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January 9, 2015

Ms. Laurie Leffler  
Division Administrator  
Federal Highway Administration  
200 North High Street  
Columbus, OH 43215

RE: **Portsmouth Bypass (SCI-823-0.00, PID 19415)**

Dear Ms. Leffler,

This letter accompanies the U.S. Fish and Wildlife Service's (Service) Conference Opinion for the Ohio Department of Transportation's (ODOT) Portsmouth Bypass project (SCI-823-0.00, PID 19415) in Scioto County, Ohio. Formal conference under section 7 of the Endangered Species Act (ESA) of 1973, as amended, for the project was initiated on July 1, 2014. The conference concerns the effects of the Portsmouth Bypass project on the northern long-eared bat (*Myotis septentrionalis*), a species proposed for federal listing under the ESA.

The Service submitted a draft Conference Opinion to ODOT's Office of Environmental Services (OES) for review on December 3, 2014 and received their comments on December 12, 2014. Upon considering the comments, we made the appropriate modifications and clarifications in a final draft, which we submitted to ODOT OES for review on January 2, 2015. With no further comments or concerns, ODOT requested that we issue the final Conference Opinion, enclosed.

This concludes formal conference on the ODOT Portsmouth Bypass project. If you have any concerns about this Conference Opinion, please feel free to contact me or Karen Hallberg of this office at (614) 416-8993 extensions 21 or 23, respectively.

Sincerely,

Jeromy Applegate  
Acting Field Supervisor

cc: T. Hill, ODOT, Office of Environmental Services, Columbus, OH (*email only*)  
N. Mehlo, FHWA, Planning & Environmental, Columbus, OH (*email only*)  
J. Kessler, ODNR, Office of Real Estate, Columbus, OH (*email only*)  
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B. Mitch, ODNR, Office of Real Estate, Columbus, OH (*email only*)

**CONFERENCE OPINION**

**on the**

**CONSTRUCTION, OPERATION, AND MAINTENANCE  
OF THE PORTSMOUTH BYPASS (SCI-823-0.00 PID 19415)**

**FOR THE NORTHERN LONG-EARED BAT (*Myotis septentrionalis*),  
PROPOSED FOR FEDERAL LISTING  
UNDER THE ENDANGERED SPECIES ACT**

**Submitted to the Federal Highway Administration**

**December 31, 2014**

Prepared by:

U.S. Fish and Wildlife Service  
Ohio Ecological Services Field Office  
4625 Morse Road, Suite 104  
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## TABLE OF CONTENTS

TABLE OF CONTENTS.....	2
INTRODUCTION .....	3
CONSULTATION HISTORY .....	3
CONFERENCE OPINION .....	6
I. Description of the Proposed Action.....	6
Construction.....	7
Operations and Maintenance.....	10
Action Area .....	12
Federally Listed Species Not Addressed in this Conference Opinion .....	14
Conservation Measures and Minimization Strategies.....	16
II. Status of the Species.....	20
Species Description.....	20
Life History .....	21
Population Dynamics .....	23
Status and Distribution.....	24
Range-wide and Recovery Needs .....	27
III. Environmental Baseline .....	28
Status of the Species within the Action Area.....	30
Factors affecting species environment within the Action Area .....	34
IV. Effects of the Action.....	35
Factors to be Considered.....	35
Analysis for Effects of the Action .....	36
V. Cumulative Effects.....	42
VI. Conclusion .....	42
Jeopardy analysis .....	42
Critical habitat adverse modification analysis .....	43
VII. Conservation Measures: Avoidance, Minimization, and Mitigation Measures .....	43
INCIDENTAL TAKE STATEMENT.....	43
Amount or Extent of Take Anticipated.....	44
Effect of the incidental take .....	45
Reasonable and prudent measures .....	45
Terms and conditions .....	45
CONSERVATION RECOMMENDATIONS.....	47
REINITIATION NOTICE .....	49
LITERATURE CITED .....	50

## INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service) Conference Opinion (CO) based on our review of the proposed Portsmouth Bypass project (SCI-823-0.00, PID 19415) in Scioto County, Ohio, and its effects on the northern long-eared bat (*Myotis septentrionalis*). This CO has been prepared pursuant to section 7 of the Endangered Species Act of 1973 (Act), as amended (16 U.S.C. 1531 *et seq.*) and its implementing regulations (50 CFR §402). The Federal Highway Administration's (FHWA) request for formal consultation was received on July 1, 2014, and formal consultation was initiated on that same date.

This conference opinion is based on the best available scientific and commercial data including information provided in the June 26, 2014 Final Biological Assessment submitted with FHWA's request to initiate formal conference; an interagency field review of the site on May 12, 2011; Ecological Survey Reports (ESR) submitted by the Ohio Department of Transportation (ODOT) during coordination with the Service between 2011-2013; the *Northern Long-eared Bat Interim Conference and Planning Guidance* issued by the Service on January 6, 2014; numerous telephone conversations and e-mails between the Service, ODOT, FHWA, and their representatives, and other sources of information available to us and/or in our files. A complete administrative record for this consultation is on file at the Columbus Ohio Ecological Services Field Office (COFO).

The purpose of this Conference Opinion is to document our analysis of whether the proposed action is likely to jeopardize the continued existence of the northern long-eared bat. The jeopardy analysis entails assessing whether the proposed action is likely to reduce appreciably the likelihood of both survival and recovery of the northern long-eared bat by reducing its reproduction, population, and distribution in the wild. The principal components of this analysis are, in brief: identifying the probability of individual northern long-eared bat exposure to action related stressors, and its response to that exposure; integrating those individual risks (exposure risk and subsequent response) to discern the consequences to the populations to which those individuals belong; and determining the consequences of any population-level risks to the species range-wide. If, at any point, we demonstrate that the risks are unlikely, we conclude that the agency has insured that their action is not likely to jeopardize the continued existence of the species and our analysis is completed.

## CONSULTATION HISTORY

The Service has been coordinating with ODOT/FHWA on the proposed project since 2000. The below list of items includes formal letters, meetings, site visits, and major milestones that occurred as part of the consultation process. In addition to the events listed below, the consultation history includes numerous phone calls, e-mails, document reviews, site visits, and conference calls.

Table 1. Consultation History for the Portsmouth Bypass Project

Date	Event/Action
November 8, 2000	ODOT developed a Feasibility Study for US 23 Portsmouth Transportation Study, Scioto County, Ohio ODOT Project SCI-823-0.00, PID 19415.
November 17, 2000	USFWS responded to Feasibility Study.
March-July 2003	ODOT consultants conducted a timber rattlesnake survey.
April 28, 2003	ODOT letter to the USFWS initiating informal consultation.
May 28, 2003	ODOT coordinated survey methodologies for the small whorled pogonia with the USFWS.
June 9, 2003	ODOT consultant ESI performed Indiana bat mist net surveys on the project alternative alignments.
June 30, 2003	USFWS provided technical assistance and guidance on surveying for the small whorled pogonia.
June-July 2003	ODOT consultant CH2MHill performed a rare plant survey on the project alignments.
July 21, 2003	ODOT submitted a letter requesting technical assistance on Indiana bat surveys.
July 23, 2003	USFWS provided a letter of technical assistance on Indiana bat surveys.
July 26, 2003	ODOT consultant ESI performed additional Indiana bat surveys on the project alternative alignments.
August 19, 2003	ODOT submitted to USFWS a preliminary report for the small whorled pogonia.
August 27, 2003	ODOT provided the USFWS an update on the Indiana bat survey.
September 12, 2003	The USFWS provided technical guidance on the preliminary small whorled pogonia survey.
November 26, 2003	ODOT submitted a survey report for the timber rattlesnake to the USFWS.
April-July 2004	ODOT consultant TransSystems performed a wetland delineation on the Preferred Alignment.
May 28, 2004	ODOT submitted a Preliminary Draft EIS and an Ecological Survey Report for the entire SCI-823-0.00 project (all three phases) to the USFWS, with effect determinations on the Indiana bat, small whorled pogonia, and Virginia spirea.
June 3, 2004	ODOT consultant CH2MHill performed a small whorled pogonia survey.
August 25, 2004	USFWS provided concurrence with effect determinations on the on Indiana bat, small whorled pogonia, and Virginia spirea, as well as acknowledged ODOT's determination of no impact to the timber rattlesnake, and recommended that the rayed bean and sheepsnose mussel be addressed in the EIS. The USFWS also provided technical assistance on the Draft EIS.
March 11, 2005	The USDOJ provided comments on the Draft EIS.
July 2005	Final Environmental Impact Statement (FEIS) was completed in July 2005.
June 9, 2006	FHWA issued the Record of Decision (ROD) based upon these documents on June 9, 2006.

Date	Event/Action
February 10, 2011	Interagency meeting between the USFWS, the FHWA, the USACE, and ODOT indicated that additional survey work would be needed in suitable habitats to determine the presence and possible effects that the project may have on the rayed bean and clubshell mussels, small whorled pogonia, running buffalo clover, eastern hellbender, and Indiana bat. It was also determined that no additional survey work would be needed for the timber rattlesnake or Virginia spiraea (as the previous surveys conducted were still valid), or for the sheepsnose mussel, pink mucket pearly mussel, fanshell mussel, snuffbox mussel, and northern riffleshell mussel (as suitable habitat streams for these species are not known to be within the project area).
May-June 2011	ODOT consultant ASC performed running buffalo clover, and small whorled pogonia surveys on the project site.
May 12, 2011	Interagency field review of the project site attended by the USFWS, USACE, and ODOT resulted in the commitment by ODOT to update the inventory of the water resources (stream and wetlands) and terrestrial habitats.
July-August 2011	ODOT consultant EnviroScience performed an Indiana bat mist net survey on the preferred alternative site.
August 2011	ODOT consultant ASC performed a mussel survey on the Little Scioto River crossing of the project.
August 16, 2011	ODOT coordinated an Ecological Survey Report for Phase 1 of the project with the USFWS.
August 16, 2011	ODOT consultant Gregory Lipps performed an eastern hellbender survey on the site.
November 9, 2011	FHWA/ODOT re-initiated informal consultation addressing effects to the federally endangered Indiana bat ( <i>Myotis sodalis</i> ), the federally endangered running buffalo clover ( <i>Trifolium stoloniferum</i> ), the federally endangered clubshell mussel ( <i>Pleurobema clava</i> ), the federally endangered fanshell mussel ( <i>Cyprogenia stegaria</i> ), the federally endangered northern riffleshell mussel ( <i>Epioblasma torulosa rangiana</i> ), the federally endangered pink mucket pearly mussel ( <i>Lampsilis abrupta</i> ), the proposed endangered rayed bean mussel ( <i>Villosa fabalis</i> ), the proposed endangered sheepsnose mussel ( <i>Plethobasus cyphus</i> ), the proposed endangered snuffbox mussel ( <i>Epioblasma triquetra</i> ), the federally threatened small whorled pogonia ( <i>Isotria medeoloides</i> ), the federally threatened Virginia spiraea ( <i>Spiraea virginiana</i> ), the federal species of concern bald eagle ( <i>Haliaeetus leucocephalus</i> ), the federal species of concern eastern hellbender ( <i>Cryptobranchus alleghaniensis</i> ), and the federal species of concern timber rattlesnake ( <i>Crotalus horridus horridus</i> ). ODOT coordinated five survey reports discussing potential impacts to federally listed species that may result from the construction of all three phases of the Portsmouth Bypass. Effect determinations on all species were applicable to the Project in its entirety (all three phases).
March 12, 2012	USFWS provided concurrence on ODOT's effect determinations on federally listed and proposed species.
March 15, 2012	USFWS officially listed rayed bean and snuffbox as endangered.
May 10, 2013	ODOT submitted an Ecological Survey Report for Phases 2 and 3 of the project to the USFWS, increasing the estimated forest habitat impacts from approximately 316 acres to approximately 685 acres and reiterating the effect determinations that had been made on November 9, 2011.

Date	Event/Action
September 12, 2013	The USFWS provided concurrence on effect determinations, as well as technical assistance and comments on the project.
October 2, 2013	USFWS proposed to list the northern long-eared bat (NLEB) as endangered under the Endangered Species Act.
November 19, 2013	ODOT began the development of a formal conference document with the consultant team for coordination of the effects of the Portsmouth Bypass project on the NLEB.
January 6, 2014	USFWS released Interim Conference and Planning Guidance on the NLEB.
January 15, 2014	ODOT consultant EnviroScience requested recent capture/hibernacula records for the NLEB.
April 18, 2014	ODOT submitted Draft Biological Assessment (BA) to USFWS for preliminary review.
May 19, 2014	USFWS requested additional information from ODOT regarding the design-build-finance-operate-maintain (DBFOM) contracting approach to be implemented for the project.
May 30, 2014	USFWS met with ODOT personnel from OES and the Office of Innovative Delivery to discuss the DBFOM contract.
June 17, 2014	USFWS provided final comments on Draft BA to ODOT.
June 30, 2014	FHWA requested initiation of formal conference with USFWS.
July 9, 2014	ODOT requested approval from USFWS to proceed with tree clearing on Phase 1 section of Bypass, to commence October 1, 2014.
July 11, 2014	USFWS approved Phase 1 tree clearing, to commence October 1, 2014, prior to issuance of Conference Opinion (CO) on the northern long-eared bat.
July 28, 2014	USFWS acknowledged receipt of complete initiation package for formal conference, with an initiation date of July 1, 2014

### CONFERENCE OPINION

#### I. Description of the Proposed Action

*The majority of information in this section is taken from the Biological Assessment prepared and submitted to the Service by FHWA/ODOT in July 2014.*

The Portsmouth Bypass project is located in Scioto County in southeastern Ohio. For this project ODOT will construct a new four-lane limited access highway to bypass the city of Portsmouth, Ohio, as part of the Appalachian Development Highway system. State Route 823 (SR 823, Portsmouth Bypass, SCI-823-0.00) will connect US 52 near Wheelersburg to US 23 just north of Lucasville, Ohio. It will be approximately 16 miles in length, bypassing approximately 26 miles of US 52 and US 23 through Portsmouth.

The proposed project is approximately 90 miles south of Columbus, Ohio, and 45 miles northwest of Huntington, West Virginia. Other nearby towns include: Wheelersburg and Ironton, Ohio, and Ashland and Greenup, Kentucky. Existing transportation facilities in the region include US 23, US 52, SR 32, Kentucky's A-A Highway, Norfolk Southern Railway, CSX Railway, Amtrak service, Scioto County Airport, and Ohio River barge shipping.

FHWA/ODOT concluded that this project is necessary, appropriate, and is in the interest of public health, safety, and economic sustainability and development. The project will provide a missing link in the Appalachian Development Highway System to improve travel time and regional mobility, avoiding 30 traffic signals, 88 intersections, and over 500 driveways over the entire 26-mile route. A new roadway will result in a time savings of 16 minutes per trip (off peak) compared to the current through route. In addition to transportation benefits, a primary purpose is to provide access to suitable property, i.e. relatively flat, for economic development in the economically depressed region surrounding Portsmouth, Ohio, which consistently experiences unemployment and poverty rates of more than twice the statewide average.

The *Draft Environmental Impact Statement* (DEIS) for the entire Portsmouth Bypass was completed in January 2005 and the *Final Environmental Impact Statement* (FEIS) was completed in July 2005. The FHWA issued the Record of Decision (ROD) based upon these documents on June 9, 2006. The project was subsequently divided into three design-construction phases, which have since been combined into a single construction phase. The environmental reevaluations of the ROD and FEIS, including Ecological Survey Reports (ESR), were completed for Phase 1, and concurrently for Phases 2 and 3. The FHWA approved the reevaluation for Phase 1 of the project on April 5, 2012, and the reevaluation for Phases 2 and 3 of the project on April 16, 2014. These approvals determined that the June 9, 2006 Record of Decision remains valid for all three Phases of the Portsmouth Bypass.

Following the ROD in 2006, the Portsmouth Bypass was divided into three design-construction phases. These phases were used for preliminary engineering, re-evaluating the environmental impacts, and permitting. However, for the purposes of determining effects on federally listed species, FHWA/ODOT assessed all three phases concurrently as a single project area. Now that the project is being constructed using a DBFOM contracting approach, all three phases will be constructed concurrently as a single project. The three phases previously utilized for the Portsmouth Bypass Project are as follows:

- Phase 1 – Shumway Hollow Road (TR 234) Interchange near the Scioto County Airport to Lucasville-Minford Road (CR 28) Interchange. Length: 3 miles; 3 bridges; 2 interchanges
- Phase 2 – Lucasville-Minford Road (CR 28) Interchange to US 23 Interchange. Length: 7.4 miles; 10 bridges; 1 interchange
- Phase 3 – Sciotoville Interchange (US 52) to Shumway Hollow Road (TR 234) Interchange near the Scioto County Airport. Length: 5.6 miles; 6 bridges; 2 partial interchanges

#### **Construction**

Based on an evaluation of innovative procurement and financing methodologies, ODOT made the determination that a DBFOM contracting approach would be utilized to construct the project. The entire project will be built by the selected developer team according to their timelines and sequencing. While the final details of the construction methodologies have yet to

be determined, Table 2 shows some of the project attributes expected based on the preliminary design and value engineering conducted for the project to date.

**Table 2. Project Attributes**

Attribute	Size
Maximum Excavation Depth	211 feet
Maximum Embankment Fill Depth	187 feet
Excavation	Over 20 million cubic yards, with approximately 15% of soil excavation, and 85 % of rock excavation
Embankment	Over 20 million cubic yards
Estimated Surface Area of Roadway and/or Impervious Surfaces Constructed	230 acres
Bridges	21
Depth to deepest culvert	171 feet

*Project Timeline and Sequencing*

Due to the DBFOM approach, the entire project will be built by the selected DBFOM team according to their timelines and sequencing. As of the writing and submittal of the FHWA/ODOT BA, the DBFOM process was still in the procurement phase for the DBFOM team; therefore, the defined construction timelines and sequencing were difficult to predict. However, during the current formal conference, the Project was awarded to the Portsmouth Gateway Group (on October 15, 2014) and construction on Phase I started at that time, with the clearing of forested areas, following coordination with the Service. Although the Service had not yet issued the Conference Opinion, we did not object to commencement of the action on Phase I, as consultation on currently listed threatened and endangered species under ESA, section 7(a)(1) had already been concluded for Phase I, and all waterway permits had been issued. During the earlier Phase I consultation, as in the present CO, FHWA/ODOT committed to clearing trees only between September 30 and April 1. Although predicted timelines remain unresolved at this time, it is expected that the project may be completed as early as 2020.

*Site Preparation*

Clearing and grubbing will be necessary for the entire project area and any borrow/spoil areas. Regardless of the DBFOM team selected, adherence with the environmental commitments in the draft re-evaluation documents for the Portsmouth Bypass will be required. In accordance with those environmental commitments, the clearing and grubbing for the project will only occur between September 30 and April 1. It is estimated that all tree removals will be complete by April 1, 2019.

The DBFOM team shall design, install, and maintain effective erosion controls and sediment controls to minimize the discharge of pollutants as required under General Permit Authorization

for construction stormwater discharges under the National Pollutant Discharge Elimination System (NPDES). At a minimum, these controls will be designed, installed, and maintained for the following reasons:

- Control storm water volume and velocity within the site to minimize soil erosion.
- Control storm water discharges, including both peak flow-rates and total storm water volume, to minimize erosion at outlets and to minimize downstream channel and stream bank erosion.
- Minimize the amount of soil exposed during construction activity.
- Minimize the disturbance of steep slopes.
- Minimize sediment discharges from the site.
- If feasible, provide and maintain a 50-foot undisturbed natural buffer around surface waters of the state.
- Minimize soil compaction and, unless infeasible, preserve topsoil.

Permanent and temporary stabilization of disturbed areas will be conducted in accordance with the time frames specified in Table 3.

**Table 3. Permanent and Temporary Stabilization Requirements**

<b>Area requiring <i>permanent</i> stabilization</b>	<b>Timeframe to apply seed and mulch to reduce erosion</b>
Any areas that will lie dormant for one year or more	Within 7 days of most recent disturbance
Any areas within 50 feet of a surface water of the state and at final grade	Within 2 days of reaching final grade
Any other areas at final grade	Within 7 days of reaching final grade
<b>Area requiring <i>temporary</i> stabilization</b>	<b>Timeframe to apply seed and mulch to reduce erosion</b>
Any disturbed areas within 50 feet of a surface water of the state and not at final grade	Within 2 days of the most recent disturbance if the area will remain idle for more than 14 days
Any disturbed areas that will be dormant for more than 14 days but less than one year, and not within 50 feet of a surface water of the state	Within 7 days of most recent disturbance
Disturbed areas that will be idle over winter	Prior to the onset of winter weather

Any dewatering necessary during construction will be managed by appropriate controls to minimize sedimentation and erosion in downstream receiving waters.

As detailed in the Storm Water Pollution Prevention Plan (SWP3) that will be prepared for the project, pollution prevention measures will be designed, installed, implemented, and maintained to minimize the discharge of pollutants from any wash waters. In addition, the exposure of construction wastes, trash, and other chemicals and materials to storm water will be minimized to

the extent possible. Finally, the pollution prevention measures specified will minimize the discharge of pollutants from spills and leaks with the implementation of chemical spill and leak prevention and response procedures.

To facilitate the maintenance of the construction storm water controls, inspections of the sediment and erosion control measures will occur every 7 days, and within 24 hours of a 0.5 inch (13 mm) or greater rainfall event throughout the life of the construction. Documentation of these inspections will be maintained in the SWP3.

ODOT will keep the USFWS apprised of the construction schedule for the project and USFWS will be given the opportunity to conduct periodic site visits to ensure that the site is being monitored and that all BMPs are implemented and functioning properly.

#### *Construction Access and Staging*

Construction access, staging areas, and borrow/spoil areas will be determined by the DBFOM team during the design-build process. All documentation and consultant certifications that have been prepared to clear all properties utilized by the DBFOM team outside the project Right-of-Way for all environmental resource impacts will be provided to the USFWS.

#### *Project Area Restoration*

The project area will be stabilized with vegetation planting in accordance with the permanent and temporary stabilization requirements in the NPDES discharge permit, detailed above. Temporary fills required in streams to facilitate structure construction or provide construction access will be removed and the areas will be restored to the original grade and vegetated as specified in the permit authorizations from the U.S. Army Corps of Engineers and the Ohio EPA.

#### **Operations and Maintenance**

Once the project is completed, the operation of the bypass and routine maintenance activities conducted in the bypass corridor are expected to affect the environment. Impacts are expected from the following:

- traffic
- storm water runoff
- snow and ice removal
- mowing
- herbicide application
- bridge cleaning
- bridge painting
- culvert clean-outs
- ditch maintenance

As indicated previously, all operations and routine maintenance of the Portsmouth Bypass will be conducted and finalized by the selected DBFOM team for the life of the contract. The maximum term of the contract will extend 35 years after substantial completion (open to traffic). The DBFOM team (Developer) is ultimately responsible to ensure environmental compliance during the Construction and Operating Period. The following sections of *The Request for*

*Proposals To Design-Build-Finance-Operate-Maintain Sci-823-0.00 Portsmouth Bypass* address this issue:

- Project Scope, Section 4 (Appendix F of the FHWA/ODOT BA) states the Developer is responsible for environmental compliance during the Construction Period and the Operating Period.
- Public-Private Agreement (PPA), Articles 5.2.2 and 5.2.3 (Appendix G of the FHWA/ODOT BA) state that the Developer shall prepare application submissions for the Environmental Approvals (other than those required to obtain the Department-Provided Approvals), and shall obtain all other Governmental Approvals required in connection with the Project, the Project Right of Way or the Work (Construction Period and Operating Period). The Department will interface with all applicable Governmental Entities in respect of, and reasonably assist Developer in obtaining, all Environmental Approvals. Prior to submitting to a Governmental Entity any application for a Governmental Approval (or any proposed modification, renewal, extension or waiver of a Governmental Approval or provision thereof), Developer shall submit the same, together with any supporting environmental studies, analyses and data, to the Department for review and comment, unless a different standard of review is expressly provided in the Contract Documents. In addition, PPA Section 5.2.4.5 states that The Department and FHWA will independently evaluate all environmental studies and documents and fulfill the other responsibilities assigned to them by 23 CFR Part 771.
- PPA, Article 5.4.1.5 (Appendix G) states that the Developer shall prepare all information and submissions required by, or necessary to maintain in full force and effect, all Department-Provided Approvals and maintain in full force and effect all Environmental Approvals to be obtained by Developer. The Department shall interface with all applicable Governmental Entities in respect of the maintenance of such Department-Provided Approvals and shall deliver to such Governmental Entities the information and submittals prepared by the Developer following approval thereof and promptly deliver to the Developer any responses or communications applicable to the Work following receipt thereof from such Governmental Entities.
- Project Scope, Section 2.1.5.10 identifies the Developer's Lead Operations and Maintenance Manager as being responsible for environmental compliance following commencement of the Operating Period and interfacing with the Department in compliance with the O&M Work requirements of the Agreement.
- Project Scope, Section 4.2 and 4.3 (Appendix F of the FHWA/ODOT BA) indicates that the Environmental Compliance Specialist and Independent Quality Firm (IQF) will be involved during the Construction and Operating Period. The Environmental Compliance Specialist shall initiate, develop, and administer any new Governmental Approvals, Governmental Approval modifications, and necessary NEPA documentation during the Construction Period and the Operating Period of the Project. Unless specifically stated otherwise, the Department's Office of Environmental Services is responsible for any environmental coordination with the Governmental Entities. The Department's Project Manager is the point of contact.

In addition to the water pollution controls implemented during construction, the project will likely maintain extended detention basins, vegetated filter strips, and vegetated bio-filters as part

of the post-construction storm water best management practices (BMPs). These post construction BMPs protect water quality by reducing sediment and pollutant concentrations prior to discharge.

#### **Action Area**

In accordance with 50 CFR §402.02, the project "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." The action area is not limited to the footprint of the action and should consider all effects to the environment resulting from the action. Within a set action area, all activities that can cause 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 are considered. The action area is not defined by the range of the species that may be impacted, rather it is defined by the impacts to the environment that would elicit a response in the species (Service and NMFS 1998). Therefore, the action area includes the Project footprint and the geographic extent of the area that could be affected by the construction, operation, and maintenance of the Portsmouth Bypass either directly, indirectly, or through interrelated or interdependent actions.

For this project, FHWA/ODOT delineated the action area in their BA as the direct project impact area and all areas within a five mile buffer of the outer Portsmouth Bypass Project boundaries. A five mile buffer was selected based on the USFWS estimated home range buffer from known capture sites of the Indiana bat (USFWS 2014) and was also expected to reasonably include all potential effects of noise, construction, and effects on water quality. The five mile action area also encompassed the three mile home range of the NLEB recognized by USFWS.

As stated above, the action area provided in the BA was based upon the area to be directly impacted by the project (project footprint) and the typical area of movement for an Indiana bat maternity colony. However, as this delineation is not fully consistent with the regulatory definition of action area (50 CFR §402.02), the Service delineated the action area differently than the method described in the BA.

The action area for this project is the area that encapsulates the reach of all the direct and indirect environmental impacts of the project. That is, the area in which the biotic, chemical, and physical impacts to the environment are anticipated to occur. The area directly affected by the action is the project footprint, where all construction, operation and maintenance activities will occur. The project footprint is linear and includes a 1,400-acre area.

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 will be caused by the road construction, operation, and maintenance and will vary in intensity depending upon the source. Logging, earth moving, and blasting activities will generate noise during site preparation and road construction. The level of noise generated from the different construction and maintenance activities will vary depending upon the methods and equipment being used or operated. Operational noise will be generated by vehicle traffic and will vary depending upon the type and volume of vehicles. Noise and vibrations are expected to increase in the area along the new corridor.

The current ambient noise along the proposed construction corridor varies greatly depending upon the proximity of the corridor to existing development and activities. Given the largely rural and forested nature of the project area, the lowest existing noise levels along the corridor should occur in the areas that are farthest from roads and existing developed areas. Along the proposed corridor, the most highly developed areas occur within the towns of Lucasville (at the northern terminus), Minford (on the east side of Phase I), and Scioto Dale (at the southern terminus).

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 are at an average of 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). However, rock blasting can generate significantly higher noise levels than construction equipment, with blasts generating as much as 115 dBA at 50 feet from the source (D. Snyder, FHWA, pers. comm., 2005). The area(s) that will be impacted by blasting noise is difficult to determine due to the sporadic and short-term nature of the blasting activity.

Based on the information above, the areas that will experience the greatest increase in noise during construction will be the heavily forested, largely undeveloped areas, where the current noise levels are the lowest. The increase in noise disturbance during construction could encompass an area up to 2.4 miles (12,800 ft) from the actual work limits. This distance was based on the estimated distance for comparable bypass projects in Ohio in areas with similar land use characteristics (D. Snyder, FHWA, pers. comm.; FHWA 2005).

In addition, a short-term ambient noise level survey was conducted for the proposed alignment in 2002 and 2003 (CH2M Hill 2003) to establish a pre-construction noise level baseline. The survey found that existing noise levels in the alignment were well below the noise abatement criteria (NAC; set at 67 dBA by federal regulation); noise levels that, when approached or exceeded, require the consideration of traffic noise abatement measures. CH2MHill then did traffic counts and assessed existing peak-hour traffic noise levels at the roads currently being used to travel this area (US-23, US-52, and Lucasville-Minford Road). The resultant peak-hour traffic noise levels and traffic volumes were then input into Traffic Noise Model program designed to determine the estimated noise levels. When the estimated noise levels were compared with the NAC, it was found that over 50% of the surveyed areas would experience noise impacts. The noise level anticipated during project operation is around 60.9 dBA. This would noticeably increase the noise around the project to a distance of about 400 ft based upon the typical reduction level of noise over distance.

Impacts to surface waters are anticipated from the project. Wetlands and streams will be directly and indirectly affected within the project footprint during all phases of the project. Also, some surface waters outside the actual project footprint could be indirectly affected from the project due to anticipated changes in the volume of pollutants entering the environment (e.g., sediment, de-icing agents) and the alteration of surface water drainage patterns. The physical, chemical, and biological nature of wetlands and streams will be altered by various activities such as

ditching, culverting, and filling. FHWA/ODOT estimate that **up to 15.13 miles of streams (79,886 lf)** and 10.75 acres of wetlands will be directly or indirectly impacted by the project.

Based on the discussion above, we determined the action area for the Portsmouth Bypass as the project footprint plus an additional 2.4-mile area surrounding the footprint that will be temporarily affected by construction noise. Once construction is completed and the highway bypass is operational, traffic noise will permanently impact an estimated area of 400 ft to either side of the highway.

#### Federally Listed Species Not Addressed in this Conference Opinion

The Service concluded consultation on the Portsmouth Bypass project with ODOT/FHWA in 2012 for the following federally listed species: the federally endangered **Indiana bat** (*Myotis sodalis*), **sheepnose mussel** (*Plethobasus cyphus*), **running buffalo clover** (*Trifolium stolaniferum*), **snuffbox mussel** (*Epioblasma triquetra*), **rayed bean** (*Villosa Fabalis*), **fanshell** (*Cyprogenia stegaria*), **northern riffleshell** (*Epioblasma torulosa rangiana*), **pink mucket pearlshell** (*Lampsilis abrupta*), and **clubshell** (*Pleurobema clava*); the federally threatened **small whorled pogonia** (*Isotria medeoloides*) and **Virginia spiraea** (*Spiraea virginiana*); and the **bald eagle** (*Haliaeetus leucocephalus*), **timber rattlesnake** (*Crotalus horridus*), and **eastern hellbender** (*Cryptobranchus a. alleganiensis*), all federal species of concern. The results of that consultation are summarized below, and none of these species are considered further in this Conference Opinion.

Suitable habitat streams for sheepnose, snuffbox, fanshell, northern riffleshell, and pink mucket mussels are not present within the Bypass project area. Although some potentially suitable habitat for clubshell may occur within the Little Scioto River and other streams within the project area, surveys conducted by a federally permitted malacologist did not detect the species, and current records of species occurrence do not suggest its potential presence in these streams. Therefore, the Service agreed with ODOT/FHWA that *no impacts to these species are anticipated*.

Although no rayed bean mussels were discovered during the surveys referenced immediately above, suitable habitat for the species was present in the Little Scioto River. Therefore, it is possible that the species could occur in the stream but was not detected during the surveys. Based on this information ODOT/FHWA determined that the bypass project *may affect but is not likely to adversely affect* the rayed bean; and the Service concurred with this determination.

In November 2011, ODOT reported that running buffalo clover, small whorled pogonia, and Virginia spiraea were not found during surveys conducted in 2011, as well as earlier surveys for one or all of these species, within the Bypass project footprint. However, due to the presence of suitable habitat for these species, but the lack of evidence that the plants are within the proposed project area, ODOT determined that the Bypass project *may affect, but is not likely to adversely affect* these species. The Service concurred with this determination.

At the time of this consultation, the nearest bald eagle nest known to be present near the project area was 3.9 miles from the northwestern project terminus along the Scioto River. Therefore, the

Service agreed that *impacts to the species are not anticipated. However, due to the eagle's expanding range within the state, it is possible that nesting could occur in the project area before, during, or after construction of the Bypass. Therefore, it is important to note that bald eagles and their nests are protected under the Migratory Bird Treaty Act (16 U.S.C. 703-712; MBTA) and are afforded additional legal protection under the Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d; BGEPA). If at any time an eagle nest is discovered within the project area, coordination with this office should occur immediately to ensure that appropriate avoidance measures are implemented.*

A state permitted herpetologist conducted a survey of the project area for timber rattlesnakes in 2003. Although suitable habitat for the species was found, no timber rattlesnakes were detected. In addition, no snakes were encountered during any subsequent ecological surveys conducted throughout the Bypass project development process. Therefore, the Service did not request additional surveys and concurred with ODOT's determination that the project *may affect but is not likely to adversely affect* the timber rattlesnake. *Although it seems unlikely that the species inhabits or utilizes the areas surveyed, the species could be found traveling through or basking within the project area from early March through late October. Therefore, we strongly recommend active daily monitoring for rattlesnakes within the project area during construction. The monitoring should be conducted before and during construction by a person that can identify a timber rattlesnake. Special attention should be given to suitable basking areas, such as heated surfaces, including natural areas with sun exposure and construction equipment that may be left standing idle for any period of time. If rattlesnakes are encountered within the project area during construction, operations should cease until the snake has moved from the project area, and our office should be notified immediately (i.e., the same day or next business day) of the sighting. All workers should be instructed not to harm or kill the snakes and to use caution, as the timber rattlesnake is a venomous species.*

A state permitted herpetologist conducted a survey of the Little Scioto River for eastern hellbender in 2011. The eastern hellbender is known to occur in the Little Scioto, the only stream within the project area where suitable habitat for the species can be found and from which the species has been captured as recent as 2009. However, no individuals of the species were found during the survey, and the herpetologist determined that the segment of the Little Scioto River within the project area did not contain suitable habitat for the species. Due to a lack of suitable habitat for the eastern hellbender, the Service agreed that *impacts to the species are not anticipated.*

The corridors associated with the proposed alignment of the Bypass were surveyed for Indiana bats in 2003 and 2011. No Indiana bats were captured during either survey effort, suggesting that the species is either not present in the project area or occurs at very low density. Therefore, ODOT determined that the project *may affect but is not likely to adversely affect* the Indiana bat. The Service concurred with this determination. However, *we appreciate ODOT's commitment to conduct tree clearing activities only between September 30 and April 1 to avoid direct take of bats during their summer brood-rearing season.*

ODCT/FHWA have determined that the Portsmouth Bypass project *may affect and is likely to adversely affect* the northern long-eared bat. This Conference Opinion will address that determination.

### **Conservation Measures and Minimization Strategies**

FHWA/ODOT have incorporated a number of environmental commitments and conservation measures into the Portsmouth Bypass Project. These commitments/measures will avoid, minimize, and/or mitigate project impacts to the natural environment, and include, but are not limited to, stream and wetland mitigation and protection of forested habitats for the NLEB.

#### *Water Resource Conservation Measures and Mitigation*

The project will mitigate for impacts to jurisdictional waters in accordance with federal and state requirements. Although impacts to wetlands and streams will cause an initial lowering of water quality within the watershed, the long-term effects of mitigation should preserve and enhance habitat for NLEB in the region, as well as any Indiana bats that may come to use the region, thereby minimizing impacts to the species.

ODOT will be securing wetland credits at a 1.5-2.5:1 ratio, depending on the impacted wetland's quality and vegetation type. All wetlands located on the mitigation sites will meet or exceed existing wetland characteristics, including forested wetlands. Mitigation for stream impacts will be done at a 1.5:1 ratio, either as preservation of equal or higher quality streams or restoration of existing degraded streams, and will include both the preservation and restoration of forested riparian buffers. All mitigation areas will be preserved in perpetuity, insuring the continued preservation of the resources and allowing for the continued use of the areas by the NLEB and the potential use by the Indiana bat. The current conceptual stream mitigation plan, for Phases 2 and 3, contains several potential stream preservation and restoration sites within three miles of one or more of the NLEB captures associated with the surveys done for the project. These areas are located within the estimated home range of the NLEB that were captured within the project area, and will provide preserved suitable habitat for the species if these sites are selected as part of the final stream mitigation. In addition, the current stream mitigation plan for Phase 1 of the project includes the preservation of approximately 170 acres of high quality forested habitat along stream corridors at a location in Adams County within the Scioto Brush Creek watershed, approximately 20.7 miles west of the project. While this site is not within the home range of any known capture records for either the NLEB or the Indiana bat, the area possesses suitable summer roosting and foraging habitat characteristics for both species. The total acreage of forested riparian restoration and preservation that will be completed as part of the stream mitigation for the project is yet to be determined. However, any forested areas restored or preserved for stream or wetland mitigation will provide suitable roosting and foraging habitat for the NLEB, and will be in addition to the areas preserved for the species as described in the *Bat Habitat Conservation* section, below. Further details on the stream and wetland mitigation components of the project and the aspects of those components that will also provide benefit to the NLEB through the preservation, restoration, or enhancement of forested habitats will be provided to the USFWS as they are developed.

### Seasonal Clearing

ODOT has committed to perform tree clearing activities outside of the period considered the NLEB and Indiana bat summer roosting season (April 1 to September 30). Clearing will most likely occur over multiple years depending on the phased construction timeline, but no trees greater than 3-inch dbh will be cleared within the seasonal restriction.

### Bat Habitat Conservation

To further ensure that no long-term detriment to the NLEB occurs as a result of the project, ODOT is proposing to preserve forested habitat at a ratio of 1:1 (acres) for forested impacts on the entire project site. This proposed conservation ratio was developed to be protective of the NLEB and should be relatively conservative (in favor of the species), since survey results did not indicate extensive use of the project area, and suitable forested habitat for the NLEB will also be preserved and restored in conjunction with the stream and wetland mitigation activities being completed for the project (see *Water Resource Conservation Measures and Mitigation* section above).

Forested acreage on the proposed alignment that may be impacted as a result of project construction was calculated to be 773 acres from December 2013 aerial photographs. Therefore, a minimum of 773 acres of forested land, which has been found to provide summer roosting and foraging habitat for NLEB, will be preserved in perpetuity. At the current time, the exact location of the proposed conservation property(ies) is still to be determined. However, all proposed habitat preservation sites will be coordinated with the USFWS. All of the following criteria will apply to the land that is being conserved specifically for the NLEB (these same criteria would not necessarily apply to the areas discussed in the *Water Resource Conservation Measures and Mitigation* section above):

- Conservation efforts will be focused on, but not limited to, areas within 2.4 miles of the Portsmouth Bypass project, as this area has been defined as the action area of the project. However, any property with suitable NLEB habitat within the following counties will be considered, with priority given to sites closer to the Portsmouth Bypass project:

Adams	Hamilton	Pike
Athens	Highland	Ross
Brown	Hocking	Scioto
Butler	Jackson	Vinton
Clermont	Lawrence	Warren
Clinton	Meigs	
Gallia	Perry	

- Preference will be given to larger properties that provide high value conservation on a landscape scale, or smaller properties that adjoin already protected properties with high conservation value.
- No property will be considered for this conservation measure that is already understood to be protected (e.g., parkland, nature preserve, etc.).
- Properties under consideration will be located within the 3-mile home range of a positive detection (past or from a current site-specific survey) for NLEB. In accordance with the NLEB Interim Conference and Planning Guidance (USFWS), methods used to determine presence of the NLEB will follow any of the acceptable methods in the *Indiana Bat*

*Summer Survey Guidance* (USFWS) or any future revisions of that or subsequent guidance.

- Properties that have severed interests with respect to mineral rights, oil/gas leases, timber rights, or similar, that would conflict with the conservation values of the properties, will not be considered.
- All property(ies) obtained for this purpose will be protected in perpetuity with an appropriate site protection legal instrument and will include provisions for long-term stewardship/management.

The anticipated schedule for completion of the bat habitat conservation is as follows:

- Conceptual Conservation Plan due by November 1, 2015
- Final Conservation Plan due by June 1, 2016
- Completion of project (including all property acquisition, recording of site protection legal instruments, any restoration activities) by June 1, 2017

#### *Bat Habitat Enhancement*

In addition to the preservation of forested habitat, ODOT is proposing to construct up to 12 artificial bat roosting structures for use as summer roosting habitat for the NLEB. While it has yet to be determined where these artificial bat habitats will be placed, it is anticipated that they will be located within existing parks or preserved lands owned and maintained by conservation minded organizations within Ohio.

#### *Environmental Compliance Monitoring*

According to the terms of the agreement between ODOT and the DBFOM team for the Portsmouth Bypass, the DBFOM team shall provide an Environmental Compliance Specialist, who shall report to the DBFOM team. The Environmental Compliance Specialist shall be pre-qualified in all ODOT environmental categories. In addition to the requirements for pre-qualification, the Environmental Compliance Specialist shall have experience in environmental compliance and be familiar with permitting requirements in Ohio for such areas as NPDES Permits and Waste Discharge Requirements (WDRs), Clean Water Act (Section 404 and Section 10), Ohio Environmental Protection Agency (OEPA) Section 401 Water Quality Certification, Threatened and Endangered Species, Section 106, Section 4(f), Section 6(f), regulated materials, groundwater, and Governmental Entity coordination. The Environmental Compliance Specialist shall be the point of contact for the DBFOM team regarding environmental regulatory issues.

The Environmental Compliance Specialist shall supervise or conduct all Work during the Construction Period and the O&M Work during the Operating Period, necessary to ensure compliance with all Environmental Commitments, regulations, and permit requirements.

The Environmental Compliance Specialist shall prepare and administer a system for documenting and verifying that the project is in compliance with all environmental commitments and permit requirements. This system shall be known as the Environmental Compliance Management Plan (ECMP). It is expected that the ECMP will be user-friendly, web-based, and linked to the Department's Environmental Commitment Achievement Tracking system (ECAT). The ECMP will contain a way to track progress and include the necessary inspection schedules, maintenance checklists, timelines, and standards to assure compliance on all Environmental

Commitments and permit requirements. Oversight for Environmental Commitment and permit compliance during the Construction Period and Renewal Work during the Operating Period will be conducted by the IQF. The DBFOM team shall not proceed with activities that do not meet the Environmental Commitments. The ECMP should be applicable throughout the Term of the Agreement. The ECMP will establish the approach, requirements, and procedures to be employed to protect the environment, both during the Construction Period, as well as during the Operating Period.

All documentation and consultant certifications prepared to clear all properties utilized by the DBFOM team outside the project right-of-way for all environmental resource impacts prior to the beginning of work must be provided to the USFWS.

#### *Storm Water Management*

Impacts associated with erosion and sedimentation caused by demolition and construction activities will be minimized by implementation of Best Management Practices (BMPs). An Erosion and Sediment Control Plan utilizing BMPs will be implemented throughout the duration of construction/demolition work to prevent adverse sedimentation effects to water quality and aquatic/terrestrial habitats in the project area. The DBFOM team shall prepare a Storm Water Pollution Protection Plan (SWPPP) in accordance with the NPDES Permit that is signed and sealed by an Engineer who maintains a current certification as a Certified Professional in Erosion and Sediment Control (CPESC). Earth disturbing activity will not be permitted prior to the OEPA issuance of a Facility Permit Number and fully executed NPDES Permit. The temporary sediment and erosion control as outlined in the SWPPP will be in place prior to the initiation of any earth disturbing activity. All temporary sediment and erosion control work will comply with the requirements of the NPDES Permit. The DBFOM team will perform the required NPDES Permit inspections and prepare the NPDES Inspection Reports. The DBFOM team's staff preparing NPDES Inspection Reports will update, amend, and revise the SWPPP as the DBFOM team's operations and site conditions warrant.

The DBFOM team shall design Post Construction BMPs to meet the requirements of the NPDES permit.

#### *Bridge Inspection*

Prior to the removal of bridge structures, the underside will be carefully examined for the presence of bats. Should any bats be found roosting on the underside of the bridge, the DBFOM team is required to notify the Engineer immediately for coordination with ODOT- Office of Environmental Services (614- 466-7100). OES will then contact USFWS COFO **within one business day** of receiving such notification from the Engineer.

#### *Construction BMPs Near Waters*

To minimize impacts to water quality, materials utilized in or adjacent to streams, wetlands, and ponds on this project for permanent fill or bank protection shall consist of suitable material free from toxic contaminants in other than trace quantities. Broken asphalt is specifically excluded. Cadmium, chromium, arsenate (CCA), creosote, and other pressure treated lumber shall not be used in structures that are placed in wetlands and streams. Additionally, the DBFOM team will provide and maintain an oil spill kit with a minimum capacity of 65 gallons. The Oil Spill Kit

shall be located within 150 feet of any equipment working in a stream, wetland, and ponds. The oil Spill Kit shall be maintained for the life of the contract. Any materials utilized during the project will be replaced within 48 hours.

## II. Status of the Species

*Unless noted otherwise, the information in this section is summarized from the proposed rule listing the northern long-eared bat as an endangered species (Service 2013).*

### **Species Description**

The northern long-eared bat (*Myotis septentrionalis*) was proposed for listing as federally endangered on October 2, 2013. While there is no prohibition for "taking" proposed species, there are certain statutory requirements under the ESA for proposed species. Section 7(a)(4) of the ESA states, "Each Federal agency shall confer with the Secretary on any agency action which is likely to jeopardize the continued existence of any species proposed to be listed or result in the destruction or adverse modification of critical habitat proposed to be designated for such species." Conference is a process of early interagency cooperation involving informal and/or formal discussions between the action agency and the Service pursuant to section 7(a)(4) of the ESA regarding the likely impact of an action on proposed species or proposed critical habitat. While consultation under section 7 of the ESA is required when a proposed action "may affect" a listed species, a conference is required only if the proposed action is likely to jeopardize the continued existence of a proposed species or destroy or adversely modify proposed critical habitat. The Conference process is discretionary for all other effect determinations besides jeopardy/adverse modification. However, it is in the best interest of the species and our Federal partners to consider the value of voluntary conservation measures in a conference opinion or conference report for projects that are not likely to cause jeopardy, but are likely to adversely affect the northern long-eared bat. For projects that will still be in progress during/after the final listing, an existing conference report or opinion will facilitate the agency's consultation requirements, as the conference opinion can be converted to a concurrence letter or biological opinion at that time. In an effort to maintain continuity in the development of the Portsmouth Bypass Project and to prevent construction delays, FHWA has requested to conference on this species.

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, p. 89; Caceres and Pybus 1997, p. 1). In the United States, the species' range reaches from Maine west to Montana, south to eastern Kansas, eastern Oklahoma, Arkansas, and east to the Florida panhandle (Whitaker and Hamilton 1998, p. 99; Caceres and Barclay 2000, p. 2; Wilson and Reeder 2005, p. 516; Amelon and Burhans 2006, pp. 71-72).

The U.S. portion of the northern long-eared bat's range can be described in four parts: the eastern population, midwestern population, the southern population, and the western population. The action area for the Portsmouth Bypass Project falls within the midwestern population. In Ohio, there are three known hibernacula. The largest of the three is located in Preble County; census counts at this hibernaculum have identified more than 300 NLEB. In general, northern

long-eared bats are also regularly collected as incidental catches in mist-net surveys for Indiana bats in Ohio (Boyer 2012, pers. comm.).

Historically, the NLEB has been most frequently observed in the northeastern United States and in Canadian Provinces, Quebec and Ontario, with sightings increasing during swarming and hibernation (Caceres and Barclay 2000, p. 2). However, throughout the majority of the species' range it is patchily distributed, and historically was less common in the southern and western portions of the range than in the northern portion of the range (Amelon and Burhans 2006, p. 71).

### Life History

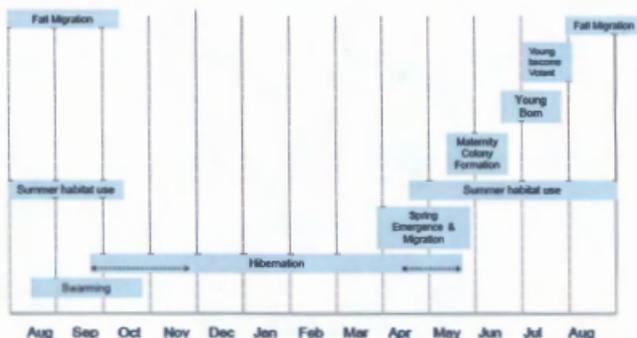
A medium-sized bat species, the northern long-eared bat adult body weight averages 5 to 8 g (0.2 to 0.3 ounces), with females tending to be slightly larger than males (Caceres and Pybus 1997, p. 3). Average body length ranges from 77 to 95 mm (3.0 to 3.7 in), tail length between 35 and 42 mm (1.3 to 1.6 in), forearm length between 34 and 38 mm (1.3 to 1.5 in), and wingspread between 228 and 258 mm (8.9 to 10.2 in) (Caceres and Barclay 2000, p. 1; Barbour and Davis 1969, p. 76). Pelage (fur) colors include medium to dark brown on its back, dark brown, but not black, ears and wing membranes, and tawny to pale-brown fur on the ventral side (Nagorsen and Brigham 1993, p. 87; Whitaker and Mumford 2009, p. 207). As indicated by its common name, the northern long-eared bat is distinguished from other *Myotis* species by its long ears (average 17 mm (0.7 in), Whitaker and Mumford 2009, p. 207) that, when laid forward, extend beyond the nose but less than 5 mm (0.2 in) beyond the muzzle (Caceres and Barclay 2000, p. 1).

Northern long-eared bats predominantly overwinter in hibernacula that include caves and abandoned mines. Hibernacula used by northern long-eared bats are typically large, with large passages and entrances (Raesly and Gates 1987, p. 118), relatively constant, cooler temperatures (0 to 9o C (32 to 48o F) (Raesly and Gates 1987, p. 18; Caceres and Pybus 1997, p. 2; Brack 2007, p. 744), and high humidity, with no air currents (Fitch and Shump 1979, p. 2; Van Zyll de Jong 1985, p. 94; Raesly and Gates 1987 p. 118; Caceres and Pybus 1997, p. 2). The sites favored by northern long-eared bats are often in very high humidity areas, to such a large degree that droplets of water are often observed on their fur (Hitchcock 1949, p. 52; Barbour and Davis 1969, p. 77). Northern long-eared bats typically prefer cooler and more humid conditions than little brown bats, similar to the eastern small-footed bat and big brown bat, although the latter two species tolerate lower humidity than northern long-eared bats (Hitchcock 1949, p. 52-53; Barbour and Davis 1969, p. 77; Caceres and Pybus 1997, p. 2). Northern long-eared bats are typically found roosting in small crevices or cracks in cave or mine walls or ceilings, often with only the nose and ears visible, thus are easily overlooked during surveys (Griffin 1940, pp. 181-182; Barbour and Davis 1969 p.77; Caire *et al.* 1979, p. 405; Van Zyll de Jong 1985, p.9; Caceres and Pybus 1997, p. 2; Whitaker and Mumford 2009, pp. 209-210). Caire *et al.* (1979, p. 405) and Whitaker and Mumford (2009, p. 208) commonly observed individuals exiting caves with mud and clay on their fur, also suggesting the bats were roosting in tighter recesses of hibernacula. They are also found hanging in the open, although not as frequently as in cracks and crevices (Barbour and Davis 1969, p.77, Whitaker and Mumford 2009, pp. 209-210). In 1968, Whitaker and Mumford (2009, pp. 209-210) observed three northern long-eared bats roosting in the hollow core of stalactites in a small cave in Jennings County, Indiana.

To a lesser extent, northern long-eared bats have been found overwintering in other types of habitat that resemble cave or mine hibernacula, including abandoned railroad tunnels, more frequently in the northeast portion of the range. Also, in 1952 three northern long-eared bats were found hibernating near the entrance of a storm sewer in central Minnesota (Goehring 1954, p. 435). Kurta and Teramino (1994, pp. 410-411) found northern long-eared bats hibernating in a hydro-electric dam facility in Michigan. In Massachusetts, northern long-eared bats have been found hibernating in the Sudbury Aqueduct, a structure created in the late 1800s to transfer water, but that is rarely used for this purpose today (French 2012, unpublished data). Griffin (1945, p. 22) found northern long-eared bats in December in Massachusetts in a dry well, and commented that these bats may regularly hibernate in "unsuspected retreats" in areas where caves or mines are not present.

In Copperhead Cave in west-central Indiana, the majority of bats enter hibernation during October, and spring emergence occurs mainly from about the second week of March to mid-April (Whitaker and Mumford 2009, p. 210). In Indiana, northern long-eared bats become more active and start feeding outside the hibernaculum in mid-March, evidenced by stomach and intestine contents. This species also showed spring activity earlier than little brown bats and tri-colored bats (Whitaker and Rissler 1992, pp. 56-57).

**Figure 1.** Northern long-eared bat annual chronology.



The northern long-eared bat is comparable to the Indiana bat in terms of summer roost selection, but appears to be more opportunistic (Carter and Feldhamer 2005, pp. 265-266; Timpone et al. 2010, p. 120-121). Male northern long-eared bats have been found to more readily use smaller diameter trees for roosting than females, suggesting males are more flexible in roost selection than females (Lacki and Schwierjohann 2001, p. 487; Broders and Forbes 2004, p. 606; Perry and Thill 2007, p. 224). Breeding occurs from late July in northern regions to early October in southern regions and commences when males begin to swarm hibernacula and initiate copulation activity (Whitaker and Hamilton 1998, p. 101; Whitaker and Mumford 2009, p. 210; Caceres and

Barclay 2000, p. 2; Amelon and Burhans 2006, p. 69). Copulation occasionally occurs again in the spring (Racey 1982, p. 73). Maternity colonies, consisting of females and young, are generally small, numbering from about 30 (Whitaker and Mumford 2009, p. 212) to 60 individuals (Caceres and Barclay 2000, p. 3).

Adult females give birth to a single pup (Barbour and Davis 1969). Birthing within the colony tends to be synchronous, with the majority of births occurring around the same time (Krochmal and Sparks 2007, p. 654). Parturition (birth) likely occurs in late May or early June (Caire et al. 1979, p. 406; Easterla 1968, p. 770; Whitaker and Mumford 2009, p. 213), but may occur as late as July (Whitaker and Mumford 2009, p. 13). The northern long-eared bat has a diverse diet including moths, flies, leafhoppers, caddisflies, and beetles (Nagorsen and Brigham 1993, p. 88; Brack and Whitaker 2001, p. 207; Griffith and Gates 1985, p. 452), with diet composition differing geographically and seasonally (Brack and Whitaker 2001, p. 208). The most common insects found in the diets of northern long-eared bats are lepidopterans (moths) and coleopterans (beetles) (Feldhamer et al. 2009, p. 45; Brack and Whitaker 2001, p. 207) with arachnids (spiders) also being a common prey item (Feldhamer et al. 2009, p. 45). Foraging techniques include hawking (catching insects in flight) and gleaning in conjunction with passive acoustic cues (Nagorsen and Brigham 1993, p. 88; Ratcliffe and Dawson 2003, p. 851). Observations of northern long-eared bats foraging on arachnids (Feldhamer et al. 2009, p. 49), presence of green plant material in their feces (Griffith and Gates 1985, p. 456), and non-flying prey in their stomach contents (Brack and Whitaker 2001, p. 207) suggest considerable gleaning behavior. Emerging at dusk, most hunting occurs above the understory, 1 to 3 m (3 to 10 ft) above the ground, but under the canopy (Nagorsen and Brigham 1993, p. 88) on forested hillsides and ridges, rather than along riparian areas (Brack and Whitaker 2001, p. 207; LaVal et al. 1977, p. 594). This coincides with data indicating that mature forests are an important habitat type for foraging northern long-eared bats (Caceres and Pybus 1997, p. 2). Female home range size may range from 19 to 172 ha (47-425 acres) (Lacki et al. 2009, p. 5).

### **Population Dynamics**

#### *Population size:*

The northern long-eared bat is commonly encountered in summer mist-net surveys throughout the majority of the Midwest and is considered fairly common throughout much of the region. Although 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). They are typically found roosting in small crevices or cracks on cave or mine walls or ceilings, thus are easily overlooked during surveys and usually observed in small numbers (Griffin 1940, pp. 181-182; Barbour and Davis 1969, p. 77; Caire et al. 1979, p. 405; Van Zyll de Jong 1985, p. 9; Caceres and Pybus 1997, p. 2; Whitaker and Mumford 2009, pp. 209-210).

Due to white-nose syndrome (WNS), the northern long-eared bat has experienced a sharp decline in the northeastern part of its range, as evidenced in hibernacula surveys. The northeastern United States is very close to saturation (WNS found in majority of hibernacula) for the disease, with the northern long-eared bat being one of the species most severely affected by it (Herzog and Reynolds 2012, p. 10). Turner et al. (2011, p. 22) compared the most recent pre-WNS count

to the most recent post-WNS count for 6 cave bat species; they reported a 98-percent decline between pre- and post-WNS in the number of hibernating northern long-eared bats at 30 hibernacula in New York, Pennsylvania, Vermont, Virginia, and West Virginia. Data analyzed in this study were limited to sites with confirmed WNS mortality for at least 2 years and sites with comparable survey effort across pre and post-WNS years. We have not yet seen the same level of decline in the midwestern and southern parts of the species' range, although we expect similar rates of decline once the disease arrives or becomes more established. Although the disease has not yet spread throughout the species' entire range (WNS is currently found in 21 of 39 States where the northern long-eared bat occurs), it continues to spread. We expect that wherever it spreads, it will have the same impact to the affected species (Coleman 2013, pers. comm.).

#### *Population variability:*

There is little data on previous population levels for this species. However, this species was previously common before the emergence of WNS. Recent data indicates that the population is in decline and that local populations that have been impacted by WNS have not stabilized but have disappeared locally.

#### *Population stability:*

The northern long-eared bat species is a long-lived species with low rates of reproduction indicating that recovery from declines will require a significant amount of time.

### **Status and Distribution**

#### *Reasons for proposed listing:*

There are several factors presented below that affect the northern long-eared bats to a greater or lesser degree; however, the Service has found that no other threat is as severe and immediate to the northern long-eared bat's persistence as the disease, WNS. WNS is currently the predominant threat to the species, and if WNS had not emerged or was not affecting the northern long-eared bat populations to the level that it has, we presume the species' would not be experiencing the dramatic declines that it has since WNS emerged.

Although modifications and disturbance to hibernacula can lead to mortality of individuals, it has not had population-level effects. More commonly, roost habitat for the northern long-eared bat is at risk of modification or destruction. Studies to date have found that the northern long-eared bat shows a varied degree of sensitivity to timber harvesting practices. However, the northern long-eared bat has shown a preference for contiguous tracts of forest cover for foraging (Owen et al. 2003, p. 356; Yates and Muzika 2006, p. 1245). However, Broders and Forbes (2004, p. 608) found that timber harvest may have negative effects on female bats since they use forest interiors at small scales (less than 2 km (1.2 mi) from roost sites). They also found that males are not as limited in roost selection and they do not have the energetic cost of raising young; therefore, males may be less affected than females (Broders and Forbes 2004, p. 608). Henderson et al. (2008, p. 1825) also found that forest fragmentation affects northern long-eared bats at different scales based on sex; females require a larger unfragmented area with a large number of suitable roost trees to support a colony, whereas males are able to use smaller areas (more fragmented). Studies to date have found that the northern long-eared bat shows a varied degree of sensitivity to timber harvesting practices and the amount of forest removal occurring varies. We have also

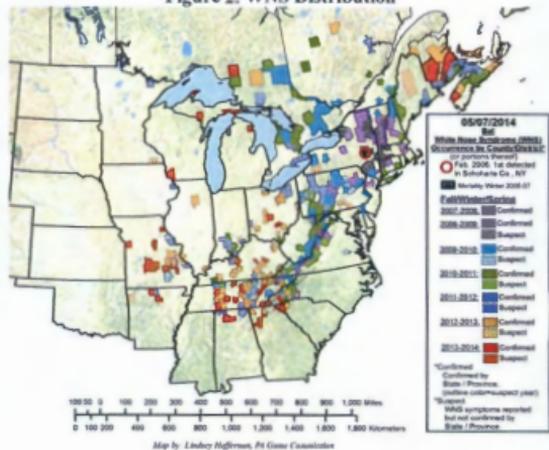
concluded that there may be adverse effects to northern long-eared bats posed by wind energy development; however, there is no evidence suggesting effects from wind energy development, in itself, have led to population declines in this species. The best available data indicate that contaminant exposure can pose an adverse effect to individual northern long-eared bats, although it is not an immediate and significant risk in itself at a population level. We conclude that there may be adverse effects posed by prescribed burning to individual northern long-eared bats; however, there is no evidence suggesting effects from prescribed burning itself have led to population declines in this species.

*New threats:*

White-Nose Syndrome

Since 2006, WNS has emerged as a new threat that may have serious implications for northern long-eared bat recovery, as well as the well-being of other hibernating North American bats. First documented in a photo taken in a New York Cave in 2006, WNS has now spread to 21 states (New York, Massachusetts, Vermont, New Hampshire, Connecticut, Virginia, West Virginia, Pennsylvania, New Jersey, Maryland, Missouri, Tennessee, North Carolina, Indiana, Ohio, Michigan, Kentucky, Georgia, Maine, South Carolina, Alabama, Illinois, and Wisconsin) and three Canadian provinces (Ontario, Quebec, and New Brunswick), including known northern long-eared bat hibernacula (Figure 2). Some affected hibernacula, especially in New York and New England, have experienced significant bat mortality (Service 2013). According to the New York State Department of Environmental Conservation (DEC) 2012 winter bat survey results indicate a 98% observed decline in the number of northern long-eared bats observed at 36 sites (DEC 2012).

Figure 2. WNS Distribution



As described above, WNS is an emerging threat resulting in significant population declines in the northeast and is spreading rapidly throughout the rest of the northern long-eared bat's range. WNS is a condition primarily affecting hibernating bats. Affected bats usually exhibit a white fungus on their muzzles and often on their ears and wings as well (Bleher et al. 2009).

Some affected bats display abnormal behavior including flying during the day and in cold weather (before insects are available for foraging) and roosting towards a cave's entrance where temperatures are much colder and less stable (Service 2011). Fat reserves in these bats are also severely diminished or non-existent, making survival to spring emergence difficult.

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 (Service 2011). The skin infection caused by *P. destructans* is thought to act as a chronic disturbance during hibernation (USGS 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). The fungus invades living tissue, causing cup-like epidermal erosions and ulcers (Meteyer et al. 2009, Puechmaillie 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).

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 (Service 2011). Within the U.S., in addition to the northern long-eared bat, WNS has been confirmed on the Indiana bat (*Myotis sodalis*), cave myotis (*Myotis velifer*), gray bat (*Myotis grisescens*), little brown bat (*Myotis lucifugus*), eastern small-footed bat (*Myotis leibii*), southeastern bat (*Myotis austroriparius*), tri-colored bat (*Perimyotis subflavus*), and big brown bat (*Eptesicus fuscus*).

WNS continues to be found at an increasing number of sites throughout the northern long-eared bat's midwest population. Based on the May 7, 2014 WNS Occurrence map (Figure 2), it is currently documented in sixteen Ohio counties and suspected in two additional counties. In the northeastern segment of the range of the northern long-eared bat, populations have experienced a sharp decline, estimated at approximately 99 percent, based on hibernacula data, due to the emergence of WNS (Service 2013). In addition, summer survey data have confirmed rates of decline observed in northern long-eared bat hibernacula data post-WNS. Since northern long-eared bats select areas of high humidity for hibernation, these areas may provide optimal growing conditions for the fungus and possibly cause higher rates of infection. WNS has primarily affected the northeast U.S. and that is the area of the northern long-eared bat's range where WNS is most common. Currently, this disease is the principal threat to the survival of the northern long-eared bat.

Northern long-eared bats are susceptible to WNS and populations have declined in areas where the disease currently occurs. As the disease spreads, further declines in populations are expected. The Service, with the help of States, researchers, and others, is continuing to research this

evolving threat. Methods are being evaluated to stop the spread of WNS and to minimize mortality where it currently exists.

#### Wind Turbines

Another emerging risk to bat species is the recent increase in the number of wind turbines being constructed and operated around the country, as efforts to create domestic, alternative sources of renewable energy ramp up. Northern long-eared bats are susceptible to impacts from wind turbines, and according to the American Wind Energy Association, thirteen northern long-eared bats had been killed by wind turbines as of 2011. While it is assumed that additional mortality has occurred at wind facilities, the fatalities reported by the American Wind Energy Association represent the only documented takings at wind facilities at this time. Monitoring at wind facilities will continue and it is expected that additional NLEB mortalities will occur. The threat to northern long-eared bats posed by wind development varies throughout their range.

#### *Range-wide trend:*

The species status review found that the decline in the northern long-eared bat population is primarily attributable to WNS, a disease caused by the fungus *Pseudogymnoascus destructans* that is known to kill bats. The disease has led to dramatic and rapid population declines in northern long-eared bats of up to 99 percent from pre-WNS levels in some areas. White-nose syndrome has spread rapidly throughout the eastern population, and numbers there have declined due to this spread. Currently WNS is spreading through the midwest. We have no information to suggest that there are areas within the species' range that will not be impacted by the disease or that similar rates of decline (to those observed in the northeast, where the disease has been present for at most 8 years) will not occur throughout the species' range. Other sources of mortality to the species include wind-energy development, habitat modification, destruction and disturbance (e.g., vandalism to hibernaculum, roost tree removal), effects of climate change, and contaminants. Although no significant decline due to these factors has been observed, they may have cumulative effects on the species.

#### *Midwest Population Trends:*

As discussed above, this species is hard to detect in winter surveys due to its tendency to roost in small cracks and crevices. Little effort has been made to conduct summer population studies. Some information is available from summer surveys, but most sites are sampled only once; therefore, long-term trend data is not available.

#### **Range-wide and Recovery Needs**

The greatest threat to the recovery of the northern long-eared bat is WNS. However, other threats to this species do occur, and may have more of an impact in populations affected by WNS. Currently the Service is working with multiple agencies to reduce and prevent the spread of the WNS fungus. Caves have been closed to human activities, and protocols have been established for disinfecting equipment that will be used in multiple locations. Actions to improve the health of potentially exposed populations include reducing or eliminating other threats and enhancing habitat quality.

### 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 (including designated critical habitat), and ecosystem, within the project action area. The environmental baseline is a "snapshot" of a species' health today, given the impacts from all past, current, and ongoing factors. The status of the northern long-eared bat within the Portsmouth Bypass Project action area is summarized below.

#### *Northern Long-eared Bat Habitat Suitability in the Action Area*

The Portsmouth Bypass project is located in the Shawnee-Mississippian Plateau of the unglaciated portion of the Appalachian Plateau Physiographic Region. The region is typified by rough, steep, broken, and severely dissected topography within the pre-glacial drainage system. The project lies within two major watersheds; the Scioto River (HUC 05060002) and the Little Scioto River (HUC 05090103), which both outlet to the Ohio River just south of the project site. Both main stems are listed by the OEPA as Warmwater Habitat, and neither has extensive impairments (OEPA 2012). Development in the vicinity of the project alignment generally consists of small towns (Lucasville, Minford, and Sciotoville), limited commercial and industrial areas, and individual residences and farms. The majority of existing roadways that intersect the project alignment are two-lane county and township roads that are often steep and poorly maintained.

Water resources in the preferred alignment include wetlands, streams, open waters, and ditches. The majority of wetlands on the site are categorized as Category 1 or 2, but a Category 3 wetland occurs on Phase 3 of the project. Streams within the project area range from ephemeral to large perennial streams, with qualitative ratings of Class I, II, and III Primary Headwater Habitats and Warmwater Habitat. Both jurisdictional and isolated resources occur on the alignment, and avoidance, minimization, and mitigation measures for the project have been developed to ensure that road construction will not cause a substantial lowering of water quality in the project watersheds.

The proposed impact area consists of approximately 1,400 acres of mixed land use typical of Scioto County. The majority of the area is composed of upland forest with interspersed agricultural, residential, commercial, or previously disturbed lands; as detailed in Table 4 below.

**Table 4. Land Uses in the Project Area**

Resource Type	Size*	Percent of Area*
Upland Forest - UF - (uplands dominated by trees)	773 ac	55.0%
Scrub/Shrub - SS - (true shrubs, and young trees in an early successional stage)	142 ac	11.2%
Grassland/Herbaceous - GH - (new fields, pastures, hay fields)	137 ac	10.7%
Cultivated Crops - CC - (annual crops, all land being actively tilled, and perennial woody crops such as orchards and vineyards)	36 ac	2.8%
Pasture/Hay - PH - (areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 % of total vegetation)	46 ac	3.6%

Resource Type	Size*	Percent of Area*
Developed Open Space - DS - (mown right-of-way, large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes)	109 ac	8.6%
Barren Land (Rock/Sand/Clay) - (barren areas of bedrock, slides, sand dunes, strip mines, gravel pits and other accumulations of earthen material. Generally, vegetation accounts for less than 15% of total cover)	114 ac	8.9%
Open Water - (generally with less than 25% cover of vegetation or soil)	3 ac	0.2%
Wetland - As defined by the USACE 1987 Manual	12 ac	0.9%
Stream - As defined by the USEPA, OEPA, and USACE	81,611 lf	0.7%

### Forest Habitat

The estimate of forested acreage within the project impact area was calculated using remote sensing techniques on high resolution aerial photography of the project area that was taken in December 2013. This estimate of forested acreage is the most accurate estimate to date, and is higher than estimates reported in the May 2004 Ecological Survey Report that had been coordinated with the USFWS, and lower than a cumulative estimate previously reported from the 2011 Ecological Survey Report for Phase 1 and the 2013 Ecological Survey Report for Phases 2 and 3.

The Ecological Survey Report, prepared by ODOT in May 2004, reported that 493 acres (53%) of the Portsmouth Bypass project area was standing forest. Of these 493 acres, 370 acres were located within the anticipated construction limits for Phases 2 and 3. The Ecological Survey Report, dated June 20, 2013, reported approximately 688 acres of forested areas will be impacted as a result of Phases 2 and 3 of the project. This was an increase of approximately 318 acres of forested habitat impacts (from 493 acres to approximately 811 acres) between the initial consultation and subsequent reevaluations and consultation. The increase was directly related to an increase in the project footprint as a result of the design build nature of the project. Since Phases 2 and 3 of the project will be developed using the design build process, no detailed designs have been completed, and precise construction limits are unknown (this is not the case for the construction limits for Phase 1, which had been established and have not changed). Therefore, for consultation purposes it had to be assumed that all forested areas within the Phase 2 and 3 right-of-way footprint will be impacted.

As noted, the most recent estimated acreage of forested habitat within the project area is approximately 773 acres. This is a decrease of 38 acres from the estimate reported to the USFWS with the June 20, 2013 Ecological Survey Report. The primary reasons for this discrepancy are private logging activities that have occurred within the proposed project area. The 2011 and 2013 Ecological Survey Reports utilized older aerial photographs to calculate forested area. The older aerial photographs of the site did not depict logging activities that had occurred on properties that overlapped the project area prior to December 2013. While project planning and development was occurring at the time of the logging activities, the properties were in private ownership, and ODOT did not possess any rights over the use or extraction of resources on the properties. ODOT believes that the December 2013 aerial photography

represents the most accurate and up to date representation of the forested acreage present within the project area prior to construction. Remaining land uses were derived from the ESR Level 2 Reports for Phase 1 and Phases 2 and 3 of this project.

### Status of the Species within the Action Area

#### *ODOT Bat Coordination and Surveys*

Inquiries were made to the USFWS in January of 2014 for any record of NLEB hibernacula, critical habitat, maternity colonies, and summer captures on or within the vicinity of the project site. The only known records of NLEB near the Portsmouth Bypass Project were the summer captures from surveys initiated by ODOT in 2003 for the feasibility study, and again in 2011 on the preferred alignment corridor. Details of the NLEB captures from the 2003 and 2011 surveys are detailed in Table 5 and in Figure 3, below. Currently, there are no records of NLEB hibernacula within 3 miles of the project site. No critical habitat for the NLEB has been designated, as the Service has determined that critical habitat for the species is not determinable at this time.

Two bat surveys were conducted within the project area; one in 2003 and one in 2011 (Schwierjohann and Brack 2003, ES 2011; see Appendix C of the FHWA/ODOT Biological Assessment). Both surveys were conducted using the respective Indiana Bat survey guidance of the time. Neither survey had Indiana bat captures and both surveys recorded captures of NLEB. The surveys were conducted at net sites that displayed habitat characteristics that were known to be favorable to Ohio *Myotis spp.*: potential flyway corridors within both upland forest sites and bottomland riparian forest sites.

The 2003 survey for Indiana Bats was conducted for the potential bypass corridor alignment alternatives. A total of 83 bats of seven species were captured at 21 net sites. Eight of the captures were determined to be NLEB: one female and seven males. The majority of the NLEB captures were made outside of the preferred alignment corridor, with the exception of a single male adult. The greatest number of NLEB individuals captured in the survey was four, all adult males, at net site 7-2003. This net site was adjacent to the net sites with the most NLEB captures in the 2011 survey. No Indiana bats were captured in the 2003 survey.

The 2011 survey was completed in the selected preferred alternative corridor and included 19 net sites. A total of 121 bats of six species were captured, including 31 NLEB: seven females and 24 males. The majority of the NLEB captures were made in the Phase 3 section of the corridor, at the southern end of the project in the bottomland forest west of OH Route 335. Most of the NLEB captured in this survey were adult males, followed by non-reproductive females. Five juvenile NLEB were also captured; four males and one female. No Indiana bats were captured in the 2011 survey.

**Table 5. Northern Long-eared Captures in the Project Area**

Survey Year	Site	Coordinates	Number Captured	Sex	Age*	Reproductive Status**	Site Description
2003 (ESI 2003)	1-2003	38.883556 -82.990639	1	F	A	P	Edge of small upland forest patch on minor slope. Nets placed across small intermittent stream and ATV trail.
	4-2003	38.854167 -82.881667	1	M	A	A	Bottomland riparian forest edge adjacent to forest patch, agricultural field and roadway. Nets placed across intermittent stream.
	6-2003	38.8505 -82.851444	1	M	A	A	Bottomland riparian corridor with thin buffer of forest, adjacent to roadway intersection, residences, and agricultural fields. Nets placed across stream in forest buffer.
	7-2003	38.816333 -82.854833	4	M	A	A	Forested bottomland roadway/stream corridor adjacent to agricultural fields. Nets placed across shallow gravel stream/road and at end of underpass tunnel.
	9-2003	38.764722 -82.838611	1	M	A	A	Bottomland riparian forest edge adjacent to residences and roadway. Nets placed across intermittent stream.
2011	2-2011	38.896737 -82.9729155	1	F	J	NR	Mid-slope Upland Forest Interior. Nets placed at Intersection of ATV trail and small shallow stream on flyway leading to/away from pond
	3-2011	38.892884 -82.953474	1	M	A	NR	Ridgetop Upland forest track edge, agricultural, clearing, and residential adjacent. Nets placed cross a logging road within woods.
	5-2011	38.870109 -82.938544	1	M	A	A	Upland forest edge on tributaries side slope. Nets placed across intersection of two roads and adjacent to entrenched creek.
	11-2011	38.828371 -82.8529720	1	M	A	A	Bottomland forest. Nets placed across Blake Hollow Road, ~30m west of R.R. overpass/tunnel.
			1	M	A	A	Bottomland forest. Nets placed across gravel road within woods and across small pond.
			2	F	A	NR	
	13-2011	38.816956 -82.857633	4	M	A	NR	Forested bottomland roadway/stream corridor adjacent to agricultural fields. Nets placed across shallow gravel stream/road under complete canopy closure, across intermittent stream corridor, and at end of underpass tunnel.
			1	F	A	NR	
			3	M	A	A	
			1	M	A	NR	
	14-2011	38.801159 -82.861964	2	M	J	NR	Forested bottomland roadway/stream corridor adjacent to agricultural fields. Nets placed across cross gravel stream with closed canopy and intersection of gravel stream and ATV trail.
5			M	A	NR		
			3	F	A	NR	

	15-2011	38.800329 -82.8623069	1	F	A	NR	Forested bottomland roadway/ stream corridor adjacent to agricultural fields. Nets placed across cross closed canopy road, gravel stream with closed canopy, and intersection of 2 streams and road.
			1	M	J	NR	
			1	M	A	NR	
	16-2011	38.790128 -82.8653326	1	M	J	NR	Mid slope upland forest. Nets placed cross a logging road within woods.
			2	M	A	NR	
	Totals	Female Adults					
Female Juveniles						1	
Male Adults						26	
Male Juveniles						4	
Northern Long-eared Captures 2003 Captures						39	
2011 Captures						31	

\*A(dult) or J(juvenile) \*\*N(on)-R(eproductive), A(ctive), P(regnant), L(actating), or P(ost)-L(actating).

Figure 3. 2003 & 2011 Mist Net Survey Results for Northern Long-eared Bat Captures



#### *Potential Maternity Colonies in the Action Area*

The home range of a northern long-eared bat can vary depending on the resources within the area. The location of a roost tree would be used to determine the approximate center of a home range. Since radio telemetry was not conducted on the northern long-eared bats, no roost trees were identified. When a roost tree is not identified, the home range for a northern long-eared bat is estimated by using the maximum distance that the roost tree could be from the capture location. Based on the information on capture location and the distance between captures, there may be 4 maternity colonies present. If we assume that each capture of a female or juvenile northern long-eared bat represents 1 maternity colony, then the 2003 and 2011 mist net surveys conducted within the action area indicate that there may be as many as 7 maternity colonies present along the bypass corridor. However, the majority of female and juvenile captures occurred along the northern half of the Phase 3 section of the corridor, with 2 captures (1 in 2003 and another in 2011) near the northernmost terminus within the Phase 2 section. In addition, the home ranges of these individuals overlapped; therefore, it is possible that some of the bats may have been part of the same maternity colony. Considering these data, it seems likely that no more than 6 maternity colonies are actively utilizing the Bypass corridor for roosting and/or foraging.

The area surveyed for bats represents only a portion of the suitable habitat within the Portsmouth Bypass Project action area. Based on the amount of suitable habitat surveyed, it is expected that additional maternity colonies may occupy the action area in suitable habitat that was not surveyed. However, due to the frequent movement of individual bats, the lack of telemetry data to determine the home range of individuals, and the uneven distribution of captures, a precise population estimate cannot be determined.

#### *Potential Population of Northern long-eared Bats in the Action Area*

In addition to the maternity colonies that are within or adjacent to the Bypass corridor, the area does provide habitat for adult male northern long-eared bats. A total of twenty-six adult male bats were captured during the 2003 and 2011 surveys. Although the majority of male captures also occurred in the northern section of Phase III, males were detected at more sites along the overall corridor than were females and juveniles. Based on this information it appears that adult male bats may exist in the action area in high densities.

The northern long-eared bat is commonly identified in summer mist-net surveys throughout its Midwestern population. Initial mist-netting surveys conducted for the project in 2003 resulted in 8 northern long-eared bats captured in the survey area. Additional surveys conducted in 2011 resulted in the capture of 31 northern long-eared bats. Northern long-eared bats were the third most common species identified in the mist net surveys conducted in both 2003 and 2011. Eight individuals were captured at 6 different sites in 2003. The maximum number of individuals captured at one site was 3. The 2011 survey resulted in the capture of 31 individuals at 9 different sites, with a high of 8 northern long-eared bats captured at one site. No bats were banded during the 2003 surveys. Some individuals were banded during the 2011 survey so that they could be identified as unique individuals. Others were not banded and may have been

recaptured at other mist net locations. Therefore, less than 39 unique individuals may have been captured.

Since the northern long-eared bats that were captured were not radio tagged, no information is available about the location of their roost trees. No home range location can be determined for any of these bats. When no information on roost trees is available, the Service considers all suitable habitat within 3 miles of the capture to be occupied habitat (Service 2014). For each of these captures occupied habitat is calculated by multiplying the average foraging distance (1.5 miles) (Sasse and Pekins 1996; Jackson 2004) by 2 since the capture location could be at the edge of the home range in any direction (Service 2014). Using this buffer, each capture site overlaps with multiple other capture sites.

In addition to the absence of information on unique individuals, potential roost trees, and emergence counts, the surveys may have also missed northern long-eared bats that were foraging in more cluttered upland areas, as survey sites were selected to detect Indiana bats. Therefore, due to these limitations, no maximum or minimum estimate of individuals can be made. However, we assume that the actual number of bats within the survey area is significantly greater than the 39 individuals that were documented during these mist net surveys.

#### **Factors affecting species environment within the Action Area**

This analysis describes factors affecting the environment of the species or critical habitat in the action area. The baseline includes the past, present and future impacts from federal, state, tribal, local, and private actions that have occurred or are presently occurring. This analysis also includes impacts from future federal actions that have undergone section 7 consultation.

##### *Land Ownership and Management*

Much of the forested land within the action area is in private ownership. In Ohio, timber harvest on private land is not regulated. As described above, some landowners in the action area have been performing logging operations on their properties at any time of the year. Timber harvest occurring between April 15 and November 15 could potentially cause the death or injury of NLEB bats if a tree they are roosting in is felled.

##### *Development*

Commercial and residential development is present within the action area, with the most concentrated development occurring within the towns of Lucasville (at the northern terminus), Minford (east of Phase I), and Scioto Dale (at the southern terminus). Other past development is most prevalent along Lucasville-Minford Road, SR-139, the Scioto River, and SR-335. Agriculture represents the majority of commercial development along the Scioto River, east of SR-335 near Minford, and along SR-335 just north of Scioto Dale. It is likely that this past development resulted in a loss of suitable roosting and/or foraging habitat for both the Indiana and northern long-eared bats.

In addition to the numerous local roads, other transportation related development exists within the action area. The CSX Railway runs along the eastern edge of the Bypass corridor near Minford, with the Scioto County Airport located south of Minford and east of the corridor. The

Norfolk Southern Railway runs alongside the northbound side of US-23 and intersects the bypass corridor at the northern terminus in Lucasville.

#### IV. Effects of the Action

##### **Factors to be Considered**

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 actions* 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. The following analysis will evaluate the effects of the proposed project in relation to the reproduction, numbers and distribution of the northern long-eared bat within the action area, and then further evaluate these effects in the context of the overall range-wide species status and cumulative effects to the species.

While analyzing direct and indirect effects of the proposed action, the Service considered the following factors:

- Proximity of the action to the species and its potential and critical habitat
- Distribution/geographic area in which the action occurs
- Timing of the project in relation to the species life cycle
- Nature of the effects of the project on the species
- Duration of the project impact
- Frequency of project impacts to the species
- Intensity of the impacts on the species
- Severity of the impact as it relates to species recovery from the impact

The proposed action and associated activities are discussed below in relation to the factors considered. Additionally, the expected response of the species to the listed actions is identified, where applicable.

## Analysis for Effects of the Action

### *Direct Effects*

#### *Loss of Northern Long-eared Bat Summer Roosting Habitat*

The direct effect of the project on NLEB summer roosting is that upon the species return to the landscape from hibernation, roosting sites the species may have used in previous years will have been partially or fully cleared for construction of the project. Approximately 55% of the project impact area consists of forested vegetation, and approximately 773 acres of forest will be eliminated for this project. Foster and Kurta, 1999, stated that NLEB show an inter-annual fidelity to roosting sites, meaning that NLEB that had used forest on the project for roosting in previous years will likely return to the area to roost, forage, and rear young. In this scenario, NLEB will be forced to alter their breeding, feeding, and sheltering patterns if substantial portions of their home ranges are modified. Until the bats locate another desirable roost tree, some individuals may be subject to increased stress resulting from having to search for a replacement roost tree, which increases energy expenditure and risk of predation. Additionally, displaced bats may have to roost in alternate trees that are less effective in meeting thermoregulatory needs. It is not known how long or how far NLEB will search to find new roosting habitat if their traditional roost tree is lost. The effects of the search can be compounded by stress from the energy demands of migration because it will occur in the spring, when fat reserves are low or depleted. This could expose them to an increased risk of mortality and/or failed reproduction.

In order to ensure that no direct take of summer roosting NLEB occurs during project forest clearing, ODOT has committed to perform tree clearing activities outside of the NLEB summer roosting season (April 1 to September 30). Clearing will most likely occur over multiple years depending on the phased construction timeline, but no trees greater than 3 inch dbh will be cleared within the seasonal restriction. Since no NLEB winter activity is known to occur on-site, avoidance of habitat impacts during the NLEB potential presence should ensure that any roosting trees or foraging areas on the project site being utilized by the NLEB will be left undisturbed until their fall migration and exit from the project vicinity (see *Conservation Measures and Minimization Strategies* section of this document).

The direct effects of loss of roosting sites differ by sex in NLEB, due to specific habitat requirements of reproductive females versus males and non-reproductive females. Upon returning to cleared traditional roosting sites, reproductive female NLEB will have to expend time and energy to search for a new roosting site that provides the required conditions for pup-rearing, which include protective cover, thermoregulation characteristics, size to accommodate the colony, availability of secondary or alternate roost trees, and access to sufficient foraging and drinking opportunities. In the interim of this search, females may have to roost singly, rather than with their colony, until the colony can attain roosting cohesiveness at an alternative roosting site. Roosting singly decreases the likelihood of the female meeting thermoregulatory needs, thereby reducing the potential for reproductive success. The effort will place additional stress on pregnant females at a critical time when fat reserves are low or depleted, they are already stressed from the energy demands of migration and pregnancy, and food availability is unpredictable. Pregnant bats not only need to secure sufficient food to maintain their body

weight and temperature, they also need to support a growing fetus or pup. Effects to the displaced reproductive population could include delayed fetal development, fetal abortion, and reduced body condition.

Proposed clearing on the project site is linear in nature, decreasing the potential for the project to affect the entirety of any maternity roosting sites along the corridor. Capture data suggests that substantive overlap between the Bypass corridor and existing NLEB maternity colonies may only occur at the northern project terminus near Lucasville and within the northern half of the Phase 3 section. Additionally, the action area contains a high abundance of forest and the proposed clearing only accounts for 1.34% of the forested area within the home range of any NLEB residing within the project area. For these reasons, reproductive females should either not experience a total loss of roosting sites or should not have extreme difficulty in locating an alternate colony site. Although the proposed loss of summer roosting habitat may adversely affect the reproductive population, most females of the colony would be expected to successfully bear a pup. However, a few females may experience a delay in giving birth or fail to successfully produce a pup, thereby slightly reducing the reproductive output of the colony.

Adult male and non-reproductive female NLEB may also be exposed to loss of roosting 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 female NLEB 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, as with pregnant females. Therefore, it is anticipated that adverse effects to non-reproductive bats will be less than the effects to reproductively active females.

The current NLEB population estimate for the project impact area was derived from surveys conducted for Indiana Bat in 2003 and 2011 (Brack and Hawkins 2003, Schwierjohann and Brack 2003, ES 2011). In these surveys a total of 39 NLEB were captured on a total effort of 40 net sites in the action area. A total of 24 of the 40 net sites were directly in the project impact area. Of the 40 net sites surveyed, 14 sites captured NLEB (11 of the 24 sites within the impact area). Of the 39 total NLEB captures, 31 captures were male and nine were female. Only one female exhibited signs indicating recent reproductive activity (pregnant); she was captured in the 2003 survey. No reproductive females were captured in the 2011 survey. Additionally, 34 of the 39 captures were adults. The five juveniles were captured in late July and early August.

A mist-net survey is not designed to determine all individuals utilizing an area, but to give a general census of the population. Based on the low number of reproductive females captured during this survey, maternity colonies do not appear to substantively overlap the Phase 1 and Phase 2 sections of the Bypass alignment. However, male and non-reproductive female NLEB appear to utilize areas along all three Phases of the alignment, but again the highest densities were detected within the northern half of the Phase 3 section. In their BA, FHWA/ODOT refers to this 1.75-mile section of the alignment as the High Capture Area. Of the 39 NLEB captures during the two surveys, 32 were made in this area, which is characterized by undulating upland

and bottomland forest with slight fragmentation of local roads, residences, and open fields. The area represents the most contiguous forest tracts that will be impacted by the project and contains many headwater tributaries to the Little Scioto River. Most of the survey captures occurred along these small to medium riparian corridors. No reproductive females were found at these sites; however, the presence of 3 juvenile males indicates the possibility of a maternity colony roost within the surrounding landscape. It is also possible that non-reproductive NLEB are using the area for roosting. Clearing of this area will likely adversely affect foraging and roosting potential of NLEB.

Given the amount of habitat that will be lost relative to what is available in the action area, and given that the loss will not be concentrated in any one area, but along a linear corridor, it is unlikely that quality and quantity of habitat will be reduced to the extent that survival consequences are incurred.

#### Loss of Northern Long-eared Bat Summer Foraging Habitat

The forest clearing proposed for the project will also affect the NLEB by altering existing foraging areas. The selection of a good roosting site for both males and females is dependent on the availability of good foraging habitat within an appropriate distance to the roost to be used at least twice a night. Removal or fragmentation of forest tracts may detrimentally affect the NLEB feeding capacity due to their preference for contiguous tracts of forest cover for foraging (Carroll et al. 2002, Owen et al. 2003, Patriquin and Barclay 2003). NLEB whose foraging areas occur entirely or mostly in the project area or whose foraging areas will be significantly fragmented due to the project, will have to expend an increased amount of energy to establish new foraging areas as well as travel corridors between roosting and foraging. Bats in this scenario could be adversely affected due to displacement from their home range and thus incur decreased fitness. The severity of this effect depends on the needs of the individual, the ability to establish new successful foraging areas, the ability to travel unharmed to new foraging areas, and the continued availability of prey and water sources.

As with roosting habitat, the needs and preferences of female versus male and non-reproductive female NLEB differ in scope and intensity. Reproductive female NLEB have much higher energy needs than males in the spring, due to pregnancy, then a much higher foraging need into later summer for lactation demands of young. Once pups become volant the mother must ensure that there is adequate foraging habitat for young in the vicinity of the roost, where new flyers can become proficient and have enough cover to protect them from predators. Male and non-reproductive NLEB have much less demanding energy needs in the roosting season, but are still affected by loss of foraging habitat by stress and energy expenditures for locating new habitats. The project clearing activities will occur along a linear corridor and the effects to any particular existing foraging areas NLEB may be using are expected to be low. Additionally, the high amount of forested habitat in the surrounding action area should ensure that NLEB will be able to locate and regularly utilize foraging habitats that meet their needs.

Another consequence of forest clearing can be inter- and intra-specific competition with other bat species that occupy the same roosting and foraging habitats. In the preferred habitat of NLEB and in areas such as the project site, Indiana bats (*Myotis sodalis*), little brown Bats (*Myotis lucifugus*), big brown bats (*Eptesicus fuscus*), red bats (*Lasiurus borealis*), Tri-color bats (*Perimyotis subflavus*), evening bats (*Nycticeius humeralis*), silver-haired bats (*Lasiorycter*

*noctivagans*), and hoary bats (*Lasturus cinereus*) may be present on the landscape. Depending on the overall landscape conditions, an overlap of the foraging habitat of any of these bats may occur. When prey resources become limited it is possible that other species could out-compete this species, and NLEB may suffer starvation as a consequence. Additionally, in years of drought, bats are drawn together to remaining water resources and suffer competition and possible dehydration. Due to the availability of forested area and water resources in the action area outside of the impact area, the effects of competition are believed to be minimal. Impacts to the NLEB prey supply due to impacted water quality are discussed below.

As detailed in the previous section, the findings of mist net surveys conducted in the project impact area suggest that the main population dynamic of NLEB using the site for foraging habitat are males and non-reproductive females. Additionally, the concentration of this utilization appears to be in the High Capture Area, as defined above. Loss of this foraging area will have adverse effects on these NLEB, but because of their less stringent energy demands, their greater ability to adapt to new habitat, and the high amount of alternative foraging habitat in the action area, it is anticipated that they will have little difficulty establishing new foraging grounds.

Maintenance projects along the Bypass corridor, once the roadway is operational, are also likely to remove suitable roosting and/or foraging habitat for NLEB. These actions are not expected to remove continuous tracts of wooded acreage, but instead are likely to remove a small number of individual trees for roadway safety and repair work. Therefore, such actions would not be expected to impact the reproductive success of a maternity colony as would the removal of large forested tracts during construction. However, if a maternity roost tree were to be removed during the summer roosting season (April 1 – September 30), mortality of non-volant pups could occur.

#### Direct Mortality of Bats Due to Vehicle Collision

The possibility exists for individual NLEB to be directly killed by vehicles traveling on the Bypass once it is operational. A Pennsylvania study investigating bat mortality from vehicle collisions recorded mortality of six NLEB within an 8.8 km section of US-322 near Lancaster during a one-year study (Russell et al. 2009). The roadway in the study represented a 20 meter wide (66 feet) corridor. During one summer roosting season (May 15-September 15), along a section of US-322 crossed by large numbers of bats, fatalities of 29 individual bats (of 3 *Myotis* species) were recorded due to vehicle collision. However, the actual number of bats killed is certain to be higher than the numbers recorded due to carcasses being thrown outside the search area or carried away on the vehicles with which they collided, scavenging by other wildlife, and searcher inefficiency.

The Service anticipates that all bats that are struck by vehicles will be killed. However, based on the best available scientific data, the uncertainty of the species' habitat use along the Bypass corridor, and the inability to detect bats that are killed (e.g., reasons for low detection provided immediately above), the actual number of NLEB that may be struck and killed from vehicles traveling on the new Portsmouth Bypass cannot be precisely quantified.

## *Indirect Effects*

### *Impacts to Water Quality*

Earthwork and general road construction activities will result in short-term adverse impacts to the water quality in the action area. Road construction will result in permanent impacts to up to 10.75 acres of wetlands and 3.741 acres of ponds through fill activities, and 79,886 linear feet of stream habitat through permanent discharges (by relocating or converting streams through drainage structures). Sediment, herbicides, and other contaminants could affect water quality through erosion, vegetation management, and accidental spills during any phase of the project from construction to operation. These impacts will primarily be localized (i.e., limited to the construction limit footprint), but may extend for some distance downstream, depending on intensity of disturbance and field conditions at the time of construction.

Insects associated with these aquatic habitats make up a portion of the diet of the NLEB; therefore, changes in water quality can affect the prey base of this species. Decreases in water quality through contamination and the destruction of wetlands and stream habitats while NLEB are present will 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 will be minimized through strict adherence to Best Management Practices (BMP's) during daily construction activities. A number of measures that will be implemented to minimize and offset the impacts to water quality during all phases of the project are included in the *Description of the Proposed Action*, above. These measures can substantially reduce the extent of impacts to water quality from the project.

Additionally, water resources in the action area include the Ohio River, the Scioto River, the Little Scioto River, and the vast network of headwater and main tributaries, wetlands, and open water features that drain to these rivers from the hills and valleys surrounding the site. NLEB that currently use the project site for foraging and water supply should not have difficulty locating alternate sources of hydration and prey.

Direct adverse effects to NLEB from a decrease in aquatic insect prey and drinking sources is likely to be undetectable due to the linear nature of the project, the availability of suitable habitat in the surrounding action area, and the assumption that bats will use or seek alternate areas for foraging and drinking as some areas become unsuitable. The action 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 NLEB, making them seek alternate foraging and drinking locations.

### *Impact of Construction Activity and Noise While Bats are Present*

In addition to the habitat impacts in the project alignment, the proposed project may result in increased disturbance in the action area during construction from the use of equipment and blasting. As a result, NLEB in the action area will be indirectly exposed to noise levels, or intensity of noise and vibrations that they may not have experienced in the past, depending on

the proximity of their roost sites to other human activities. The highest project noise levels are expected to occur during clearing, when no NLEB should inhabit the action area, and during construction activities, which will be conducted year round until project completion. An additional increase in noise level will accompany the completed project in the form of traffic flow.

A short-term ambient noise level survey was conducted for the proposed alignment in 2002 and 2003 (CH2M Hill 2003) to establish a pre-construction noise level baseline. The survey found that existing noise levels in the alignment were well below the noise abatement criteria (NAC); noise levels that, when approached or exceeded, require the consideration of traffic noise abatement measures. CH2MHill then did traffic counts and assessed existing peak-hour traffic noise levels at the roads currently being used to travel this area (US-23, US-52, and Lucasville-Minford Road). The resultant peak-hour traffic noise levels and traffic volumes were then input into a Traffic Noise Model program designed to determine the estimated noise levels. When the estimated noise levels were compared with the NAC, it was found that over 50% of the surveyed areas would experience noise impacts. The noise level anticipated during project operation is around 60.9 dBA. This would noticeably increase the noise around the project to a distance of about 400 ft based upon the typical reduction level of noise over distance.

In general, the increased noise and vibrations could cause disturbance to NLEB unaccustomed to these impacts while roosting and thereby lower the suitability of habitat adjacent to the project area. Owen et al. (2003) found that NLEB prefer roosting sites on the interior of forest tracts. Similar findings (Henderson et al. 2008) for NLEB foraging areas support the NLEB preference for less fragmented forest to edge habitats as flyways. Because selection of roosting and foraging sites for NLEB will most likely be greater than 400ft away from the project impact limits, any impact resulting from noise and vibrations related to construction activities would be expected to result in bats selecting roost trees further from the disturbance in habitat. For this reason, short-term disturbance in the immediate project vicinity is anticipated due to increases in noise associated with the project. However, this should not result in long-term detrimental effects to the species.

#### *Interrelated and Interdependent Actions and Activities*

Construction of the Portsmouth Bypass is expected to increase mobility throughout the area, and therefore spur development, as is the intended goal of the Appalachian Regional Commission's Appalachian Highway System initiative and ODOT's Access Ohio plan. The intent of these programs is to provide a transportation infrastructure to impoverished areas to promote economic growth and attract industrial investments to the area. Because of this, future industrial development in the action area is reasonably certain, particularly in the vicinity of the Ohio River. Although no current commitments by industry have been made for the area following Bypass construction, industrial development affecting the habitat of the NLEB is expected to be an effect of bypass construction.

In addition to industrial development, a level of commercial development is anticipated at proposed exit ramps of the bypass. The communities surrounding the preferred alignment are small and have few businesses that would accommodate travelers, such as gas stations,

restaurants, hotels, and shopping. Three full interchanges to existing local roads and two partial interchanges are proposed for the project, including one for the Portsmouth Regional Airport. It is reasonable to assume that an increased level of commercial development will follow the construction of the Bypass in these areas, although no plans are known at this time.

With the increased access to a highway infrastructure and the potential for increased industrial and commercial growth in the area, it is also reasonable to assume that residential development along the bypass will increase as well. The Action Area currently contains many sparse individual residences and clusters of residential housing around existing roadways, as is typical of rural areas, but increased access to the highway could attract additional residents and commuters.

Increased development in any area creates the need for increased utility systems to facilitate electric, gas, phone/cable, water, and sewer use to a larger customer base. If creation of the bypass increases industrial, commercial, or residential development, it is reasonable to assume that utility line expansion will be necessary in the action area.

All of these potential effects of Bypass construction are interdependent of the project, because the construction of the Bypass may facilitate economic growth in the area. It is impossible to predict how the Bypass construction will ultimately affect the land use outside the direct impact footprint, but it is reasonable to assume that some degree of additional NLEB habitat destruction will occur. These effects should be minor and confined mostly to previously developed areas. Any project that would cause a significant loss of NLEB habitat should be coordinated with the USFWS, independent of the Bypass project.

#### V. Cumulative Effects

At this time we are 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 NLEB 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

##### **Jeopardy analysis**

After reviewing the current status of the northern long-eared bat, the environmental baseline for the action area, the effects of the proposed Portsmouth Bypass Project, and the cumulative effects, it is the Service's opinion that the Portsmouth Bypass, as proposed, is not likely to jeopardize the continued existence of the northern long-eared bat.

The direct and indirect loss of habitat due to this project will impact NLEB maternity colonies in the project area, causing short-term effects on individuals of the colony. The Service anticipates that most females of the colony will successfully bear a pup, but a few females may experience a delay in giving birth or fail to successfully produce a pup, thereby slightly reducing the

reproductive output of the colony. The females expected to be most at risk to the loss of a pup or delayed birth are those whose fitness is already compromised due to other environmental factors.

The Service concludes that overall the project will not contribute a measurable decrease in reproduction or numbers of the NLEB at the local level. In addition to the one-time loss of recruitment from a few individuals of a maternity colony, the potential for direct mortality of an undiscernible number of individual NLEB exists due to vehicle collision. However, these impacts do not represent an appreciable reduction in the recruitment of a maternity colony as a whole, nor does it represent an appreciable reduction in the overall number of future bats available to contribute towards the survival and recovery of the species rangewide. The Service also determined that the loss of 773 acres of forested habitat and fragmentation of the largely forested landscape in the region, with impacts to water quality in up to 15.13 miles of streams, 3,741 acres of ponds, and 10.75 acres of wetlands are not likely to result in an appreciable reduction in the distribution of the species at the local or rangewide level given the availability of the remaining suitable habitat in the surrounding landscape. Thus, we conclude that the Portsmouth Bypass project, as proposed, is not likely to jeopardize the continued existence of the northern long-eared bat.

#### **Critical habitat adverse modification analysis**

No critical habitat for northern long-eared bats is designated.

#### VII. Conservation Measures: Avoidance, Minimization, and Mitigation Measures

The proposed action includes avoidance and minimization activities. As explained within the *Description of the Proposed Action* section above, FHWA/ODOT have proposed a number of measures to avoid, minimize, and mitigate the potential for take of northern long-eared bats. The primary methods for avoidance and minimization are limiting waterway impacts and degradation, and clearing all wooded areas (i.e., trees with greater than 3-inch dbh) when bats are not present (i.e., between September 30 and April 1). The effects of these avoidance and minimization measures are already incorporated into our effects analysis above.

#### 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 attempt to engage in any such conduct. Harm is further defined by the Service to include significant modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavioral 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 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 prohibitions against taking the species found in section 9 of the Act do not apply until the species is listed. However, the Service advises FHWA/ODOT to consider implementing the following reasonable and prudent measures. If this conference opinion is adopted as a biological opinion following a listing or designation, these measures, with their implementing terms and conditions, will be nondiscretionary, and must be undertaken by FHWA/ODOT so that they become binding conditions of any grant, permit, or contract, as appropriate, for the exemption in section 7(o)(2) to apply. FHWA/ODOT has a continuing duty to regulate the activity covered by this Incidental Take Statement. If FHWA/ODOT (1) fails to assume and implement the terms and conditions or (2) fails to require other grantees, permittees, or contractors to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to any grant, permit, or contract, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, FHWA/ODOT must report the progress of the action and its impact on the species to the Service as specified in the Incidental Take Statement. [50 CFR § 402.14 (1)(3)].

#### **Amount or Extent of Take Anticipated**

In this incidental take statement, we are evaluating the incidental take of northern long-eared bats that may result from the construction, operation, and maintenance of the proposed Portsmouth Bypass in Scioto County, Ohio. The Service anticipates that incidental take of NLEB will occur in the form of harm through habitat loss, and death by collisions with vehicles. Based on our knowledge of the ecology of the species, and the distribution of the bats within the action area, we assume that the habitat that will be lost will adversely affect the roosting and foraging habitat of NLEB.

Based on our analysis of the environmental baseline and effects of the proposed action, the Service anticipates that at least one maternity colony of NLEB occupy wooded acreage within the Bypass alignment and may be impacted as the result of the proposed project. The effect of the loss of roosting and foraging habitat is expected to result in behavioral or physiological effects which impair reproduction and recruitment, or other essential behavioral patterns. Death of individuals due to vehicle collision, decreased fitness of individuals, reduced reproductive potential, and reduced overwinter survival of some unquantifiable number of individuals may result. The effects on an assumed colony may be lost reproductive capacity and potentially a short-term decline in the size of the colony.

Construction of the Portsmouth Bypass and its associated actions is expected to result in the permanent loss of approximately 773 acres of suitable summer foraging and roosting habitat for northern long-eared bats. In addition, construction of the Bypass is expected to facilitate economic growth in the area. It is impossible to predict how the Bypass construction will ultimately affect the land use outside the direct impact footprint, but it is reasonable to assume that some degree of additional NLEB habitat destruction will occur. Degradation of remaining habitat is also likely to occur from increased fragmentation and increased disturbance.

It is unlikely that direct mortality of bats will be detected; that is, we do not expect that dead or moribund bats will be found, even though we expect that some number of individuals within a colony may die as result of the proposed actions. In fact, there is no practical means to directly measure these impacts to bats. Therefore, the anticipated level of take is being expressed below as the permanent loss of currently suitable summer roosting and foraging habitat for NLEB that will result from project implementation.

#### **Effect of the incidental take**

In the accompanying Conference Opinion, the Service determined that, based on the proposed project and the conservation measures described on pages 16-19, this level of anticipated take is not likely to result in jeopardy to the species.

#### **Reasonable and prudent measures**

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of northern long-eared bats:

1. The implementation status of all the proposed conservation measures, mitigation efforts, and terms and conditions and any related problems will be monitored and clearly communicated to the Service on an annual basis.
2. The Service will take the necessary steps to ensure that the FHWA successfully implements all the conservation measures to the fullest extent practicable.
3. To the maximum extent practicable, incorporate measures to benefit the NLEB into mitigation plans for stream and wetland impacts.
4. All engineering, construction, and maintenance personnel will be made aware of these terms and conditions to ensure compliance with these and all environmental commitments contained within this conference opinion.
5. Ensure that construction equipment is in proper working order to minimize operation noise and reduce the risk of equipment spills and leaks.

#### **Terms and conditions**

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

1. Monitoring and reporting requirements:
  - A. FHWA/ODOT will prepare an annual report detailing all conservation measures, mitigation efforts, and terms and conditions that have been initiated, are ongoing, or completed during the previous calendar year and the current status of those yet to be

completed. The report will be submitted to the Service's COFO by 31 December each year (the first report will be due December 31, 2015) and reporting will continue until the construction phase of the project is completed.

- B. If proposed conservation measures or mitigation goals cannot be realized (e.g., lack of willing-sellers), then ODOT/FHWA will investigate and propose alternative solutions that can be realized and are of equal or greater benefit to NLEB. The Service must concur with the alternative measure(s) plan prior to finalization.
  - C. Any dead bats located within the construction limits and right-of-way, regardless of species, should be immediately reported to COFO [(614) 416-8993], and subsequently transported (frozen or on ice) to COFO. No attempt should be made to handle any live bat, regardless of its condition; report bats that appear to be sick or injured to COFO. COFO will make a species determination on any dead or moribund bats.
2. ODOT/FHWA must implement all proposed mitigation and conservation measures, as detailed in the *Bat Habitat Conservation* section of this Conference Opinion or alternative measures that are of equal or greater benefit to NLEB as developed in consultation with the Service.
  3. During development of mitigation plans required under the Clean Water Act, seek mitigation opportunities which both fulfill the requirements of the water resource agencies and benefit the northern long-eared bat through habitat protection, restoration, and/or enhancement.
  4. ODOT/FHWA will ensure that these terms and conditions are implemented on the Bypass project and that environmental commitments contained herein are upheld, with all work conducted in compliance with same. If ODOT/FHWA discovers any action that is in non-compliance, ODOT/FHWA will notify the Service within three business days.
  5. Conduct regular inspections of construction equipment to ensure that equipment is in good working order to minimize disturbance to bats from operational noise and to reduce the risk of surface water contamination from equipment leaks and spills which could affect the bats' prey base and drinking sources.

In conclusion, the Service believes that the permanent loss of currently suitable summer roosting and foraging habitat for NLEB will be limited to 773 acres. This acreage represents approximately 1.34% of the forested area within the home range of any NLEB residing within the project area. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded (or clearing occurs during the period April 1-September 30) such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. ODOT/FHWA must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

## CONSERVATION RECOMMENDATIONS

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

The Service provides the following conservation recommendations to the FHWA/ODOT:

1. Working with the Service, develop guidelines for addressing NLEB issues associated with ODOT/FHWA projects in Ohio.
2. Expand on scientific research and educational outreach efforts on NLEB in coordination with the Service's COFO.
3. Once the highway is in operation, terrestrial mammals, reptiles, and amphibians will be subject to the hazards of being struck by vehicles. Animals may cross the road in order maintain population movement, genetic interchange, and to meet their basic biological needs. Mitigation measures designed to reduce the impacts of road-related mortality and barrier effects should consider the combined performance of the measures in reducing both of these impacts, while also making an effort to provide the traveling public safe passage through the prevention of wildlife-vehicle collisions.

We understand that the project lies within range of the **timber rattlesnake** (*Crotalus h. horridus*), a federal species of concern and state endangered species, as well as the following state listed species: **bobcat** (*Lynx rufus*), **mud salamander** (*Pseudotriton montanus*), **four-toed salamander** (*Hemidactylium scutatum*), **black kingsnake** (*Lampropeltis getula nigra*), **northern rough greensnake** (*Opheodrys aestivus*), **queensnake** (*Regina septemvittata*), **little brown skink** (*Scincella lateralis*), **eastern box turtle** (*Terrapene carolina*), and **smooth earthsnake** (*Virginia valeriae*). The Service recommends implementation of the following wildlife crossing measures to avoid potential road-related mortality, barrier effects, and impacts to human safety:

- **Underpass with water flow** - An underpass structure designed to accommodate the needs of moving water and wildlife. These underpass structures are frequently used by some large mammal species, but their use depends largely on how it is adapted for their specific crossing needs. Small- and medium-sized mammals generally utilize these structures, particularly if riparian habitat or cover is retained within the underpass.
- **Small- to medium-sized mammal underpass** - Primarily designed for small- and medium-sized mammals, but species use will depend largely on how it may be adapted for their specific crossing needs.

- *Modified culvert* - Crossing that is adaptively designed for use by small- and medium-sized wildlife associated with riparian habitats or irrigation canals. Adapted dry platforms or walkways can vary in design and typically constructed on the lateral interior walls of the culvert and above the high-water mark.
- *Amphibian and reptile tunnels* - Crossing designed specifically for passage by amphibians and reptiles, although other small- and medium-sized vertebrates may use as well. Many different amphibian and reptile designs have been used to meet the specific requirements of each species or taxonomic group.
- *Right-of-way fencing* - Directional control wildlife fencing with a minimum height of 8 feet aimed at reducing wildlife–vehicle collisions by preventing animals from entering the road and guiding them toward safe crossing opportunities.
- *Wildlife jump-outs* - Allow deer and other wildlife species that may end up in the fenced road corridor to escape by walking up an earthen ramp positioned adjacent to the fence and jumping down and out of the road corridor. These jump-outs should be low enough so animals will readily “jump-out” to the safe side of the fence, but high enough to discourage animals from “jumping in” the fenced road corridor.
- *Non-invasive monitoring* - Passive or active trigger camera-trap and track plates allow for non-invasive monitoring of mitigation crossing structure use.
  - **Passive:** The camera is equipped with a heat in motion sensor that triggers the camera when an object with a temperature different to the ambient temperature moves through the sensor’s field of detection. Passive systems may not trigger if the animal’s body temperature and ambient temperature are similar. Direct sunlight, sun-warmed vegetation, and sometimes even high ambient temperatures may cause false triggers with this system.
  - **Active:** In an active system, an infrared beam is actively established across the potential travel path of the target animal(s) and the camera is triggered when this infrared beam is broken. This system provides more flexibility in setup (the height of the beam can be adjusted for the target species, for example) but is triggered by anything breaking the infrared beam, including vegetation, rain or large insects. Also, since the trigger comprises separate units (emitter and receiver), the equipment becomes heavier and more cumbersome to transport and also requires two supports one extra to fix the trigger units.
- *Mortality surveys* – Observe direct wildlife mortality due to reduced landscape connectivity and allow for evaluation of crossing and barrier structures.

These recommendations should be employed and used in conjunction with other crossing recommendations in areas that provide the best crossing opportunity based on impacts and habitat availability.

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

## REINITIATION NOTICE

This concludes the formal conference for the Portsmouth Bypass Project in Scioto County, Ohio. FHWA/ODOT may ask the Service to confirm the conference opinion as a biological opinion issued through formal consultation if the northern long-eared bat is listed or critical habitat is designated. The request must be in writing. If the Service reviews the proposed action and finds that there have been no significant changes in the action as planned or in the information used during the conference, the Service will confirm the conference opinion as the biological opinion on the project and no further section 7 consultation will be necessary.

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

The incidental take statement provided in this conference opinion does not become effective until the species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation. At that time, the project will be reviewed to determine whether any take of the (species/habitat) has occurred. Modifications of the opinion and incidental take statement may be appropriate to reflect that take. No take of the (species/habitat) may occur between the listing of (species) and the adoption of the conference opinion through formal consultation, or the completion of a subsequent formal consultation.

## LITERATURE CITED

- Amelon, S., and D. Burhans. 2006. Conservation assessment: *Myotis septentrionalis* (northern long-eared bat) in the eastern United States. Pages 69-82 in Thompson, F. R., III, editor. Conservation assessments for five forest bat species in the eastern United States. U.S. Department of Agriculture, Forest Service, North Central Research Station, General Technical Report NC-260. St. Paul, Minnesota.
- Barbour, R. W. and W. H. Davis. 1969. Bats of America. The University of Kentucky Press, Lexington, Kentucky.
- Blehert D. S., A. C. Hicks, M. Behr, C. U. Meteyer, B. M. Berlowski-Zier, E. L. Buckles, J. T. H. Coleman, S. R. Darling, A. Gargas, R. Niver, J. C. Okoniewski, R. J. Rudd, and W. B. Stone. 2009. Bat white-nose syndrome: an emerging fungal pathogen? *Science* 323:227.
- Brack V., and J. Hawkins. 2003. A cave assessment and summer mist net survey at 11 additional sites for the endangered Indiana Bat along the proposed Portsmouth Bypass project in Scioto County, Ohio. Environmental Solutions and Innovations Incorporated, Cincinnati (OH).
- Brack, V., and J. O. Whitaker. 2001. Foods of the northern myotis, *Myotis septentrionalis*, from Missouri and Indiana, with notes on foraging. *Acta Chiropterol.* 3: 203-210.
- Broders, H. G., and G. J. Forbes. 2004. Interspecific and intersexual variation in roost site selection of *Myotis septentrionalis* and *M. lucifugus*. *Journal of Wildlife Management.* 68:602-610.
- Caceres, M. C., and R. M. R. Barclay. 2000. *Myotis Septentrionalis*. *Mammalian Species No.* 634:1-4.
- Caceres, M. C., and M. J. Pybus. 1997. Status of the northern long-eared bat (*Myotis septentrionalis*) in Alberta. Alberta Environmental Protection, Wildlife Management Division, Wildlife Status Report No. 3, Edmonton, AB.
- Caire, W., R. K. LaVal, M. L. LaVal, and R. Clawson. 1979. Notes on the ecology of *Myotis Keenii* (Chiroptera, Vespertilionidae) in Eastern Missouri. *American Midland Naturalist.* 102(2):404-407.
- Carroll, S. K., T. C. Carter, and G. A. Feldhamer. 2002. Placement of nets for bats: effects on perceived fauna. *Southeastern Naturalist* 1(2):193-198.
- Carter, T. C., and G. A. Feldhamer. 2005. Roost tree use by maternity colonies of Indiana bats and northern long-eared bats in southern Illinois. *Forest Ecology and Management* 219: 259-268.
- CH2M Hill. 2003. Noise Analysis Report, SCI-823-0.00, PID No. 19415. Dublin, Ohio.

- Cryan, P. M., C. U. Meteyer, J. G. Boyles, and D. S. Blehert. 2010. Wing pathology of white-nose syndrome in bats suggests life-threatening disruption of physiology. *BMC Biology* 8:135-142.
- Easterla, D. A. 1968. Parturition of Keen's Myotis in Southwestern Missouri. *Journal of Mammalogy* 49(4):770.
- EnviroScience Incorporated. 2011. Indiana Bat mist-net survey; approximately 26.28 kilometers Ohio Department of Transportation Portsmouth Bypass (SCI-813-0.00/6.81, PID 19415), Scioto County, Ohio. EnviroScience Incorporated, Stow (OH).
- Feldhamer, G. A., T. C. Carter, J. O. Whitaker Jr. 2009. Prey Consumed by Eight Species of Insectivorous Bats from Southern Illinois. *American Midland Naturalist* 162(1):43-51.
- Fitch, J. H. and K. A. Shump, Jr. 1979. *Myotis keenii*. *Mammalian Species*, No. 121:1-3.
- Federal Highway Administration and Ohio Department of Transportation. 2005. Draft environmental impact statement for SR 823, Portsmouth Bypass Project, Scioto County, Ohio, PID 19415. United States Department of Transportation and Ohio Department of Transportation, Columbus (OH).
- French, T. 2012. Unpublished data from USFWS Region 3 data request regarding status of 7 cave bats species (sent January 3, 2012).
- Frick, W. F., J. F. Pollock, A. C. Hicks, K. E. Langwig, D. S. Reynolds, G. G. Turner, C. M. Butchkoski, and T.H. Kunz. 2010. An emerging disease causes regional population collapse of a common North American bat species. *Science* 329:679-682.
- Goehring, H. H. 1954. *Pipistrellus subflavus obscurus*, *Myotis keenii*, and *Eptesicus fuscus fuscus* hibernating in a storm sewer in central Minnesota. *Journal of Mammalogy* 35(3):434-436.
- Griffin, D. R. 1940. Reviewed notes on the life histories of New England cave bats. *Journal of Mammalogy* 21(2):181-187.
- Griffin, D. R. 1945. Travels of banded cave bats. *Journal of Mammalogy* 26(1): 15-23.
- Griffith, L.A. and J.E. Gates. 1985. Food Habits of Cave-Dwelling Bats in the Central Appalachians. *Journal of Mammalogy* 3:451-460.
- Henderson, L. E., L. J. Farrow, and H. G. Broders. 2008. Intra-specific effects of forest loss on the distribution of the forest-dependent northern long-eared bat (*Myotis septentrionalis*). *Biological Conservation* 141:1819-1828.
- Herzog, C., and R. Reynolds. 2012. Epicenter regional update. Abstract. 5th Annual White-nose Syndrome Symposium, June 4-7, 2012, Madison Wisconsin.

- Hitchcock, H. B. 1949. Hibernation of bats in southeastern Ontario and adjacent Quebec. *Canadian Field-Naturalist* 63(2): 47-59.
- Jackson, J. L. 2004. Effects of Wildlife Stand Improvements and Prescribed Burning on Bat and Insect Communities: Buffalo Ranger District, Ozark-St. Francis National Forest, Arkansas. M.S. Thesis. Arkansas State University.
- Krochmal, A. R. and D. W. Sparks. 2007. Timing of Birth and Estimation of Age of Juvenile *Myotis septentrionalis* and *Myotis lucifugus* in West-Central Indiana. *Journal of Mammalogy* 88(3):649-656.
- Kurta, A. and J. A. Teramino. 1994. A novel hibernaculum and noteworthy records of the Indiana bat and eastern pipistrelle (Chiroptera: Vespertilionidae). *American Midland Naturalist* 132(2):410-413.
- Lacki, M.J., D.R. Cox, and M.B. Dickinson. 2009. Meta-analysis of Summer Roosting Characteristics of Two Species of Myotis Bats. *American Midland Naturalist*. 162:318-326.
- Lacki, M. J., and J. H. Schwierhohann. 2001. Day-roost characteristics of northern bats in mixed mesphytic forest. *Journal of Wildlife Management*. 65:482-488.
- Meteyer, C. U., E. L. Buckles, D. S. Blehert, A. C. Hicks, D. E. Green, V. Shearn-Bochsler, N. J. Thomas, A. Gargas, M. J. Behr. 2009. Histopathologic criteria to confirm white-nose syndrome in bats. *Journal of Veterinary Diagnostic Investigation* 21:411-414.
- Minnis, A. M. and D. L. Lindner. 2013. Phylogenetic evaluation of *Geomyces* and allies reveals no close relatives of *Pseudogymnoascus destructans*, comb. nov., in bat hibernacula of eastern North America. *Fungal Biology* 117(9): 638-649.
- Nagorsen, D. W., and R. M. Brigham. 1993. The Mammals of British Columbia. 1. Bats. Royal British Columbia Museum, Victoria, and the University of British Columbia Press, Vancouver.
- Ohio Environmental Protection Agency. 2012. Integrated water quality monitoring and assessment report. Columbus (OH): Ohio Environmental Protection Agency. Available from: <http://www.epa.state.oh.us/dsw/tmdl/OhioIntegratedReport.aspx>
- Owen, S. F., M. A. Menzel, W. M. Ford, B. R. Chapman, K. V. Miller, J. W. Edwards, and P. B. Wood. 2003. Home-range size and habitat used by the Northern Myotis (*Myotis septentrionalis*). *American Midland Naturalist* 150(2):352-359.
- Patriquin, K.J., and R.M.R. Barclay. 2003. Foraging by bats in cleared, thinning and unharvested boreal forest. *Journal of Applied Ecology* 40: 646-657.

- Perry, R. W., and R. E. Thill. 2007. Roost selection by male and female northern long-eared bats in a pine-dominated landscape. *Forest Ecology and Management* 247:220-226.
- Puechmaile, S. J., P. Verdeyroux, H. Fuller, A. G. M. Behaert, and E. C. Teeling. 2010. White-nose syndrome fungus (*Geomyces destructans*) in bat, France. *Emerging Infectious Diseases*. Available at: <http://www.cdc.gov/eid/content/16/2/pdfs/09-1391.pdf>
- Racey, P.A. 1982. Ecology of bat reproduction. *Ecology of Bats* 57-104.
- Raesly, R. L. and J. E. Gates. 1987. Winter habitat selection by north temperate cave bats. *American Midland Naturalist* 118(1):15-31.
- Ratcliffe, J. M. and J. W. Dawson. 2003. Behavioral flexibility: the little brown bat, *Myotis lucifugus*, and the northern long-eared bat, *M. septentrionalis*, both glean and hawk prey. *Animal Behaviour* 66:847-856.
- Russell, A., C. M. Butchkoski, L. Saidak, G. F. McCracken. 2009 Road-killed bats, highway design, and the commuting ecology of bats. *Endangered Species Research*, 8, 49-60.
- Sasse, D. B. and P. J. Pekins. 1996. Summer roosting ecology of northern long-eared bats (*Myotis septentrionalis*) in the White Mountain National Forest. *Bats and Forests Symposium* October 1995, Victoria, British Columbia, Canada, p.91-101.
- Schwierjohann J. H., and V. Brack. 2003. A summer mist net survey for the endangered Indiana bat along the proposed Portsmouth Bypass project in Scioto County, Ohio. *Environmental Solution and Innovations Incorporated, Cincinnati (OH)*.
- U.S. Fish and Wildlife Service. 2011. A National Plan for Assisting States, Federal Agencies, and Tribes in Managing White-Nose Syndrome in Bats.
- U.S. Fish and Wildlife Service. 2013. Listing the Northern Long-Eared Bat as an Endangered Species. Proposed Rule. Fed. Reg. 78: 191.
- U.S. Fish and Wildlife Service. 2014. Northern Long-eared Bat interim conference and planning guide. Washington (DC): United States Fish and Wildlife Service. Available from: <http://www.fws.gov/midwest/endangered/mammals/nlba/pdf/NLEBinterimGuidance6Jan2014.pdf>
- Timpone, J. C., J. G. Boyles, K. L. Murray, D. P. Aubrey, and L.W. Robbins. 2010. Overlap in roosting habits of Indiana bats (*Myotis sodalis*) and Northern bats (*Myotis septentrionalis*). *American Midland Naturalist*. 163: 115-123.
- Turner, G. G., D. M. Reeder, and J. T. H. Coleman. 2011. A five-year assessment of mortality and geographic spread of white-nose syndrome in North American bats and a look to the future. *Bat Research News* 52(2): 13-27.

- U.S. Geological Survey (USGS). 2010. White-Nose Syndrome threatens the survival of Hibernating bats in North America. <http://www.fort.usgs.gov/WNS/>. Accessed 31 May 2013.
- van Zyll de Jong, C. G. 1985. Handbook of Canadian mammals. National Museums of Canada, Ottawa, Canada. pp. 116-120.
- Whitaker, J. O. and W. J. Hamilton. 1998. Mouse-eared bats, Vespertilionidae. P. 89-102. In *Mammals of the eastern United States, Third Edition*. Comstock Publishing Associates, a Division of Cornell University Press, Ithaca, New York.
- Whitaker, J. O. and R. E. Mumford. 2009. Northern Myotis. P. 207-214. In *Mammals of Indiana*. Indiana University Press, Bloomington, Indiana.
- Whitaker, J. O. and L. J. Rissler. 1992. Seasonal activity of bats at copperhead cave. Proceedings of the Indiana Academy of Science, 101: 127-134.
- Don E. Wilson & DeeAnn M. Reeder (editors). 2005. *Mammal Species of the World. A Taxonomic and Geographic Reference* (3rd ed), Johns Hopkins University Press.
- Yates, M. D. and R. M. Muzika. 2006. Effect of forest structure and fragmentation on site occupancy of bat species in Missouri ozark forests. *The Journal of Wildlife Management*, 70(5): 1238-1248.