adverse effects to roosting bats are reduced during the spring staging and fall swarming periods. During spring staging, most bats would be expected to be staging near their hibernaculum; during swarming, most NLEBs would be expected to be 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 less than 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.

Some areas of timber harvest used to create or maintain openings, prairies, grasslands, or savannas 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 (greater than 3 inches dbh) and not densely stocked could be roosting and foraging habitat for NLEBs; tree removal 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.

The removal of trees would likely have very limited indirect effects on NLEBs due to the low number of trees removed in these landscapes. Trees that serve as roosts and maternity colony sites may be removed from the landscape; however the limited tree removal likely would not disrupt social assemblages or home ranges. Additionally, prey bases should not be disturbed by this limited tree removal. Any effects should be short-term in nature and would most likely be mitigated by other surrounding habitat. The removal of a few trees could also be beneficial by creating an opening in the canopy that could serve as a foraging location.

Effects to NLEBs from Prescribed Fire

Activities that involve the use of prescribed fire and will occur in habitat that could support NLEB include management of openings, savannas, forests, and wetlands. The primary impact to NLEBs from the action is direct impacts to colonies or individuals if an occupied roost tree is burned or adjacent to burned areas during the active season (April 1–September 30).

The MDNR will conduct various types of prescribed burns that are dependent upon the management objectives and conditions of a particular program and targeted site. The burns are usually planned for three to five year intervals. Back burns are commonly used when the objective is to thoroughly kill ground vegetation and/or to kill individual trees at ground level in a savanna setting. Back burns are generally low to moderate in intensity, with flame heights of two to four feet, and no greater than six 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.

In locations with lower fuel loads, MDNR may use higher intensity burns to allow fire to spread across a large forest stand or savanna without requiring continual relighting. Higher intensity burns may also be used to kill fire susceptible trees, such as red maple within an oak dominated forest. Prescribed fire is generally not used in jack pine stands as there is a high risk of sparks and flames igniting areas outside of the burn perimeter. Generally, fires generated through prescribed burning in forests are limited to the ground and understory, and flame consumption of mature trees is rare.

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.

To minimize effects to NLEB, the MDNR will implement the following conservation measures pursuant to the NLEB interim 4(d) rule:

1. Prescribed burns will not occur within 0.25 mile of a known, occupied hibernacula.
2. Destroying known roost trees will not occur during the pup season (June 1–July 1).

Prescribed fire activities are used to improve forest health and restoration, reduce fuel loading, invasive species management, and site preparation activities. 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. 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).

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 three 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.

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.

For projects covered in this BO, the intensity and severity of disturbance are based primarily on the type of habitat that will be impacted, and secondarily on the likelihood of impact, best indicated here by size of the project footprint or nature of the activity. Projects that cause disturbances with high severity are those that impact maternity colonies, whereas disturbances that impact non-maternity or migratory bats are of moderate severity. Disturbances with high intensity are those that are most likely to impact occupied roost trees, either because they cover large acreages or are the kind of activity that is focused on the removal of these specific kinds of trees.

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. There are several known NLEB hibernacula complexes within the action area, and the potential exists that bats affected by WNS may be more likely to use the action area for at least temporary foraging and roosting rather than migrating longer distances to established summer home ranges.

While none of the MDNR'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 in the Action Area considered in this BO. 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.

NLEBs within the action area may be affected by wind energy developments and tree clearing activities on private and public land. The operation of wind turbines has been documented to cause mortality of Indiana bats (Good et al. 2011, Service 2011). Wind energy developments are currently in operation and are more likely to be planned in Michigan. Therefore, we expect that cumulative effects from wind projects could impact NLEBs in the Action Area.

When considered with future State, county, tribal and private actions that are reasonably certain to occur in the future, the management actions considered by MDNR under this WSFR program would have a minor adverse cumulative effect on the NLEB. Non-MDNR 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 MDNR lands or private lands with MDNR cooperative management agreements. Tree cutting activities on non-commercial private lands is estimated to be substantially lower than state-owned or managed 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. right-of-way maintenance). Many of the tree removal activities will occur in areas that have previously been maintained as openings or savannas or in early successional forest stands that have previously been clearcut. These areas are likely to have no or very little roosting sites for NLEB. Additionally, some tree removal activities would occur outside of the summer occupancy period, further reducing the risk of NLEBs being injured or killed while in a roost. Tree cutting activities on non-state lands may retain snags and den trees that could be roost trees for NLEBs. Snag creation activities may improve roosting habitat.

Prescribed burning within forests or savannas and openings that contain scattered trees, is limited to the ground and understory and flame consumption of mature trees is rare. 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. At the landscape level, prescribed burning is likely 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 adverse cumulative effect on the NLEB.

Site preparation can involve roller chopping, soil disking and trenching using a variety of machinery to prepare the site for regeneration of trees, reduce competition from undesirable vegetation, and to prepare or modify the soil. These activities would have an extremely small adverse cumulative effect on NLEB. County, tribal, and private site preparation activities within the action area are estimated to be small when compared to MDNR actions on an annual basis. As stated in the effects, the likelihood of NLEBs being impacted on by site preparation activities on the MDNR lands would be remote and similar effects would be expected on county, tribal, and private activities.

We have considered the impacts of direct and cumulative effects throughout the action area. While impacts could occur to individuals, we do not consider these impacts to rise to the level of Jeopardy for NLEBs rangewide.

CONCLUSION

WNS is the primary threat to species continued existence. All of the other (non-WNS) threats, including management of openings, savannas, prairies, grasslands, wetlands, and forests, 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 NLEB to (Boggess et al. 2014). Further, only a portion of forested habitat will actually be harvested during the bat's 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.

Additionally, according to the interim 4(d) rule, the Service anticipated minimal tree removal will only have a minimal impact on NLEB habitat and individuals. This activity will collectively impact only small percentages of NLEB habitat and individuals in the season during which they occur.

Projects occurring in non-maternity roosting habitat and swarming and staging habitat are relatively small and could occur in proximity to hibernacula where these individuals are likely to spend the summer. The roosting behavior of non-maternity bats is such that they occur in much smaller groups or as individuals compared to reproductive females. MDNR will follow the conservation measures and will refer to the Service's known NLEB hibernacula and roost trees in Michigan maps prior to implementing activities that may impact the bats. Actions during the summer roosting period around all hibernacula could cause impacts at the individual level; population-level impacts are unlikely because of bats' dispersed nature across forested landscapes. Population-level impacts to bats in hibernacula through disturbance in staging and swarming habitats are unlikely to occur based on implementation of conservation measures.

After reviewing the current status of the listed species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is the Service's biological opinion that the proposed habitat management and maintenance activities will not jeopardize the continued existence of the NLEB, because the proposed action is not expected to reduce the reproduction, numbers, or distribution of the species range-wide. Therefore, we do not anticipate a reduction in the likelihood of both survival and recovery of the species as a whole.

INCIDENTAL TAKE

Section 9 of the Act and Federal regulations pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to 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. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species 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(a)(2), taking that is incidental to and not intended as part of the agency action is not considered prohibited taking under the Act, provided that such taking is in compliance with the terms and conditions of an Incidental Take Statement (ITS).

On April 2, 2015, the Service published an interim species-specific rule pursuant to section 4(d) of the Act for NLEB. The Service's interim 4(d) rule for NLEB exempts the take from the section 9 prohibitions of the Act, 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 from NLEBs for one 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 measures described below are non-discretionary, and must be undertaken by WSFR and MDNR so they become binding conditions of any grant, permit, or action for the exemption in section 7(a)(2) to apply. WSFR and MDNR have a continuing duty to regulate the actions covered by this Incidental Take Statement as it relates to their allocation of federal funding. If WSFR and MDNR: (1) fail to assume and implement the terms and conditions or, (2) fail to require any contracted group to adhere to the terms and conditions of the Incidental Take Statement through enforceable conditions that are added to any grant, contract, or permit, the protective coverage of section 7(a)(2) may lapse. In order to monitor the impact of incidental take, WSFR and MDNR must report the impact on the species to the Service as specified in the ITS [50 CFR 402.14(I)(3)].

Amount or Extent of Take Anticipated

Despite the implementation of MDNR's bat guidelines, we anticipate that some male, female, and juvenile NLEBs may be killed or injured during habitat management and maintenance activities that occur during the active season. This is likely to occur if an occupied roost tree is felled during summer roosting, migration, staging, or swarming. We anticipate that tree removal and prescribed burning during the active season may result in take, in the form of death, injury, harm, or harassment of individuals in approximately 40,000 acres each year, of maternity and non-maternity roosting habitat, swarming and staging habitat, and migratory habitat. Because many activities will occur in grasslands, prairie, savannas, and openings where NLEB is either absent or very few trees are available, we expect that the amount of take will not rise to 40,000 acres. Take will be measured annually by the number of acres of suitable roosting habitat that are modified or removed during implementation of the projects covered in this BO. Direct take also will be detected by observing disturbance, injury, or mortality of individuals or colonies.

WSFR must reinitiate consultation with the Service if more than 40,000 acres of habitat is modified or removed by actions covered in this BO.

Effect of the Take

Overall, the harm, harassment, injury, or death of individuals caused by tree removal and prescribed burning of 40,000 acres annually is not likely to affect the range-wide status of NLEBs. In the accompanying opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the NLEB.

REASONABLE AND PRUDENT MEASURES

The Service believes that the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize the incidental take of NLEBs:

1. Protect hibernacula from disturbance.
2. Avoid removal of known NLEB maternity roost trees.
3. Report on the progress of project activities and the impact on the species as required pursuant to 50 CFR 402.14 (i)(3).

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of Section 9 of the Act, the following terms and conditions, which implement the RPMs described above applies. These terms and conditions are non-discretionary:

The following terms and conditions implement the RPMs:

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.

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 MDNR will evaluate planned activities around the roosts and establish appropriate buffers or protective measures in coordination with the Service so that project-related activities are not likely to damage or destroy the roosts, or make them unsuitable.

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 a surrogate to monitor the level of take. In order to track the amount of take that occurred during the year and cumulatively to date, the MDNR will provide the Service with an updated project list 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 December 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 MDNR or project contractors 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 Act directs Federal agencies to utilize their authorities to further the purposes of the Act 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.

The Service has identified the following additional actions that would further the conservation of NLEBs:

- ❖ NLEBs 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 nonvolant 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 MDNR actions is enhanced. Adverse effects to NLEB would be minimized by following these timing restrictions.

- ❖ To protect swarming and staging areas, the MDNR should emphasize the conservation of NLEB habitat within five 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 state lands 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 WNS. For example:
  - Monitor the status/health of the known colonies
  - Collect samples for ongoing or future studies

- ❖ The MDNR 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 MDNR 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 on the allocation of Federal Aid to the Michigan Department of Natural Resources. As provided in 50 CFR 402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is

authorized by law) and if: 1) the amount or extent of incidental take is exceeded; 2) new information reveals effects of the action agency 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 listed or critical habitat not considered in this opinion; or 4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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