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February 27, 2016

Timothy M. Hill, Administrator
Ohio Department of Transportation
Office of Environmental Services
1980 West Broad Street, Mail Stop 4170
Columbus, OH 43223

TAILS: 03E15000-2014-F-1033 (PID 81747/81748)

Attn: Michael Pettegrew, Matt Perlik

RE: Biological Opinion on the Ohio Department of Transportation FRA-270-21.76/22.85 Project (PIDs 81747/81748) in Franklin County, Ohio and Its Effects on the Indiana Bat (*Myotis sodalis*) and Northern Long-eared Bat (*Myotis septentrionalis*)

Dear Mr. Hill,

This letter accompanies the U.S. Fish and Wildlife Service's (Service) enclosed Biological Opinion based on our review of the the Ohio Department of Transportation (ODOT) FRA-270-21.76/22.85 project (PIDs 81747/81748) in Franklin County, Ohio, and its effects on the **Indiana bat** (*Myotis sodalis*) and **northern long-eared bat** (*Myotis septentrionalis*) not previously considered during ODOT's Endangered Species Act (16 U.S.C. 1531 *et seq.*) section 7 informal consultation on the FRA-270-21.76/22.85 project in 2006. The ODOT request for emergency, after-the-fact formal consultation[1] was made and received on October 28, 2016. We provided you with a January 4, 2017 letter notifying you that we had initiated formal consultation effective October 28, 2016.

In this Opinion, the Service concludes that the action described therein is likely to adversely affect but is not likely to jeopardize the continued existence of the Indiana bat or northern long-eared bat. ODOT determined that the action would have no effect on any other federally listed species. Critical habitat for the Indiana bat has been designated at hibernacula in Illinois, Indiana, Kentucky, Missouri, Tennessee, and West Virginia. However, because this action did not affect these areas, and because no critical habitat has been designated for the northern long-eared bat, no critical habitat was affected by this action.

[1] Pursuant to 23 U.S.C. 327(a)(2)(B), FHWA assigned and ODOT assumed, subject to the terms and conditions set forth in 23 U.S.C. 327 and the *Memorandum of Understanding Between The Federal Highway Administration and the Ohio Department of Transportation Concerning State of Ohio's Participation in the Project Delivery Program Pursuant to 23 U.S.C. 327* dated 11 December 2015, all of the United States Department of Transportation Secretary's responsibilities for environmental review, reevaluation, consultation, or other action pertaining to the review or approval of highway projects specified under subpart 3.3 required under the Federal environmental laws stated in Part 3.2.1 of the Memorandum of Understanding (MOU).

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) of the ESA, taking that is incidental to and not intended as part of the agency action is not considered to be prohibited under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement (ITS). The ITS accompanying this Biological Opinion, pursuant to section 7(b)(4) of the ESA, addresses the taking of Indiana and northern long-eared bats due to the removal of 11.46 acres of roosting and foraging habitat during the bats' active summer season.

This concludes the emergency, after-the-fact formal consultation on the ODOT FRA-270-21.76/22.85 project. The Service appreciates your full cooperation during this consultation and ODOT's immediate decision to offset impacts to the species by replacing the lost habitat at a high (5:1) ratio through the purchase and protection of high quality roosting and foraging habitat within the known home range of an Indiana bat maternity colony. This property was acquired with funds provided by ODOT to ODNR. As per restrictions on the property contained within the General Warranty Deed (Instrument 201600003234), filed for record in Madison County, Ohio, on July 20, 2016:

> *[The Ohio Department of Natural Resources] ODNR agrees that the Property will be kept in its natural state and used only as a nature preserve... As used herein the term "natural state" means: the physical status quo ante of the Property immediately prior to the time this instrument was executed and recorded, as such physical status may change or evolve due to only natural causes.*

ODOT's inclusion of these restrictions serves to protect the property into perpetuity, whereas it may have otherwise been sold for commercial development in this fast-growing region of the state.

For further coordination, or if you have any concerns about this Biological Opinion, please feel free to contact me or Karen Hallberg of this office at (614) 416-8993 extensions 12 and 23, respectively.

Sincerely,

Dan Everson
Field Supervisor

Enclosure

cc: J. Kessler, ODNR, Office of Real Estate, Columbus, OH (*email only*)
M. Ervin, ODNR, Division of Wildlife, Columbus, OH (*email only*)
P. Clingan, USACE, Ohio Regulatory Transportation Office, Columbus, OH (*email only*)
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Biological Opinion on the Ohio Department of Transportation FRA-270-21.76/22.85 Project (PIDs 81747/81748) in Franklin County, Ohio and Its Effects on the Indiana Bat (*Myotis sodalis*) and Northern Long-eared Bat (*Myotis septentrionalis*)

February 27, 2017

Prepared by:

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INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service) Biological Opinion (BO) based on our review of the Ohio Department of Transportation (ODOT) FRA-270-21.76/22.85 project (PIDs 81747/81748) in Franklin County, Ohio, and its effects on the **Indiana bat** (*Myotis sodalis*) and **northern long-eared bat** (*Myotis septentrionalis*) not previously considered during ODOT's Endangered Species Act (16 U.S.C. 1531 *et seq.*) section 7 informal consultation on the FRA-270-21.76/22.85 project in 2006. The ODOT request for emergency, after-the-fact formal consultation[1] was made and received on October 28, 2016, and formal consultation was initiated on that same date.

This biological opinion is based on information provided to the Service by ODOT's Office of Environmental Services (OES) during the original project consultation in February 2006, and ODOT's current Biological Assessment[2] (BA) submitted to our office on October 28, 2016; numerous telephone conversations and emails between the Service, ODOT, and the U.S. Army Corps of Engineers (Corps), and their representatives; and other sources of information. A complete administrative record for this consultation is on file at the Ohio Ecological Services Field Office (OFO).

On Friday, August 21, 2015, the Service was notified by the Corps that tree clearing activities were currently ongoing at the FRA-270-21.76/22.85 project site and contacted ODOT's Office of Environmental Services (OES). During earlier informal consultations on the project in 2006 and 2014, ODOT had committed to clearing suitable roosting and foraging habitat for the Indiana and northern long-eared bats only during the species' inactive season (October 1 – March 31). Therefore, in response to the Service's call on August 21, ODOT halted all tree clearing on the site that same day to allow for coordination with the Service.

In phone conversations and emails on August 21, 2015, and the following week, and via written correspondence exchanged on August 28, 2015, ODOT informed the Service that there was no means by which they could avoid further impacting the site during the bats' roosting season. Based on that information, the Service agreed to coordinate with ODOT on the tree clearing activity through the Service's emergency consultation process. As per the process protocol, ODOT agreed to submit a BA to the Service, in which they would formally propose conservation measures to offset potential take of federally listed bats that had occurred and may continue to occur. During subsequent months, ODOT coordinated with the Service on the development of the BA, and the final BA was submitted to the Service on October 28, 2016, initiating formal consultation.

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[1] Pursuant to 23 U.S.C. 327(a)(2)(B), FHWA assigned and ODOT assumed, subject to the terms and conditions set forth in 23 U.S.C. 327 and the *Memorandum of Understanding Between The Federal Highway Administration and the Ohio Department of Transportation Concerning State of Ohio's Participation in the Project Delivery Program Pursuant to 23 U.S.C. 327* dated 11 December 2015, all of the United States Department of Transportation Secretary's responsibilities for environmental review, reevaluation, consultation, or other action pertaining to the review or approval of highway projects specified under subpart 3.3 required under the Federal environmental laws stated in Part 3.2.1 of the Memorandum of Understanding (MOU).

[2] Included herein by reference.

CONSULTATION HISTORY

An Ecological Survey Report (ESR) submitted by ODOT was received by the Service in June 2005, with an impacts addendum to that ESR submitted in January 2006. In a letter dated February 22, 2006, the Service concurred with ODOT's determination that the project *may affect but was not likely to adversely affect* (MANLAA) the **Indiana bat**, as ODOT committed to removing the 16 suitable summer roost trees for the Indiana bat from the project area only between September 15 and April 15. During this consultation, ODOT had also determined that the project would have *no effect* on the federally listed: **clubshell** (*Pleurobema clava*), **northern riffleshell** (*Epioblasma torulosa*), **rayed bean** (*Villosa fabalis*), and **Scioto madtom** (*Noturus trautmani*).

During their Clean Water Act section 404 permitting process, the Corps consulted with the Service on three additional species that were federally listed after the 2006 consultation with ODOT and that are known to occur in Franklin County: **snuffbox** (*Epioblasma triquetra*), **rabbitsfoot** (*Quadrula c. cylindrica*), and **northern long-eared bat**. Because the snuffbox and rabbitsfoot do not occur within streams that would be impacted by the FRA-270 project, it was determined that the project would have *no effect* on either species. The Service concurred with the Corps determination that the project *may affect but was not likely to adversely affect* the northern long-eared bat. Concurrence with the Corps' determination that the project was unlikely to adversely affect the northern long-eared bat was based upon the Service's October 30, 2013 "blanket concurrence" issued to ODOT for projects on which:

1) ODOT had previously consulted with the Service, **and**
2) surveys, if conducted, did not detect MYSE in the project area, **and**
3) the Service had concurred with ODOT's determination that the project *may affect but is not likely to adversely affect* the Indiana bat (*Myotis sodalis*) **and**
4) ODOT had committed to seasonal clearing of trees (clearing only between September 30 and April 1).

Table 1. Consultation History for the FRA-270-21.76/22.85 project (PIDs 81747/81748).

Date	**Event/Action**
June 17, 2005	A Level 1 Ecological Survey Report (ESR) and Conceptual Alternatives Study (CAS) for FRA- 270-21.63 (all phases) PID 77319 was coordinated with the Service.
July 21, 2005	The Service responded with a technical assistance letter, in which they requested additional information on Indiana bat habitat.
February 6, 2006	An Impacts Addendum to the ESR for all phases was coordinated with the Service.
February 22, 2006	The Service responded and concurred that the project would have "insignificant or discountable" impacts to the Indiana bat, and agreed that impacts to the Clubshell, Northern Riffleshell, Rayed Bean, and Scioto Madtom were not anticipated to occur.
January 2014	As part of the Section 404 of the Clean Water Act waterway permitting process for the FRA-270-21.67 and 22.85 projects (PIDs 81747 and 81748), the Corps consulted with the Service on the effect calls for new species federally listed since 2006 (snuffbox mussel, rabbitsfoot mussel, and northern long-eared bat).

Table 1. continued

Date	Event/Action
January 23, 2014	The Service responded to the Corps and noted that the Olentangy River is listed as a Group 1 stream and is not considered to contain federally listed mussel species. The Service also stated that this project met the "blanket clearance" for the northern long-eared bat as provided in the Service's email dated October 30, 2013. Therefore, the Service concurred with ODOT's determination that the project *may affect, but is not likely to adversely affect* the northern long-eared bat, as long as all of the criteria in the above-mentioned email were met.
January 24, 2014	ODOT-OES submitted updated effects determinations to the Corps, indicating that the project was expected to have *no effect* on all federally listed mussel species, the Scioto madtom, and the bald eagle and did not require additional consultation with the Service.
Fall/Winter 2014-2015	Removal of 28 suitable roost trees occurred prior to the start of project construction.
August 21, 2015	Karen Hallberg (Service-OFO) telephoned Megan Michael (ODOT-OES) to report that tree clearing was occurring at the project site. She stated that the tree removal was in conflict with ODOT's MANLAA determination and tree removal commitments in the October 30, 2013 "blanket concurrence" for northern long-eared bat. The Service requested that all tree removal be halted.
August 28, 2015	A letter was sent from ODOT-OES to the Service stating that tree clearing on the remaining 4.99 acres of wooded habitat needed to continue for safety reasons. OES noted that the 11.46 acres of wooded habitat cleared for the project would be replaced at a 5:1 ratio by purchasing known *Myotis* species habitat in the Central Management Unit (defined in the ODOT-USFWS 2007 programmatic biological opinion on the Indiana bat). The letter also stated that an after-the-fact formal consultation would be conducted and that a biological assessment (BA) would be provided to the Service to initiate that consultation.
August 28, 2015	The Service responded to ODOT-OES acknowledging that tree removal would continue through the summer months and re-iterating ODOT's commitment to enter into formal consultation.
July 20, 2016	The Ohio Department of Natural Resources (ODNR) purchased the Forrest parcel in Madison County, Ohio, with funds provided by ODOT. This purchase and associated deed restrictions fulfilled ODOT's commitment (see August 28, 2015 letter) to offset take of federally listed bats during summer tree clearing in the FRA-270-21.76/22.85 project area.
October 28, 2016	ODOT submitted their final BA on the summer tree clearing action, initiating formal consultation with the Service.
January 4, 2017	A letter was sent from the Service to ODOT notifying them that formal consultation was initiated effective October 28, 2016.

BIOLOGICAL OPINION

I. Description of the Proposed Action

The FRA-270/315 project is located in Franklin County, City of Columbus in central Ohio. The project area (see Figure 1) is contained within the Rush Run-Olentangy River watershed (HUC-05066661-11-02), which has an area of 30.7 square miles, and is over 75% developed. The Olentangy River within the study area is designated by the Ohio Environmental Protection Agency (Ohio EPA) as Exceptional Warmwater Habitat (EWH) and is also a designated State Scenic River. Other small unnamed tributaries to the Olentangy River are located within the project area. The Olentangy River is bordered on both banks by a narrow riparian corridor that generally contains mature trees. Some park land is located adjacent to the Olentangy River within the project area, which contains a mix of ball fields, mowed fields, and areas of natural vegetation. The majority of the project area consists of suburban business, industrial, and residential developments. These areas are dominated by retail businesses, office parks, single family homes, apartments, and road rights-of-way. In general, most of the project area is dominated by herbaceous vegetation commonly found in roadway rights-of-way and yards. On many of the roadway slopes along IR 270 and SR 315, stands of shrubs (generally invasive honeysuckle species) and young trees have grown up over time. Less disturbed wooded areas were located along Tributary 9 and the Olentangy River.

This project was originally part of the North Central Outerbelt project that proposed to upgrade the SR 315 and US 23 interchanges and connections between these interchanges on IR 270 on the north side of Columbus. The original study area covered 910 acres surrounding these interchanges. The original project area extended approximately 3.4 miles along IR 270, 2.5 miles along SR 315 and approximately 1.5 miles along US 23.

The North Central Outerbelt project has been divided into seven construction phases to allow for scheduling, design, and construction of the project as funding becomes available. Construction phasing also helps alleviate maintenance of traffic (MOT) impacts and construction delays that can occur on complex construction projects in heavily-congested urban areas such as the North Central Outerbelt corridor. To date, construction has been completed on Phase B2 (I-270 improvements immediately to the east of this project), Phase C1 (Linworth Road bridge widening), and Phase F (ramps from I- 270 to southbound SR 315). Construction of Phase B/B1 (US 23 widening and US 23/I-270 interchange improvements) is presently under construction. Construction Phases C and D (SR 315 interchange improvements) began construction in summer 2015.

FRA-270-21.67 (Phase C) includes replacing the southbound SR 315 to eastbound I-270 loop ramp with a “shepherds hook” ramp; creating a new eastbound I-270 exit ramp to US 23; and constructing an eastbound I-270 collector-distributor system between SR 315 and US 23. FRA-270-22.85 (Phase D) includes creating separate southbound US 23 entrance ramps to I-270 and SR 315; splitting the northbound US 23 entrance ramp to access westbound I-270 and SR 315; and constructing the westbound I-270 collector-distributor system between SR 315 and US 23.

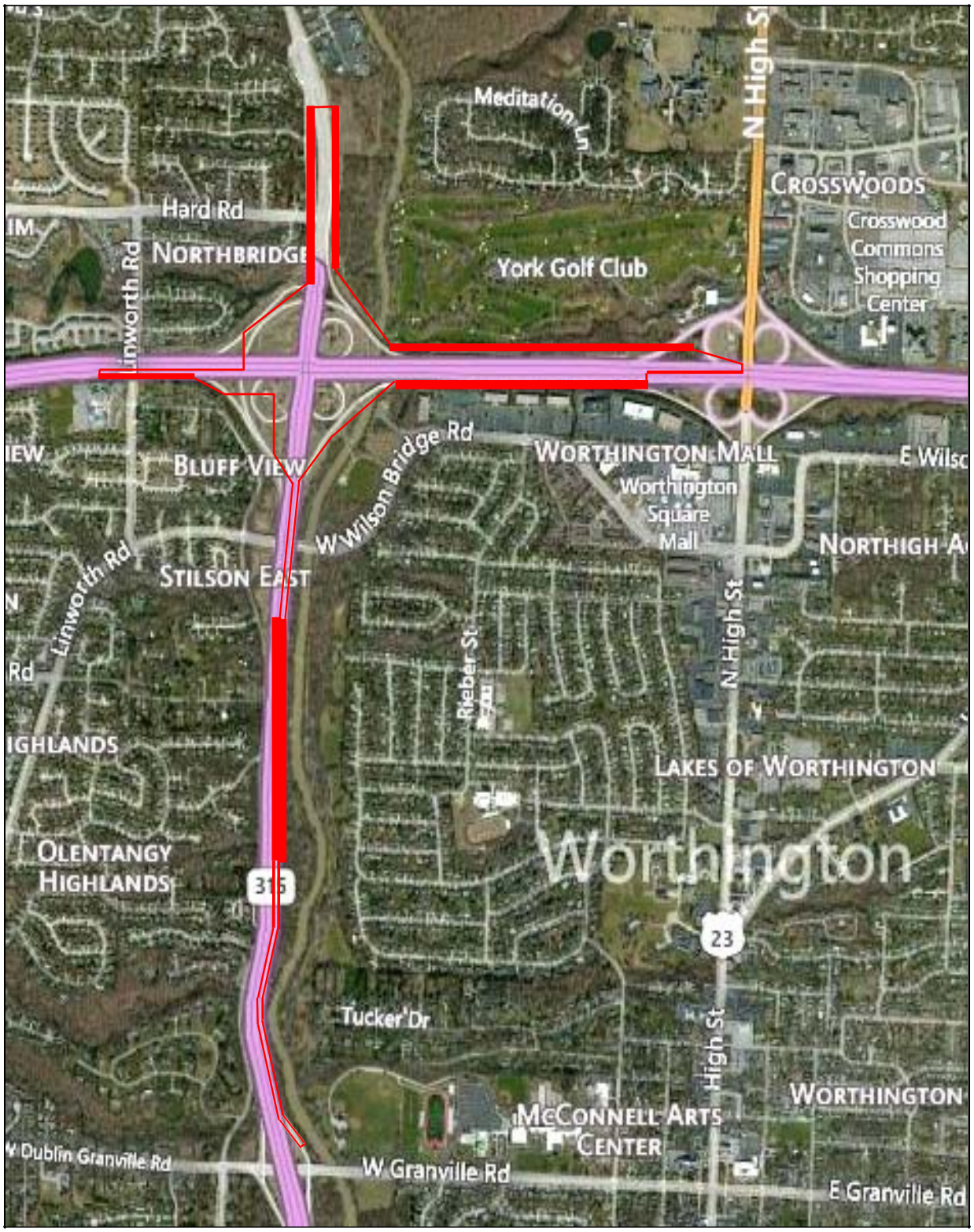


Figure 1. FRA-270-21.67/22.85 (PIDs 81747/81748) Study Area/Project Location Map.

Based on information included in Ellis, ODOT's publicly available project database, construction on this project began on July 1, 2015, and summer tree clearing most likely began at that time.

As noted in the consultation history, Karen Hallberg (Service-OFO) notified ODOT-OES (Megan Michael) of summer tree clearing on Friday, August 21, 2015. She stated that the tree removal was in conflict with ODOT's MANLAA determination and tree removal commitments in the October 30, 2013 "blanket concurrence" for northern long-eared bat. The Service requested that all tree removal be halted. ODOT-OES submitted this information to ODOT upper management and District 6 and requested information on the tree clearing from District 6. OES also requested that District 6 have the contractor cease all tree clearing until the issue was resolved. ODOT-District 6 notified OES that they had followed the environmental commitment in the Categorical Exclusion (CE) and planned to remove all roost trees between October 1 and March 31, and that roost tree habitat may no longer be present in the project area. The environmental commitment plan note in the CE was based on the January 2014 email between the Service and the Corps, in which the Service concurred with ODOT's determination that the project *may affect but is not likely to adversely affect* the northern long-eared bat. The Service's concurrence was based on ODOT's past coordination effort and commitment to seasonal tree clearing, as long as all of the "blanket concurrence" criteria in the Service's October 30, 2013 email were followed. The plan note updated the seasonal clearing dates from the original (September 15 to April 15) to the new dates (October 1 to March 31), but the criterion that requires **all trees**, not only suitable roost trees, to be seasonally cleared was unintentionally left out.

ODOT-OES and District 6 staff performed a field review on Monday, August 24, 2015 to determine: 1) the amount of tree clearing that had already occurred, 2) the amount of tree clearing that remained to be done, and 3) whether suitable roosting habitat was still present in the project area. Based on information collected during that field review, OES determined that 11.46 acres of tree removal was required for the project, slightly more than the 10.1 acres estimated in the 2006 Impacts Addendum to the 2005 ESR. Of the 11.46 acres of habitat, 6.47 acres had been removed after April 1 and could not be analyzed. According to District 6, 28 suitable roost trees had been removed in the winter 2014/2015 from the 6.47 acre area that had already been removed. OES found an additional 61 trees that could provide roosting habitat for either the Indiana or northern long-eared bat in the 4.99 acres of habitat that remained. No potential maternity roost trees were noted, either by District 6 when the trees were marked in the winter or by OES during the August 24, 2015 field review.

After the field review, OES and District 6 reviewed options for tree removal timing for the portions of the project that had not yet been cleared. ODOT considered ceasing tree removal until after October 1. However, in consultation with the contractor, OES found that this would add an additional year to the construction timing, and would trigger delay claims from the contractor because the trees would need to be cleared for them to do the required work. Delaying tree clearing was also going to cause a significant safety issue because the project area already had a very high accident rate prior to the start of construction, and the lane restrictions had created a greater likelihood of traffic accidents and delays. ODOT was concerned that leaving the lane restrictions in place for an additional year would lead to a larger number of accidents

and delays and would put the contractors and on-site ODOT employees at a higher risk for a longer period of time.

Once the decision was made that summer tree clearing had to continue due to safety, ODOT consulted with the Service for ways to minimize impacts to the bat species. One minimization effort requested by the Service was to conduct emergence surveys on the remaining roost trees prior to removal. Based on the information collected during the August 24, 2015 field review, most of the trees were in areas that were inaccessible for survey because of steep topography or not being able to see the tree from anywhere but the travel lanes of the roadway. The Service also stated that ODOT could preserve suitable summer roosting/brood-rearing habitat for these species off-site as a conservation measure that may help to offset potential take. ODOT agreed that land preservation to offset take would be acceptable.

On August 28, 2015, a letter was sent from ODOT-OES to the Service stating that, due to safety issues, tree clearing on the remaining 4.99 acres of wooded habitat would be required prior to October 1. OES noted that the 11.46 acres of wooded habitat would be replaced at a 5:1 ratio by purchasing known *Myotis* species habitat in the Central Management Unit (CMU). The letter also stated that an after-the-fact formal consultation would be conducted, and that a Biological Assessment (BA) would be provided to the Service as soon as it was completed by OES. On the same date, the Service responded to ODOT-OES noting that tree removal would continue through the summer months, and re-iterating that ODOT had committed to formal consultation.

Action Area

"Action area" is defined as all areas that will be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR §402.02). The action area is defined by measurable or detectable changes in land, air and water or to other measurable factors that may elicit a response in the species or critical habitat. The action area is not limited to the "footprint" of the action and should consider the chemical and physical impacts to the environment resulting from the action.

ODOT determined the action area for this project based upon the biotic, chemical, and physical impacts to the environment that are anticipated due to the project. The Service concurs with the action area determined by ODOT.

The area directly affected by the action is the project footprint where all construction, operation and maintenance activities will occur. The project footprint includes IR 270 from US 23 to just west of Linworth Road, the SR 315 interchange, and SR 315 from Hard Road to SR 161, although all of the work starting just south of Wilson Bridge Road is paving. The Service did not include the paving areas as part of the action area, as no clearing outside of the mowed rights-of-way will be required.

The area indirectly affected by the action includes the area affected by noise and vibrations, and surface and subsurface water impacts. Noise and vibrations are physical impacts to the environment that are caused by the road construction, operation, and maintenance and vary in intensity depending upon the source. Tree removal, earth moving, and pile driving generate noise

during site preparation and road construction. The level of noise generated from the different construction and maintenance activities vary depending upon the methods and equipment being used or operated. Operational noise is generated by vehicle traffic and varies depending upon the type and volume of vehicles. Noise and vibrations are expected to increase minimally during construction through this corridor, but as this project will not increase traffic through this already busy interchange, noise and vibrations are not expected to remain elevated above the amount present prior to the start of construction. In addition, much of the construction area is already surrounded by noise-walls that mitigate the amount of noise that areas outside of the rights-of-way experience from the roadway itself.

The pre-construction ambient noise along the construction corridor varied based on distance from the roadway and local topography. Based on the 2006 Highway Noise Analysis Report (URS 2006), ambient noise along the IR 270 and SR 315 corridor ranged from 53 dBA to 75 dBA. The report showed that noise increases of 0 to 2 dBA are expected at the monitored sites by 2028. Most of the areas of highest noise impacts either now have noise walls in place or will be protected by noise walls post-construction.

The highest project noise levels are expected to occur during the clearing and construction activities. Logging activities typically involve sawing equipment, which can generate high noise levels. Based on previous information from FHWA for similar projects, typical construction noise levels average 85 dBA at 50 feet from the source (D. Snyder, FHWA, pers. comm., 2005), with peak noise level for most construction equipment at or below 95 dBA (FHWA 2005).

Based on the information above, the areas surrounding the construction limits may have experienced (and continue to experience) a minor increase in ambient noise during construction, but the noise caused by the construction equipment is similar to what has been experienced in areas surrounding the existing roadway during its operation. As shown above, increased noise from construction should not impact areas more than 200 feet from the construction limits.

Impacts to surface waters have also occurred and will continue to occur during construction of the project. The Olentangy River and three tributaries were directly and indirectly affected within the project footprint. Also, some surface waters outside the actual project footprint may have been indirectly affected from construction due to anticipated changes in the volume of pollutants entering the environment (e.g., sediment, construction run-off). This area was already impacted by run-off and storm water from the existing roadway and adjacent development. The physical, chemical, and biological nature of streams has been altered by bridge construction, culverting, relocation, and temporary fills. Areas that have been directly impacted by the new bridges, culverts, or areas where the channels were relocated were permanently impacted; however, as the waterways were already impacted by the existing roadway, much of the expected physical, chemical and biological impacts outside of the construction limits are expected to be temporary and limited to the period of active construction. The 404 permit for this project indicated that 667 linear feet of the Olentangy River, 220 feet of Stream 8, 200 linear feet of Stream 9B, and 192 linear feet of Stream 15 will be temporarily impacted by this project. Permanent impacts include 412 linear feet of the Olentangy River, 220 linear feet of Wilson Run, 1,453 linear feet of Stream 9B, and 915 feet of Stream 15.

Based on the discussion above, we determined the action area for this project as the project footprint (minus the paving only areas) plus an additional 200-foot area surrounding the footprint that will be temporarily affected by construction noise. This action area is 264.5 acres. Once construction is completed, noise will return to pre-construction ambient levels, and no permanent noise impacts are expected. Permanent waterway impacts are only expected inside the construction limits. Impacts outside the construction limits are expected to be temporary.

II. Status of the Species

The Indiana bat was officially listed as an endangered species on March 11, 1967 (Federal Register 32[48]:4001), under the Endangered Species Preservation Act of October 15, 1966 (80 Stat. 926; 16 U.S.C. 668aa[c]). The ESA subsequently extended full legal protection from unauthorized take to the species.

The northern long-eared bat was listed as a federally threatened species on April 2, 2015. With the species' listing, the Service published an interim, species-specific rule pursuant to section 4(d) of the ESA (80 FR 17973). On January 14, 2016, the Service published a final, species-specific rule pursuant to section 4(d) of the ESA (80 FR 17973). Section 4(d) of the ESA states that:

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

The Service's final 4(d) rule for the northern long-eared bat exempts some take of the species from section 9 prohibitions of the ESA. The exemptions described below apply to federal agencies for actions located partially or wholly inside the WNS zone (see Figure 2). All of the state of Ohio is inside the WNS zone. The following take of northern long-eared bats is exempted under the final 4(d) rule:

1) Take that is incidental to activities that do not involve tree removal and do not take place within hibernacula or would not alter the hibernaculum's entrance or environment, even when the bats are not present at the hibernaculum.
2) Take that is incidental to removal of hazardous trees.
3) Take that is incidental to removal of trees, at any time, beyond 0.25 mile of a hibernaculum.
4) Take that is incidental to removal of trees, at any time, beyond 150 feet of a known occupied maternity roost tree; or take that is incidental to removal of trees within 150 feet of a known roost tree between August 1 and May 31.
5) Purposeful take in defense of human life, including for public health monitoring.
6) Purposeful take that results from removal of bats from human structures, but only if the actions comply with all applicable State regulations.

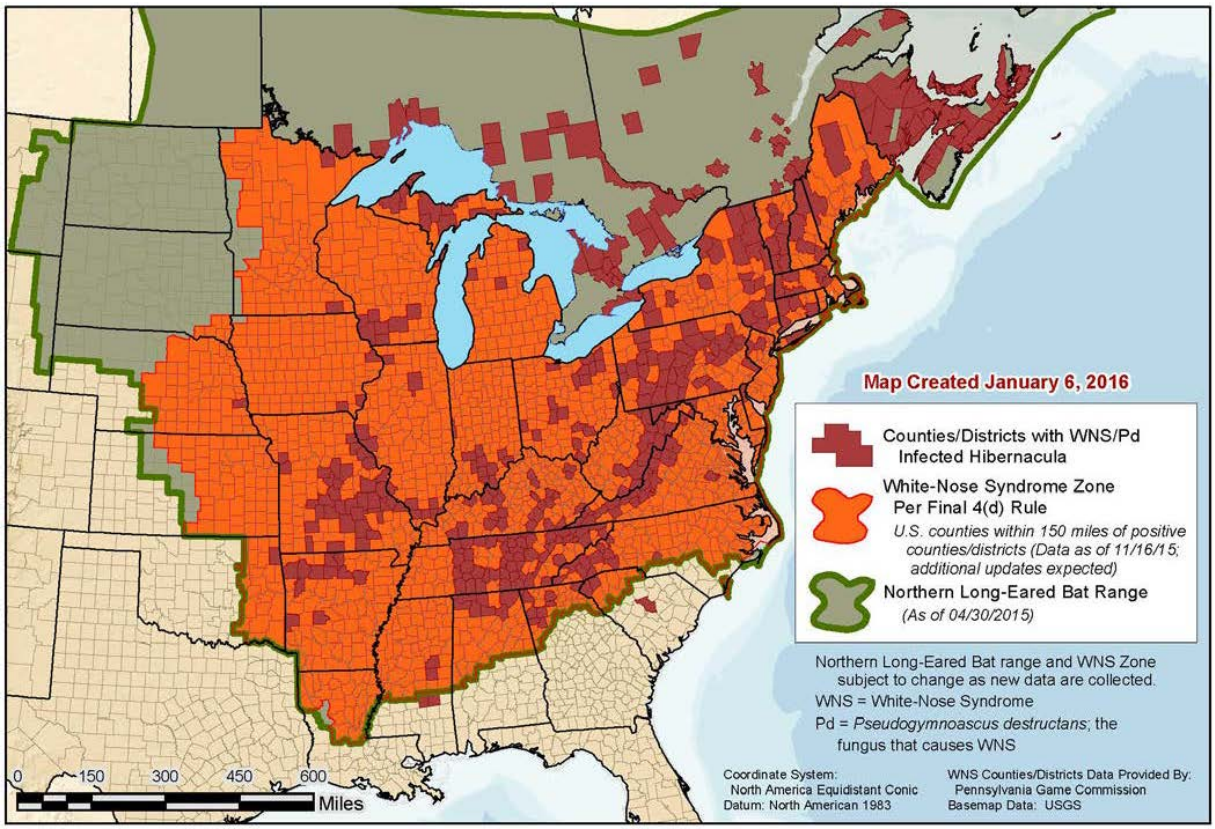


Figure 2. White-nose syndrome zone map (January 14, 2016).

Description and Distribution

The Indiana bat is a temperate, insectivorous, migratory bat that hibernates in caves and mines in the winter and summers in wooded areas. It is a medium-sized bat, having a wing span of 23 to 28 cm (9 to 11 in) and weighing only 7.1 g (0.25 oz). It has brown to dark-brown fur and the facial area often has a pinkish appearance. The Indiana bat closely resembles the little brown bat (*Myotis lucifugus*) and the northern long-eared bat (*Myotis septentrionalis*). It is distinguished from these species primarily by its foot structure and fur color. The Indiana Bat Draft Recovery Plan (USFWS 2007) provides a comprehensive summary of the description of the species and is incorporated here by reference.

Like the Indiana bat, the northern long-eared bat is a temperate, insectivorous, migratory bat that hibernates in mines and caves in the winter and spends summers in wooded areas. It is also a medium-sized bat, with a wingspread between 22.6 to 25.9 cm (8.9 to 10.2 in) and weighing 5.7 to 8.5 g (0.2 to 0.3 oz). The northern long-eared's fur is typically medium to dark brown on its back and tawny to pale brown on its underside. Its ears and wing membranes are dark brown. Within its range, the northern long-eared bat can be confused with the little brown bat (*Myotis lucifugus*) or the western long-eared myotis (*Myotis evotis*). However, it can be distinguished from the little brown bat by its longer ears that, when laid forward, extend beyond the nose up to 5 mm (0.2 in), and from the western long-eared bat by its darker fur and paler membranes. The final listing rule (80 FR 17974) contains the best available information on this species' life

history, biology, threats, distribution and overall status. The rule is incorporated into the present document by reference.

Life History and Population Dynamics

The Indiana bat is a migratory bat, hibernating in caves and mines in the winter (typically October through April) and migrating to summer habitat in the spring. Although some Indiana bat bachelor colonies have been observed (Hall 1962, Carter et al. 2001), males and non-reproductive females typically do not roost in colonies, and may stay close to their hibernacula (Whitaker and Brack 2002) or migrate long distances to their summer habitat (Kurta and Rice 2002). Some reproductive females have been documented to migrate up to 574.5 km (357 mi) (Winhold and Kurta 2006) to form maternity colonies. Some maternity colonies form within a few miles of their hibernacula. Both males and females return to hibernacula in late summer or early fall to mate and store up fat reserves for hibernation. By mid-November, male and female Indiana bats have entered hibernation. They typically emerge in April, at which time they again migrate to summer habitat. The Indiana Bat Draft Recovery Plan (USFWS 2007) provides a comprehensive summary of Indiana bat life history.

The key stages in the northern long-eared bat's annual cycle are: hibernation, spring staging and migration, pregnancy, lactation, volancy/weaning, fall migration and swarming. Northern long-eared bats generally hibernate between mid-autumn through mid-spring each year. Spring migration period likely runs from mid-March to mid-May each year, as females depart shortly after emerging from hibernation and are pregnant when they reach their summer area. Young are born between mid-June and early July, with nursing continuing until weaning, which is shortly after young become volant in mid- to late-July. Fall migration likely occurs between mid-August and mid-October.

Fall Swarming, Mating, and Hibernation

Indiana bat

From late-August to mid-October, prior to entering the hibernacula, large numbers of bats fly in and out of cave or mine openings from dusk until dawn in a behavior called swarming. Swarming usually lasts for several weeks and mating occurs toward the end of this period. Male Indiana bats tend to be active for a longer period of time than females during swarming and will enter the hibernacula later than the females (USFWS 1999). Adult females store sperm through the winter thus delaying fertilization until early May. Temperature and relative humidity are important factors in the selection of hibernation sites. Beginning in early autumn, Indiana bats roost in warm sections of caves and move down a temperature gradient as temperatures decrease. During winter, Indiana bats are restricted to suitable underground habitats known as hibernacula. The majority of hibernacula consist of limestone caves, especially in karst areas of east central United States, but abandoned underground mines, railroad tunnels, and even hydroelectric dams can provide winter habitat throughout the species' range (USFWS 2007). Indiana bats tend to roost in portions of the cave where temperatures are cool (37 to 43 degrees Fahrenheit). Relative humidity in Indiana bat hibernacula tends to be high, ranging from 66 percent to 95 percent (Barbour and Davis 1969). Ohio contains one Priority 2 and one Priority 3 hibernacula (USFWS

2007). Including these two Priority hibernacula, Ohio has seven hibernacula where Indiana bat hibernation has been observed.

Northern long-eared bat

Males and non-reproductive females may summer near hibernacula or migrate to summer habitat some distance from their hibernaculum. Northern long-eared bats are not considered to be long distance migrants (typically 64-80 km (40-50 mi). Migration is an energetically demanding behavior for the northern long-eared bat, particularly in the spring when their fat reserves and food supplies are low and females are pregnant.

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

Suitable winter habitat (hibernacula) includes underground caves and cave-like structures (e.g. abandoned or active mines, railroad tunnels). There may be other landscape features being used by northern bats during the winter that have yet to be documented. Generally, northern long-eared bats hibernate from October to April depending on local climate (November-December to March in southern areas and as late as mid-May in some northern areas).

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

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

<u>Spring Staging</u>

Indiana bat

Spring emergence occurs when outside temperatures have increased and insects are more abundant (Richter et al. 1993). Some bats may remain in close proximity to the cave for a few days before migrating to summer habitats. During this mid-spring period, adult females occupy trees that are similar to those used in summer in terms of species, size, and structure (Britzke et al. 2003, Butchkoski and Turner 2005, Britzke et al. 2006). This activity is known as spring staging. Others head directly to summer habitat. Migration distances range from a few miles to

over 483 km (300 mi) (Winhold and Kurta 2006). Some males spend the summer near their hibernacula (Whitaker and Brack 2002), while others disperse longer distances. Males roost individually or in small groups. In contrast, reproductive females form larger groups, referred to as maternity colonies, in which they raise their offspring.

Northern long-eared bat

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

In general, northern long-eared bats use roosts in the spring and fall similar to those selected during the summer. Suitable spring staging/fall swarming habitat consists of the variety of forested/wooded habitats where they roost, forage, and travel, which is most typically within 8 km (5 mi) of a hibernaculum. This includes forested patches as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Isolated trees are considered suitable habitat when they exhibit the characteristics of a suitable roost tree and are less than 304.8 m (1,000 ft) from the next nearest suitable roost tree, woodlot, or wooded fencerow.

<u>Female Maternity Colony and Summer Roosting Habitat</u>

Indiana bat

After emergence from hibernacula in the spring, Indiana bats first arrive at their summer locations as early as April or early May (Humphrey et al. 1977, Kurta and Rice 2002). During summer, female and juvenile Indiana bats almost always roost in trees, as do adult males. While Indiana bats primarily roost in trees, some colonies have been found in artificial roost sites (e.g., buildings, bat boxes, utility poles), however this is uncommon (USFWS 2007).

In the spring, females migrate to summer roosting habitat where they form maternity colonies. Females usually start grouping into larger maternity colonies by mid-May and give birth to a single young between late June and early July (Humphrey et al. 1977). These colonies are typically located under the sloughing bark of live, dead and partially dead trees in upland and lowland forest (Humphrey et al. 1977; Gardner et al. 1991). Colony trees are usually large-diameter, standing dead trees with direct exposure to sunlight. Direct solar exposure on the tree surface provides increased temperatures within the roost fostering development of fetal and juvenile young (Racey 1982). The average maternity colony size is 50 to 80 adult females (Whitaker and Brack 2002). With pups, a maternity colony could contain 100 or more Indiana bats.

Densities of tree-roosting bats are generally greater in old growth forests in temperate regions where structural diversity provides more roosting options (Crampton and Barclay 1996, Brigham et al. 1997, Racey and Entwistle 2003). Within the range of the Indiana bat, particularly within

the core maternity range in the Midwest (including Ohio) old growth forest has been virtually eliminated. While the forest cover in Ohio has increased since the Indiana bat became Federally listed in 1967, the composition of these forests is primarily second growth forest. Forest quantity is not necessarily a reliable indicator of increased suitable Indiana bat habitat. Habitat suitability models for the Indiana bat have been developed (Rommé et al. 1995, Farmer et al. 2002) that suggest density of suitable roost trees may be the only reliable predictor of habitat suitability

Roost trees often provide suitable habitat as a maternity roost for only a short period of time. Roost trees are ephemeral in nature; suitable trees fall to the ground or lose important structural characteristic such as bark exfoliation (Gardner et al. 1991; Britzke et al. 2003). Dead trees retain their bark for only a certain period of time (about 2-8 years). Once all bark has fallen off a tree, it is unsuitable to the Indiana bat for roosting. Gardner et al. (1991) found that 31% of Indiana bat occupied roost sites were unavailable the summer following their discovery; 33% of the remaining occupied roost sites were unavailable by the second summer. For this reason, an area must provide a continual supply of suitable roost trees in order to support a colony over the long-term.

A meta-analysis (Lacki et al. 2009) was conducted of published gray literature on 915 summer roost trees used by both sexes of Indiana bats, but predominately female Indiana bats, across 41% of the states within the species range including Ohio. The results of this meta-analysis indicated a roost tree mean diameter of 41.4 cm ± 2.4 cm (16.29 in ± 0.94 in) and ranged from 62.0 to 20.0 cm (24.4 to 7.9 in.). The roost was on average 8.6 m ± 0.5 m (28.2 ft ± 1.64 ft) above the ground and ranged from 10.0 to 5.0 m (32.8 to 16.4 ft.). Roosts occurred in areas with average snag densities of 66.6±16.6/ha. (approximately 26.96±6.72/ac). Roosts beneath bark occurred in 95% of the populations examined and 30% were inside crevices or cavities. Further, 69.6% of the populations used live trees and 95.6% of the populations used snags. The study also revealed Indiana bats appeared to select roost trees at lower elevations somewhat more often than higher elevations.

The Service's (2007) draft recovery plan also provides a summary of roost tree data that was available up through 2004. The grand averages of both the Service's (2007) data as well as the Lacki et al (2009) are summarized below in Table 2.

Table 2. Summary of Indiana bat summer roosting habitat tree characteristics (USFWS 2007; Lacki et al. 2009).

Data Source	Age/Sex	Average Diameter (cm)	Average Height of Tree (m)	Average Height of Exit (m)	Average Total Bark Remaining (%)	Average Canopy Cover (%)	Snag Density (#/ha.)	Roost Location
USFWS 2007	Adult ♀ &, Juvenile ♂ & ♀	45 ± 2	20 ± 1	9 ± 1	59 ± 5	50 ± 10	na	na
USFWS 2007	Adult ♂	33 ± 2	18 ± 1	10 ± 1	57 ± 1	63 ± 10	na	na
Lacki et al 2009	Mixed adult and juvenile ♀and ♂	41.4 ± 2.4	na	8.6 ± 0.5	na	na	66.6 ± 16.6	30.0% used crevices

Female Indiana bats have shown strong site fidelity to both their summer maternity grounds and specific roost trees, and will use suitable roost trees in consecutive years, if they remain standing and have sloughing bark (Gardner et al. 1991; Callahan et al. 1997; Kurta and Murray 2002). Traditional summer areas are essential to the reproductive success of local populations. The distance and time that female Indiana bats will search to find new roosting habitat if their traditional roost habitat is lost or degraded is unknown. If they are required to search for new roosting habitat this effort is assumed to place additional stress on pregnant females at a time when fat reserves are low or depleted and they are already stressed from the energy demands of migration. Belwood (2002) anecdotally described the effects of a lost roost tree and the apparent reestablishment of the colony 20 m (65.6 ft) from the lost tree.

The number of roosts that are critical to the survival of a colony is unknown, but the temporary nature of the use of the roost trees dictates that several must be available in an area if the colony is to return to the same area and raise their young successfully. Indiana bats require many roost trees to fulfill their needs during the summer. Callahan et. al. (1997) report 10-20 trees may be used each summer. In Michigan, Indiana bats used two to four different roost trees during the course of one season (Kurta and Williams 1992). In Missouri, each colony used between 10-20 roost trees, and these were not widely dispersed (all within a circle ranging in size from 0.81 to 1.48 km (0.5 to 0.9 mi)) (Miller et al. 2002).

The important factors associated with roost trees are their ability to protect individuals from the elements, and to provide thermal regulation of their environment. Maternity colonies have at least one primary roost, which is generally located in an opening or at the edge of a forest stand. Maternity colonies also use multiple alternate roosts which are located in the open or in the interior of forest stands. Exposure to sunlight is important during development of fetal and juvenile young. In Missouri, use of dead trees in the forest interior increased in response to unusually warm weather (i.e., shading provided a cooler thermal environment), and use of live trees and snags in interior forest increased during periods of precipitation (Miller et al. 2002). Maternity colonies in North Carolina and Tennessee used roosts located above the surrounding canopy (Britzke et al. 2003).

Studies have shown that 97% of trees used as maternity roosts are deciduous species; however, a few coniferous trees have also been used (Harvey 2002, Britzke et al. 2003, Palm 2003). The predominance of deciduous trees used as roosts reflects greater availability of these species in the range of the Indiana bat, as other species of bats roost in conifers and Indiana bats use coniferous trees during autumn swarming (Gumbert et al. 2002). Male and juvenile bats have also shown variability in their selection roost trees. Both males and females have been known to use coniferous tree species for roosts (USFWS 2007).

Indiana bats have been found roosting in several different species of trees, and they appear to choose roost trees based on their structural composition. Therefore, determining what species of trees are more important for roosts is difficult. However, twelve tree species have been listed in Romme et al.'s (1995) Habitat Suitability Index Model as primary species (class 1 trees), and the Service (2007) identified 33 species of used by female Indiana bats. These trees include silver maple (*Acer saccharinum*), shagbark hickory (*Carya ovata*), shellbark hickory (*C. laciniosa*), bitternut hickory (*C. cordiformis*), green ash (*Fraxinus pennsylvanica*), white ash (*F.*

americana), eastern cottonwood (*Populus deltoides*), red oak (*Quercus rubra*), post oak (*Q. stellata*), white oak (*Q. alba*) slippery elm (*Ulmus rubra*), and American elm (*U. americana*). In addition to these species, sugar maple (*A. saccharum*), shingle oak (*Q. imbricaria*), and sassafras (*Sassafras albidum*) are listed as class 2 trees (Romme et al. 1995). The class 2 trees are those species believed to be less important, but that still have the necessary characteristics to be used as roosts. These tree species are favored by the Indiana bat, since as these trees age, their bark will slough.

A summer roosting study in Ohio (Kniowski and Gerht 2011) tracked Indiana bats to 56 roost trees 474 times. Roost trees were clustered in riparian woodland habitat and of at least 11 different species including silver maple, sugar maple, shagbark hickory, green ash, white ash, black walnut (*Juglans nigra*), eastern cottonwood, swamp white oak (*Quercus bicolor*), chinkapin oak (*Q. muehlenbergii*), black locust (*Robinia pseudoacacia*), and American elm. Eight of the trees were alive, two were declining, and the rest were dead or in a greater stage of decay. All roost trees, with the exception of one live cottonwood, had at least one visually identified possible roosting location. The maximum observed emergence was 109 bats, but average emergence was 22 bats including all counts, or 34 bats excluding zero counts. All roosts, even primary roosts, notably received variable amounts of use during the summer, including periods of no use by bats. All primary roosts and many secondary roosts possessed areas of loose bark. This study attempted to identify simple characteristics that would predict secondary and primary roosts. However, no single characteristic, or simple combinations of characteristics, were found to predict secondary versus primary roost use. Roost trees were not located randomly in the landscape but were closer to water at two spatial scales. Roosts also tended to be dominant or emergent trees within the stand, had a greater percentage of remaining bark, and were more decayed than random trees in the landscape. Roosts were predominately found under bark and were generally within 80% or greater canopy cover. The roost trees averaged over 20 m (65.6 ft) tall.

An exercise in estimating the number of maternity roosts within the range of the Indiana bat was provided in USFWS 2007. This work sheds light on the very limited number of maternity roosts that could be encountered on the landscape. The exercise assumed maternity colony size of 80 female bats. Taking the then current population estimate and dividing it in half (50% female) resulted in an estimate of 2,860 maternity colonies.

Non-reproductive females and males may roost individually or in small groups, and occasionally are found roosting with reproductive females. Adult males have been found to use mature forests near their hibernacula for roosting and foraging from spring through fall. Others have been found migrating far from their hibernacula area (Hobson and Holland 1995; Timpone 2004). Male Indiana bats also exhibit summer habitat philopatry.

Roosting habitat for male Indiana bats appears similar to female bats, and males and females have been caught using the same general area (e.g., Fishhook Creek, Illinois, Gardner et al. 1991). However, there are often notable gender differences in roost tree size and the juxtaposition of roosting and foraging areas. Male Indiana bats have been found roosting in trees as small as 6.4 cm (2.5 in) dbh (Gumbert 2001), although the average diameters reported in literature are much larger: 38.1 cm (14.9 in) in Indiana (n=14, Brack et al. 2004) and 28.6 cm

(11.2 in) in Kentucky (n=41, Gumbert 2001). As male bats roost solitarily or in small groups, the size of the roost tree in terms of its available roosting space is not likely a limiting factor. Male bats must thermoregulate, thus roost tree size and other characteristics affecting the microclimate of the roost site are still germane. The connectivity between roosting and foraging sites may not be as critical for males as it is for maternity colonies because the latter must have prey close to their roost trees for nursing females and newly volant bats.

During a 1999 radio telemetry survey on the Athens District of the WNF, males were found roosting in American elm, red maple, shagbark hickory, and sugar maple trees. The average dbh of these trees was 30 cm (11.8 in) and the average length of time within one year each tree was used was 2.3 days (Schultes 2002). In 2000, two male Indiana bats were found roosting in American elm, red maple, black oak (*Quercus velutina*), white oak, pignut hickory and shagbark hickory. The average dbh of these trees was 30.2 cm (11.9 in) and the average length of time each tree was used was 1.9 days (Schultes 2002).

Northern long-eared bat

Upon emergence from the hibernacula in the spring, females seek suitable habitat for maternity colonies. Northern long-eared bats actively form colonies in the summer (Foster and Kurta 1999) and exhibit fission-fusion behavior (Garroway and Broders 2007), where members frequently coalesce to form a group (fusion), but composition of the group is in flux, with individuals frequently departing to be solitary or to form smaller groups (fission) before returning to the main unit (Barclay and Kurta 2007). As part of this behavior, northern long-eared bats switch tree roosts often (Sasse and Pekins 1996), typically every 2 to 3 days (Foster and Kurta 1999; Owen et al. 2002; Carter and Feldhamer 2005; Timpone et al. 2010). Northern long-eared bat maternity colonies range widely in size, although 30-60 may be most common (USFWS 2014a). Owen et al. (2003) estimated average maternal home range size to be 65 ha (161 acres). Home range size of northern long-eared bats in this study site was small relative to other bat species, but this may be due to the study's timing (during the maternity period) and the small body size of northern long-eared bats (Owen et al. 2003). This species shows some degree of inter-annual fidelity to single roost trees and/or maternity areas and males are routinely found with females in maternity colonies. Northern long-eared bats use networks of roost trees often centered around one or more central-node roost trees (Johnson et al. 2012), with roost networks including multiple alternate roost trees. Male and non-reproductive female northern long-eared bats may also roost in cooler places, like caves and mines (Barbour and Davis 1969, Amelon and Burhans 2006).

Northern long-eared bats roost in cavities, crevices, and hollows or underneath bark of both live and dead trees and/or snags (typically ≥7.6 cm (3 in) dbh). They are known to use a wide variety of roost types, using tree species based on presence of cavities or crevices or presence of peeling bark. This species has also been occasionally found roosting in structures like barns and sheds (particularly when suitable tree roosts are unavailable).

Young northern long-eared bats are typically born in late May or early June, with females giving birth to a single offspring. Lactation then lasts 3 to 5 weeks, with pups becoming volant (able to fly) between early July and early August.

Foraging

Indiana bat

Indiana bats feed exclusively on flying aquatic and terrestrial insects. Although no consistent trends exist, diet appears to vary across their range, as well as seasonally and with age, sex and reproductive-status (Murray and Kurta 2002; Belwood 1979). Murray and Kurta (2002) found that diet is somewhat flexible across the range and that prey consumed is potentially affected by regional and local differences in bat assemblages and/or availability of foraging habitats and prey. For example, Lee and McCracken (2004) and Murray and Kurta (2002) found that adult aquatic insects (Trichoptera and Diptera) made up 25-81% of Indiana bat diets in northern Indiana and Michigan. However, in the southern part of the species range terrestrial insects were the most abundant prey items (as high as 85%) (Brack and LeVal 1985; LaVal and LaVal 1980; Belwood 1979). Kiser and Elliot (1996) found that Lepidopterans (moths), Coleopterans (beetles), Dipterans (true flies) and Homopterans (leafhoppers) accounted for the majority of prey items (87.9% and 93.5% combined for 1994 and 1995, respectively) consumed by male Indiana bats in their study in Kentucky. Diptera, Trichoptera, Lepidoptera, and Coleoptera also comprised the main prey of Indiana bats in Michigan (Murray and Kurta 2002); however, Hymenoptera (specifically, alate ants) were also taken when abundant.

The function of foraging habitat is to provide a source of food, but it also provides night roosts for resting and digesting meals between forays and shelter from predators. The few studies conducted to date indicate that (1) Indiana bats appear to be solitary foragers; (2) individuals establish several foraging areas, likely in response to varying insect densities; and (3) individuals are faithful to their foraging areas (Kiser and Elliot 1996, Murray and Kurta 2004). Foraging areas may or may not overlap with day or night roosting areas, but individual foraging ranges commonly overlap (Menzel et al. 2001). Indiana bats generally prefer foraging in wooded areas (LaVal et al. 1976, Brack 1983, Gardner et al. 1991, Butchkoski and Hassinger 2002, and Murray and Kurta 2002), and are frequently associated with streams, floodplain forests, forested wetlands, and impounded water bodies (Garner and Gardner 1992, Murray and Kurta 2002). Woody vegetation with a width of at least 30.5 m (100 ft) on both sides of a stream has been characterized as excellent foraging habitat (Cope et al. 1974). Indiana bats forage and fly within air space from 2 to 30 m (6 to 100 ft) above ground level (Humphrey et al. 1977), typically in and around tree canopy and in openings (Humphrey et al. 1977, LaVal et al. 1976, Brack 1983, Garner and Gardner 1992, Gardner et al. 1996, Murray 1999).

Indiana bats will forage in small openings, but generally appear to avoid foraging over large open expanses and prefer forested areas (Humphrey et al. 1977, Brack 1983, Brack and LaVal 1985, Gardner and Gardner 1992, Murray and Kurta 2004). In Michigan, Murray and Kurta (2004) found that Indiana bats used wooded corridors for traveling and foraging, even when this required them to significantly increase their nightly commuting distance.

Another important aspect of Indiana bat habitat is mid-story clutter. It is important to discuss forest clutter for two reasons. First, when foraging in clutter, bats must detect targets amid the echoes from non-target objects (Fenton 1990). The greater the density of non-target items the more noise bats must decipher. Second, the greater the physical and acoustical clutter, the more difficult it is for Indiana bats to maneuver to avoid collisions. Indiana bats navigate and forage

during flight. Foraging in less spatially complex habitats is likely to be less energetically expensive. Hence, it is acknowledged that a relatively open mid-story (<40% of trees are 2-4.7 in (5-12 cm) dbh) (Rommé et al. 1995) is an important feature of high quality Indiana bat foraging habitat.

Connectivity of the foraging area to the roosting area is also an important feature. Murray and Kurta (2002) suggested that within a home area, bats appear to be faithful to their travel corridors as they observed Indiana bats using the same corridors for more than 5 years. There have been reports of bats traveling through relatively open areas (e.g., bats documented crossing over or under bridges on I-70 in Indiana) to reach foraging habitat (USFWS 2002; Butchkoski and Hassinger 2002, Kniowski and Gehrt 2011). Whether bats in these instances are specifically choosing to use the open areas or whether they have no other option is unknown. In the case of the bats tracked in Ohio, one bat was observed travelling over an open area from one wood lot to another. For lactating females and newly volant pups, the distance between foraging and roosting sites would presumably be minimized to the extent possible. Murray and Kurta (2004) found that lactating females returned two to four times per night to their day roosts, presumably to nurse their young; while non-lactating females did not return to their day roosts. Barclay (1991) and MacGregor (1999) have found that female bats chose roost sites based on high insect abundance in the area (along with other roost suitability criteria), so that foraging doesn't come at too high an energetic cost.

The maximum distance that Indiana bats will travel to forage is unknown and studies have revealed a considerable range of movement capabilities. Foraging distances reported range between 1 and 7.8 km (0.62-4.85 mi) for females and 1 and 3 km (0.62-1.86 mi) for males (Gardner et al. 1991, Garner and Gardner 1992; Kiser and Elliot 1996, Kniowski and Gehrt 2011). This great variability likely reflects differences in habitat quality and/or prey availability. Although the ideal configuration of a colony's or individual bat's home-range is unknown, presumably the closer the essential habitat elements are located, the better. Contiguous habitat elements reduce the travel time between foraging and day roosting areas, which will decrease exposure time to predation and reduce energetic costs of foraging.

Foraging habitat for females has been found to include forest habitats with open understories and canopy closures of 50 to 70 percent. However, other foraging habitat includes upland, bottomland, and riparian woodlands, as well as forest and cropland edges, fallow fields, and areas of impounded water (Kiser and Elliott 1996). Females tend to use larger foraging areas than males during the summer. A post-lactating female has been recorded as having a foraging range of approximately 214.5 ha (530 ac). Males have an area of approximately 56.7 ha (140 ac) (Kiser and Elliott 1996). Kniowski and Gehrt (2011) calculated home ranges for 32 Indiana bats in Ohio. Depending on the method to calculate the size, Indiana bat home ranges were estimated to be 210.5±130.6 hectares (0.84±0.52 mi^2) to 374.2±359.6 hectares (1.49±1.44 mi^2).

The importance of forest cover surrounding maternity colonies and within the species home range has been studied. The Service analyzed available forest habitat data for known maternity colonies in Kentucky and found that maternity colonies in the action area (the State of Kentucky) occur in areas with percent forest cover ranging from 8.8 percent to 94.6 percent (USFWS 2011). In Illinois, land near one colony was 67 percent agricultural, 33 percent forested, and 0.1 percent

farm ponds (Gardner et al. 1991). For a colony in Michigan, 55 percent was agricultural, 19 percent wetland (including lowland hardwood forest), 17 percent other forests, 6 percent urban development, and 3 percent lakes/ponds/rivers (Kurta et al. 2002). In Indiana, within 4 km (2.5 mi) of primary roosts, the landscape consisted of 10 to 80 percent deciduous forest cover ($\bar{x}$ = 37%) (USFWS 2007). In Missouri the species selected maternity roost sites based upon tree size, tree species, and surrounding canopy cover of forest within a 3 km (1.9 mi) radius (n = 4 maternity sites) of 19 to 30 percent (Callahan 1993). Analysis of land cover in 132 counties where evidence of reproduction by the species found non-forested habitats, primarily agricultural land, was 75.7 percent of the total land area in those counties. Deciduous forest covered 20.5 percent of the land, whereas coniferous forests and mixed coniferous/deciduous woodland occupied 3.4 percent. (Gardner and Cook 2002).

In Ohio, Kniowski and Gehrt (2011) investigated land use types within home ranges during nocturnal tracking of Indiana bats and revealed that they selectively foraged near woodland and water at all spatial scales, although their relative importance shifted with scale. Bats appeared to be avoiding cropland at all scales while foraging at night. The spatial distribution of home ranges reflected the preference for woodland/water habitat, as the home ranges were typically clustered along the riparian woodland habitat each year, much like the roost sites. Although bats largely avoided croplands, they were capable of flying over the croplands to locate more preferred habitat elsewhere. One lactating adult female was tracked flying 8 km (5 mi) overland to alternative riparian forest. The researcher documented the use of remote woodland patches for roosting and foraging at night.

Northern long-eared bats

Suitable summer habitat for northern long-eared bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields, and pastures. This includes forests and woodlots containing potential roosts, as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure.

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

Range-wide Status

Indiana bat

The current range of the Indiana bat includes much of the eastern half of the United States, from Oklahoma, Iowa, and Wisconsin east to Vermont, and south to northwestern Florida. The species has disappeared from, or greatly declined, in most of its former range in the northeastern United States due to the impacts of WNS. The current revised recovery plan (USFWS 2007) delineates

four recovery units for the Indiana bat: Ozark-Central, Midwest, Appalachian Mountains, and Northeast.

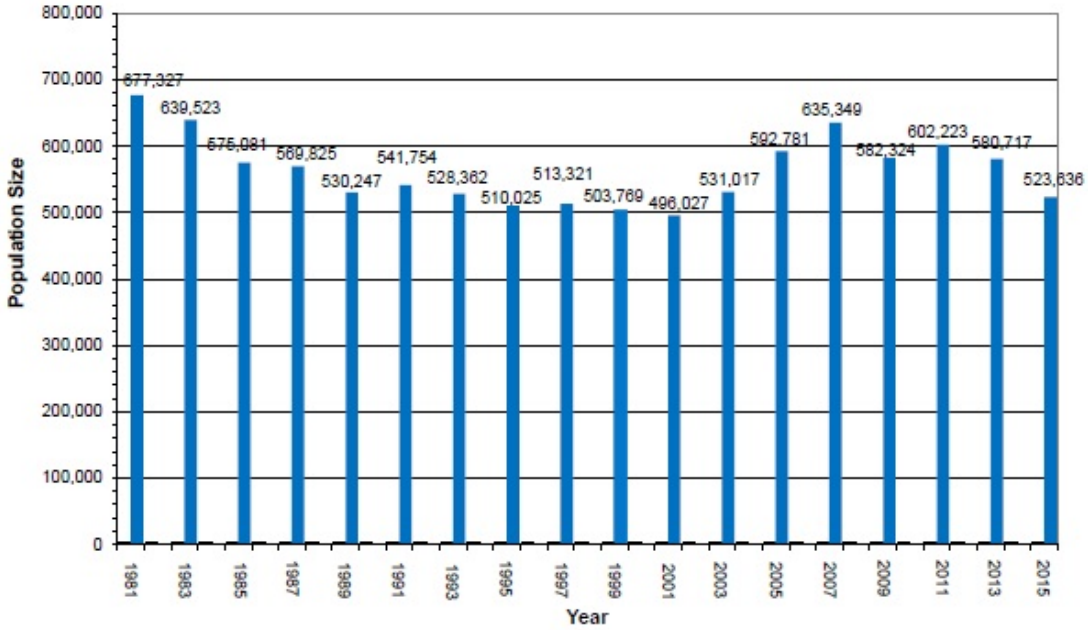
Hibernacula are divided into priority groups that have been redefined in the Service's Draft Recovery Plan (USFWS 2007):

- Priority 1 (P1) hibernacula typically have a current and/or historically observed winter population of greater than or equal to 10,000 Indiana bats;
- P2 have a current or observed historic population of 1,000 or greater, but fewer than 10,000;
- P3 have current or observed historic populations of 50 to 1,000 bats; and
- P4 have current or observed historic populations of fewer than 50 bats.

Based on winter surveys, as of August 2015, there are a total of 27 P1 hibernacula in seven states: Illinois; Indiana; Kentucky; Missouri; New York; Tennessee; and West Virginia. A total of 56 P2, 166 P3, and 270 P4 hibernacula are also known from the aforementioned states, as well as 10 additional states.

The majority of known maternity sites have been located in forested tracts in agriculturally dominated landscapes such as Missouri, Iowa, Indiana, Illinois, southern Michigan, western Ohio, and western Kentucky, as well as the Northeast, with multiple spring emergence telemetry studies.

From 1965 to 2001, there was an overall decline in the range-wide population of the Indiana bat (USFWS 2007). Despite the discovery of many new, large hibernacula during this time, the range-wide population estimate dropped approximately 57 percent from 1965 to 2001, which has been attributed to various causes (e.g., habitat loss/degradation, forest fragmentation, winter disturbance, and environmental contaminants). Between 2001 and 2007, the estimated range-wide population increased, from 451,554 to 590,875 Indiana bats (USFWS 2013). According to the 2015 Range-wide Population Estimate for the Indiana Bat (USFWS 2015), the total known Indiana bat population was estimated to be approximately 523,636, a 17.6 percent decrease from the 2007 range-wide estimate (Figure 3, USFWS 2015).



Andy King, U. S. Fish and Wildlife Service, Bloomington, Indiana. Revised August 25, 2015.

Figure 3. Indiana Bat Rangewide Population Estimates 1981-2015.

Northern long-eared bat

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 to Montana, south to eastern Kansas, eastern Oklahoma, Arkansas, and east through the Gulf states to the Atlantic Coast (Whitaker and Hamilton 1998; Caceres and Barclay 2000; Amelon and Burhans 2006). The species' range includes the following 37 states (plus the District of Columbia): Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming. Historically, the species has been most frequently observed in the northeastern United States and in the 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 was historically 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). More than 780 hibernacula have been identified throughout the species' range in the United States, although many hibernacula contain only a few (1 to 3) individuals (Whitaker and Hamilton 1998). Known hibernacula (sites with one or more winter records of northern long-eared bats) include: Alabama (2), Arkansas (41), Connecticut (8), Delaware (2), Georgia (7), Illinois (21),

Indiana (25), Kentucky (119), Maine (3), Maryland (8), Massachusetts (7), Michigan (103), Minnesota (11), Missouri (more than 269), Nebraska (2), New Hampshire (11), New Jersey (7), New York (90), North Carolina (22), Oklahoma (9), Ohio (7), Pennsylvania (112), South Carolina, (2), South Dakota (21), Tennessee (58), Vermont (16), Virginia (8), West Virginia (104), and Wisconsin (67).

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

WNS has been particularly devastating for northern long-eared bats in the northeast, where the species was believed to be the most abundant. There are data supporting substantial declines in the species populations in portions of the Midwest due to WNS. In addition, WNS has been documented at more than 100 northern long-eared bat hibernacula in the southeast, with apparent population declines at most sites.

Threats to the Species

Indiana bat

The Indiana bat was one of 78 species first listed as being in danger of extinction under the Endangered Species Preservation Act of 1966 because of large decreases in population size and an apparent lack of winter habitat (USFWS 1983, USFWS 1999). The 1967 federal document that listed the Indiana bat as "threatened with extinction" (32 FR 4001, March 11, 1967) did not address the five factor threats analysis later required by section 4 of the 1973 ESA. The subsequent recovery plans do address threats to the species in greater detail. Threats to the species discussed in the 2007 Recovery Plan (USFWS 2007) include the following: destruction/degradation of hibernation habitat (caves and mines); loss and degradation of summer habitat, migration habitat, and swarming habitat (especially forested habitats); disturbance of hibernating bats; predation; competition; inadequacy of existing regulations, particularly regulations that protect summer roosting habitat; natural catastrophes in hibernacula, such as flooding; and, environmental contaminants.

Since 2006, white-nose syndrome (WNS) has emerged as a new threat that may have serious implications for Indiana bat recovery. WNS primarily affects hibernating bats. Affected bats usually exhibit a white fungus on their muzzles, ears, and wings (Blehert et al. 2009). The fungus associated with WNS has been identified as *Pseudogymnoascus destructans* (formerly *Geomyces destructans*), a previously undescribed species (Minnis and Lindner 2013). The fungus thrives in the cold and humid conditions of bat hibernacula (USFWS 2011). The skin infection caused by *P. destructans* is thought to act as a chronic disturbance during hibernation (USGS 2010). The fungus invades living tissue, causing cup-like epidermal erosions and ulcers (Meteyer et al. 2009, Puechmaille et al. 2010). These erosions and ulcers may in turn disrupt the many important physiological functions that wing membranes provide, such as water balance (Cryan et al. 2010). Infected bats exhibit premature arousals, aberrant behavior, and premature

loss of critical fat reserves which is thought to lead to starvation prior to spring emergence (Frick et al. 2010). It has been determined that *P. destructans* is the primary cause of death (Lorch et al. 2011).

It is believed that WNS is primarily transmitted through bat-to-bat contact. In addition, people may unknowingly contribute to the spread of WNS by visiting affected caves and subsequently transporting fungal spores to unaffected caves via clothing and gear (USFWS 2011). Within the U.S., WNS has been diagnosed on the Indiana bat, northern long-eared bat, gray bat (*Myotis grisescens*), little brown bat (*Myotis lucifugus*), eastern small-footed bat (*Myotis leibii*), tri-colored bat (*Perimyotis subflavus*), and big brown bat (*Eptesicus fuscus*).

First documented in a New York cave in 2006, WNS has since spread to 26 states and five Canadian provinces, including over 50 known Indiana bat hibernacula (Figure 4). Affected hibernacula typically exhibit significant mortality (USFWS 2013). WNS has resulted in significant population declines in the Northeast and Appalachian Recovery Units (RU). Between 2007 and 2011, the Northeast RU lost 70% of its Indiana bat population (USFWS 2013). WNS is spreading rapidly throughout the rest of the Indiana bat's range. WNS continues to be found at an increasing number of sites throughout the Midwest RU. In March 2011, the first case of WNS was confirmed in Ohio, in an abandoned mine in Lawrence County. Currently, 16 counties in Ohio have been confirmed as WNS positive (ODNR 2014).

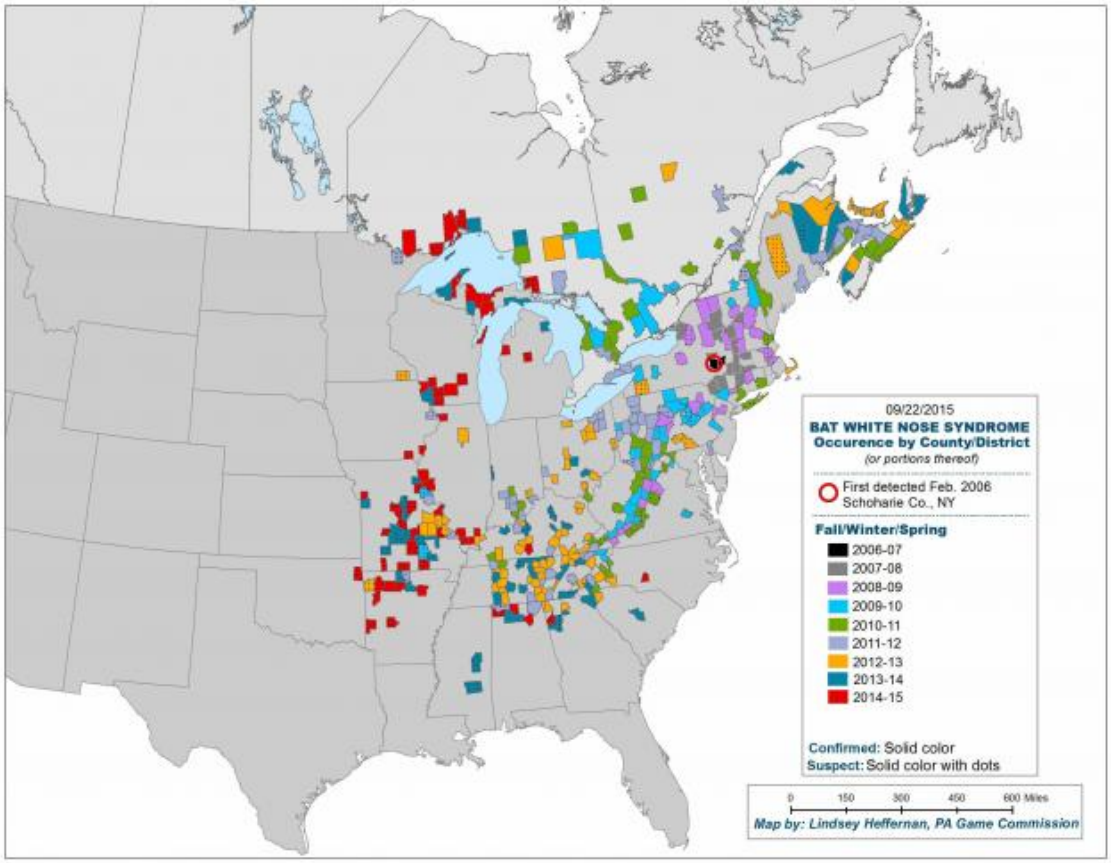


Figure 4. Bat White-Nose Syndrome Occurrence Map (as of 9/22/2015).

Another emerging risk to bat species is the recent increase in the number of wind turbines being constructed and operated. To date, seven Indiana bat fatalities have been documented at wind energy facilities (USFWS 2014b).

Northern long-eared bat

No other threat is as severe and immediate for the northern long-eared bat as WNS. It is unlikely that northern long-eared bat populations would be declining so dramatically without the impact of this disease. Since the disease was first observed in New York in 2007 (later biologists found evidence from 2006 photographs), WNS has spread rapidly in bat populations from the Northeast to the Midwest and the Southeast. Population numbers of this species have declined by 99 percent in the Northeast, which along with Canada, has been considered the core of the species' range. Although there is uncertainty about how quickly WNS will spread, it is expected to spread throughout the species entire range.

Although significant northern long-eared bat population declines have only been documented due to the spread of WNS, other sources of mortality could further diminish the species' ability to persist as it experiences ongoing dramatic declines. Individual bats sickened or struggling with infection by WNS may be less able to survive other stressors. Also, northern long-eared bat populations impacted by WNS, with smaller numbers and reduced fitness among individuals, may be less able to recover from other stressors, making them more prone to extirpation.

Depending on their characteristics and location, forested areas can function as summer maternity habitat, staging and swarming habitat, migration or foraging habitat, or sometimes, combinations of more than one habitat type. Impacts from tree removal to individuals or colonies would be expected to range from indirect impact (e.g., minor amounts of forest removal in areas outside the species summer home ranges or away from hibernacula) to minor (e.g., largely forested areas, areas with robust northern long-eared populations) to significant (e.g., removal of a large percentage of summer home range, highly fragmented landscapes, areas with WNS impacts).

Lastly, as mentioned for Indiana bats, there is growing concern that bats, including the northern long-eared bat, may be threatened by the recent surge in construction and operation of wind turbines across the species' range.

III. Environmental Baseline

This section is an analysis of the effects of past and ongoing human and natural factors leading to the current status of the species, its habitat, and ecosystem, within the ***action area.*** *It includes a description of the status of the species within the* ***action area****.*

This project lies within the Till Plains Section of the Central Lowlands Province (Anderson 1983). The elevation of the project area ranges from 900 feet MSL to 750 MSL. The project area lies in the Loamy High Lime Till Plains sub region of the Eastern Corn Belt Plains Ecoregion. Soils in this area are generally products of glacial till that overlay limestone bedrock.

The project area is entirely within the Olentangy River watershed in the Olentangy River-Rush Run HUC (HUC -05066661-11-02). Land-use within this HUC is over 75% developed. The Olentangy River is a direct tributary to the Scioto River, and outlets to the Scioto River further south in Columbus. This river is listed as EWH by Ohio EPA, and is a State Scenic River within the project area. The Olentangy River will be impacted by bridge replacements and additional bridges associated with the IR 270 main-stem and new ramps from IR 270 to SR 315. In addition to the Olentangy River, Wilson Run (a small Warmwater Habitat (WWH) perennial tributary), one unnamed perennial WWH tributary, and one intermittent Class I tributary are present in the project area and will be impacted. Although a few wetlands are located adjacent to the project area, no wetlands will be impacted by this project.

The project area is dominated by a mix of commercial development, residential development, roadway rights-of-way, and park land. The northeast quadrant of the project area consists of the Olentangy River, its associated riparian corridor, the York Golf Club, and Antrim Park. This quadrant contains floodplain forest, some upland forest, and developed open space. The southeast quadrant of the project area is dominated by commercial development directly adjacent to the freeway (mostly office parks and light industrial) and residential development (single family homes on small suburban lots) further from the road. The northwest and southwest quadrants of the project area are dominated by residential development, mostly consisting of single family homes on small lots.

Status of the Species within the Action Area

Based on the Service's GIS database of Indiana bat and northern long-eared bat capture records, these species have never been captured within the project area. Also, no critical habitat for either species has been defined in Ohio. No presence/absence surveys were conducted as part of the ecological survey work for this project. Based on the Service's database, the nearest northern long-eared bat capture is approximately 4 miles southeast of the project area along Alum Creek. The nearest Indiana bat collection record is approximately 10 miles to the northwest in Jerome Township, Union County. A 2004 mist-net survey conducted approximately 3 miles northwest of the project area and a 2013 mist-net survey conducted approximately 1.5 miles north of the project area, both in Delaware County, did not capture any individuals of either species. Numerous capture records for both species are located in central Ohio. Indiana bats have been caught along Big Darby Creek, and several maternity colonies have been reported from the Darby corridor in multiple counties. The northern long-eared bat has also been captured along the Big Darby Creek corridor, and was often found concurrently with Indiana bat. This species has been captured in the northeast portion of Columbus along Alum Creek, which is bordered by medium to high density commercial and residential development.

Both species could potentially be found in the mature wooded riparian corridor along the Olentangy River north of the project area. The wooded area between the York Golf Course and Tributary 9b also exhibits potentially suitable areas for roosting and foraging. The wooded areas located directly adjacent to the roadways on the roadway slopes are generally very immature (15-20 years old), and were characterized by dead ash, small maples, black walnut, and cottonwood trees, and contained very dense understory areas of invasive honeysuckle shrubs and Callery pear. Although some of the trees in these areas exhibited small amounts of roosting

habitat (loose bark, cavities, broken branches, etc.), the quality of the habitat is not high due to its isolation from larger woodlots, location directly adjacent to busy freeways, roadways, and development, and the density of the understory.

Approximately 11.46 acres of poor to moderate bat habitat was present within the project area prior to the start of construction. The wooded areas contained approximately 99 roost trees (most of which were smaller than 8" dbh, and would more likely offer habitat for the northern long-eared bat), and no potential maternity roost trees for the Indiana bat were identified. As the northern long-eared bat was listed after the original ecological survey, the trees that were noted during the ecological survey were only assessed for Indiana bat maternity potential. One or more of the trees that were removed prior to ODOT-OES's field review conducted on August 24, 2015 may have offered maternity roosting habitat for the northern long-eared bat.

Factors affecting species environment within the Action Area

As described above, IR 270 on the north side of Columbus is a major commuter thoroughfare, with severe traffic congestion occurring specifically at the SR 315 and US 23 interchanges due to high density residential and commercial development surrounding the area. Therefore, it is likely that past and ongoing development in the area has led to loss and fragmentation of roosting and foraging habitat for the species.

IV. Effects of the Action

In evaluating the *effects of the action*, section 7 of the Endangered Species Act and the implementing regulations (50 CFR §402) require the Service to consider both the direct and indirect effects of the action on the species, together with the effects of other activities that are interrelated or interdependent with the action that will be added to the environmental baseline. *Direct effects* are those effects that have immediate impacts on the species or its habitat while *indirect effects* are those that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur. *Interrelated actions* are those that are part of a larger action and depend on the larger action for project justification. *Interdependent action*s are those actions that have no independent utility apart from the action under consideration.

The *effects* evaluation is necessary to make the required determination under 7(a)(2), of insuring the Federal action does not jeopardize the continued existence of the species, or result in the destruction or adverse modification of designated critical habitat. *Jeopardize the continued existence* of a species means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species.

Because this biological opinion addresses an action that has already occurred, the effects analysis below evaluates: (1) the environmental consequences to which northern long-eared bat and Indiana bats were exposed; (2) which individuals may have been exposed and when (males and non-reproductive females vs. maternity colonies); and (3) how those individuals responded upon exposure. This analysis, based on the data, demonstrates that reductions in survivorship and reproductive potential were unlikely to have occurred. Once it was understood how exposed

individuals likely responded, it was assessed how these responses affected their fitness and ultimately the reproduction, numbers, and distribution of the species range-wide. In general, the environmental consequences associated with implementation of tree clearing during the bats' active season include the following: permanent loss of roosting and foraging habitat and temporary reductions in water quality. There are no known hibernacula within the action area, so impacts to northern long-eared bat and Indiana bats during the winter are not anticipated and will not be analyzed in this determination.

Beneficial Effects

Because ODOT could not commit to seasonal clearing of all remaining trees within the project area, and could not conduct emergence surveys on the remaining roost trees prior to removal, ODOT committed to provide bat habitat conservation of previously non-protected, high quality *Myotis* species habitat at a 5:1 replacement ratio based on the amount of wooded acreage impacted by this project. A total of 11.46 acres of wooded habitat was impacted, and ODOT agreed to provide at least 57.3 acres of bat habitat conservation to offset potential take from the summer tree clearing. The land being preserved conforms to the following criteria:

- Conservation area(s) must be within the Central Management Unit (Crawford, Delaware, Fairfield, Fayette, Franklin, Knox, Licking, Madison, Marion, Morrow, Pickaway, and Union Counties).
- Each conservation area must be located within the home range of a maternity colony for Indiana bat (either based on maternity record, or based on capture of a lactating or pregnant female or a juvenile bat).
- Each conservation area must be larger than five acres in size.
- Within the conservation area(s), no non-forested areas will be wider than 500 feet at any given point.
- Must be protected by a legal instrument.

Per the above requirements, ODOT, in cooperation with the Ohio Department of Natural Resources (ODNR), purchased 138.85 acres of a 149.77 acre parcel along Little Darby Creek in Madison County, Jefferson Township (the Forrest Property). This entire property is located within the home range of a known Indiana bat maternity colony. This parcel contains 91.00 acres of wooded habitat, 3.00 acres of scrub/shrub habitat, 44.10 acres of grassland/prairie habitat, and 4,707 linear feet of streams, including 3,590 linear feet of Little Darby Creek.

The Forrest property was acquired with funds provided by ODOT to ODNR. ODNR Division of Real Estate and Land Management (REALM) worked with ODNR-Scenic Rivers to locate and purchase the property. The deed restriction states that the property will be kept in its natural state, and the only activities that will be allowed on the property include hiking, hunting, fishing, and restoration/conservation activities. This property will not be generally open to the public. This deed restriction is in perpetuity. ODOT has also provided funding to ODNR for future management activities, including boundary marking and possible restoration activities.

(Appendix C of ODOT's associated BA for this action contains Forrest Property mapping, photos, and real estate documentation.)

Direct and Indirect Effects

Injury or Mortality

As noted above, only a portion of the trees that exhibited roosting habitat were removed between October 1 and March 31. Of the 11.46 acres of wooded habitat present in the project area, 6.47 acres were cleared after March 31, but prior to the Service reporting the summer tree clearing. As this area was not analyzed for roosting habitat just prior to clearing, the presence of trees that developed roosting habitat after the wooded acreage was last evaluated is unknown. The other 4.99 acres was surveyed by ODOT-OES biologists to determine if trees suitable for roosting were present in the project area, and would require removal. OES biologists noted 61 trees with suitable roosting habitat in the 4.99 remaining acres, and no trees that exhibited potential maternity roosting habitat. As these trees and potentially other roosting trees in the 6.47 acres of habitat that was not surveyed, were removed during the summer, bats may have been directly injured or killed if the trees were in use. As most (if not all) of the roosting habitat was removed from the highest quality woodlot during the winter, and the very low to low-moderate quality of the remaining woodlots, mortality and injury are unlikely to have occurred (or to occur with the remaining wooded habitat removal). Most of the remaining suitable roosting habitat consisted of small dead or dying ash trees or other dying trees with small amounts of peeling bark or small cavities. Only four or five larger trees with areas of peeling bark were noted in the northeastern quadrant of the project area, and were considered moderate quality roosting habitat.

If Indiana or northern long-eared bats are present in the project area, they likely use the riparian corridor along the Olentangy River north and south of the project area for roosting, as these wooded areas are more mature, and are connected to wooded parkland, the Scioto River corridor, and wooded areas along tributaries. If trees located within the construction limits were used for roosting, they would most likely have been used by a small number of males or non-reproductive females, as no potential maternity roosts were reported from the project area during the original ecological survey, and were not noted within the project area during the August 24, 2015 emergency review. These adult bats would most likely abandon the roost and fly away if their roost tree was disturbed while they were present. Injury or death would most likely be caused by the bat being struck by the falling tree. Given the quality of the roosting habitat within the construction area and better habitat located adjacent to the project, these species are most likely not using this project area for day roosting, and the possibility of direct injury or mortality from the summer tree clearing in this location was low.

Loss of Summer Roosting and Foraging Habitat

Of the 11.46 acres of wooded habitat were removed for this project, twenty-eight trees that exhibited roosting habitat were removed during the winter months, and 61 roosting trees were removed during the summer/early fall of 2015. In general, the wooded habitats located directly adjacent to IR 270 in the southeastern and northwestern quadrants were of low quality. These areas were dominated by small trees and dense stands of invasive honeysuckle bushes. In many cases, the roosting habitat exhibited by the trees was either obscured by vines or located beneath the honeysuckle canopy. These two wooded areas consisted of narrow strips between IR 270 and

high density development. The northwestern trees were fairly isolated from other woodlots. The trees in the southeastern quadrant were connected to the Olentangy River corridor. The wooded habitat in the northeastern quadrant was more mature, contained a small stream, and was less impacted by invasive shrubs. The trees near the road tended to be younger, and the understory was more cluttered. The wood lot improved in age and quality toward the top of the hill. All of the wooded areas within the project area were inferior habitat for bats compared to the riparian corridor along the Olentangy River outside of the project area.

Existing records of northern long-eared bat and Indiana bat summer captures and winter hibernacula do not occur on or in the vicinity of the project site. However, because habitat that could be used by currently unidentified and/or future populations has been lost, the project may affect the species' ability to perpetuate in or colonize this area. The amount of forested habitat loss in the general project vicinity will be low compared to the available habitat along the Olentangy River. The woodlots impacted by this project were already fragmented, and the area is highly developed, so the tree removal on this project did not significantly, further fragment the available habitat in this area to a noticeable degree.

Based on the type and quality of habitat within the project area, this action was most likely to impact males or non-reproductive female bats. Those individuals may have been exposed to loss of roosting and/or foraging habitat upon return from hibernation. In general, effects on these individual bats would be less severe than the effects associated with individuals of maternity colonies. Adult male and non-reproductive females are not subject to the physiological demands of pregnancy and rearing young. Males and non-reproductive females typically roost alone and are more opportunistic in roost selection. Because these individuals are not functioning as members of maternity colonies, they do not face the challenge of reforming as a colony. Additionally, energy demands and reserves are not being used at the increased rate experienced by pregnant females. Therefore, it is anticipated that adverse effects to non-reproductive bats would be less than the effects to reproductively active females. As a large amount of good quality roosting and foraging habitat is present along the Olentangy River in the vicinity of the project, these individuals should be able to find replacement roosting and foraging habitats nearby.

As no potential maternity habitat was identified within the project area, direct impacts to maternity colonies did not likely occur. Loss of the small amount of foraging habitat may have increased stress to a nearby colony, but this stress would most likely be due to the disturbance of the Olentangy River near the bridges. This corridor contains much better roosting and foraging habitat, and would offer replacement habitat for the lower quality wooded areas removed for this project.

Impacts to Water Quality

Earthwork and general road construction activities have resulted and will result in short-term adverse impacts to the water quality in the action area. Road construction has impacted approximately 3,000 linear feet of stream habitat through permanent discharges (by relocating or converting streams through drainage structures). Sediment and other contaminants could have affected water quality through erosion and vegetation management and may impact the stream from accidental spills during any phase of the project from construction to operation. These

impacts are typically localized (i.e., limited to the construction limit footprint), but may extend for some distance downstream, depending on intensity of disturbance and field conditions, especially during construction.

Insects associated with these aquatic habitats make up a portion of the diet of these bat species, and a change in water quality can affect the prey base.

Decreases in water quality through contamination and the impacts to stream habitats while these species are present may reduce the availability of aquatic insects and reduce the availability or quality of suitable drinking sources.

In general, adverse impacts to the water quality of streams during construction are not expected to be substantial, and are to be minimized through strict adherence to Best Management Practices (BMP's) during daily construction activities.

Additionally, the Olentangy River and other tributaries are located adjacent to the action area, and any bats that currently use or did use the project site for foraging and water supply should not have difficulty locating alternate sources of hydration and prey.

Direct adverse effects to the Indiana bat and northern long-eared bat from this decrease in aquatic insect prey and drinking sources is likely to be undetectable due to the linear nature of the project, existing high development, the availability of suitable habitat in the areas adjacent to the project area, and the assumption that bats will use or seek alternate areas for foraging and drinking as some areas become unsuitable. This area will continue to provide an abundant prey base of both terrestrial and aquatic insects during project construction, operation, and maintenance. Therefore, any potential effects of lowered water quality are anticipated to have a minor effect on these species, making them seek alternate foraging and drinking locations.

Impacts of Construction Activity and Noise while Bats are Present

In addition to the habitat impacts in the project alignment, the proposed project may have resulted in increased disturbance in the action area during construction from the use of equipment and blasting. Bats in the action area may have been directly exposed to increase noise levels and vibrations. The highest project noise levels are expected to occur during construction activities, which is on-going. This project is not adding capacity to IR 270 or SR315; therefore, it will not result in an appreciable permanent increase in noise.

The pre-construction ambient noise along the proposed construction corridor varied based on distance from the roadway and local topography. Based on the 2006 Highway Noise Analysis Report (URS, 2006), ambient noise along the IR 270 and SR 315 corridor ranged from 53 dBA to 75 dBA. The report showed that noise increases of 0 to 2 dBA is expected at the monitored sites by 2028. Most of the areas of highest noise impacts either now have noise walls in place or will be protected by noise walls post-construction.

In general, the increased noise and vibrations could cause disturbance to bats less accustomed to these impacts while roosting, thereby lowering the suitability of habitat adjacent to the project area. Owen et al. 2003 found that northern long-eared bats prefer roosting sites on the interior of

forest tracts. Similar findings (Henderson et al. 2008) for northern long-eared bat foraging areas support the northern long-eared bat preference for less fragmented forest to edge habitats as flyways. Indiana bats may use edge habitats more often for foraging, and have been found in more fragmented woodlots in Ohio. This site is very disturbed, and the wooded habitats within and near the project area were very fragmented and generally of poor quality. Due to lack of suitable habitat, maternity colonies would not likely use this area. Roosting habitat for males and non-reproductive females was present within the project area prior to removal, and is present adjacent to the project area, so increases in noise impact associated with the project construction may cause short-term, nuisance-level adverse impacts in the immediate project vicinity and will not detrimentally affect the species.

Interrelated and Interdependent Actions and Activities

The Service and ODOT are unaware of any interdependent or interrelated actions or activities associated with this project. All staging areas are already in place and are within the defined action area. This project is not adding capacity to the main-line SR 315 or IR-270; it is only reconfiguring the entrance/exit lanes of an existing interchange. This project is designed to correct existing traffic and safety issues and is not being constructed to encourage development. Most of the areas surrounding the SR 315/IR 270 interchange have already been developed. Better traffic flow through the interchange may encourage a small amount of new residential development, but not much property in the project vicinity is still available for development. This area is affluent and has experienced swift growth over the last 20 years, even with a poorly performing interchange.

V. 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.

The Service is unaware of any other tribal, state, local, or private actions presently occurring or that are reasonably certain to occur in the future, which would destroy, modify or curtail the remaining northern long-eared bat and Indiana bat summer habitat within the Action Area. Therefore, we do not anticipate significant cumulative effects from the proposed action, combined with other reasonably foreseeable non-Federal actions**.**

VI. Conclusion

After reviewing the current status of the Indiana bat, the environmental baseline for the action area, the effects of the FRA-270-21.76/22.85 project (PIDs 81747/81748), and the cumulative effects, it is the Service's biological opinion that the clearing of suitable habitat for the Indiana and northern long-eared bat during the active roosting season did not likely jeopardize the continued existence of the species, and did not destroy or adversely modify designated critical habitat. Critical habitat for the Indiana bat has been designated at hibernacula in Illinois, Indiana, Kentucky, Missouri, Tennessee, and West Virginia; however, this action did not affect these areas. No critical habitat has been designated for the northern long-eared bat; therefore,

none was affected. Thus, no destruction or adverse modification of critical habitat occurred during this action.

The Service recognizes that the status of the Indiana and northern long-eared bats is uncertain due to WNS. In order to slow down and reverse the rate of decline and support the species' survival and recovery, the species not only need to maintain their current rate of reproduction, but also increase reproduction and decrease mortality rates. Nevertheless, based on the Service's analysis of effects, it does not appear that the FRA-270-21.76/22.85 project action significantly affected the bats' reproduction or increased their vulnerability of extinction.

The Service concludes that overall the action on the FRA-270-21.76/22.85 project described above did not contribute to a measurable decrease in reproduction or numbers of Indiana and northern long-eared bats. The Service also determined that the removal of 11.46 acres of roosting and foraging habitat during the bats' active summer roosting season did not likely result in an appreciable reduction to the distribution of the species given the availability of the remaining suitable habitat in the surrounding landscape and ODOT's purchase and protection of a 138.85-acre parcel within a known Indiana bat maternity colony home range along Little Darby Creek in Madison County.

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 the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal 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 Service's 1998 Endangered Species Consultation Handbook provides the following guidance regarding documentation of incidental take in biological opinions for emergency consultation:

> *If incidental take is anticipated during the emergency response, the Services can advise the action agency during the informal consultation phase of ways to minimize take. In some circumstances, the actual or estimated take occurring from the agency's emergency response actions can be determined, and should be documented in the biological opinion for future inclusion in the species' environmental baseline. The incidental take statement in an emergency consultation does not include reasonable and prudent measures or terms and conditions to minimize take, unless the agency has an ongoing action related*

to the emergency. Rather, an emergency consultation incidental take statement documents the recommendations given to minimize take during informal consultation, the success of the agency in carrying out these recommendations, and the ultimate effects on the species of concern through take.

Amount or Extent of Take Anticipated

Based on the action as described herein, the Service assumes that incidental take of Indiana and northern long-eared bats may have occurred in the form of harm or harassment through tree clearing activity and habitat loss from the FRA-270-21.76/22.85 project action. Incidental take of Indiana bats and northern long-eared bats is difficult to detect for the following reasons: 1) the species are highly motile, 2) the species occur in habitat (e.g., trees) that makes detection difficult, and 3) finding dead or moribund bats is unlikely due to a small body size and the likely scavenging of specimens by predators. However, we believe that take of these species can be monitored by tracking the acreage of habitat modification and ODOT's adherence to avoidance, minimization, and mitigation measures. Specifically, during this action, the avoidance measure (i.e., clearing trees only during the bats' inactive season, October 1 – March 31) was not implemented. Therefore, the roosting and foraging habitat affected by this action was used as a surrogate for the level of take. Therefore, ODOT must reinitiate consultation with the Service if more than 11.46 acres of forested habitat are removed during the remainder of the project.

Effect of the incidental take

Overall, the harm and harassment of Indiana and northern long-eared bats caused by the removal of 11.46 acres of suitable roosting and foraging habitat during the species' active summer season, was not likely to cause population-level effects. In the accompanying biological opinion, the Service determined that this level of take was not likely to result in jeopardy to either species. No critical habitat for the Indiana bat occurs in the action area and none has been designated for northern long-eared bat, so none would be impacted.

REINITIATION NOTICE

This concludes formal consultation for ODOT's actions outlined in your request dated October 28, 2016. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over an action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded (more than 11.46 acres of forested habitat is removed); (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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