United States Department of the Interior
Fish and Wildlife Service

Bloomington Field Office (ES)
620 South Walker Street
Bloomington, IN 47403-2121
Phone: (812) 334-4261 Fax: (812) 334-4273

April 27, 2015

Mr. Richard Marquis
Division Administrator, Indiana Division
U.S. Department of Transportation
Federal Highway Administration
575 North Pennsylvania Street, Room 254
Indianapolis, IN 46204

Dear Mr. Marquis:

This enclosed document transmits the U.S. Fish and Wildlife Service's conference opinion for the construction, operation, and maintenance of the SR 641 Terre Haute Bypass project in Vigo County, IN, and its anticipated effects to the northern long-eared bat (*Myotis septentrionalis*). The species status will be listed as "threatened" under the Endangered Species Act, effective May 4, 2015.

This conference opinion is based on information provided in the March 16, 2015 northern long-eared bat biological assessment; the October 30, 2009 biological assessment; revised early coordination for an Environmental Assessment for new Phases 3 and 4 alignment alternatives initiated on September 25, 2007; the Indiana bat Habitat Fragmentation and Loss report dated December 22, 2008; the addendum to the biological assessment dated January 21, 2011; various telephone conversations and e-mails; and other sources of information.

These comments have been prepared in accordance with Section 7 of the Endangered Species Act of 1973, as amended. Our comments are consistent with the intent of the National Environmental Policy Act of 1969 and the U. S. Fish and Wildlife Service's Mitigation Policy.

Sincerely,

Scott E. Pruitt
Field Supervisor

Enclosure

Cc (via email): Michelle Allen, FHWA-Indiana Division
Laura Hilden, INDOT
Kristi Todd, INDOT
Deborah Snyder, USCOE, Louisville District
Matt Buffington, IDNR, Division of Water
Jason Randolph, IDEM
Jennifer Szymanski, USFWS, Region 3

Northern long-eared bat Conference Opinion for SR 641 – Terre Haute Bypass Vigo County, Indiana

On October 2, 2013, the U.S. Fish and Wildlife Service (FWS) proposed the northern long-eared bat (*Myotis septentrionalis*) (NLEB) for listing as endangered under the ESA. A proposed species is any species where a proposed listing rule under section 4 of the ESA has been published in the Federal Register. For species that have been proposed for listing, the FWS has determined that there is enough information to warrant listing them as either threatened or endangered. The NLEB was proposed for federal listing under the ESA on October 2, 2013 and the final listing decision was expected within one year from that date. Recently, the FWS published a Federal Register notice announcing a 6-month extension of the deadline for making a final determination on listing the northern long-eared bat (*Myotis septentrionalis*) as endangered. With the extension, the Service recently made a final decision on April 2, 2015, to list the northern long-eared bat as threatened. The official listing action will take effect on May 4, 2015; therefore, we are entering into a formal conference at this point in time.

While there is no prohibition for "taking" proposed species, there are certain statutory requirements under the ESA for proposed species. Section 7(a)(4) of the ESA states, "Each Federal agency shall confer with the Secretary on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed or result in the destruction or adverse modification of critical habitat proposed to be designated for such species." Conference is a process of early interagency cooperation involving informal and/or formal discussions between the action agency and the FWS pursuant to section 7(a)(4) of the ESA regarding the likely impact of an action on proposed species or proposed critical habitat.

While consultation under Section 7 of the ESA is required when a proposed action "may affect" a *listed* species, a conference is required only if the proposed action is likely to jeopardize the continued existence of a proposed species or destroy or adversely modify proposed critical habitat. The Conference process is discretionary for all other effect determinations besides jeopardy/adverse modification. However, it is in the best interest of the species, and our federal partners to consider the value of voluntary conservation measures in a conference opinion or conference report for projects that are not likely to cause jeopardy, but are likely to adversely affect the NLEB.

Action agencies are not prohibited from unauthorized taking or jeopardizing the continued existence of a proposed species until the species becomes listed. However, as soon as the listing becomes effective, the section 7(a)(2) prohibition becomes effective 30 days after the publication of the final rule, regardless of an action's stage of completion. Because of this, the timing of the proposed action should influence whether an informal or formal conference is conducted. Action agencies/applicants may experience significant project delays if the NLEB has not been addressed, either formally or informally, if the species is listed.

Although not required, for projects that may adversely affect the NLEB, formal conference is advisable if the action will be ongoing subsequent to the listing. This is appropriate because, even though the proposed action may not result in jeopardy to the NLEB, the prohibition against taking a listed species under section 9 of the ESA (in addition to the prohibition against jeopardy) will apply as soon as the listing becomes effective (30 days after publication of the final rule), regardless of the proposed action's stage of completion. Therefore, formal conference and the issuance of a conference opinion that can be adopted as the biological opinion on the proposed action, should allow the project to proceed with little delay once the NLEB becomes listed. The conference opinion can then be adopted after listing as a biological opinion without interruption in the action, if both the FWS and action agency agree. If the NLEB becomes listed prior to project completion and the action agency has not conferred with the FWS, the action agency would need to cease action on the project and enter into formal consultation with the FWS if the action is likely to adversely affect the NLEB. This approach has the potential to result in significant delays and costs to applicants.

Formal conferences follow the same procedures as formal consultation and end with the issuance of a conference opinion. The conference opinion follows the same format and content of a biological opinion; however, the incidental take statement provided with a conference opinion for the NLEB does not take effect until the FWS and action agency adopt the conference opinion as a biological opinion on the proposed action, after the NLEB is listed.

Because most of the project and species' information has been generated and evaluated as a result of the formal Section 7 consultation for the Indiana bat, and because of the significant similarities in the species life cycle and habitat requirements, the Service is relying significantly on the effects analysis information that we developed as part of the Section 7 consultation for the Indiana bat on this project. In addition, because all tree-clearing activities have already occurred for this project, the scope of the effects being evaluated is much more limited than what was evaluated for the Indiana bat and we expect the level of take to be significantly lower than what was determined for the Indiana bat.

Project Consultation History

Section 7 consultation with the Federal Highway Administration (FHWA) and the Indiana Department of Transportation (INDOT) for the SR 641 project was first initiated in January, 1997, during early coordination (scoping) for the NEPA environmental document. At that point, the only listed species whose range included the project area was the Indiana bat (*Myotis sodalis*). At that time the Service stated that summer habitat for the Indiana bat was present in the SR 641 study area, and recommended conducting mist net surveys to determine whether Indiana bats were present in the study area.

A bat survey was conducted in June and July, 1997, with negative results for Indiana bats (as well as northern long-eared bats). Subsequent to the bat survey, and in our review of the draft Environmental Impact Statement (EIS) in 1999, the Service concurred that the project was not likely to adversely affect the Indiana bat. After the final EIS (November, 1999) there was essentially no further Section 7 consultation until 2006.

Beginning in March, 2006 a series of new route alternatives was offered for Phases 3 and 4 at the east end of the proposed route. By that time construction was underway on Phases 1 and 2. The first new alignment proposal was Line C, which was similar to the original Line Cx but with considerably less impacts to Indiana bat habitat along Little Honey Creek. During 2007 four new alignments were proposed for consideration: two east alignments (Line E1 and Line E2) and two south alignments (Lines E3(a) and E3(b)).

In May, 2008 another mist net survey for bats was conducted in response to the new alignments, the increased study area and the elapsed time since the previous survey. That survey resulted in the capture of a pregnant female Indiana bat and seven northern long-eared bats (3 pregnant females, 1 non-reproductive female, 2 of unknown status, and 1 that escaped before processing was complete). A radio-telemetry study of the captured Indiana bat was attempted, but the transmitter signal was not detected. No telemetry was done for the northern long-eared bats. Shortly thereafter the Service concluded that the project "may affect" the Indiana bat, and the Service, FHWA and INDOT entered into informal Section 7 consultation. The Service stated that a habitat impact analysis would be necessary to determine whether formal Section 7 consultation would be required.

The alternatives under consideration were later reduced to Lines E3(b) and E1, and in a letter dated November 24, 2008 INDOT announced that Line E1 had been eliminated and that Line E3(b) was the new preferred alignment.

On December 23, 2008, INDOT finalized a document entitled "*Habitat Fragmentation and Loss for the Indiana Bat on Indiana Department of Transportation's Proposed SR 641 Bypass (Phases III and IV) in Terre Haute, Vigo County, Indiana*". That document provided a detailed analysis of the forest impacts associated with Line E3(b). On January 29, 2009 the agencies met to discuss the findings of the habitat loss document. At that meeting it was agreed that formal Section 7 consultation would be necessary, and the Service informed INDOT and FHWA of the type of additional information that would be necessary to complete a Biological Opinion. FHWA expressed the intent to repackage all of the previous information on the project, along with some additional information requested by the Service, into a Biological Assessment.

On September 10, 2009 the Service received the document entitled "Biological Assessment for the Indiana Bat on Indiana Department of Transportation's Proposed SR 641 Bypass (Phases III and IV) in Terre Haute, Vigo County, Indiana" (BA), dated August 7, 2009. After reviewing the BA the Service determined that it was not adequate to proceed with formal consultation, although FHWA had concurrently sent a request to initiate formal consultation. The Service did not concur with the BA's finding of "not likely to adversely affect".

Subsequently, the Service continued informal consultation with the FHWA through its agent, Beam, Longest and Neff (BLN), and Environmental Solutions & Innovations, Inc. (ESI). ESI developed a conceptual list of modifications for the BA, and on October 19, 2009 the Service participated in a telephone conference call with FHWA, INDOT, BLN and ESI to discuss the proposed modifications.

On November 3, 2009 the Service received a modified BA dated October 30, 2009, and a concurrent request from FHWA to initiate formal consultation. After review of the modified BA the Service notified the FHWA by e-mail and letter dated November 16, 2009 that the Service had sufficient information to initiate formal consultation as of the date of FHWA's request (November 3, 2009). A draft biological opinion was submitted to the FHWA for review on March 11, 2010.

After reviewing the draft biological opinion FHWA and INDOT expressed concerns about their ability to acquire and/or restore adequate habitat to compensate for habitat losses associated with the project (determined by the Service to be 3 acres of acquisition for each acre lost). During a conference call on April 28, 2010 among the Service, transportation agencies, and consultants, INDOT and FHWA stated that they had elected to perform additional, more extensive mist net surveys to reassess the project's impact on the Indiana bat. Because previous radio-telemetry efforts were unsuccessful, the primary focus of the additional surveys was to more accurately determine the Indiana bat's primary foraging and roosting habitat in relation to the project's Action Area. The Service agreed that if the results of the new bat survey demonstrated that the maternity colony was not using the project area, a conclusion of "not likely to adversely affect" would be issued. Formal consultation was suspended pending the results of the mist net survey.

The mist net survey plan was approved by the Service in a letter dated July 7, 2010 and the survey was conducted from July 26 through August 12, 2010. Radio-telemetry and roost tree emergence monitoring were conducted from July 30 through August 15. On August 11, 2010 the Service was notified by telephone call of the results of the bat survey, and the draft bat survey report dated October 15, 2010 was provided to the Service on December 15, 2010.

Mist net surveys during 2010 resulted in the capture of 4 Indiana bats at 3 sites, including 2 sites along the Little Honey Creek corridor (one of which was the previous 2008 capture site) and one site along the Honey Creek corridor. During telemetry studies 3 roost trees were located within a mile of the Project Area. The report concluded that a maternity colony of Indiana bats is present in the Project area.

In addition to Indiana bats, the survey in 2010 resulted in the capture of three northern long-eared bats (1 adult male and 2 post-lactating females). Since the survey was focused on Indiana bats, no telemetry information for northern long-eared bats was collected.

Subsequent telephone calls and emails focused on the process and time frame for acquisition and/or protection of compensatory Indiana bat habitat. Due to the difficulty of finding suitable and available land parcels in the project area the Service agreed that, after reasonable land acquisition efforts had been exhausted, a post-construction demographic study of Indiana bats could be conducted in the project area as a surrogate for a shortfall in land acquisition. The study scope would reflect a cost equivalent to the value of the land acquisition shortfall. On January 6, 2010 INDOT's consultant, Beam Longest and Neff, submitted to the Service a proposed process for identification and acquisition of land parcels and approximate timetable for completion of the process and the formal consultation. The proposal indicated that multiple preliminary alternatives would be developed for the scope of the bat study, with a range of costs. The final study scope could not be determined until the land acquisition process had been completed and the extent of the land shortfall determined. The Service concurred with this approach. (Update: to date approximately 268 acres of compensatory habitat has been secured and restored where applicable, fulfilling the mitigation requirement without the need for an additional bat study.)

On February 7, 2011 INDOT's environmental consultant provided an amendment to the BA and the FHWA requested resumption of formal consultation. The Service notified the FHWA on February 14, 2011 that the amendment provided adequate information to proceed with formal consultation. Formal consultation for the Indiana bat was concluded and a biological Opinion was submitted to the FHWA on June 6, 2011.

Presently, based on the status of the SR 641 Phase 3 and Phase 4 construction project and the proposed listing of the northern long-eared bat in May 2015, the FHWA requested a formal conference with the Service on March 16, 2015. Following is our conference opinion.

CONFERENCE OPINION

PROPOSED ACTION

The following information is primarily taken from the Indiana bat Biological Opinion dated June 6, 2011.

The SR 641 bypass is a new terrain, freeway-quality road project extending from US 41 Highway south of Terre Haute to Interstate 70 Highway east of Terre Haute. The project consists of 4 phases, of which only the construction and operation Phases 3 and 4 are being considered in this conference opinion. Section 7 consultation for the Indiana bat on Phases 1 and 2 was completed in 1999 and those phases are primarily completed. A Section 7 consultation for the Indiana bat for Phases 3 and 4 has also been completed (June 2011). The following project description was taken from the Environmental Assessment for Phases 3 and 4.

Please note that the proposed action being considered for the northern long-eared bat conference involves only construction of the infrastructure, roadway operation/maintenance, and indirect growth associated with the roadway. All tree-clearing and forested habitat impacts have already occurred prior to the proposed listing of the northern long-eared bat.

Phase III

The entire mainline length of SR 641 in Phase III (from the southern terminus to south of Moyer Road) would consist of two 12 ft. travel lanes in each direction with 10 ft. paved (11 ft. graded) outside shoulders and 4 ft. paved (5 ft. graded) inside shoulders. The median would be a 60 ft. depressed grass median. The design speed along SR 641 in Phase III will be 70 mph.

Beginning at the southern terminus, the new roadway crosses an unnamed tributary to Little Honey Creek located within a large forested tract. Upon emerging from the forested tract, it crosses an agricultural field and upland field before crossing Little Honey Creek approximately

1,930 ft. to the west of existing Riley Road. Continuing eastward, the roadway traverses a forested and agricultural parcel before crossing existing Riley Road.

Riley Road would be realigned along an estimated 2,000 ft. section converging at a full diamond interchange with SR 641 and SR 46. Existing Riley Road south of the proposed SR 641 route would dead end with a cul-de-sac to prevent movement across the proposed highway and would form a three legged intersection at Tucker Street. Riley Road east of Tucker Street to SR 46 would become a local access road. SR 46 would also require realignment beginning at a point approximately 275 ft. northwest of its existing intersection with Riley Road. The SR 46 typical section would consist of one 12 ft. travel lane in each direction with 8 ft. paved (9 ft. usable) shoulders.

Tucker Street would be reconstructed and realigned to (perpendicularly) intersect with realigned SR 46. Tucker Street would consist of two 11 ft. travel lanes bordered by 4 ft. usable shoulders. Continuing north of the SR 46/Tucker Street intersection, a local service road would be provided that extends approximately 1.2 miles (6,363 ft.) to the north, terminating at Sony Drive. The service road would consist of two 11ft. travel lanes bordered by 2 ft. paved (4 ft graded) shoulders.

Phase IV

The mainline of SR 641/SR 46 in Phase IV (from Moyer Road to Margaret Avenue) would consist of two 12 ft. through lanes in each direction with 10 ft paved (11 ft graded) outside shoulders. The median would transition from a 60 ft. depressed grass median, which is proposed in Phase III, to a 26 ft. paved median with barrier wall. North of the I-70 southern ramp terminal, the median would transition from a barrier wall to a raised median before terminating at a point approximately 150 ft. north of Margaret Avenue. The design speed of SR 641/SR 46 in Phase IV will be 55 mph from Moyer Road to the southern I-70 ramp junction and reduced to 45 mph to Margaret Avenue.

At Moyer Road a grade separation is proposed that would elevate Moyer Road over SR 641/SR 46. Furthermore, the existing structure that carries Moyer Road over Little Honey Creek is proposed to be replaced. Moyer Road would consist of one 11 ft. travel lane in each direction bordered by a 2 ft. paved (4 ft. graded) shoulder. The design speed for Moyer Road will be 35 mph.

Alternative E3b would continue north of Moyer Road, shifted to the east of the existing SR 46 alignment to provide for sufficient area for relocation of Little Honey Creek. It will be necessary to relocate approximately 3,550 ft. of Little Honey Creek. The creek would be realigned along a meandering section that would extend approximately 3,775 ft. in length. The realignment would begin at a point approximately 185 ft. upstream of the Moyer Road crossing and would terminate at approximately the existing crossing that carries Little Honey Creek under SR 46

North of the Moyer Road Bridge SR 641/SR 46 would include additional acceleration and deceleration lanes for the I-70 interchange. The proposed SR 641/SR 46 interchange at I-70 would be modified from a folded diamond to a Parclo-B interchange. The Parclo-B interchange would utilize two collector/distributor roads with loop ramps: one in the northwest quadrant and the other in the southeast quadrant. Directional ramps are proposed in all four quadrants. With the exception of the northeast quadrant, the interchange ramps are proposed to be single 16 ft. lanes with an 8 ft. paved (11 ft. graded) outside shoulder and a 4 ft. paved (7 ft. graded) inside shoulder. The northeast ramp will consist of two 12 foot lanes after diverging from the westbound collector/distributor road. The design speed for directional ramps and collector distributor roads will be 50 mph. The design speed of loop ramps will be 25 mph.

Improvements are also proposed for the I-70 mainline. The improvements include raising the profile grade of the roadway while maintaining the two travel lanes in each direction and replacing the existing twin bridges.

See Figure 1 at the end of this document for a depiction of the project action area.

Since the Biological Opinion for the Indiana bat was issued, INDOT has completed all tree clearing for the SR 641 project and both Phase 3 and Phase 4 of the project are under construction. The Phase 3 construction contract was let in December of 2011 and is expected to be complete by the end of 2016. Primary work to complete the Phase 3 contract includes additional embankment fill and grading, bridge construction, construction of the SR 46 and Riley Road interchange and pavement. The Phase 4 construction contract was let March of 2014 and is expected to be completed in June 2017. Most of the work on Phase 4 is still left to be completed including the reconstruction of the I-70 Interchange, relocation of Little Honey Creek, replacement of bridges and culverts, new lane construction, and the Moyer Road overpass. All of the mitigation sites for the SR 641 project have been purchased and restoration work has either been let or will be let in May of this year.

Proposed Right-of-Way

The proposed right-of-way will be full limited access, providing points of access at only two interchanges, one at SR 46 and Riley Road and the other at I-70. Beginning at the southern terminus of Phase III, a band of right-of-way extending approximately 246 ft. on either side of the centerline is required for the proposed SR 641 interchange with Riley Road and SR 46. At the interchange the right-of-way will expand from a total minimum width of approximately 470 ft. to a total maximum width of approximately 2,000 ft., and incorporate the realignment of Riley Road and SR 46, as well as the local service road that is along the east side of the interchange. Right-of-way along SR 46 from the proposed SR 641 interchange to the southeast will be a typical width of 83 ft. either side of the centerline (166 ft. total).

Proposed right-of-way along Tucker Street will be a typical width of 45 ft. either side of the centerline (90 ft. total). The right-of-way is necessary for the realignment of Tucker Street to intersect with realigned SR 46.

North of the proposed SR 641 interchange with Riley Road and SR 46, SR 641 will utilize the existing SR 46 corridor, but will still require additional right-of-way. Right-of-way requirements from this point north to the I-70 interchange will be irregular in width due to the relocation of Little Honey Creek to the west and the local service road to the east. Additionally, right-of-way will be required along Moyer Road for its grade separation from SR 641/SR 46. Along Moyer Road the proposed right-of-way will expand from a total minimum width of 100 ft. to a total maximum width of 383 ft. Continuing northward, and not taking into consideration the existing SR 46 right-of-way, the limits of the proposed right-of-way will expand from a minimum of approximately 192 ft. (west of the proposed centerline) and 250 ft. (east of the proposed centerline) to a maximum width of 430 ft. (west of the proposed centerline) and 570 ft. (east of the proposed centerline). North of the I-70 interchange, right-of-way will be a typical width of 114 ft. (west of the proposed centerline) and 100 ft. (east of the proposed centerline).

Temporary right-of-way will be required in certain locations. Upon the completion of construction, any acquired temporary right-of-way would revert to the original property owner(s).

Land use of the acquired right-of-way is primarily agricultural, upland field and forest. North of the I-70 interchange, land use of the proposed right-of-way becomes commercial in nature.

Conservation Measures

As part of the overall project design, several strategies to minimize the adverse effects of construction on fish and wildlife have been incorporated. The majority of those measures are not directly related to the conservation of bats, however several measures may serve to minimize impacts to bat habitat. The following measures were developed specifically for the Indiana bat but will benefit the northern long-eared bat as well:

1. Do not cut any trees greater than 3 inches dbh from April 1 through September 30.
2. Implement seasonal tree clearing in areas near suitable maternity roosts to preclude the possibility of roost abandonment due to excessive disturbance.
3. Provide foraging habitat for Indiana bats through restoration of cleared areas.
4. Provide habitat replacement at forest mitigation sites. (All but one mitigation location has already been acquired.)

Other mitigation measures which will benefit Indiana and northern long-eared bats are preservation of habitat within the right-of-way outside the construction zone, relocation of the Little Honey Creek channel and riparian zone using a natural channel design, and compensatory mitigation for wetlands.

Additional actions described in Section 2.3, Page 11, of the 2009 Indiana bat Biological Assessment prepared by the INDOT are paraphrased as follows:

1. Avoid future tree removal along SR 641 except for vehicle safety and compliance with federal regulations. INDOT would consult with the Service for future tree removal when potential Indiana bat habitat may be affected.

2. Preserve and protect remaining habitat for the Indiana bat maternity colony, potentially including:

a. Permanent protection via conservation easement.

b. Incorporation of bat habitat into wetland mitigation areas.
c. Forest management [to enhance Indiana bat habitat].
d. Bat box installation.
e. Development of an Indiana bat Conservation Plan to coordinate all conservation measures.

The 2011 amendment to the BA provided a process and timetable for mitigation land acquisition and for development of the aforementioned surrogate Indiana bat study. Based on current habitat acquisition, it does not appear that an additional Indiana bat study will be needed.

ACTION AREAS

The Action Area for a project is defined by regulation as all areas to be affected directly or indirectly by the Federal Action and not merely the immediate area involved in the action. This analysis is not limited to the "footprint" of the action nor is it limited by the Federal agency's authority. Rather, it is a biological determination of the reach of the proposed action on listed species.

As applied to the Indiana bat biological opinion the Action Area generally included the following categories:

1. All land within the permanent right-of-way of Phases 3 and 4 as well as all land that is within temporary right-of-way or that would be altered for any reason during construction of the proposed highway.

2. Borrow areas, disposal areas, and equipment access/staging areas that are associated with construction of the highway but may be geographically removed from the construction zone.

3. All areas that will be indirectly affected by impacts which are later in time, and which are reasonably certain to occur, including secondary development.

The final Indiana bat BA for the proposed action provided an analysis and delineation of the Action Area based on all anticipated direct impacts from construction (Project Area), potential indirect impacts from secondary development which is reasonably certain to occur, and the extent of Indiana bat habitat which may be used by the affected Indiana bat maternity colony (Kudlu et al. 2009). Figure 3 in the BA depicts an Indiana bat Maternity Area within the Little Honey Creek corridor and tributaries where impacts of the proposed action would occur, along with areas of additional available habitat and areas of expected secondary development which would be facilitated by the new highway.

We have used this same area for analysis of the northern long-eared bat since both species have similar habitat requirements and were captured at most of the same locations. See Figures 1 and 2 at the end of this document.

ANALYTICAL FRAMEWORK FOR JEOPARDY DETERMINATIONS

In accordance with policy and regulation, the jeopardy analysis in this Conference Opinion relies on four components: (1) the Status of the Species, which evaluates the NLEB range-wide condition, the factors responsible for that condition, and its survival and recovery needs; (2) the Environmental Baseline, which evaluates the condition of the NLEB in the action area, the factors responsible for that condition, and the relationship of the action area to the survival and recovery of the NLEB; (3) the Effects of the Action, which determines the direct and indirect impacts of the proposed Federal action and the effects of any interrelated or interdependent activities on the NLEB; and (4) Cumulative Effects, which evaluates the effects of future, non-Federal activities in the action area on the NLEB. In accordance with policy and regulation, the jeopardy determination is made by evaluating the effects of the proposed Federal action in the context of the NLEB's current status, taking into account any cumulative effects, to determine if implementation of the proposed action is likely to cause an appreciable reduction in the likelihood of both the survival and recovery of the NLEB in the wild. The jeopardy analysis in this Conference Opinion places an emphasis on consideration of the range-wide survival and recovery needs of the NLEB and the role of the action area in the survival and recovery of the NLEB as the context for evaluating the significance of the effects of the proposed Federal action, taken together with cumulative effects, for purposes of making the jeopardy determination.

STATUS OF THE SPECIES/CRITICAL HABITAT

Northern Long-eared Bat (*Myotis septentrionalis*)

The northern long-eared bat was proposed for listing as endangered under the Act on October 2, 2013 (78 Federal Register 61045). At this time no critical habitat has been proposed for the northern long-eared bat.

The northern long-eared bat (*Myotis septentrionalis*) belongs to the order Chiroptera, suborder Microchiroptera, family Vespertilionidae, subfamily Vesperitilionae, genus Myotis, subgenus Myotis (Caceres and Barclay 2000). The northern long-eared bat was considered a subspecies of Keen's long-eared *Myotis* (*Myotis keenii)* (Fitch and Schump 1979), but was recognized as a distinct species by van Zyll de Jong (1979) based on geographic separation and difference in morphology (*in* Caceres and Pybus 1997; Caceres and Barclay 2000; Nagorsen and Brigham 1993; Whitaker and Hamilton 1998; Whitaker and Mumford 2009; Simmons 2005).

A medium sized bat species, the northern long-eared bat adult body weight averages five to eight grams (0.2 to 0.3 ounces), with females tending to be slightly larger than males (Caceres and Pybus 1997). Average body length ranges from 77 to 95 mm (3.0 to 3.7 in), tail length between 35 and 42 mm (1.3 to 1.6 in), forearm length between 34 and 38 mm (1.3 to 1.5 in), and wingspread between 228 and 258 mm (8.9 to 10.2 in) (Caceres and Barclay 2000; Barbour and

Davis 1969). Pelage (fur) colors include medium to dark brown on its back, dark brown, but not black, ears and wing membranes, and tawny to pale-brown fur on the ventral side (Nagorsen and Brigham 1993; Whitaker and Mumford 2009). As indicated by its common name, the northern long-eared bat is distinguished from other *Myotis* species by its long ears (average 17 mm (0.7 in); Whitaker and Mumford 2009) that, when laid forward, extend beyond the nose but less than five mm (0.2 in) beyond the muzzle (Caceres and Barclay 2000). The tragus (projection of skin in front of the external ear) is long (average 9 mm (0.4 in); Whitaker and Mumford 2009), pointed, and symmetrical (Nagorsen and Brigham 1993; Whitaker and Mumford 2009).

Status and Distribution

The northern long-eared bat 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; Amelon and Burhans 2006). The species' range includes the following 38 States: Alabama, Arkansas, Connecticut, Delaware, the District of Columbia, Florida, 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).

Although they are typically found in low numbers in inconspicuous roosts, most records of northern long-eared bats are from winter hibernacula surveys (Caceres and Pybus 1997) (for more information on use of hibernacula, see Biology below). They are typically found roosting in small crevices or cracks on cave or mine walls or ceilings (Griffin 1940; Barbour and Davis 1969; Caire *et al.* 1979; Van Zyll de Jong 1985; Caceres and Pybus 1997; Whitaker and Mumford 2009).

The U.S. portion of the northern long-eared bat's range can be described in four parts: the eastern population, the southern population, the western population, and the Midwestern population. Historically, the northern long-eared bat was most abundant in the eastern portion of its range (Caceres and Barclay 2000, p. 2). Northern long-eared bats have been consistently caught during summer mist-net surveys and detected during acoustic surveys in eastern populations (Caceres and Barclay 2000, p. 2). The northern long-eared bat is generally less common in the western portion of its range (Amelon and Burhans 2006, p. 71) and is considered common in only small portions (*e.g.,* Black Hills of South Dakota) and uncommon or rare in the western extremes of the range (*e.g.,* Wyoming, Kansas, Nebraska). In the southern portion of its range it is considered less common than in the northern portion (Amelon and Burhans 2006, p. 71). It is more common in states such as Kentucky and Tennessee, and more rare in the southern extremes of the range (*e.g.,* Alabama, Georgia, South Carolina). Finally, in the Midwest portion of its range, the northern long-eared bat is commonly encountered in summer mist-net surveys throughout the majority of the Midwest and is considered fairly common throughout much of the region.

Although it is often encountered in summer surveys, the species is found infrequently and in small numbers in hibernacula surveys throughout most of the Midwest. In Missouri, northern long-eared bats were listed as a State species of conservation concern until 2007, after which it was decided the species was more common than previously thought because they were commonly captured in mist net surveys (Elliot 2013, pers. comm.). Historically, the northern long-eared bat was considered quite common throughout much of Indiana, and was the fourth or fifth most abundant bat species in the State in 2009. The species has been captured in at least 51 counties, is often captured in mist-nets along streams, and is the most common bat taken by trapping at mine entrances (Whitaker and Mumford 2009, pp. 207–208). The abundance of northern long-eared bats appears to vary within Indiana during the summer. For example, during 3 summers (1990– 1992) of mist-netting surveys in the northern half of Indiana, 37 northern long-eared bats were captured at 22 of 127 survey sites, which represented 4 percent of all bats captured (King 1993, p. 10). In contrast, northern long-eared bats were the most commonly captured bat species (38 percent of all bats captured) during three summers (2006– 2008) of mist netting on two State forests in south-central Indiana (Sheets *et al.* 2013, p. 193). Indiana has 25 hibernacula with winter records of one or more northern long-eared bats. However, it is very difficult to find individuals in caves and mines during hibernation in large numbers in Indiana hibernacula (Whitaker and Mumford 2009, p. 208). Their tendency to roost in cracks and crevices make detection challenging.

In Michigan, the northern long-eared bat is known from 25 counties and is not commonly encountered in the State except in parts of the northern Lower Peninsula and portions of the Upper Peninsula (Kurta 1982, p. 301; Kurta 2013, pers. comm.). The majority of hibernacula in Michigan are in the far northern and western Upper Peninsula; therefore, there are very few cave-hibernating bats in general in the southern half of the Lower Peninsula during the summer because the distance to hibernacula is too great (Kurta 2013, pers. comm.). It is thought that the few bats that do spend the summer in the southern half of the Lower Peninsula may hibernate in caves or mines in neighboring states, such as Indiana (Kurta 1982, pp. 301–302; Kurta 2013, pers. comm.).

In Wisconsin, the species is reported to be uncommon (Amelon and Burhans 2006, pp. 71–72). ‘‘Although the northern long-eared bat can be found in many parts of Wisconsin, it is clearly not abundant in any one location. The department has determined that the northern long-eared bat is one of the least abundant bats in Wisconsin through cave and mine hibernacula counts, acoustic surveys, mist-netting in summer foraging areas and harp trap captures during the fall swarming period’’ (Redell 2011, pers. comm.).

Northern long-eared bats are regularly caught in mist-net surveys in the Shawnee National Forest in southern Illinois (Kath 2013, pers. comm.). Further, the average number of northern long-eared bats caught during surveys between 1999 and 2011 at Oakwood Bottoms in the Shawnee National Forest has been fairly consistent (Carter 2012, pers. comm.). In Iowa, there are only summer mist net records for the species; in 2011 there were eight records (including three lactating females) from west-central Iowa (Howell 2011, unpublished data). In Minnesota, one mine in St. Louis County may contain a large number of individuals, possibly over 3,000; however, this is a very rough estimate since the majority of the mine cannot be safely accessed for surveys (Nordquist 2012, pers. comm.). In Ohio, there are three known hibernacula and the largest population in Preble County has had more than 300 bats. In general, northern long-eared bats are also regularly collected as incidental catches in mist-net surveys for Indiana bats in Ohio (Boyer 2012, pers. comm.).

Reasons for Listing

No other threat is as severe and immediate as the disease, white-nose syndrome. If this disease had not emerged, it is unlikely the northern long-eared population would be declining so dramatically. Since symptoms were first observed in New York in 2006, white-nose syndrome has spread rapidly from the Northeast to the Midwest and Southeast; an area that includes the core of the northern long-eared bat's range where it was most common before this disease. Numbers have declined by 99 percent in the Northeast. Although there is uncertainty about the rate that white-nose syndrome will spread within the species' range, it is expected to spread throughout the United States.

Although significant population declines have not been observed due to the sources of mortality listed below, they may now be important factors affecting this bat's ability to persist while experiencing dramatic declines caused by white-nose syndrome.

Impacts to Hibernacula - Gates or other structures to exclude people from caves and mines restrict bat flight and movement and change airflow and internal cave and mine microclimates. A few degrees change can make a cave unsuitable for hibernating bats. Also, cave-dwelling bats are vulnerable to human disturbance while hibernating. Bats use up their energy stores when aroused and may not survive the winter or females may not successfully give birth or rear young.

Loss or Degradation of Summer Habitat- Highway and commercial development, surface mining, and wind facility construction permanently remove habitat and are prevalent in many areas of this bat's range. Timber harvest and forest management can remove or alter (improving or degrading) summer roosting and foraging habitat.

Wind Farm Operation- Wind turbines kill bats, including northern long-eared bats, although only a small number have been documented to date. However, there are many wind projects within a large portion of the bat's range and many more are planned.

Life history

Winter habitat - The northern long-eared bat predominantly overwinters in hibernacula that include caves and abandoned mines. Hibernacula used by northern long-eared bat are typically large, with large passages and entrances (Raesly and Gates 1987), relatively constant, cooler temperatures (0 to 9 degrees C (32 to 48 degrees F)) (Raesly and Gates 1987; Caceres and Pybus 1997; Brack 2007), with high humidity and no air currents (Fitch and Shump 1979; Van Zyll de Jong 1985; Raesly and Gates 1987; Caceres and Pybus 1997). The sites favored by northern long-eared bats are often in very high humidity areas, to such a large degree that droplets of water are often observed on their fur (Hitchcock 1949; Barbour and Davis 1969). The northern long-eared bat is typically found roosting in small crevices or cracks in cave or mine walls or ceilings, often with only the nose and ears visible (Griffin 1940; Barbour and Davis 1969; Caire *et al*. 1979; Van Zyll de Jong 1985; Caceres and Pybus 1997; Whitaker and Mumford 2009).

Caire *et al*. (1979) and Whitaker and Mumford (2009) commonly observed individuals exiting caves with mud and clay on their fur, suggesting the bats were roosting in tighter recesses of hibernacula. They are also found hanging in the open, although not as frequently as in cracks and crevices (Barbour and Davis 1969; Whitaker and Mumford 2009). In 1968, Whitaker and Mumford (2009) observed three northern long-eared bats roosting in the hollow core of stalactites in a small cave in Jennings County, Indiana. To a lesser extent, the northern long-eared bat has been found overwintering in other types of habitat that resemble cave or mine hibernacula (*e.g*., abandoned railroad tunnels and storm sewer drains, wells, aqueducts, etc.) (Goehring 1954; Kurta and Teramino 1994; French 2011, pers. comm.; Griffin 1945).

Summer habitat - During the summer, northern long-eared bats typically roost singly or in colonies underneath bark or in cavities or crevices of both live trees and snags (Sasse and Perkins 1996; Foster and Kurta 1999; Owen *et al*. 2002; Carter and Feldhamer 2005; Perry and Thill 2007; Timpone *et al.* 2010). Male and non-reproductive female summer roost sites also may include cooler locations (*e.g*., caves and mines) (Barbour and Davis 1969; Amelon and Burhans 2006). The northern long-eared bat also has been observed roosting in colonies in human-made structures (*e.g*., buildings, barns, a park pavilion, sheds, cabins, under eaves of buildings, behind window shutters, and bat houses) (Mumford and Cope 1964; Barbour and Davis 1969; Cope and Humphrey 1972; Amelon and Burhans 2006; Whitaker and Mumford 2009; Timpone *et al*. 2010; Joe Kath 2013, pers. comm.).

The northern long-eared bat appears to be somewhat opportunistic in tree roost selection, selecting varying roost tree species and types of roosts throughout its range (*e.g*., black oak (*Quercus velutina*), northern red oak (*Quercus rubra*), silver maple (*Acer saccharinum*), black locust (*Robinia pseudoacacia*), American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), sourwood (*Oxydendrum arboreum*), and shortleaf pine (*Pinus echinata*)) (Mumford and Cope 1964; Clark *et al*. 1987; Sasse and Pekins 1996; Foster and Kurta 1999; Lacki and Schwierjohann 2001; Owen *et al*. 2002; Carter and Feldhamer 2005; Perry and Thill 2007; Timpone *et al*. 2010). The northern long-eared bat most likely is not dependent on a certain species of tree for roosts throughout their range; rather, certain tree species will form suitable cavities or retain bark suitable for their use (Foster and Kurta 1999). Carter and Felhamer (2005) speculated structural complexity of habitat or available roosting resources are more important factors than the actual tree species.

Many studies document the selection of live trees and snags by northern long-eared bats, with a range of 10 to 53 percent selection of live roosts (Sasse and Perkins 1996; Foster and Kurta

1999; Lacki and Schwierjohann 2001; Menzel *et al*. 2002; Carter and Feldhamer 2005; Perry and Thill 2007; Timpone *et al*. 2010). Foster and Kurta (1999) found 53 percent of roosts in Michigan were in living trees, whereas in New Hampshire, 34 percent of roosts were in snags (Sasse and Pekins 1996). The use of live trees versus snags may reflect the availability of such structures in study areas (Perry and Thill 2007) and the flexibility in roost selection when there is a sympatric bat species present (*e.g*., Indiana bat) (Timpone *et al*. 2010). In tree roosts, the northern long-eared bat is typically found beneath loose bark or within cavities and have been found to use both exfoliating bark and crevices to a similar degree for summer roosting habitat (Foster and Kurta 1999; Lacki and Schwierjohann 2001; Menzel *et al*. 2002; Owen *et al*. 2002; Perry and Thill 2007; Timpone *et al*. 2010).

Canopy coverage at northern long-eared bat roosts has ranged from 56 percent in Missouri (Timone *et al*. 2010), 66 percent in Arkansas (Perry and Thill 2007), greater than 75 percent in New Hampshire (Sasse and Pekins 1996), to greater than 84 percent in Kentucky (Lacki and Schwierjohann 2001). Canopy coverage around northern long-eared bat roosts is lower than in available stands (Sasse and Pekins 1996). Females tend to roost in more open areas than males, likely due to the increased solar radiation, which aids pup development (Perry and Thill 2007). Fewer trees surrounding maternity roosts also may benefit juvenile bats learning to fly (Perry and Thill 2007). However, in southern Illinois, the northern long-eared bat was observed roosting in areas with greater canopy cover than in random plots (Carter and Feldhamer 2005). Roosts are also largely selected below the canopy, which could be due to the species' ability to exploit roosts in cluttered environments due to gleaning behavior enabling them to easily maneuver around obstacles (Foster and Kurta 1999; Menzel *et al*. 2002).

Northern long-eared bat females typically roost in tall, large-diameter trees (Sasse and Pekins 1996). The diameter-at-breast height (dbh) and height of northern long-eared bat roost trees is greater than random trees (Lacki and Schwierjohann 2001; Sasse and Pekins 1996; Owen *et al*. 2002). However, other studies have found roost tree mean dbh and height did not differ from random trees (Menzel *et al*. 2002; Carter and Feldhamer 2005). Lacki and Schwierjohann (2001) found northern long-eared bat roosts are located more often on upper and middle slopes than lower slopes, which suggests a preference for higher elevations due to increased solar heating.

<u>Biology</u>

Hibernation - Northern long-eared bats hibernate during the winter months to conserve energy from increased thermoregulatory demands and reduced food resources. In general, northern long-eared bats arrive at hibernacula in August or September, enter hibernation in October and November, and leave the hibernacula in March or April (Caire *et al*. 1979; Whitaker and Hamilton 1998; Amelon and Burhans 2006). Northern long-eared bats have shown a high degree of philopatry (using the same site multiple years) for a hibernaculum (Pearson 1962), although they may not return to the same hibernaculum in successive seasons (Caceres and Barclay 2000).

Typically, the northern long-eared bat is not abundant and comprises a small proportion of the total number of bats hibernating in a hibernaculum (Barbour and Davis 1969; Mills 1971; Caire *et al*. 1979; Caceres and Barclay 2000). Although usually found in small numbers, the species typically inhabits the same hibernacula with large numbers of other bat species, and occasionally are found in clusters with these other bat species. Other species that commonly occupy the same habitat include: little brown bat, big brown bat, eastern small-footed bat, tri-colored bat, and Indiana bat (Swanson and Evans 1936; Griffin 1940; Hitchcock 1949; Stones and Fritz 1969; Fitch and Shump 1979). Whitaker and Mumford (2009), however, infrequently found northern long-eared bats hibernating beside little brown bats, Indiana bats, or tri-colored bats, since they found few hanging on side walls or ceilings of cave passages. Barbour and Davis (1969) found the species is rarely found in concentrations exceeding 100 individuals in a single hibernaculum.

The northern long-eared bat often moves between hibernacula throughout the winter, which may further decrease population estimates (Griffin 1940; Whitaker and Rissler 1992b; Caceres and Barclay 2000). Whitaker and Mumford (2009) found this species flies in and out of some of the mines and caves in southern Indiana throughout the winter. In particular, the bats were active at Copperhead Cave periodically all winter, with northern long-eared bat being more active than other species (such as little brown bat and tricolored bat) hibernating in the cave. Though northern long-eared bats fly outside of the hibernacula during the winter, they do not feed; hence the function of this behavior is not well understood (Whitaker and Hamilton 1998). However, it has been suggested bat activity during winter could be due in part to disturbance by researchers (Whitaker and Mumford 2009).

The northern long-eared bat exhibits significant weight loss during hibernation. In southern Illinois, northern long-eared bat individuals weighed an average of 6.6 g (0.2 ounces) prior to 10 January compared to an average of 5.3 g (0.2 ounces) after this date (Pearson 1962). Whitaker and Hamilton (1998) report a weight loss of 41 – 43 percent over the hibernation period for northern long-eared bats in Indiana. In eastern Missouri, male northern long-eared bats lost an average of 3 g (0.1 ounces) during the hibernation period (late October through March), and females lost an average of 2.7 g (0.1 ounces) (Caire *et al*. 1979).

Migration and homing - While the northern long-eared bat is not considered a long-distance migratory species, short migratory movements (56 km (35 mi) to 89 km (55 mi)) occur between summer roost and winter hibernacula (Nagorsen and Brigham 1993; Griffith 1945). However, movements from hibernacula to summer colonies may range from 8 to 270 km (5 to 168 mi) (Griffin 1945). Several studies show a strong homing ability of northern long-eared bat in terms of return rates to a specific hibernaculum, although bats may not return to the same hibernaculum in successive winters (Caceres and Barclay 2000). Banding studies in Ohio, Missouri, and Connecticut show return rates to hibernacula of 5.0 percent (Mills 1971), 4.6 percent (Caire *et al*. 1979), and 36 percent (Griffin 1940), respectively. An experiment with a (intentionally) blinded bat showed the individual returned to its home cave up to 32 km (20 mi) away after being removed 3 days prior (Stones and Branick 1969). Individuals have been known to travel between 56 and 97 km (35 and 60 mi) between caves during the spring (Caire *et al*. 1979; Griffin 1945).

Summer roosts - Northern long-eared bats switch roosts often (Sasse and Perkins 1996), typically every two – three days (Foster and Kurta 1999; Owen *et al*. 2002; Carter and Feldhamer 2005; Timpone *et al*. 2010). In Missouri, the longest time spent roosting in one tree was three nights. However, a maximum of 11 nights spent roosting in a human-made structure has been documented (Timpone *et al*. 2010). Bats switch roosts for a variety of reasons, including, temperature, precipitation, predation, parasitism, and ephemeral roost sites (Carter and Feldhamer 2005). Ephemeral roost sites, with the need to proactively investigate new potential roost trees prior to their current roost tree becoming uninhabitable (*e.g.*, tree falls over), may be the most likely scenario (Kurta *et al*. 2002; Carter and Feldhamer 2005; Timpone *et al*. 2010). In Missouri, Timpone *et al*. (2010) radio-tracked 13 northern long-eared bats to 39 roosts and found the mean distance between the location where captured and roost tree was 1.7 km (1.1 mi) (range 0.07–4.8 km (0.04–3.0 mi), and the mean distance traveled between roost trees was 0.67 km (0.42 mi) (range 0.05–3.9 km (0.03–2.4 mi)). In the Ouachita Mountains of Arkansas, Perry and Thill (2007) found individuals moved among snags that were within a 2 ha (5 ac) area.

Some studies have found tree roost selection to differ slightly between males and females. Northern long-eared bat males have been found to more readily use smaller diameter trees for roosting than females, suggesting males are more flexible in roost selection than females (Lacki and Schwierjohann 2001; Perry and Thill 2007). In the Ouachita Mountains of Arkansas, both sexes primarily roosted in snags, although females roosted in snags surrounded by fewer midstory trees than did males (Perry and Thill 2007). In northeastern Kentucky, males do not use colony roosting sites and are typically found occupying cavities in live hardwood trees, while females form colonies more often in both hardwood and softwood snags (Lacki and Schwierjohann 2001).

The northern long-eared bat is comparable to the Indiana bat in terms of summer roost selection, but appears to be more opportunistic (Carter and Feldhamer 2005; Timpone *et al*. 2010). In southern Michigan, northern long-eared bats used cavities within roost trees, living trees, and roosts with greater canopy cover more often than the Indiana bat, which occurred in the same area (Foster and Kurta 1999). Similarly, in northeastern Missouri, Indiana bats typically roosted in snags with exfoliating bark and low canopy cover, whereas northern long-eared bat used the same habitat in addition to live trees, shorter trees, and trees with higher canopy cover (Timpone *et al*. 2010). Although northern long-eared bats are more opportunistic than Indiana bats, there may be a small amount of roost selection overlap between the two species (Foster and Kurta 1999; Timpone *et al*. 2010).

Reproduction - Breeding occurs from late July in northern regions to early October in southern regions and commences when males begin to swarm hibernacula and initiate copulation activity (Whitaker and Hamilton 1998; Whitaker and Mumford 2009; Caceres and Barclay 2000; Amelon and Burhans 2006). Copulation occasionally occurs again in the spring (Racey 1982). Hibernating females store sperm until spring, exhibiting a delayed fertilization strategy (Racey 1979; Caceres and Pybus 1997). Ovulation takes place at the time of emergence from the hibernaculum, followed by fertilization of a single egg, resulting in a single embryo (Cope and Humphrey 1972; Caceres and Pybus 1997; Caceres and Barclay 2000); gestation is approximately 60 days (Kurta 1994). Males are reproductively inactive until late July, with testes descending in most males during August and September (Caire *et al*. 1979; Amelon and Burhans 2006).

Maternity colonies, consisting of females and young, are generally small, numbering from 30 to 60 individuals (Whitaker and Mumford 2009; Caceres and Barclay 2000). However, one group of 100 adult females was observed in Vermilion County, Indiana (Whitaker and Mumford 2009). In West Virginia, maternity colonies in two studies had a range of 7–88 individuals and 11–65 individuals, with a mean size of 31 (Owen *et al*. 2002; Menzel *et al*. 2002). Lacki and Schwierjohann (2001) found population size of colony roosts declined as summer progressed with pregnant females using the largest colonies (mean=26) and post-lactating females using the smallest colonies (mean=4), with the largest overall reported colony size of 65 bats. Other studies also found number of individuals within a maternity colony typically decreases from pregnancy to postlactation (Foster and Kurta 1999; Lacki and Schwierjohann 2001; Garroway and Broders 2007; Perry and Thill 2007; Johnson *et al*. 2012). Female roost site selection, in terms of canopy cover and tree height, changes depending on reproductive stage; relative to pre- and post-lactation periods, lactating northern long-eared bats have been shown to roost higher in tall trees situated in areas of relatively less canopy cover and tree density (Garroway and Broders 2008).

Adult females give birth to a single pup (Barbour and Davis 1969). Birthing within the colony tends to be synchronous, with the majority of births occurring around the same time (Krochmal and Sparks 2007). Parturition (birth) likely occurs in late May or early June (Caire *et al*. 1979; Easterla 1968; Whitaker and Mumford 2009), but may occur as late as July (Whitaker and Mumford 2009). Broders *et al*. (2006) estimated a parturition date of July 20 in New Brunswick. Lactating and post-lactating females were observed in mid-June in Missouri (Caire *et al*. 1979), July in New Hampshire and Indiana (Sasse and Pekins 1996; Whitaker and Mumford 2009), and August in Nebraska (Benedict 2004). Juvenile volancy (flight) occurs by 21 days after parturition (Krochmal and Sparks 2007; Kunz 1971) and as early as 18 days after parturition (Krochmal and Sparks 2007). Subadults were captured in late June in Missouri (Caire *et al*. 1979), early July in Iowa (Sasse and Pekins 1996), and early August in Ohio (Mills 1971). Adult longevity is estimated to be up to 19 years (Hall 1957; Kurta 1995). Most mortality for northern long-eared bat occurs during the juvenile stage (Caceres and Pybus 1997).

Foraging behavior and home range - The northern long-eared bat has a diverse diet including moths, flies, leafhoppers, caddisflies, and beetles (Nagorsen and Brigham 1993; Brack and Whitaker 2001; Griffith and Gates 1985), with diet composition differing geographically and seasonally (Brack and Whitaker 2001). Feldhamer *et al*. (2009) noted close similarities of all *Myotis* diets in southern Illinois. Griffith and Gates (1985) found significant differences in the diets of northern long-eared bat and little brown bat. The most common insects found in the diets of northern long-eared bat are lepidopterans (moths) and coleopterans (beetles) (Feldhamer *et al*.

2009; Brack and Whitaker 2001) with arachnids (spiders) also being a common prey item (Feldhamer *et al*. 2009). Foraging techniques include hawking and gleaning, in conjunction with passive acoustic cues (Nagorsen and Brigham 1993; Ratcliffe and Dawson 2003). Hawking is aerial foraging; catching insects in flight through the use of echolocation. The northern long-eared bat has the highest frequency call of any bat species in the Great Lakes area (Kurta 1995). Observations of northern long-eared bat foraging on arachnids (Feldhamer *et al*. 2009), presence of green plant material in their feces (Griffith and Gates 1985), and non-flying prey in their stomach contents (Brack and Whitaker 2001) suggest considerable gleaning behavior. Gleaning allows this species to gain a foraging advantage for preying upon moths because moths are less able to detect these high frequency echolocation calls (Faure *et al*. 1993). Emerging at dusk, most hunting occurs above the understory, 1 to 3 m (3 to 10 ft) above the ground, but under the canopy (Nagorsen and Brigham 1993) on forested hillsides and ridges, rather than along riparian areas (Brack and Whitaker 2001; LaVal *et al*. 1977). This coincides with data indicating mature forests are an important habitat type (Caceres and Pybus 1998). Occasional foraging also takes place over forest clearings and water and along roads (Van Zyll de Jong 1985). Foraging patterns indicate a peak activity period within five hours after sunset followed by a secondary peak within eight hours after sunset (Kunz 1973). Brack and Whitaker (2001) did not find significant differences in the overall diet between morning (3 a.m. to dawn) and evening (dusk to midnight) feedings. However there were some differences in the consumption of particular prey orders between morning and evening feedings. Additionally, no significant differences existed in dietary diversity values between age classes or sex groups (Brack and Whitaker 2001).

Female home range size may range from 19 to 172 ha (47–425 acres) (Lacki *et al*. 2009). Owen *et al*. (2003) estimated average maternal home range size to be 65 ha (161 ac). Home range size of northern long-eared bat in this study site was small relative to other bat species, but this may be due to the studies timing (during the maternity period) and the small body size of northern long-eared bat (Owen *et al*. 2003). The mean distance between roost trees and foraging areas of radio-tagged individuals in New Hampshire was 620 m (2034 ft) (Sasse and Pekins 1996).

<u>Recovery and Management</u>

The most important recovery action for the northern long-eared bat is to stop or slow the spread of white-nose syndrome (WNS). WNS is a disease responsible for unprecedented mortality in hibernating bats in the northeast, and continues to spread throughout the range of the northern long-eared bat. Although conservation efforts have been undertaken to help reduce the spread of the disease through human-aided transmission, these efforts have only been in place for a few years and it is too early to determine how effective they are in decreasing the rate of spread.

Previous Incidental Take Authorizations

Because the northern long-eared bat is not yet federally listed, no Incidental Take Authorizations have been implemented to date. Several conferences related to the northern long-eared bat have or are currently taking place. Last December (2013), a conference opinion was developed for the Ouachita National Forest in Arkansas. This project anticipates removing six acres of wooded northern long-eared bat habitat within the new construction footprint of roads and trails associated with the Wolf Pen Gap Trail Complex.

Another conference opinion was developed at part of the section 7 consultation for the Potters Mill Gap (SR 0322) transportation improvement project in Centre County, Pennsylvania. Impacts to northern long-eared bats included the loss of up to 57 acres of forested habitat and some “slight, but unquantifiable” amount of take due to roadkill.

Currently, this office is involved in a conference for the northern long-eared bat for the I-69 Interstate project. Anticipated impacts to northern long-eared bats include the loss of nearly 500 acres of forested habitat (mostly in linear stretches along an existing four lane highway) and take of individual bats primarily as a result of roadkill and disturbance from construction noises.

In the Midwest, rapid wind development is a concern for bats. Due to the known adverse effects from wind energy development, the Service, State natural resource agencies, and wind energy industry representatives are developing the Midwest Wind Energy Multi-Species Habitat Conservation Plan (MSHCP). The planning area includes the Midwest Region of the Service, which includes all or portions of the following States: Illinois, Indiana, Iowa, Michigan, Minnesota, Missouri, Ohio, and Wisconsin. The MSHCP would allow permit holders to proceed with wind energy development, which may result in "incidental" taking of a listed species under section 10 of the Act, through issuance of an incidental take permit (77 FR 52754). The northern long-eared bat is a covered species under the MSHCP. The MSHCP will address protection of covered species through avoidance, minimization of take, and mitigation to offset take (*e.g.*, habitat preservation, habitat restoration, habitat enhancement) and help ameliorate the adverse effects of wind development (77 FR 52754).
In certain cases, the U.S. Forest Service has agreed to limit or restrict burning in the central hardwoods from mid- to late April through summer to avoid periods when bats are active in forests (Dickinson *et al*. 2010).

ENVIRONMENTAL BASELINE

This section is an analysis of the past effects of State, tribal, local and private actions already affecting the species within the Action Areas and the present effects within the Action Areas that will occur contemporaneously with the consultation in progress. It includes a description of the known status of northern long-eared bats and their habitats within or near the SR 641 Action Areas.

Northern Long-eared Bats within the SR 641 Action Area

Critical Habitat

No critical habitat is proposed at this time for the northern long-eared bat.

Maternity Colonies

As referenced in the consultation history section of this document, three pregnant female northern long-eared bats were captured during mist-net surveys of the Action Area in the 2008 summer reproductive season (along with a non-reproductive female, 2 adult females of unknown reproductive status, and one northern long-eared bat that escaped prior to examination). Two post-lactating females were captured in the 2010 survey in addition to one adult male. No radio-telemetry was performed for northern-long eared bats during the two surveys.

It is assumed from the capture of these reproductive northern long-eared bats that a maternity colony is located within the area near and adjacent to the capture sites. Like the Indiana bat, we have concluded that the maternity colony habitat is most likely focused along the Little Honey Creek corridor within the Action Area (and the Indiana bat maternity area as described in the Indiana bat Biological Opinion), due to the distribution and proximity of habitat. The forested Honey Creek corridor southeast of the Action Area also likely provides foraging habitat for the maternity colony, based on northern long-eared bat captures in the area.

Adult Males

One adult male was captured in the 2010 bat survey at Site Sup A. **There are no other records of** adult males in the Action Area.

EFFECTS OF THE ACTION

Direct Effects on the Northern Long-eared Bat

No direct effects are anticipated to northern long-eared bats as a result of habitat loss, habitat modification, or felling of an occupied roost tree. All tree clearing for the project has already been completed.

Barrier Impacts

There is abundant literature regarding the adverse effects of roads on wildlife movements, although relatively little is known about effects on the northern long-eared bat. Whereas some species avoid roads entirely, restricting their movement patterns and distribution, others show little avoidance behavior and attempt to cross roads at inappropriate times, resulting in vehicle collisions and mortality. Indiana bats associated with a maternity colony near the Indianapolis

Airport have been observed to readily cross small roads (e.g., dirt, gravel, and paved) while foraging at night, but multilane divided highways were only rarely crossed and most of those crossings occurred when bats followed a stream under Interstate 70 (Dale Sparks, Indiana State University, personal communication, 2007). More recently, a study of bat interactions with roads at the Indianapolis Airport demonstrated that commuting bats were twice as likely to avoid crossing a road when vehicles were present (60% avoidance vs 32% avoidance), indicating that roads with higher traffic volumes have an increased barrier effect on foraging bats (Zurcher et. al. , 2010). Although all tree-clearing has occurred in the Action Area, traffic is not yet present on Phases 3 and 4. It is possible some bats are willing to still cross the cleared right of way now, but when the road becomes fully operational, their movement may be reduced. Due to the substantial width of the SR 641 corridor and the volume of traffic that will use the new highway, it could act as a partial barrier and deterrent to foraging females and juveniles which remain in the area, impairing access to preferred foraging areas, thus reducing the colony's foraging efficiency. The change in any barrier affect occurring now verses once the road is fully operation is difficult to determine and likely minimal.

Water Quality Impacts

During construction, water quality may be temporarily adversely affected in streams (*e.g.*, increased siltation) where NLEBs may drink and presumably obtain a small portion of their insect prey. Water quality impacts that may result from the proposed project include the relocation of stream channels, increased sedimentation as the result of construction activities, and increased runoff (and associated pollutants) from newly constructed roadways. Foraging habitat and aquatic insect production associated with relocated stream segments will be relatively poor until the riparian zone and aquatic community become re-established. Because the bulk of the bats' prey base is made up of terrestrially based insects (Feldhammer et al. 2009; Brack and Whitaker 2001), short and/or long-term adverse effects to local water quality are not likely to rise to a level where incidental take of NLEBs is reasonably certain to occur.

Construction Noise and Vibration Impacts

Most noise generated from project-related construction activities will likely occur during daylight hours when NLEBs are roosting in trees. Unfamiliar noises from the operation of chainsaws, bulldozers, skidders, trucks, etc. could occur in relatively close proximity to occupied primary and alternate roost trees during the summer reproductive season. The novelty of these noises and their relative volume levels will likely dictate the range of responses from individuals or colonies of bats. At low noise levels (or farther distances), bats initially may be startled and have increased respiration/heart rates, but they would likely habituate to the low background noise levels. At closer range and louder noise levels (particularly if accompanied by physical vibrations from heavy machinery) many bats would probably be startled to the point of fleeing from their day-time roosts and in a few cases may experience increased predation risk. Because the noise levels in construction areas will likely continue for more than a single day the bats roosting within or close to these areas are likely to shift their focal roosting areas further away or may temporarily abandon these roosting areas completely. Callahan (1993) noted that the likely cause of the bats in his study area abandoning a primary roost tree was disturbance from a bulldozer clearing brush adjacent to the tree. Female Indiana bats in Illinois used roosts at least

1640 ft (500 m) from paved roadways (Garner and Gardener 1992). Very low bat usage close to interstates has also been noted by other bat biologists (Whitaker, Jr. per. comm.). Conversely, Indiana bats did use roosts near the I-70/Indianapolis Airport area, including a primary maternity roost 1,970 ft (0.6 km) south of I-70. This primary maternity roost was not abandoned despite constant noise from the Interstate and airport runways, however; their proximity to the Interstate could also have been due to lack of more suitable roosting areas and furthermore the noise levels from the airport were not novel to the bats, so they had likely habituated to them (USFWS 2002).

Noise impacts will be reduced from what was evaluated for Indiana bats since all tree-clearing has already occurred.

No blasting activities are expected to occur during project construction.

Highway Noise

Highways are linear noise sources in which the tire/pavement contact, engine and exhaust generate sound at various pressures and frequencies. It is unclear exactly how bats may react once the new highway becomes fully operational. Some studies indicated very low bat usage close to interstates and others indicate that some bats will roost and forage near large roadways. In fact, both northern long-eared bats and Indiana bats were netted within approximately 300 feet of existing SR 46. The latter may be a factor of available surrounding habitat and habituation over time to the noise.

It is possible that some northern long-eared bats in the area have acclimated somewhat to road noises since capture records indicate they have been found near existing SR 46.

Roadkill

Roadkill may also result in direct death of maternity colony members (and is likely currently occurring to some extent); the full effect of the take is not anticipated to occur until the entire roadway is constructed and fully operational (*i.e.* free flowing traffic). In addition, some direct mortality from roadkill may be compensatory rather than additive as the number of roadkills currently occurring on other local roads may decrease as traffic shifts to the new 641 bypass. Because SR 46 is already operational in a portion of the proposed maternity area, we do not expect roadkill deaths to escalate significantly in this area. Some rise could occur due to traffic using the Phase 3 portion of the project, overall increased traffic volume and faster moving vehicles.

Studies on Indiana bats, a species considered to be very similar to the NLEB, indicate that they typically avoid crossing over open areas (Brack 1983; Menzel *et. al.* 2001) although they have been documented flying over busy interstate highways such as I-70 near the Indianapolis Airport (USFWS 2002) and U.S. Route 22 near the Canoe Creek Church in Pennsylvania (Butchkowski 2003). In both of these circumstances, however, the road lies between known roosting and foraging areas for members of the colonies (Butchkowski 2003; D. Sparks, ESI, Inc., pers. comm. 2005). While it has been shown that Indiana bats will cross over busy highways when they separate foraging from roosting areas, it should also be noted that through a radio telemetry study done by Indiana State University, Sparks (pers. comm.) observed that individuals of the Indianapolis Airport Colony avoided flying over I-70 where a bridge provided a 35-ft high corridor beneath the road. The results of this particular study indicate that bats may avoid flying over highways when an alternative corridor is present. Recent research published by Zurcher *et. al*. 2010 indicates that bats may actually avoid traffic. In this study, bats were more than twice as likely to reverse their flight course while approaching a road when vehicles were present. They found that when automobiles were present, 60% of bats exhibited avoidance behavior and reversed course at an average of 10 meters from the oncoming vehicle. Conversely, when no automobiles were present, only 32% of bats reversed their course and 68% crossed the road. Therefore, although it is logical to assume that some roadkill may occur, the amount of roadkill attributable to SR 641 is somewhat speculative and will be difficult to detect.

Research at a highway in Pennsylvania demonstrated that an Indiana bat and several bats of other species were killed by automobile collisions (Russell et al. 2008, Butchkoski, 2002). Assuming that some individual bats will continue to use this area, due to the increase in traffic volume and velocity, combined with increased traffic from secondary development, we anticipate that a small number of bats will be killed by vehicle collisions while attempting to cross the highway at low altitudes, especially when following stream corridors or other travel corridors. This amount of roadkill is likely insignificant at the regional or species level.

<u>Effects on Adult Males</u>

Due to the apparently low density of adult males in the Action Area and the adult male behavior of roosting singly and in relatively lower quality roost trees, we conclude that take of adult males as a result of the proposed action is likely to occur but will be substantially lower than for females and juveniles.

Effects of Avoidance, Minimization and Mitigation Measures

<u>Forest Mitigation</u>

The FHWA and INDOT have incorporated measures into the proposed project design to avoid, minimize and mitigate the impacts of the project to the extent practical. Some of these include seasonal tree-clearing restrictions, specific design measures to reduce the right of way area, post construction bat surveys, etc.

In addition, during consultation for the Indiana bat, the FHWA and INDOT committed to mitigate for the permanent and unavoidable loss of forests (3:1 ratio) and wetlands (ratios vary) within the action areas by purchasing existing habitat, and/or creating, restoring, and enhancing habitat. Due to similarities in the two species, we believe these mitigation properties will also benefit the NLEB and help to mitigate and minimize project impacts on this species.

Currently, 268 acres of land has been secured; 182 acres are existing forested habitat and 86 acres of land is in various stages of reforestation activities. Permanent conservation easements have been placed on these parcels. This mitigation will help to provide and maintain forested habitat in the area in perpetuity.

Indirect Effects

Indirect effects are defined for the purposes of the Endangered Species Act (ESA) as those impacts that are caused by or will result from the proposed action, are later in time, and are reasonably certain to occur. Indirect effects may occur outside of the area directly affected by the action.

Induced Growth

It is likely that habitat loss, fragmentation, and human disturbance in some portions of the Action Area will increase over time, as new secondary development occurs, particularly near the proposed SR 46/Riley Road interchange and along Moyer Road. The SR 641 BA for the Indiana bat stated that, based on current zoning and land use plans, most new residential and commercial growth in the vicinity of the action area will occur in 14 parcels of open land totaling 380 acres located adjacent to existing SR 46, Riley Road, and Moyer Road, with little growth planned in the remainder of the Action Area. This information is relevant for analysis of the northern long-eared bat as well, and although we believe that additional development will likely occur, and that some development will be induced or expedited by the presence of SR-641, it is unlikely that the growth will occur in forested areas and impacts to the northern long-eared bat are expected to be minimal.

Summary of Effects

In summary, the following effects are anticipated:

- Disturbance of roosting bats during construction.
- Vehicle collision mortality.
- Indirect loss of forest or wetland habitat from residential and commercial development (this is anticipated to be minimal)
- Decreased movement in the area of new construction once traffic is flowing

Although there may be some short-term impacts to individuals within the colonies, these impacts are not likely to affect the colonies' long-term reproduction and viability. Thus, the maternity colonies are likely to persist within the action area into the reasonably foreseeable future following construction, operation, and maintenance of the SR 641 project. Furthermore, with successful implementation and maturation of the proposed mitigation projects and other mitigation and conservation measures, we anticipate that long-term habitat conditions for this colony will be suitable and sustainable for the long-term survival and recovery of the species.

CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the Act. In general, a cumulative effects analysis considers actions that are not related to or dependent on the action which is the subject of this biological opinion.

The Indiana bat BA for this project discusses cumulative effects of the project but does not provide information regarding cumulative effects that are reasonably likely to occur. Potential cumulative effects include future municipal or private development which affects the maternity colony but would not be considered an indirect effect of this agency action, changes in municipal planning and zoning ordinances or policies which promote development in Indiana bat habitat, and county actions such as highway projects and drainage improvements. We are not aware of any cumulative effects which are reasonably certain to occur.

CONCLUSION

After reviewing the current status of the northern long-eared bat, the environmental baseline for the action area, the effects of the remaining highway construction and the cumulative effects, it is the Service's biological opinion that the highway project, as proposed, is not likely to jeopardize the continued existence of the northern long-eared bat, and is not likely to destroy or adversely modify designated critical habitat since none has been designated.

Our basis for this conclusion is as follows: We anticipate that the northern long-eared bat colony will not be destroyed or decimated by direct or indirect effects associated with the construction, operation, and maintenance of SR 641. All direct forest impacts from the project construction have already occurred prior to the species being listed. Direct take is likely to only occur in the form of vehicle collision mortality, which we estimate will be no more than one bat every two years. Some take may occur as a result of reduced movement throughout the area once traffic is flowing, however we anticipate this change to be very minimal and difficult to measure. Based on this information, the colony will likely continue to exist.

This concludes the conference for the northern long-eared bat on the SR 641 Bypass project. Based on the timing of the completion of this conference opinion and the effective listing date of May 4, 2015, this conference opinion will automatically be adopted as a biological opinion upon the listing date and no further section 7 consultation will be necessary. The incidental take statement provided in this conference opinion will become effective once the species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation.

After listing of the northern long-eared bat as threatened and the subsequent adoption of this conference opinion as the biological opinion, the Federal agency shall request re-initiation of consultation if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect the species or critical habitat in a manner or to an extent not considered in this conference opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the species or critical habitat that was not considered in this conference opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation 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 to attempt to engage in any such conduct. Harm is further defined by FWS 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 FWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. 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 Act provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the Federal Highway Administration so that they become binding conditions of any grant or permit issued to the Indiana Department of Transportation, as appropriate, for the exemption in section 7(o)(2) to apply. The Federal Highway Administration has a continuing duty to regulate the activity covered by this incidental take statement. If the Federal Highway Administration (1) fails to assume and implement the terms and conditions or (2) fails to require the Indiana Department of Transportation to adhere to the terms and conditions of the incidental take statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the Federal Highway Administration must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement. [50 CFR 402.14(i)(3)]

AMOUNT OR EXTENT OF TAKE

The Service anticipates that northern long-eared bats could be taken as a result of direct or indirect effects of the proposed action. The incidental take is expected to be in the form of disruption of foraging patterns, roost disturbance/abandonment and daytime exposure to predators, wounding and death of individuals (highway traffic collision mortality), and indirect .

The Service anticipates that the amount of incidental take of northern long-eared bats will be difficult to detect for the following reason(s):

1. The primary maternity roost tree(s) were not identified and the foraging range was not characterized, therefore the size of the colony and the relationship of project impacts to the colony's foraging range are unknown.

2. The northern long-eared bat's small body size, nocturnal habits and secretive daytime roosts make finding a dead or injured specimen unlikely.

3. Population monitoring is typically conducted in hibernation caves rather than in maternity colonies which makes it particularly difficult to determine northern long-eared bat populations,

especially due to their propensity to hibernate in small crack and crevices; therefore, population monitoring cannot be used to estimate take.

Often we quantify and track the level of anticipated take by monitoring the amount of habitat modification as a surrogate. However, no additional habitat loss is expected at this stage of the project. The only quantifiable anticipated take at this point is take of no more than 1 individual northern long-eared bat every 2 years as a result of traffic collision mortality.

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 the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measure(s) are necessary and appropriate to minimize take of the northern long-eared bat:

1. Continue to adhere to seasonal tree-clearing restrictions and not clear any trees during the northern long-eared bat summer reproductive occupancy season.

2. Continue to implement the plan to acquire, preserve, restore and permanently protect a minimum of 255 acres of Indiana bat habitat in the maternity area. This habitat protection and restoration will benefit the northern long-eared bat as well. Currently, over 240 acres have been secured and another 24 acres is in the final stages of acquisition.

3. Develop and implement a 2 year post-construction monitoring plan that includes both northern long-eared and Indiana bats.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the Federal Highway Administration must comply with the following terms and conditions, which implement the reasonable and prudent measures described above and outline required reporting/monitoring requirements. These terms and conditions are non-discretionary.

1. Tree clearing may not occur April 1 - September 30. Prohibit contractors from destroying bat summer habitat for borrow areas and spoil disposal areas. Require contractors to locate access routes and equipment staging areas to minimize summer habitat impacts.

2. The 255 acres may be a combination of permanent protection of existing forested habitat and restoration of lost forested habitat. Restoration may not comprise more than 33% of the total acreage. The most effective measure to minimize reproductive take is to ensure that resident individuals are provided adequate foraging and roosting habitat.

3. Monitor the post-construction use of the project corridor by the resident northern long-eared and Indiana bat maternity colonies by conducting a two-year follow-up bat survey of the action area, with telemetry, in the summer following completion of the project. This survey will be used to determine whether the conservation measures and reasonable and prudent measures were successful in maintaining useable foraging habitat. Monitoring must consist of a mist net survey following the Service's standard protocols, and should be initiated in the summer following the completion of the SR 641 project. The surveys must encompass the entire Action Area (as defined in this biological opinion) but can cover a larger area at the discretion of FHWA or INDOT.

4. Bridges and culverts over 60 inches in vertical height or rise should be inspected for the presence of bats within seven days of the start of construction activity on that bridge or culvert that will take place between April 1 and September 30. Inspection consists of examining the underside of each bridge or the ceiling of each culvert for the presence of bats. If any bats are found roosting on the bridge or culvert, immediately contact our office at (812) 334-4261 to determine the appropriate response.

5. Bats may use man-made structures as roosts to shelter their pups, which are not be able to fly when they are very young. Therefore, during the maternity season, in May, June, and July, buildings should be visually inspected prior to demolition to determine whether bats are present. Should bats be found using the building, contact our office at (812) 334-4261 to determine the appropriate response.

6. To ensure the appropriate evaluations are completed during field efforts associated with Terms and Conditions numbers 4 and 5 above, INDOT and FHWA will prepare specific protocols for inspecting bridges, culverts and structures for review and approval by USFWS prior to initiation of any activities associated with modification of existing bridges and culverts or demolition of existing structures.

   Dead bats located in the action area during construction or monitoring activities are to be reported immediately to the Service's Bloomington Field Office [(812) 334-4261], and subsequently transported on ice to that office. Handling of dead bats requires heavy gloves and/or a small shovel. Sick or injured bats should also be reported to the Service. No one except researchers contracted to conduct bat monitoring activities should attempt to handle a live bat, regardless of its condition. The Service will make a species identification of dead, injured or sick bats. If a northern long-eared bat is identified the Bloomington Field Office will notify the appropriate Service law enforcement office. This information on the disposition of dead or injured bats should be incorporated into instructions provided to project personnel and included in the construction specifications.

The Service believes that no more than 1 individual every two years bat will be incidentally taken as a result of the proposed action. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded, such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The Federal agency must 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.

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 provides the following conservation recommendations for the FHWA's consideration; these activities may be conducted at the discretion of FHWA as time and funding allow:

NORTHERN LONG-EARED BAT CONSERVATION RECOMMENDATIONS

1. Working with the Service, develop national guidelines or best management practices for addressing northern long-eared bat issues associated with FHWA projects within the range of the northern long-eared bat.

2. Provide funding to expand on scientific research and educational outreach efforts on northern long-eared bats in coordination with the Service's BFO.

3. In coordination with the BFO, purchase or otherwise protect additional northern long-eared bat hibernacula and forested swarming habitat in Indiana.

4. Provide funding for research to address White Nose Syndrome in bats.

5. Conduct additional post-construction monitoring to evaluate the effect of the project on northern long-eared and Indiana bats and to explore methods of reducing adverse impacts from traffic and highway maintenance.

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

REINITIATION NOTICE

This concludes formal consultation for the northern long-eared bat with FHWA on the construction, operation, and maintenance of the SR 641 Terre Haute Bypass and associated development. As provided in 50 CFR §402.16, re-initiation 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 agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action (e.g., highway construction and associated development) are 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 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 re-initiation.

Figure 1. SR 641 Action Area as defined in the Indiana bat Biological Assessment. This same action area is being used for the northern long-eared bat formal conference on SR 641.

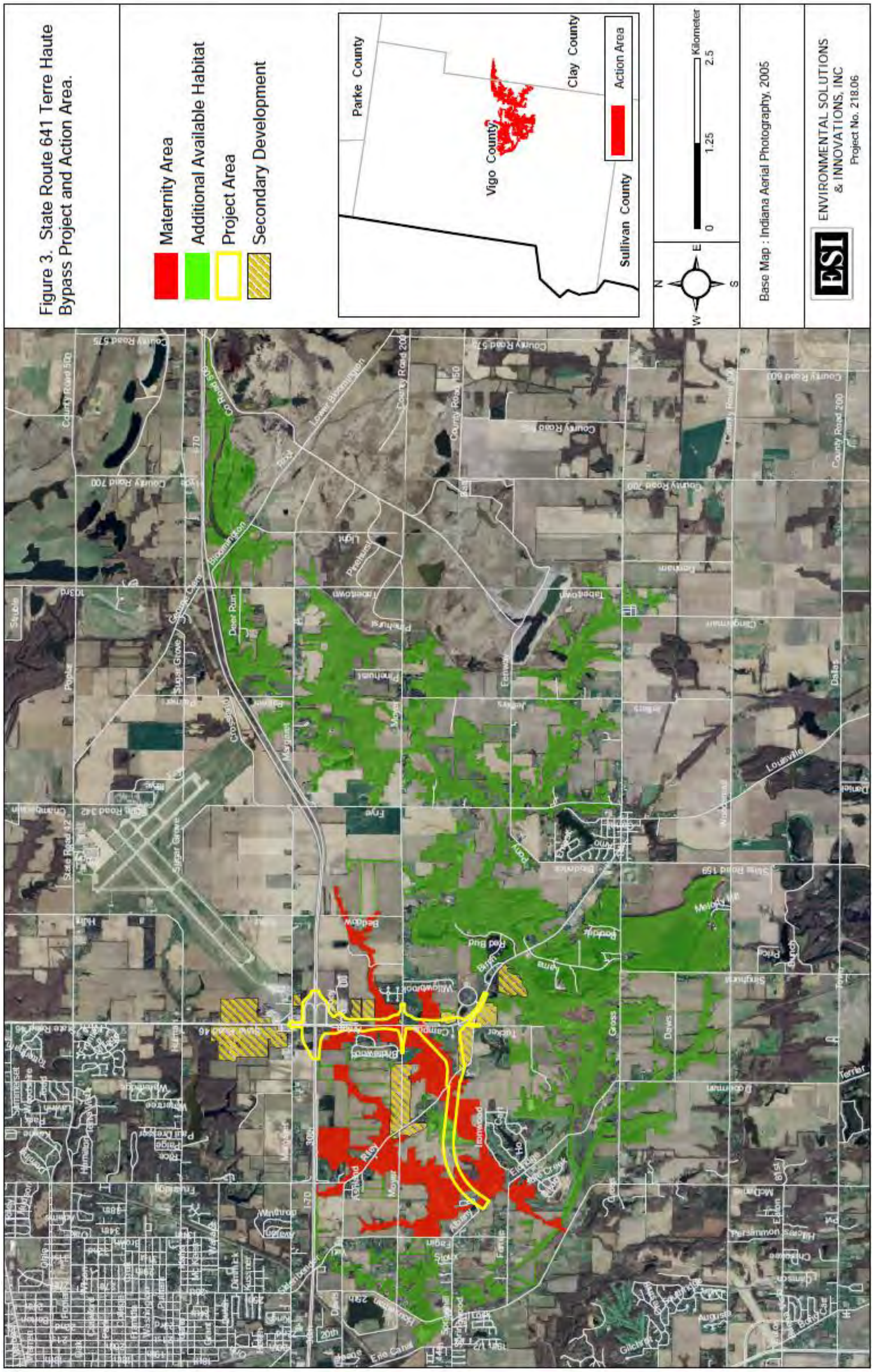
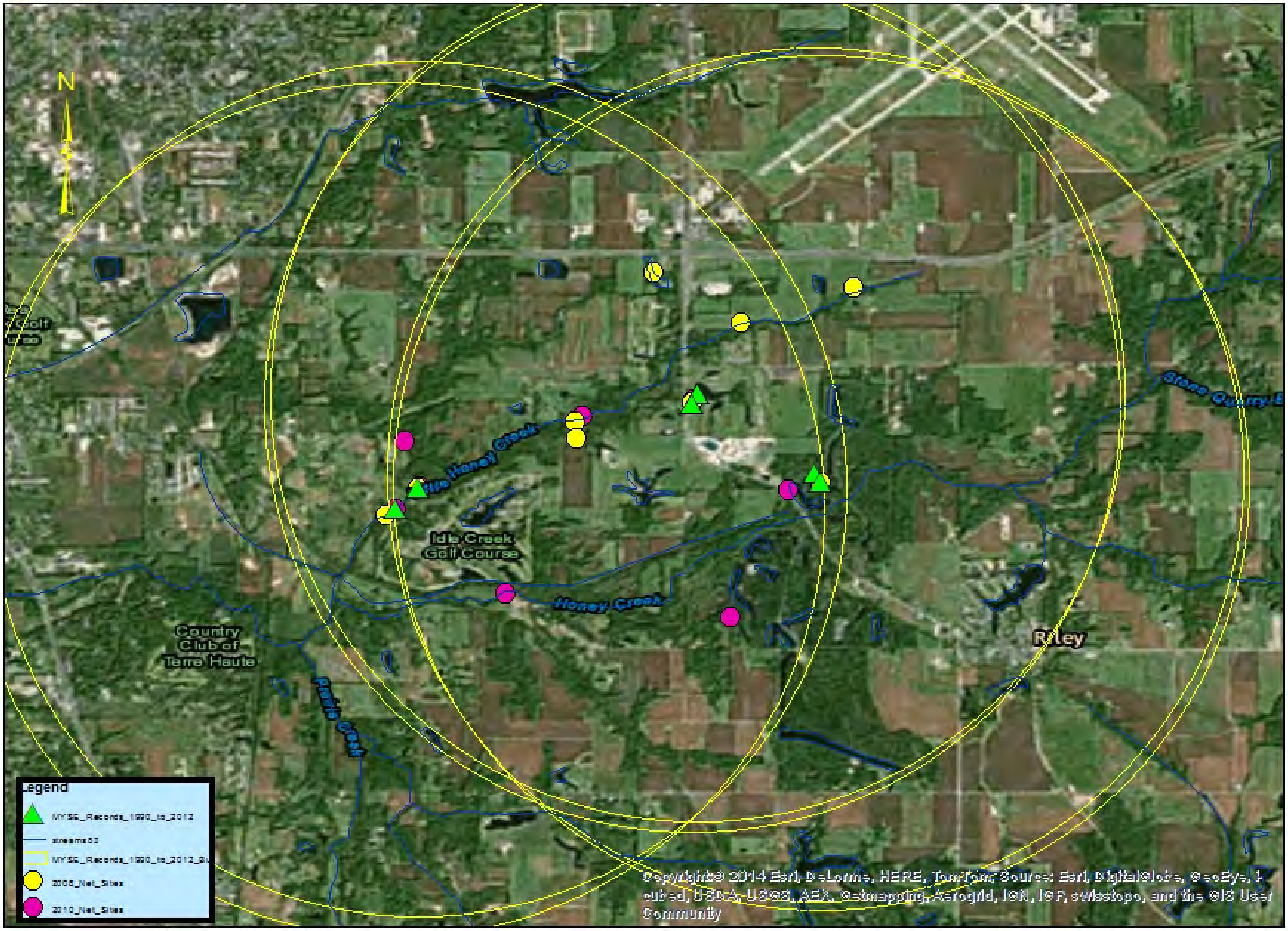


Figure 2. NLEB survey and capture locations 2008 and 2010 with 3-mile buffer.



Literature Cited

Amelon, S., and D. Burhans. 2006. Conservation assessment: *Myotis septentrionalis* (northern long-eared bat) in the eastern United States. Pages 69-82 in Thompson, F. R., III, editor. Conservation assessments for five forest bat species in the eastern United States. U.S. Department of Agriculture, Forest Service, North Central Research Station, General Technical Report NC-260. St. Paul, Minnesota. 82 pp.

Arnold, B. 2007. Population structure and sex-biased dispersal in the forest dwelling vespertilionid bat, *Myotis septentrionalis*. Am. Midl. Nat. 157:374–384.

Barbour, R. W. and W. H. Davis. 1969. Bats of America. The University of Kentucky Press, Lexington, Kentucky.
64

Brack, V. 2007. Temperatures and Locations Used by Hibernating Bats, Including *Myotis sodalis* (Indiana Bat), in a Limestone Mine: Implications for Conservation and Management. Journal of Environmental Management 40:739–746.

Brack, V., and J. O. Whitaker. 2001. Foods of the northern myotis,*Myotis septentrionalis*, from Missouri and Indiana, with notes on foraging. *Acta Chiropterol.* 3: 203–210.

Brack, V., Jr. 1983. The non-hibernating ecology of bats in Indiana with emphasis on the endangered Indiana bat, *Myotis sodalis*. Ph.D. dissertation, Purdue Univ., West Lafayette, Ind. 280 pp.

Broders, H.G., Forbes, G.J., Woodley, S., Thompson, I.D., 2006. Range extent and stand selection for roosting and foraging in forest-dwelling northern long-eared bats and little brown bats in the Greater Fundy ecosystem, New Brunswick. J. Wildl. Manage. 70, 1174–1184.

Butchkowski, C. M. 2003. Indiana Bat (*Myotis sodalis*) Investigations at Canoe Creek, Blair County Pennsylvania. Report to Pennsylvania Game Commission, Bureau of Wildlife Management. 13 pp.

Caceres, M. C., and M. J. Pybus. 1997. Status of the northern long-eared bat (*Myotis septentrionalis*) in Alberta. Alberta Environmental Protection, Wildlife Management Division, Wildlife Status Report No. 3, Edmonton, AB.

Caceres, M. C., and R. M. R. Barclay. 2000. *MYOTIS SEPTENTRIONALIS*. Mammalian Species No. 634:1-4.

Caire, W., R. K. LaVal, M. L. LaVal, and R. Clawson. 1979. Notes on the ecology of *MYOTIS KEENII* (Chiroptera, Vespertilionidae) in Eastern Missouri. Amer. Midl. Nat. 102(2):404-407.

Callahan, E.V., III. 1993. Indiana bat summer habitat requirements. M.S. Thesis. University of Missouri, Columbia. 84 pp.

Carter, Timothy C. and G. Feldhamer. 2005. Roost tree use by maternity colonies of Indiana bats and northern long-eared bats in southern Illinois. Forest Ecology and Management 219: 259–268.

Clark, B.K, Bowles, J.B. and B.S. Clark. 1987. Status of the endangered Indiana bat in Iowa. American Midland Naturalist, 118(1): 32-39.

Cope, J.B. and S.R. Humphrey. 1972. Reproduction of the bats *MYOTIS KEENII* and *PIPISTRELLUS SUBFLAVUS* in Indiana. 13:9-10.

Dickinson, M.B., Norris, J.C., Bova, A.S., Kremens, R.L., Young, V. and M.J. Lacki. 2010. Effects of wildland fire smoke on a tree-roosting bat: integrating a plume model, field measurements, and mammalian dose–response relationships. Can. J. For. Res. 40: 2187–2203.

Easterla, D. A. 1968. Parturition of Keen's Myotis in Southwestern Missouri. Journal of Mammalogy 49(4):770.

Faure, P. A., J. H. Fullard, J. W. Dawson. 1993. The gleaning attacks of the Northern long-eared bat, Myotis septentrionalis, are relatively inaudible to moths. Journal of Experimental Biology 178:173-189.

Feldhamer, G. A., T. C. Carter, J. O. Whitaker Jr. 2009. Prey Consumed by Eight Species of 5 Insectivorous Bats from Southern Illinois. The American Midland Naturalist 162(1):43-51.

Fitch, J. H. and K. A. Shump, Jr. 1979. Myotis keenii. Mammalian Species, No. 121:1-3.
Fobian, T. B. 2007. Reproductive biology of the rabbitsfoot mussel (Quadrula cylindrica) (Say, 1817) in the upper Arkansas River system, White River system, and the Red River system. Unpublished M.S. thesis, Missouri State University, Springfield. 104 pp.

Foster, R. W. and A. Kurta. 1999. Roosting ecology of the Northern bat (*Myotis septentrionalis*) and comparisons with the endangered Indiana bat (*Myotis sodalis*). Journal of Mammalogy 80(2):659-672.

Garner, J. D., and J. E. Gardner. 1992. Determination of summer distribution and habitat utilization of the Indiana bat (Myotis sodalis) in Illinois. Final Report. Project E-3. Illinois Department of Conservation, Division of Natural Heritage and Illinois Natural History Survey, Center for Biogeographic Information. 25 pp.

Garroway, C. J. and H. G. Broders. 2008. Day roost characteristics of northern long-eared bats (*Myotis septentrionalis*) in relation to female reproductive status. Ecoscience 15(1):89-93.

Garroway, C.J., Broders, H.G., 2007. Nonrandom association patterns at northern long-eared bat maternity roosts. Can. J. Zool. 85, 956–964.

Goehring, H. H. 1954. *Pipistrellus subflavus obscurus, Myotis keenii*, and *Eptesicus fuscus fuscus* hibernating in a storm sewer in central Minnesota. Journal of Mammalogy 35(3):434-436.

Griffin, D. R. 1940. Reviewed notes on the life histories of New England cave bats. Journal of Mammalogy 21(2):181-187.

Griffin, D. R. 1945. Travels of banded cave bats. Journal of Mammalogy 26(1): 15-23.
Griffith, L. A. and J. E. Gates. 1985. Food habits of cave-dwelling bats in the central Appalachians. Journal of Mammalogy 66(3):451-460.

Hall, J. S., R. J. Cloutier and D. R. Griffin. 1957. Longevity records and notes on tooth wear of bats. Journal of Mammalogy 38 (3): 407-409.

Hitchcock, H. B. 1949. Hibernation of bats in southeastern Ontario and adjacent Quebec. Canadian Field-Naturalist 63(2): 47-59.

Johnson, J. B., W. M. Ford, J. W. Edwards. 2011. Nocturnal activity patterns of northern myotis (*Myotis septentrionalis*) during the maternity season in West Virginia (USA). Acta Chiropterologica, 13(2): 391–397.

Johnson, J. B., W. M. Ford, J. W. Edwards. 2012. Roost networks of northern myotis (*Myotis septentrionalis*) in a managed landscape. Forest Ecology and Management 266: 223–231.

King, A. 1993. A Model of Summer Habitat Use by the Federally Endangered Indiana Bat (*Myotis sodalis*) in Indiana: Compilation of Data from 1990-1992 Field Studies. 3D/Environmental Services Inc., Cincinnati, Ohio. Unpublished Technical Report submitted to the Indiana Department of Natural Resources, Division of Fish and Wildlife, Endangered Species Program.

Krochmal, A. R. and D. W. Sparks. 2007. Timing of Birth and Estimation of Age of Juvenile *Myotis septentrionalis* and *Myotis lucifugus* in West-Central Indiana. Journal of Mammalogy 88(3):649-656.

Kunz, T. H. 1971. Reproduction of Some Vespertilionid Bats in Central Iowa. American Midland Naturalist 86(2):477-486.

Kunz, T. H. 1973. Temporal and Spatial Components of Bat Activity in Central Iowa. Journal of Mammalogy 54(1):14-32.

Kurta, A. 1995. Mammals of the great lakes region. Ann Arbor: University of Michigan Press.

Kurta, A. and J. A. Teramino. 1994. A novel hibernaculum and noteworthy records of the Indiana bat and eastern pipistrelle (Chiroptera: Vespertilionidae). American Midland Naturalist 132(2):410-413.

Kurta, A. 1982. A review of Michigan Bats: Seasonal and Geographic Distribution. Michigan Academician 14:295-311.

Lacki, M. J., D.R. Cox, L. E. Dodd, and M. B. Dickinson. 2009. Response of northern bats (*Myotis septentrionalis*) to prescribed fires in eastern Kentucky forests. Journal of Mammalogy 90(5): 1165-1175.

Lacki, M. J. and J. H. Schwierjohann. 2001. Day-Roost Characteristics of Northern Bats in Mixed Mesophytic Forest. The Journal of Wildlife Management 65(3):482-488.

LaVal, R. K., R. L. Clawson, M. L. LaVal and W. Caire. 1977. Foraging Behavior and Nocturnal Activity Patterns of Missouri Bats, with Emphasis on the endangered species *Myotis grisescens* and *Myotis sodalis.* Journal of Mammalogy 58(4):592-599.

Menzel, M. A., S. F. Owen, W. M. Ford, J. W. Edwards, P. B. Wood, B. R.Chapman, and K. V. Miller. 2002. Roost tree selection by northern long-eared bat (*Myotis septentrionalis*) maternity colonies in an industrial forest of the central Appalachian mountains. Forest Ecology and Management 155:107-114.

Menzel, M.A., J.M. Menzel, T.C. Carter, W.M. Ford, J.W. Edwards. 2001. Review of the forest habitat relationships of the Indiana bat (*Myotis sodalis*). USDA Forest Service, Pennsylvania.

Mills, R. S. 1971. A concentration of *Myotis keenii* at caves in Ohio. Journal of Mammalogy. 52(3) 625 pp.

Mumford R. E., and J. B. Cope. 1964. Distribution and status of the chiroptera of Indiana. American Midland Naturalist 72(2):473-489.

Nagorsen, D. W., and R. M. Brigham. 1993. The Mammals of British Columbia. 1. Bats. Royal British Columbia Museum, Victoria, and the University of British Columbia Press, Vancouver. pp. 164.

Owen, S. F., M. A. Menzel, W. M. Ford, B. R. Chapman, K. V. Miller, J. W. Edwards, and P. B. Wood. 2003. Home-range size and habitat used by the Northern Myotis (*Myotis septentrionalis*). American Midland Naturalist 150(2):352-359.

Owen, S. F., M. A. Menzel, W. M. Ford, J. W. Edwards, B. R. Chapman, K. V. Miller, and P. B. Wood. 2002. Roost tree selection by maternal colonies of Northern long-eared Myotis in an intensively managed forest. USDA Forest Service. Newtown Square, Pennsylvania.

Pearson, E. W. 1962. Bats hibernating in silica mines in southern Illinois. Journal of Mammalogy 43(1):27-33.

Perry, R. W., and R. E. Thill. 2007. Roost selection by male and female northern longeared bats in a pine-dominated landscape. Forest Ecology and Management 247:220-226.

Raesly, R. L. and J. E. Gates. 1987. Winter habitat selection by north temperate cave bats. American Midland Naturalist 118(1):15-31.

Sasse, D.B. and P.J. Pekins. 1996. Summer roosting ecology of northern long-eared bats (Myotis septentrionalis) in the white mountain national forest. Bats and Forests Symposium October 1995, Victoria, British Columbia, Canada, p.91-101.

Sheets, J. Whitaker, John O., Brack Jr., Virgil W., Sparks, Dale W. 2013. Bats of the hardwood ecosystem experiment before timber harvest: assessment and prognosis. Gen. Tech. Rep. NRS-P-108. U.S. Department of Agriculture, Forest Service, Northern Research Station.

Simmons, N.B. 2005. Mammal species of the world: a taxonomic and geographic reference. P.516. [Wilson, D.E. and D.M. Reeder (editors)]. The John Hopkins University Press, Baltimore, Maryland.

Stones, R.C. and W. Fritz. 1969. Bat studies in upper Michigan’s copper mining district. The Michigan Academician, p. 77-85.

Swanson, G. and C. Evans. 1936. The hibernation of certain bats in southern Minnesota. Journal of Mammalogy, 17(1): 39-43.

Timpone, J. C., Boyles, J.G., Murray, K.L., Aubrey, D.P., and L.W. Robbins. 2010. Overlap in roosting habits of Indiana Bats (Myotis sodalis) and northern bats (Myotis septentrionalis). American Midland Naturalist, 163:115-123.

U.S. Fish and Wildlife Service (USFWS). 2002. Biological Opinion on the Application for an Incidental Take Permit for the Federally Endangered Indiana Bat (*Myotis sodalis*) for the Six Points Road Interchange and Associated Development. Unpublished Report. Bloomington Field Office, Bloomington, Indiana. 35 pp.

U.S. Fish and Wildlife Service and National Marine Fisheries Service. 1998. Endangered species handbook – procedures for conducting consultation and conference activities under section 7 of the Endangered Species Act. Washington, D.C.

van Zyll de Jong, C.G. 1979. Distribution and systematic relationships of long-eared Myotis in western Canada. Canadian Journal of Zoology, 57: 987-994.

van Zyll de Jong, C. G. 1985. Handbook of Canadian mammals. National Museums of Canada, Ottawa, Canada. pp. 116-120.

Whitaker, J.O. and W.J. Hamilton. 1998. Mouse-eared bats, Vespertilionidae. P. 89-102. In Mammals of the eastern United States, Third Edition. Comstock Publishing Associates, a Division of Cornell University Press, Ithaca, New York.

Whitaker, J.O. and R.E. Mumford. 2009. Northern Myotis. P. 207-214. In Mammals of Indiana. Indiana University Press, Bloomington, Indiana.

Whitaker, J.O. and L.J. Rissler. 1992. Seasonal activity of bats at copperhead cave. Proceedings 17 of the Indiana Academy of Science, 101: 127-134.

Zurcher, A. A., D. W. Sparks, and V. J. Bennett. 2010. Why the bat did not cross the road. Acta Chiropterologica, 12(2): 337–340.