FRAMEWORK PROGRAMMATIC BIOLOGICAL OPINION

on the

Ohio Department of Transportation's Federal-Aid Highway Program

for the

Federally Endangered Indiana Bat (*Myotis sodalis*)

and

Federally Threatened Northern Long-eared Bat *(Myotis septentrionalis*)

Submitted to the Ohio Department of Transportation

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Table of Contents

INTRODUCTION 1

CONSULTATION HISTORY 1

Activities that will have No Effect on the Species and Informal Consultation on Categorical Activities that May Affect but are Not Likely to Adversely Affect the Species 2

Batched and Tiered Consultation 12

BIOLOGICAL OPINION

I. DESCRIPTION OF THE PROPOSED ACTION 13

Action Area 32

II. STATUS OF THE SPECIES 33

Description and Distribution 33

Life History and Population Dynamics 34

Range-wide Status 42

Threats to the Species 44

III. ENVIRONMENTAL BASELINE 46

Status of the Species within the Action Area 47

Factors Affecting Species Environment within the Action Area 49

IV. EFFECTS OF THE ACTION 50

Beneficial Effects 52

Direct and Indirect Effects 53

V. CUMULATIVE EFFECTS 58

VI. CONCLUSION 59

FRAMEWORK PROGRAMMATIC INCIDENTAL TAKE STATEMENT 60

Amount or Extent of Take Anticipated 60

EFFECT OF THE TAKE 61

REASONABLE AND PRUDENT MEASURES 61

TERMS AND CONDITIONS 62

REINITIATION NOTICE 63

CONSERVATION RECOMMENDATIONS 63

LITERATURE CITED 65

Figures

Figure 1 White-nose syndrome zone map (January 14, 2016).....10

Figure 2 Indiana and northern long-eared bat Management Units as defined for the programmatic ESA Section 7 consultation between USFWS and ODOT.....17

Figure 3 Example Programmatic Consultation Bat Buffer Map (PC Map), as of.....19

Figure 4 Flowchart: ESA Section 7 Programmatic Project-Level Consultation for the Indiana and Northern Long-Eared Bats in Ohio.....20

Figure 5 Indiana Bat Rangewide Population Estimates 1981-2015.....43

Figure 6 Bat White-Nose Syndrome Occurrence Map (as of 9/22/2015). 45

Tables

Table 1 Summary of consultation history. 1

Table 2 A summary of Indiana bat summer roosting habitat tree characteristics compiled in USFWS (2007a) and Lacki et al. (2009). 37

Appendices

Appendix A: Glossary

Appendix B: Field Procedure For Determining Potential Maternity Roost Trees Within An ODOT Project Area

Appendix C: Indiana And/Or Northern Long-Eared Bat Habitat Restoration Guidance

Appendix D: Preliminary Bat Assessment Guidelines for Bridges/Structures *and* Bridge Bat Inspection Form

Appendix E: Cited ODOT Construction Specifications, Ohio Administrative Code, and Ohio Revised Code

Appendix F: Dec 2015 ODOT-ODNR-USFWS MOA For Interagency Coordination For Projects Which Require Consultation Under the Endangered Species Act, Impact State Listed Species, and/or Modify Jurisdictional Waters

Appendix G: Northern Long-Eared Bat 4(d) Rule, USFWS Intra-Service Biological Opinion on the 4(d) Rule, and Optional Framework for Federal Action Agencies

Appendix H: FHWA/FRA Indiana Bat and Northern Long-eared Bat Biological Assessment, USFWS Concurrence Letter with BA (MANLAA), and BA User's Guide

INTRODUCTION

In accordance with section 7 of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 et seq.), this document transmits the U.S. Fish and Wildlife Service's (USFWS) Biological Opinion (BO) based on our review of the Ohio Department of Transportation's (ODOT) Biological Assessment on ODOT's Federal-Aid Program and Its Effects on the Federally Endangered Indiana Bat and Federally Threatened Northern Long-Eared Bat (herein referred to as the "BA"). On February 5, 2016, USFWS received ODOT's request for formal consultation along with the aforementioned BA. The USFWS determined that the initiation package received on February 5, 2016 was complete in accordance with 50 CFR §402.14 and provided a letter to ODOT, dated February 16, 2016, stating that the USFWS had received a complete initiation package. Formal consultation was initiated on February 5, 2016.

This Biological Opinion (BO) is based on information provided in the BA, meetings, telephone conversations, and e-mail exchanges among the USFWS, FHWA, and ODOT, and other sources of information. A complete administrative record of this consultation is on file at the USFWS's Columbus Ohio Field Office (COFO).

CONSULTATION HISTORY

Table 1 presents a summary of the primary points in the consultation history.

Table 1 Summary of consultation history.

DATE	EVENT/ACTION
January 10, 2012	FHWA-ODOT-USFWS agreed (via signed letters) to extend the 2007 Programmatic Biological Opinion through January 31, 2013.
July 31, 2012	ODOT submitted a Draft Biological Assessment on their statewide program to the USFWS.
February 1, 2013	FHWA-ODOT-USFWS agreed (via signed letters) to extend the 2007 Programmatic Biological Opinion through January 31, 2014.
October 25, 2013	After months of meetings and discussions between ODOT, FHWA, and the USFWS in which staff from the three agencies worked to resolve points of disagreement regarding the programmatic consultation, ODOT initiated a contract with the U. S. Institute for Environment Conflict Resolution (USIECR) to facilitate completion of the Biological Assessment (BA). ODOT informed USFWS of this action at their joint meeting on this date.
January 13, 2014	FHWA-ODOT-USFWS agreed (via signed letters) to extend the 2007 Programmatic Biological Opinion through January 31, 2016.
March 7, 2014	FHWA-ODOT-USFWS Kick-off Meeting conference call with USIECR.
April 30, 2014	USIECR held a meeting with ODOT, FHWA, and the USFWS, in Columbus, Ohio, to review results of assessments conducted by USIECR with staff from each agency and to outline a proposed strategy to complete the consultation.
October 16, 2014	Consultation suspended until January 21, 2015, due to incapacitation of sole USFWS staff member engaged in the consultation.
January 21, 2015	Meetings of the consultation Technical Working Group (TWG) resume; work on the BA restarts.
February 20, 2015	TWG began meeting every two weeks via video-/tele-conference.
January 28, 2016	FHWA-ODOT-USFWS agreed (via signed letters) to continue the extension of the 2007 Programmatic Biological Opinion through February 29, 2016.

DATE	EVENT/ACTION
February 5, 2016	ODOT submitted the Final Biological Assessment to USFWS, along with a letter requesting initiation of the Programmatic Formal Consultation.
February 16, 2016	The Service sent a letter to ODOT notifying them that a complete initiation package was received and formal consultation was initiated effective 2/5/2016.
February 22, 2016	Draft Programmatic Biological Opinion sent to members of the consultation TWG for review.

Activities that will have No Effect on the Species and Informal Consultation on Categorical Activities that May Affect but are Not Likely to Adversely Affect the Species

Background

In their BA, ODOT determined that certain activities carried out under ODOT's Federal-Aid Program are likely to adversely affect the Indiana bat and/or northern long-eared bat. These activities are evaluated in the BO that follows. In addition, ODOT determined that many activities carried out under the Federal-Aid Program will either not effect or are not likely to adversely affect the Indiana bat and northern long-eared bat; and ODOT requested our concurrence with the latter determination. These activities are described below.

A **No Effect** determination is appropriate when no impacts to the species are expected. A **May Affect**, **Not Likely to Adversely Affect** determination is appropriate when effects on the species are expected to be discountable, insignificant, or entirely beneficial. Insignificant effects are those that would not result in "take." Discountable effects are those that are extremely unlikely to occur. **Entirely Beneficial Effects** are those effects of an action that are wholly positive, without any adverse effects (even in the short term), on the species or its habitat. A **May Affect, Likely to Adversely Affect** determination is appropriate when direct or indirect effects will likely result in the "incidental take" of one or more Indiana and/or northern long-eared bats.

The effects of various stressors on the bats are related to their location on the landscape relative to sensitive habitat features used by the species. Areas of particular importance when evaluating project impacts to bats are identified on the Programmatic Consultation (PC) Bat Buffer Map (also referred to as the "PC Map"; Figure 3). The colored "buffers" on this map refer to areas of the state in which Indiana and/or northern long-eared bats are known to occur or have occurred in the past. Note that references to buffer colors (**BLUE**, **PURPLE**, **RED**, **YELLOW**, **GOLD**, **BROWN**, **GREEN**) here and within the following BO sections refer to the buffers on the PC Map. These buffers are based on survey data submitted to the USFWS COFO by federally permitted surveyors. The buffer colors are defined as:

BLUE	Indiana bat hibernaculum (0.5-mi buffer)
PURPLE	Northern long-eared bat hibernaculum (0.25-mi buffer)
RED	Indiana bat swarming location (5-mi buffer)
YELLOW	Acoustic Indiana bat detection (5-mi buffer)
GOLD	Indiana bat maternity colony (actual or 5-mi buffer)
BROWN	Northern long-eared bat known maternity roost (150-ft buffer)
GREEN	Male or non-reproductive female Indiana bat (5-mi buffer)

(It is important to note that the map in Figure 3 (on page 19) is only a "snapshot" of these buffers as of the writing of this document. These data are not static and are updated regularly as survey results are submitted to USFWS COFO. Updates are subsequently provided to ODOT by USFWS COFO.)

The Western Management Unit[1] (WMU) is more susceptible to adverse effects from summer habitat removal, which in turn may result in adverse effects to the Indiana bat and northern long-eared bat. With lower forest cover in this unit (under 33% in all counties in the WMU), less potential suitable summer habitat is available in the WMU than in the Eastern Management Unit (EMU). Indiana bat capture records indicate that several maternity colonies occur (or did occur) in the WMU. Based on the USFWS's 2014 records, Indiana bat home-range buffers either fully or partially overlap 34 of the 55 counties in the WMU. The largest hibernaculum in Ohio occurs in Preble County, along the western border of the state. Capture records are also known from southern Michigan, just beyond the northwestern border of Ohio. Indiana bats tend to migrate north to find their summer habitat, as demonstrated in the literature and field studies (Gardner and Cook 2002, Whitaker and Brack 2002). For these reasons, the western portion of Ohio may serve as a migrating/foraging corridor for the Indiana bat and possibly the northern long-eared bat and other species, in addition to summering habitat. Because radio telemetry data on maternity roosting locations of northern long-eared bats were not collected until the species was federally listed, the majority of the USFWS's maternity colony records for this species are based on mist-net survey captures. The USFWS identified a maternity colony location based on the capture of a pregnant, lactating, or post-lactating female or a juvenile bat of either sex at that location. Based on capture records, the northern long-eared bat was one of the more common bat species in Ohio before WNS. In 2014 data records northern long-eared bat home-range buffers either fully or partially overlap 38 of the 55 counties in the WMU. The largest concentration of northern long-eared bat capture records occur in Eastern Ohio.

For the purposes of this PBO, **Suitable Wooded Habitat** (**SWH**) – that is, potential summer roosting habitat – will be evaluated in the field based on this definition:

> *Any tree covered area that is 0.2 ha (0.5 ac) or larger, containing any potential roosts (i.e., live trees and/or snags ≥3 inches dbh that have exfoliating bark, cracks, crevices, and/or cavities) greater than 4 m (13 ft) tall and at least 7.6 cm (3 in) dbh OR any patch of trees with these characteristics that is less than ½ acre in size but is within 1,000 feet of or connected by a travel corridor to a PMRT, ½-acre or larger stand of SWH, or any patch of wooded riparian buffer. (It is important to note that the entire tree covered area – i.e., <u>all</u> trees, not just the trees with roost characteristics – are considered SWH if this definition is met.)*

Male Indiana bats have been found roosting in trees as small as 6.4 cm (2.5 in) dbh (Gumbert 2001), although the average diameters reported in literature are much larger: 38.1 cm (14.9 in) in Indiana (n=14, Brack et al. 2004) and 28.6 cm (11.2 in) in Kentucky (n=41, Gumbert 2001) and as summarized in Table 2 on page 37. Compared to the Indiana bat, northern long-eared bats are considered less habitat specific in their roosting habits. They will roost in very small trees (7.6 cm (3 in) dbh) with small cavities, or other small areas of peeling bark, even in habitat low on a tree. Because smaller trees are considered potential habitat, and more emphasis is placed on foraging and commuting areas (not just roosting sites), ODOT will report the acreage of impact to SWH instead of the number of suitable roost trees in consultation efforts. The 2015 Range-wide Indiana Bat Summer Survey Guidelines describe essentially all vegetated areas as potential Indiana and northern long-eared bat habitat: "Suitable summer habitat…consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures." These additional non-forested vegetated areas do not appear to be limited in Ohio and, therefore, are not included in this BO impact assessment.

[1] See map (Figure 2) and definitions for the Western and Eastern Management Units on page 17.

For the purposes of this BO, a **Potential Maternity Roost Tree (PMRT)** is defined as:

A tree that provides suitable summer roosting habitat for an Indiana bat or northern long-eared bat maternity colony[2]. Maternity roost trees have the following habitat characteristics:

- *Live or standing dead trees or snags over 40.6 cm (16 in) diameter at breast height (dbh) with exfoliating, peeling or loose bark, split trunks and/or branches, or cavities.*
    - *These characteristics must be plentiful enough (i.e., enough area in which the colony can roost) to allow the colony to change locations along the tree to aid in thermoregulation.*
- *Any area(s) of habitat on a particular tree does not have to cover a large area, as a group of roosting bats can fit into a very small space.*
- *If the habitat characteristics are found only on the branches of the tree, the branches must be at least 20.3 cm (8 in) in diameter at the site of the habitat characteristics.*
- *Structural roosting characteristics must be at least 4 m (13 ft) above the ground (see photo gallery in attached Field Guide (Appendix B)).*
- *These trees must have solar exposure **and** must be:*
    - *within 304.8 m (1,000 ft) of SWH (see definition above) **or***
    - *part of or connected to a Travel Corridor that is connected to either a) SWH that is 0.2 ha (0.5 ac) or larger or b) any wooded riparian corridor.*

Potential Maternity Roost Trees (PMRTs), as defined above, would offer suitable maternity roosting sites for both bat species. The trees, as defined above, are of average, or slightly below the average size of roosting trees for Indiana bats in Ohio and across the range. Though in some cases single or few Indiana bats have been found roosting in trees with smaller diameter than 40.6 cm (16 in), they are considered not the norm for the species. Cases of a maternity colony of Indiana bats roosting in a tree smaller than 40.6 cm (16 in) dbh are rare.

Northern long-eared bats also use larger trees as described above for maternity roosting, but can also use smaller trees with less solar exposure, and rarely may also use buildings for maternity roosts. Because they have less specific maternity roosting requirements, impacts to the smaller trees and buildings that this species may use would be less impactful to the species because they are not unique or rare on the landscape. Because of this, only trees that meet the above definition will be called PMRTs for this species.

All trees that meet the definition of a PMRT will be reported for each project area where tree removal, regardless of season, will occur <u>more than 30.5 m (100 ft) from the roadway (edge of pavement)</u> (see Appendix B, *Field Guide for PMRT Determinations*). Most projects will be constructed along an existing roadway, where habitat quality is generally degraded or not preferred. Of the 40 records of known Indiana bat maternity roost trees in Ohio as of August 2014, only four were located within 91.4 m (300 ft) of a roadway. Also, ODOT's project impacts are typically linear in nature, and would not likely remove all of the PMRTs in an area. In cases of impacts from bike trails, the impacts are very narrow and linear, and therefore are even more unlikely to remove all PMRTs in an area. For projects where only small amounts of SWH will be removed (less than 0.4 ha (1 ac) in the WMU and 0.8 ha (2 ac) in the EMU), the likelihood of actually impacting a maternity colony by removing roost trees not identified during the field survey as PMRTs, appears low. To minimize impacts from removal of PMRTs, tree clearing on all projects impacting PMRTs will be done outside of the restricted dates unless USFWS approved sampling shows that the trees are not being used by Indiana or northern long-eared bats. (*Note that surveys conducted for projects located within a colored buffer on the PC Map (Figure 3) will only serve to provide additional information regarding species activity within the project area. Regardless of survey results in these areas (i.e., whether or not Indiana*

[2] A maternity colony consists of reproductive females and their young that may number 100 individuals or more.

bats are detected), the species is assumed present by USFWS.) These restrictions will further reduce potential impact to the species from PMRT removal. Based on the 2015 Range-wide Biological Assessment for Transportation Projects for Indiana Bat and Northern Long-Eared Bat, trees that otherwise meet the definition of a PMRT but are located within 30.5 m (100 ft) of the edge of pavement of a roadway would not likely be used for roosting due to disturbance from traffic. Therefore, **PMRTs to be removed on projects where the only tree clearing to occur is <u>within 30.5 m (100 ft) of existing edge of pavement</u> will not trigger project-specific consultation, unless trees will be cleared during the bats' active season (i.e., between March 31 and October 1)**. Project-specific consultation will be required for all projects that remove PMRTs further than 30.5 m (100 ft) from the edge of the roadway surface regardless of the season of removal.

No Effect Activities

ODOT has determined that there will be no effect on the Indiana bat, the northern long-eared bat, or their habitats on projects that:

- will not remove Suitable Wooded Habitat (SWH; see definition above and in Appendix A); ***and***
- will not impact a bridge that is considered suitable for bat roosting[3], ***and***
- will only impact the top of the bridge deck or other non-suitable roosting areas on bridges over streams; ***and***
- will not involve pile driving, blasting, and/or removal of SWH within 0.8 km (0.5 mi) of an Indiana bat hibernaculum or within 0.4 km (0.25 mi) of a northern long-eared bat hibernaculum.

No Effect activities do not require consultation with USFWS.

Activities with Potentially Beneficial Effects

ODOT has determined that the following activities may benefit the Indiana bat and/or northern long-eared bat and their habitats:

1. Stream and/or wetland mitigation (that is in potential Indiana and/or northern long-eared bat habitat) that aims to restore riparian/forested wetland areas and is completed in compliance with the Army Corps of Engineers Clean Water Act Section 404 Permits and the Ohio Environmental Protection Agency's Clean Water Act Section 401 Water Quality Certification Process where no tree removal is planned.
2. Native tree planting that will supply future suitable habitat for the bats.
3. Invasive species plant control that will create better quality habitat for the Indiana and northern long-eared bat.

These Potentially Beneficial Effects will not be coordinated with USFWS under the ESA.

[3] Only bridges over waterways are considered suitable for bat roosting under this PBO. However, bridges on which there is evidence that the superstructure is regularly flooded are not considered suitable for bat roosting.

Categorical Activities that May Affect but are Not Likely to Adversely Affect the Species

ODOT has determined that the majority of their projects with minimal environmental impacts are not likely to adversely affect the Indiana bat or northern long-eared bat because the possible effects of these projects are insignificant (too small to be measured) or discountable (not likely to occur)**.**

Effects on the bats from the following stressors will be minimized by ODOT as described below:

- water quality impacts
- increased lighting
- smoke/heat associated with burning brush piles

Impacts to water quality from direct stream impacts (e.g., temporary and permanent fills for bridges and culverts) and indirect impacts (e.g., siltation, construction run-off, chemical spills), may reduce the number and diversity of insects in an area and impact bats by reducing their prey base. Implementation of ODOT's standard BMPs and storm water controls (ODOT Construction and Materials Specifications (2016) 601, 616, 625, and 670, and Supplemental Specification 832) (see Appendix E) will minimize these impacts.

Increased lighting can cause disruption to maternity and foraging behavior in bats. Lights that illuminate maternity roosting structures can potentially negatively affect growth and maturity rates of juvenile bats. In European *Myotis* species that generally use houses and buildings for roosts, juveniles from illuminated structures were found to be significantly smaller, and night emergence was significantly delayed for adults (Boldogh et al. 2007). A British study showed that LED street lights caused a reduction in activity in slower flying bats (including *Myotis* ssp.) (Stone et al. 2012). One study from Ontario, Canada found that free-flying little brown bats (*Myotis lucifugus*) were more likely to strike an obstacle (in this case, a large trailer) in illuminated conditions (McGuire & Fenton 2010). These impacts to the Indiana and northern long-eared bats will be minimized by using downward facing lights in permanent lighting installations, and minimizing the use of temporary construction lighting in wooded areas.

Minor impacts to air quality may be caused by slash pile burning. ODOT's Construction and Material Specifications 105.16 restricts the use of slash pile burning per the regulations set aside in Ohio Administrative Code (OAC) 3745.19 and Ohio Revised Code (ORC) 1503.18 (see Appendix E). Slash pile burning can only be conducted after ODOT or the contractor has gained written permission from ODNR and Ohio EPA, and has submitted documentation to the ODOT Project Engineer. Burns must be conducted when atmospheric conditions will readily dissipate smoke and contaminants, and air contaminants and smoke from slash pile burning must be minimized by the use of an air curtain destructor (burner). Because of these restrictions, ODOT's use of slash pile burning is rare, and as an air curtain burner is required for ground clearing waste disposal to minimize air quality and smoke issues, burning must be permitted by ODNR and Ohio EPA to monitor impacts on air quality, and only clean plant waste that is not contaminated with oil, grease, etc. can be burned, slash pile burning by ODOT or contractors will not have a discernable effect on bat species.

Additional projects with insignificant or discountable effects are generally defined as:

1) Roadway projects where:
   - Project is not within 0.8 km (0.5 mi) of an Indiana bat hibernaculum or within 0.4 km (0.25 mi) of a northern long-eared bat hibernaculum (i.e., within a **BLUE** or **PURPLE** buffer, respectively), ***and***
   - Project does not involve bridge work, ***and***
     - All SWH to be removed for the project is contained within 30.5 m (100 ft) of the existing roadway (edge of pavement (EOP)). SWH will be cleared only between October 1 and March 31 (or between November 15 and March 15 in **RED** buffer areas), ***or***

- ANY SWH to be removed occurs more than 30.5 m (100 ft) from existing EOP

AND:

- the project is not a new location roadway; ***and***
  - no more than 0.1 ha (0.25 ac) of SWH within 15.2 m (50 ft) of a perennial stream (a stream over 259 ha (1 mi^2; 640 ac) drainage area) will be removed; ***and/or***
  - no more than 0.4 ha (1 ac) of SWH will be cleared in the WMU further than 30.5 m (100 ft) from the road or 0.8 ha (2 ac) of SWH in the EMU further than 30.5 m (100 ft) from the road, ***and/or***;
  - no potential maternity roost trees (PMRTs) will be removed beyond 30.5 m (100 ft) from EOP (PMRTs are further defined below and a field assessment method is provided in Appendix B.); ***and/or***
  - All tree clearing will occur only between October 1 and March 31 (or between November 15 and March 15 in **RED** buffer areas).

2) Bridge[4] projects where:
   - Project is not within 0.8 km (0.5 mi) of an Indiana bat hibernaculum or within 0.4 km (0.25 mi) of a northern long-eared bat hibernaculum (i.e., within a **BLUE** or **PURPLE** buffer, respectively), ***and***
   - Project will replace/remove or disturb (e.g., by painting, sealing, power washing, pier or abutment patching, etc.) the underside of a bridge over a stream; ***and***
   - Bridge inspection did not show evidence that bats are roosting on the bridge; ***and***
   - If SWH will be removed, all restrictions regarding SWH for roadway projects (described above) will be applied appropriately for projects where either all SWH to be removed is located within 30.5 m (100 ft) of EOP ***or*** ANY SWH to be removed occurs more than 30.5 m (100 ft) from existing EOP.

3) Bridge projects where:
   - Project is not within 0.8 km (0.5 mi) of an Indiana bat hibernaculum or within 0.4 km (0.25 mi) of a northern long-eared bat hibernaculum (i.e., within a **BLUE** or **PURPLE** buffer, respectively), ***and***
   - Project will replace/remove or disturb (e.g., by painting, sealing, power washing, pier or abutment patching, etc.) the underside of a bridge over a stream; ***and***
   - Bridge inspection did show evidence that bats are roosting on the bridge; ***and***
   - Bridge maintenance work will occur only between October 1 and March 31; ***or*** Demolition work for bridge replacement will begin only between October 1 and March 31;

   AND

   - Project will not preclude bats from roosting on the bridge in the future; ***and***
   - If SWH will be removed, all restrictions regarding SWH for roadway projects (described above) will be applied appropriately for projects where either all SWH to be removed is located within 30.5 m (100 ft) of EOP ***or*** ANY SWH to be removed occurs more than 30.5 m (100 ft) from existing EOP.

4) Any project that will remove SWH, but:
   - Is located in an area that is not contained within a buffer of any color on the PC Map; ***and***
   - Where a presence/absence survey detected no Indiana bats.

[4] Bridge = a span 20 feet or greater that carries a roadway.

(Note: on these projects, with negative bat surveys, the Service still recommends that SWH be cleared only between October 1 and March 31, but these seasonal tree clearing restrictions are not required.)

These projects with insignificant or discountable impacts will not alter the essential character, function, or suitability of the area for the Indiana or northern long-eared bat. Because ODOT projects are linear in nature, these projects would not remove all or a significant portion of a bat's home range or foraging area. Based on prior field experience and informal Section 7 consultation, any adverse effects to the Indiana or northern long-eared bat from projects with impacts as listed above will be discountable because adverse effects would be extremely unlikely to occur.

The Service concurs with ODOT's determination that the projects and activities described in the section immediately above (i.e., *Categorical Activities that May Affect but are Not Likely to Adversely Affect the Species*) **may affect but are not likely to adversely affect the Indiana bat or northern long-eared bat. Should, during the term of this action, additional information on the Indiana bat or northern long-eared bat becomes available, or if new information reveals effects of the action that were not previously considered, ODOT should consult with the USFWS to determine whether these determinations are still valid.**

Assessing Habitat Suitability and Species Presence/Absence

ODOT will assess potential impacts to the Indiana and northern long-eared bats utilizing one or both of the following methods. Method one is to assess the habitat. Method two is to determine if the species is present or probably absent from the site.

1) Assess habitat by determining if the vegetation within a project area meets the definition of SWH, and then delineating that area in the field with GPS or on desktop using GIS. For projects where all tree clearing will occur within 30.5 m (100 ft) of the edge of pavement of the existing roadway, no information on PMRTs will be collected. For projects with tree clearing that extends further than 30.5 m (100 ft) from edge of pavement, the investigator must also look through the SWH within the project area and identify PMRTs utilizing the Field Guide provided in Appendix B. Representative photos of the SWH and photos of all PMRTs will be included in the coordination package submitted to USFWS for all projects requiring project-specific consultation under this PBO. The amount of impact to SWH, the presence and numbers of PMRTs impacted, and the distance to positive capture and hibernacula records will be taken into consideration in assigning the project into a consultation category (categories are defined on pages 21-25). This information will be contained in the Ecological Survey Report submitted to the USFWS.
2) *For projects located in areas that do not fall within a colored buffer on the PC Map (Figure 3)*, determine presence or probable absence of Indiana bat by performing a survey for this species using a USFWS approved survey protocol. These surveys will follow all applicable USFWS guidelines and be performed by trained and appropriately permitted personnel during the appropriate time of year. These surveys will be completed and coordinated as part of the ecological survey data collection prior to consultation on the ESR with USFWS, and may be used in cases where the habitat assessment places the project in the Consultation Category 3 level of impacts (as defined on pages 24-25) to determine if that category is appropriate. The presence/absence surveys may also be used in cases where SWH needs to be removed during the restricted time-frames to determine if Indiana bats are using the SWH proposed for removal. In the event that only a small amount of SWH will be removed, ODOT may request to conduct an emergence survey to document if bats are utilizing the SWH in question. Current USFWS guidance on appropriate situations and protocols for emergence surveys will

be followed (this information is included in USFWS general bat survey guidance). Survey data collected using USFWS approved protocols will supersede habitat assessments.

Other Consultations Included by Reference

Intra-Service Programmatic Biological Opinion on Final 4(d) Rule for the Northern Long-Eared Bat and Activities Excepted from Take Prohibitions

The northern long-eared bat listing and 4(d) rule, as published in the Federal Register, as well as the complete Intra-Service Programmatic Biological Opinion, and the Key and Optional Framework for federal agencies to streamline section 7 consultation are included in Appendix G.

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

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

The USFWS's final 4(d) rule for the northern long-eared bat exempts some take of the species from section 9 prohibitions of the ESA. The exemptions described below apply to federal agencies for actions located partially or wholly inside the WNS zone (see Figure 1 below). All of the state of Ohio is inside the WNS zone. The following take of northern long-eared bats is exempted under the final 4(d) rule:

(1) Take that is incidental to activities that do not involve tree removal and do not take place within hibernacula or would not alter the hibernaculum's entrance or environment, even when the bats are not present at the hibernaculum.

(2) Take that is incidental to removal of hazardous trees.

(3) Take that is incidental to removal of trees, at any time, beyond 0.25 mile of a hibernaculum.

(4) Take that is incidental to removal of trees, at any time, beyond 150 feet of a known occupied maternity roost tree; or take that is incidental to removal of trees within 150 feet of a known roost tree between August 1 and May 31.

(5) Purposeful take in defense of human life, including for public health monitoring.

(6) Purposeful take that results from removal of bats from human structures, but only if the actions comply with all applicable State regulations.

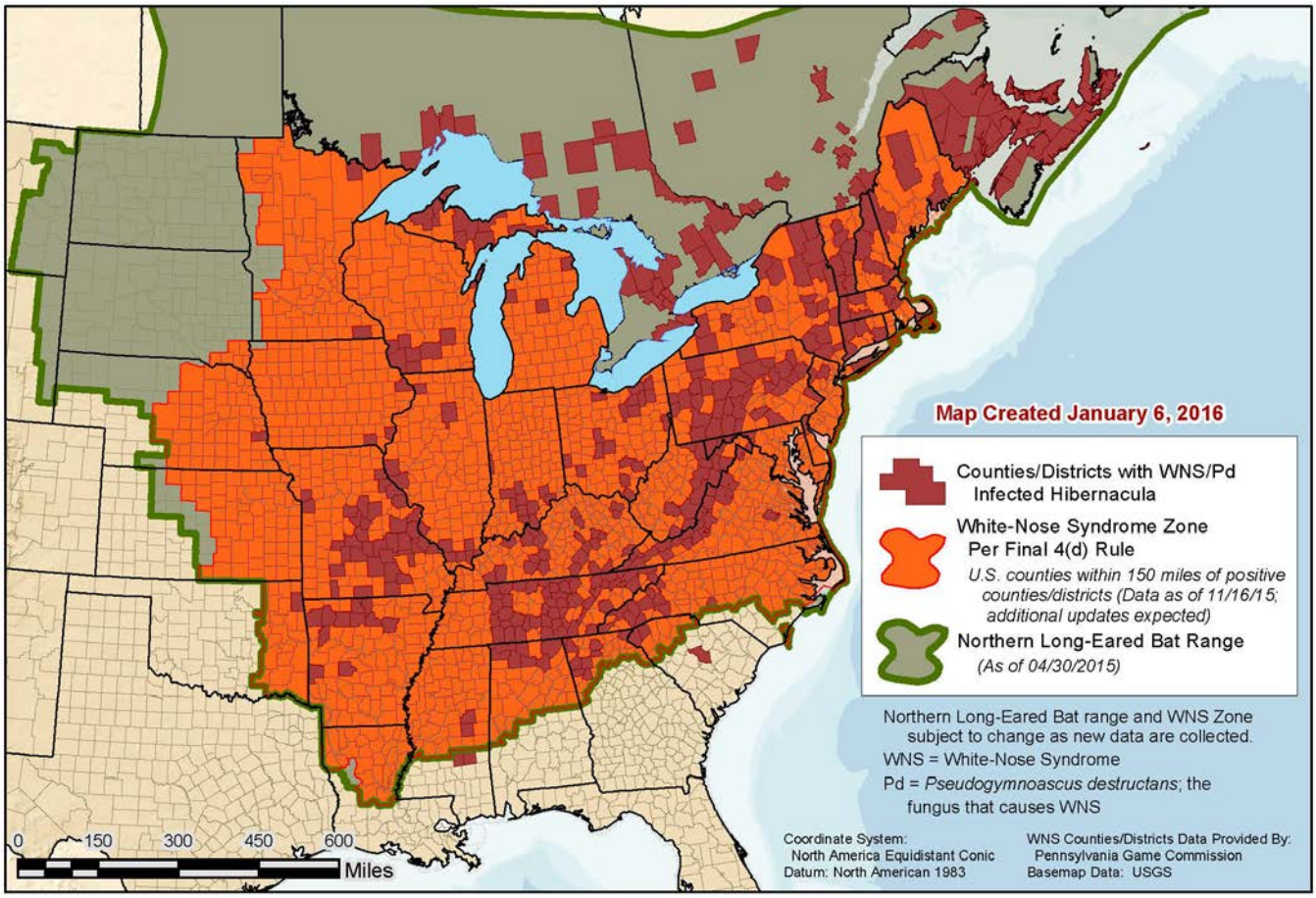


Figure 1 White-nose syndrome zone map (January 14, 2016).

Within the *Key to the Northern Long-Eared Bat 4(d) Rule for Federal Actions that May Affect Northern Long-Eared Bats*, published by the USFWS on January 13, 2016, it states that Federal agencies may rely on the Intra-Service Programmatic Biological Opinion to fulfill their project-specific section 7(a)(2) responsibilities under the following framework:

1) For all federal activities that may affect the northern long-eared bat, the action agency will provide project-level documentation describing the activities that are excepted from incidental take prohibitions and addressed in this consultation. The federal agency must provide written documentation to the appropriate Service Field Office when it is determined their action may affect (i.e., not likely to adversely affect or likely to adversely affect) the northern long-eared bat, but would not cause prohibited incidental take. This documentation must follow these procedures:

    a) In coordination with the appropriate Service Field Office, each action agency must make a determination as to whether their activity is excepted from incidental taking prohibitions in the final 4(d) rule. Activities that will occur within 0.25 mile of a known hibernacula or within 150 feet of known, occupied maternity roost trees during the pup season (June 1 to July 31) are not excepted pursuant to the final 4(d) rule. This determination must be updated annually for multi-year activities.

    b) At least 30 days in advance of funding, authorizing, or carrying out an action, the federal agency must provide written notification of their determination to the appropriate Service Field Office.

c) For this determination, the action agency will rely on the definitions of prohibited activities provided in the final 4(d) rule and the activities considered in this consultation.

d) The determination must include a description of the proposed project and the action area (the area affected by all direct and indirect project effects) with sufficient detail to support the determination.

e) The action agency must provide its determination as part of a request for coordination or consultation for other listed species or separately if no other species may be affected.

f) Service concurrence with the action agency determination is not required, but the Service may advise the action agency whether additional information indicates consultation for the northern long-eared bat is required; i.e., where the proposed project includes an activity not covered by the 4(d) rule and thus not addressed in the Biological Opinion and is subject to additional consultation.

g) If the Service does not respond within 30 days under (f) above, the action agency may presume its determination is informed by best available information and consider its project responsibilities under section 7(a)(2) with respect to the northern long-eared bat fulfilled through this programmatic Biological Opinion.

2) Reporting

a) For monitoring purposes, the Service will assume all activities are conducted as described. If an agency does not conduct an activity as described, it must promptly report and describe such departures to the appropriate Service Field Office.

b) The action agency must provide the results of any surveys for the northern long-eared bat to the appropriate Service Field Office within their jurisdiction.

c) Parties finding a dead, injured, or sick northern long-eared bat must promptly notify the appropriate Service Field Office.

If a Federal action agency chooses not to follow this framework, standard section 7 consultation procedures will apply.

ODOT will fulfill their project-specific section 7(a)(2) responsibilities for activities that may affect the northern long-eared bat through the consultation process described in the present PBO on ODOT's Federal-Aid Program. This consultation process and the USFWS concurrence provided within this PBO for defined projects that may affect but are not likely to adversely affect the species are consonant with the streamlining framework outlined above. Therefore, USFWS COFO considers ODOT's consultation under this PBO to fulfill their ESA section 7(a)(2) responsibilities for the northern long-eared bat under the January 2016 4(d) rule.

Range-wide Programmatic Informal Consultation for the Indiana Bat and Northern Long-eared Bat between the Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), and the U.S. Fish and Wildlife Service (USFWS).

In a letter dated April 20, 2015, the USFWS concurred with FHWA/FRA's determination that select FHWA Federal Aid and Federal Lands Highway Program activities and rail improvements funded or authorized by the FRA, are not likely to adversely affect the Indiana bat or northern long-eared bat. Concurrence was based on the *Range-wide Biological Assessment for Transportation Projects for Indiana Bat and Northern Long-eared Bat*, dated April 16, 2015, and submitted to USFWS by FHWA/FRA. Documentation related to this range-wide consultation (hereafter referred to as the RWPIC) is included here in Appendix H.

A draft scoping worksheet developed by USFWS in January 2016 identifies projects covered by the USFWS concurrence letter of April 20, 2015 to be those for which ALL of the following apply:

- Does not construct a new road corridor (i.e., a new alignment, not a minor realignment);
- Does not impact SWH that occurs beyond 100 feet from existing road/rail surfaces;
- Does not raise the road profile above the tree canopy within 1,000 feet of known summer habitat (based on documented roosts and/or captures);
- Is not within 0.5 mi of a hibernaculum and includes activities that either extend outside the existing road/rail surface or are wholly within the existing road/rail surface but include percussive or other activities that increase noise above existing traffic/background levels;
- Does not clear SWH (at any distance from the road) during the bats' active season (unless presence/absence surveys are conducted in areas where bats are not known to have previously occurred and the surveys are negative).
- Does not remove documented roosts or foraging areas/travel corridors (based on radio telemetry) at any time of the year or does not remove trees within 0.25 miles of documented roosts at any time of year;
- Does not remove a bridge (at any time of year) under which bat colonies are known to be roosting;
- Does not modify a bridge (at any time of year) under which bat colonies are known to be roosting so that it is no longer suitable for roosting; and
- Does not disturb roosting bats while conducting maintenance on a bridge or other structure.

The consultation process and the USFWS concurrence provided within this PBO for defined projects that may affect but are not likely to adversely affect the Indiana bat and/or northern long-eared bat are consonant with the RWPIC, as outlined above. Therefore, USFWS COFO considers ODOT's consultation under this PBO to fulfill their ESA section 7(a)(2) responsibilities for these species under the RWPIC.

Batched and Tiered Consultation

The USFWS will implement a batched/tiered programmatic consultation approach to ODOT's Federal-Aid Program. Tier 1, this biological opinion, analyzes the program as a whole for impacts to the Indiana and northern long-eared bats. Based upon this analysis, the USFWS concurs that a subset of projects meeting criteria described within this opinion *may affect but are not likely to adversely affect* the Indiana bat or northern long-eared bat. That is, the USFWS has provided "batched concurrence" for this subset of projects. However, no individual projects are analyzed at the Tier 1 level, as implementation of the federal-aid program requires authorization, funding, and/or implementation of site-specific actions that will be subject to future section 7 consultation. Therefore, for projects that do not meet the USFWS batched concurrence criteria (see Consultation Category 1 (CC1) description on pages 21-23 of this opinion), implementation of ODOT's federal-aid program is considered a framework programmatic action. As individual projects are proposed under the program, ODOT will provide the USFWS with project-specific information for consultation. The information to be provided is described in detail in the December 2015 *Ecological MOA* (Eco MOA), section II.C. (Consultation Package Contents for Notifying Projects). The 2015 Eco MOA can be found in Appendix F of this opinion.

The USFWS will review the project-specific information provided by ODOT for each project requiring programmatic project-level consultation. Following its review, if the USFWS agrees with ODOT's

determination that an individual project *may affect but* is *not likely to adversely affect* the Indiana or northern long-eared bat, the USFWS will complete its documentation with a concurrence letter that refers to the programmatic biological opinion and specifies that the USFWS concurs that the project *may affect but is not likely to adversely affect* these listed species. If it is determined that a project is *likely to adversely affect* the listed bat species, the USFWS and ODOT will engage in formal consultation for the project. Each formal consultation under this programmatic biological opinion (PBO) will culminate with the USFWS issuing a Tier 2 biological opinion. The Tier 2 opinion will include a project-specific incidental take statement if take is reasonably certain to occur.

BIOLOGICAL OPINION

I. DESCRIPTION OF THE PROPOSED ACTION

The proposed action is the continuing implementation of ODOT's Federal-Aid Highway Program. The action includes current and future projects over a ten year period (2016 through 2026). These projects will include all forms of federally funded transportation infrastructure construction and maintenance. All of the ODOT projects that are scheduled today may not be completed, and the project schedules change daily in ODOT's database. Any one project may also change in focus and purpose over time, thereby changing the impacts and/or footprint of the project. New projects will also be added during the ten years. Therefore, the details of every project that will be completed through 2026 are not known. Because of this lack of certainty, the estimated impacts to forested areas for future projects are based on historical forested area impact data collected during the last PBO timeframe (2007-2012 extended to 2016) to give an overall estimation of the amount of forested area that may be impacted over the ten year period of this PBO. For project types where acreage of forested impacts were not reported (i.e., only the number of roost trees were reported) under the previous programmatic biological opinion, the average study area size and maximum forested impacts for project type were used in the estimate (see section *IV. Effects of the Action*, pp 51-52).

The anticipated effects from the implementation of the federal-aid highway program on the Indiana and northern long-eared bats is loss of summer roosting and foraging habitat; specifically the removal of potential roost trees and/or foraging areas. This PBO will concentrate on defining the projects that have the potential to affect this habitat, i.e. the removal of wooded habitat defined as being potentially suitable for either or both species. In general, major new projects (on new alignments) will likely have effects that fall outside the scope of this PBO. Therefore, those projects will undergo project-specific consultation as they arise, though measures from this PBO can be used to minimize impacts for any such projects. Projects that create intense vibrations during construction may also impact the bat when this activity is in proximity to a hibernaculum. This effect is also discussed.

Federally funded ODOT construction and maintenance projects typically include several activities that may require the removal of trees from the landscape. These trees may be located on existing roadway right-of-way or newly acquired right-of-way. Projects can vary greatly in the level of disturbance they may cause, and range from the removal of no trees to a few trees (as in the case of a simple culvert replacement) to the removal of acres of natural vegetation (as in the case of construction of a major roadway on new location). The proposed action applies to the entire federal-aid highway program in Ohio. The proposed action is further defined as the types of activities conducted and/or coordinated by ODOT that may result in the removal of trees or vegetation, which may include, but is not limited to:

- Drainage improvement projects such as roadway ditch cleanouts and maintenance;
- General roadway safety maintenance (such as removing dead or dying trees that may be near or overhanging the roadway or within the safety clear zone);

- Construction of sidewalks;
- Construction or replacement of right-of-way fence;
- Construction of noise walls;
- Construction of bike lanes or multi use paths along existing roadways, on new alignments, or along abandoned railroads or canal towpaths;
- Constructing overpasses or underpasses;
- Culvert construction, replacement, or repair;
- Bridge construction, replacement, or repair;
- Widening of existing lanes along roadways;
- Adding new lanes along existing roadways within existing right-of-way;
- Adding turn lanes along existing roadways;
- Repair of landslides or unstable slopes along a roadway;
- Realigning existing roadways, intersections, or interchanges;
- Constructing rest areas, outposts, or other facilities;
- Constructing new interchanges;
- Adding new lanes or capacity along existing transportation infrastructure on new right-of-way;
- Constructing new transportation infrastructure on new alignments.

In general, these activities have been listed in order of their increasing potential to clear or modify forested habitats. However, the impacts that these projects may have on the federally listed bats could vary greatly based on the surrounding land cover/use, terrain, and extent of the project area (length of roadway, size of bridge, etc.). For example, the construction of a new four-lane, divided, limited access highway in northwest Ohio may result in disturbances to an approximately 91.4 m (300 ft) wide alignment on relatively flat, previously farmed land that possesses few trees. However, a similar type of roadway constructed in a hilly, forested area of southeast Ohio, could possibly require a variable alignment width due to the terrain (possibly ranging from 91.4 to 304.8 m (300 to 1,000 ft), and may result in much larger forest habitat impacts.

Because of the site specific variability inherently associated with each individual project, predicting the disturbance area associated with each work activity is difficult. In terms of project size, maintenance, rehabilitation, replacement, and minor widening activities would generally remain within 15.2 m (50 ft) of the existing right-of-way (for example, heavy equipment would remain within 15.2 m (50 ft) upstream or downstream of a bridge being replaced). Smaller (less than 4-lane) new alignment projects (new roads or relocations) would generally disturb an area less than 45.7 m (150 ft) wide, while larger (four lanes or greater) new alignment projects would generally disturb an area less than 152.4 m (500 ft) in width. While extremely variable due to terrain and other constraints, new interchange projects would generally disturb an area less than 609.6 m (2,000 ft) in diameter. In each of these examples, the area of disturbance may be smaller or larger than the predicted value based on project-specific conditions, and would vary greatly based on the proposed length of the project. Therefore, some projects, especially new infrastructure on new alignments, may require project-specific formal consultation with USFWS, outside this PBO.

Ohio is approximately 11,615,061 ha (28,701,440 ac), of which land is about 10,481,424 ha (25,900,160 ac) and water and wetlands are about 1,133,638 ha (2,801,280 ac) (Sanders and Zimmerman 2000). The state is 31% forested today, and 96% of these forests are comprised of deciduous trees (ODNR 2015a). Forests in Ohio are highly fragmented, as seen by viewing the Ohio Land Cover Data Set created by the U.S. Geological Survey (USGS 2006). Ohio's largest section of forest is the only National Forest in the state, the Wayne National Forest (WNF). The WNF itself is fragmented by private and State lands, and is divided into three physically separated units which total approximately 97,489 ha (240,900 ac) (USFS 2015). There are over 4,000 different streams in Ohio

that together create a network of an estimated 99,026 total km (61,532 total mi) of water (Sanders and Zimmerman 2000).

Of the over 10,521,827 ha (26,000,000 ac) of land that make up the state of Ohio, only 2.59% of that land is publicly owned by the state or federal government (NRCM, 2015). Oswalt et. al. (2014) determined that the majority of forested land in the range of the Indiana bat and northern long-eared bat is privately owned, although public ownership in Ohio has increased over the last decade. Approximately 86% of Ohio's forests were in private ownership in 2012, down from 91% in 2003 (Oswalt et al. 2014, Smith et al. 2003). ODOT currently directly owns or controls an estimated 95,506 ha (236,000 ac), or 0.8% of the total area in Ohio. That area includes roadways, bikeways, rest areas, mitigation areas, undeveloped vegetated ROW, mown shoulders, office buildings, parking, and vehicle and equipment storage lots.

The Draft 2007 Indiana Bat Draft Recovery Plan (USFWS 2007a) defined Ohio as being in the core of the summer roosting habitat for the Indiana bat. Further, the entire State of Ohio is encompassed by the "Midwest Recovery Unit" defined in the same document. Review of the literature suggests variability in landscape composition across the species range that the species prefers. In general, most known maternity colonies of Indiana bats exist in fragmented landscapes with low-to-moderate forest cover (USFWS 2007a).

In the final listing rule for the northern long-eared bat (80 FR 17974), the species' U.S. range is divided into four parts, solely for the purpose of organization within that document. The four portions of the range are defined as eastern, midwest, southern, and western, with Ohio contained within the midwest range. The species range also includes all Canadian provinces west to the southern Yukon Territory and eastern British Columbia (80 FR 17974). Based upon capture records of northern long-eared bats in Ohio, the species appears to occur more frequently in areas more heavily forested than those in which Indiana bats have been found within the state (USFWS 2015a).

The ODOT projects that will be coordinated under this programmatic consultation primarily affect the bats' summer habitat (i.e., forested areas) by removing trees and fragmenting the landscape. Therefore, for purposes of this PBO, Ohio has been divided into two Management Units, West and East (Figure 2), based on forest cover by county. Forest was cumulatively defined by the percent cover of 2006 National Land Cover Dataset (NLCD) land cover classifications of deciduous forest, evergreen forest, mixed forest, and woody wetlands as defined below:

Deciduous Forest - areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species shed foliage simultaneously in response to seasonal change.

Evergreen Forest - areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. More than 75% of the tree species maintain their leaves all year. Canopy is never without green foliage.

Mixed Forest - areas dominated by trees generally greater than 5 meters tall, and greater than 20% of total vegetation cover. Neither deciduous nor evergreen species are greater than 75% of total tree cover.

Woody Wetlands - areas where forest or shrub-land vegetation accounts for greater than 20% of vegetative cover and the soil or substrate is periodically saturated with or covered with water.

The vast majority of trees used as maternity roosts by both Indiana and northern long-eared bats are deciduous species; however, a few coniferous trees have also been used (Harvey 2002, Britzke et al.

2003, Palm 2003, 80 FR 17974). The predominance of deciduous trees reflects availability; however, the bats are known to use coniferous trees during autumn swarming (Gumbert et al. 2002). Male and juvenile Indiana bats have also shown variability in their selection of species of roost trees. In general, Indiana bats have been observed using upland and bottomland forests. Northern long-eared bats also primarily roost in trees during the summer season and are known to select many of the same tree species as those used by Indiana bats. However, northern bats are more flexible (plastic) in their use of roosting habitat features than Indiana bats, more often using tree crevices and cavities, and roosting in live trees and artificial roosts (USFWS 2014a). Due to their greater flexibility in roost choice, northern bats are likely less summer habitat limited than Indiana bats. Therefore, the forest cover types within the NLCD used to delineate habitat regions for the Indiana bat also represent potential summer habitat limitations for the northern long-eared bat.

While county boundaries have no ecological significance, they provide a refined segmentation of the state without extreme oversimplification of the forestry data. The use of county boundaries for this delineation is obviously pragmatic, as it allows for simple translation of position in the state and ODOT Districts to a bat Management Unit.

An aerial forest cover of 35% was selected to demarcate two management units. This value was conservatively based on the wide range of forest cover Indiana bats appear to prefer within their home range. The USFWS (2007a) indicates a wide range of forest cover has been documented within the home ranges (approximately 4 km (2.5 mi)) of Indiana bats tracked from primary roost trees. While forest cover is not a direct predictor of where Indiana bats will be found, boundaries around forest cover may suggest where this feature is a potential limiting factor to the overall survival of the species. Similarly, higher percentages of forest cover are assumed to increase chances that suitable roost trees are present in sufficient number and quality in those counties.

In general, this approach bifurcates the state into heavily forested, less developed counties (East) and groups the highly urbanized, developed, and heavily agricultural counties together (West). Indiana bat summer capture records and confirmed or suspected hibernacula occur in both Units. With continued sampling, additional captures for this species will probably continue to be identified across the state, as the entire state is part of the core maternity range for the species (USFWS 2007a).

For the sake of assessment within this PBO, forest cover is presumed to be a baseline driver for the adequacy and availability of summer roosting and foraging habitat for the Indiana and northern long-eared bat. Consideration of the traditional use of trees as a surrogate for take led to the decision to delineate the state into two management units. The two management units are defined as follows:

West Management Unit (WMU): Land in these counties is less than 35% forested. Forest cover averaged 14.57% in these counties. The dominant land use is agriculture and development, with isolated woodlots (forested patches) and forested riparian areas. Indiana bat summer capture records and confirmed or suspected hibernacula occur in this Unit. The West Unit includes 55 counties.

East Management Unit (EMU): Land in these counties is greater than 35% forested. Forest cover averaged 58.10% in these counties. The dominant land use is forest, including one of the three National Forest Ranger Districts, along with current and historic resource extraction (i.e. resource mining, timber harvesting, and drilling), agriculture, and development. Forest cover was observed over 60% in seventeen counties in this Unit. Indiana bat summer capture records and confirmed or suspected hibernacula occur in this Unit. The East Unit includes 33 counties.

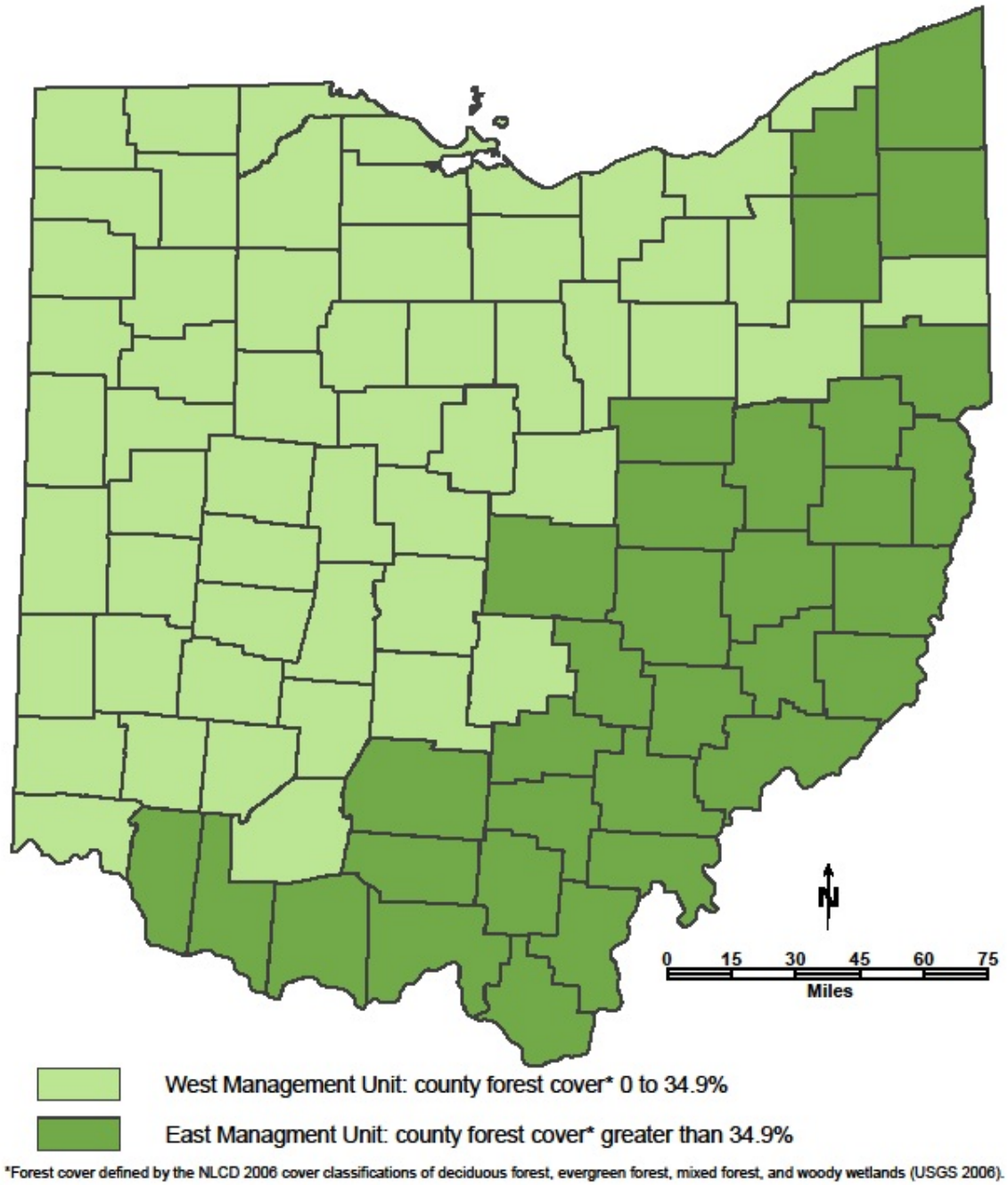


Figure 2 Indiana and northern long-eared bat Management Units as defined for the programmatic ESA Section 7 consultation between USFWS and ODOT.

Areas of particular importance when evaluating project impacts to bats and appropriate avoidance, minimization, and/or mitigation measures are identified on the PC Map (Figure 3). The colored "buffers" on this map refer to areas of the state in which Indiana and/or northern long-eared bats are known to occur or have occurred in the past. Note that references to buffer colors (**BLUE**, **PURPLE**, **RED**, **YELLOW**, **GOLD**, **BROWN**, **GREEN**) within this PBO refer to the buffers on the PC Map. These buffers are based on survey data submitted to the USFWS COFO by federally permitted surveyors. The buffer colors are defined as:

BLUE	Indiana bat hibernaculum (0.5-mi buffer)
PURPLE	Northern long-eared bat hibernaculum (0.25-mi buffer)
RED	Indiana bat swarming location (5-mi buffer)
YELLOW	Acoustic Indiana bat detection (5-mi buffer)
GOLD	Indiana bat maternity colony (actual or 5-mi buffer)
BROWN	Northern long-eared bat known maternity roost (150-ft buffer)
GREEN	Male or non-reproductive female Indiana bat (5-mi buffer)

The map in Figure 3 (on page 19) is only a "snapshot" of these buffers as of the writing of this document, meant to aid the reader in interpreting the consultation guidance contained herein. These data are not static and are updated regularly as survey results are submitted to USFWS COFO. Therefore, the most current map, available from ODOT's Office of Environmental Services (OES) and/or USFWS COFO should always be referenced to evaluate project impacts. Mapping updates will be sent to ODOT OES from USFWS by September 15th of each year.

This PBO establishes a two-tiered consultation process for ODOT activities, with the PBO being Tier 1 and all subsequent site-specific project analyses constituting Tier 2 consultations. That is, in issuing this PBO (the Tier 1 biological opinion) the Service has evaluated the effects of all ODOT actions outlined in their February 5, 2016, programmatic biological assessment (PBA) on the federally listed Indiana bat and northern long-eared bat. Under this tiered process, the Service will produce a tiered biological opinion (Tier 2 BO) when it is determined that a specific project covered under the PBO is *likely to adversely affect* one or both federally listed bat species. The Tier 2 BO will be issued in the form of a letter addressing the effects of the specific project action, will include an Incidental Take Statement (ITS), and will document any changes to species data (e.g., population estimates) since issuance of the PBO. The Tier 2 BO will focus on determining whether: (1) the proposed site-specific project falls within the scope of the Tier 1 PBO, (2) the effects of the proposed action are consistent with those anticipated in the Tier 1 PBO, and (3) the appropriate conservation measures identified in the PBO are adhered to.

The flowchart in Figure 4 summarizes the consultation process described below. Note that although discrete consultation categories are specifically defined in this PBA, ODOT and USFWS may mutually agree that a particular project's impacts are better represented by a higher or lower category than the one under which it is included here. In such cases, the project will be coordinated under the mutually agreed-upon category. If USFWS or ODOT does not agree to a proposed category change, the project will be reviewed in the category determined by the flowchart. In addition, large and/or complex projects may or may not be included under this PBO. In cases where a project does not fall under this PBO, non-programmatic formal consultation may be required; therefore, coordination with USFWS should occur as early as possible in the project development process.

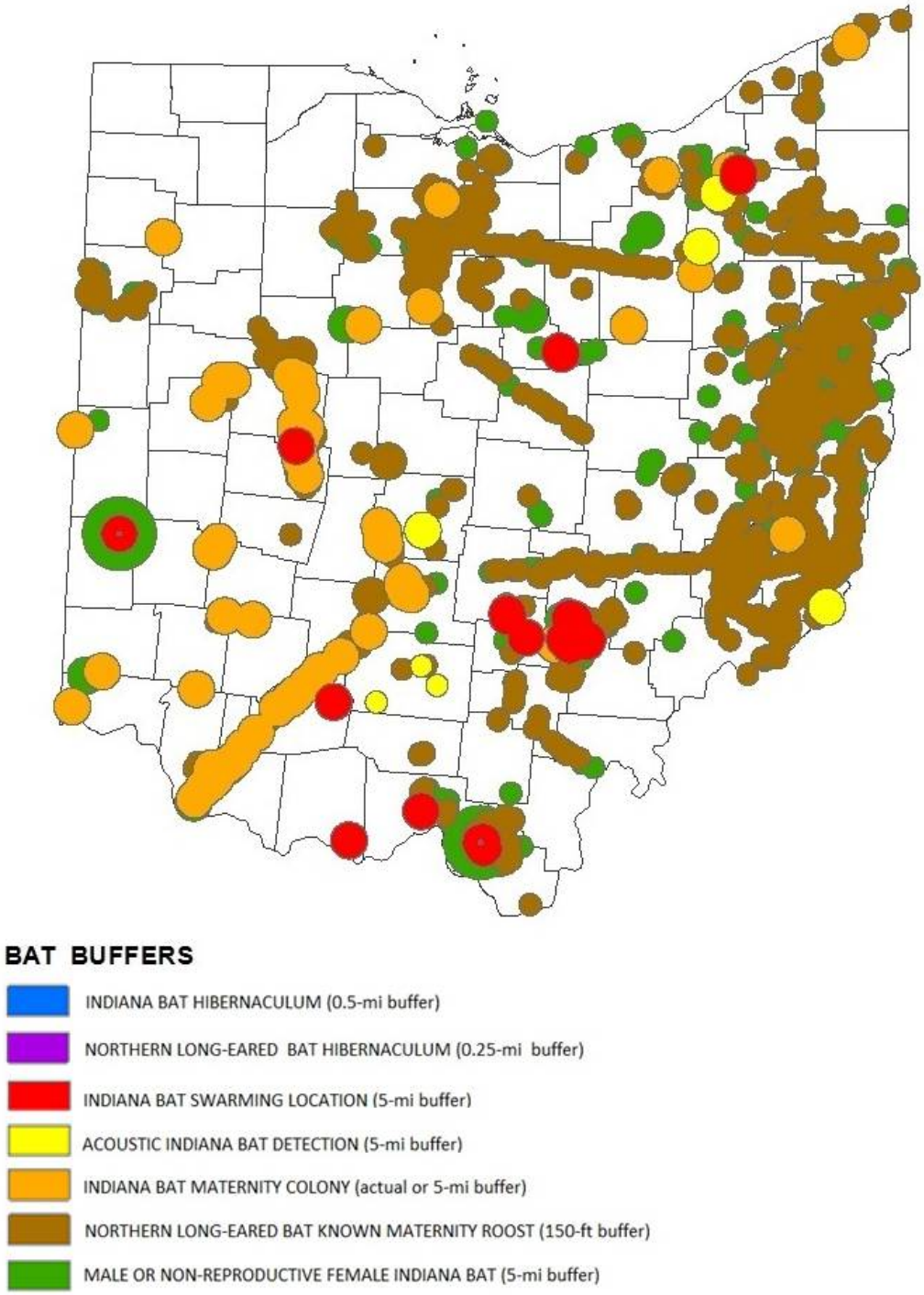


Figure 3 Example Programmatic Consultation Bat Buffer Map (PC Map), as of December 29, 2015.

Important: *This map was created prior to the release of the final 4(d) rule for northern long-eared bat. Many of the northern long-eared bat records shown on this map will be removed in the final mapping to comply with the 4(d) rule. This map is included as an example only. The final determination of whether a project is within a bat buffer will be made during the literature search for each individual project.*

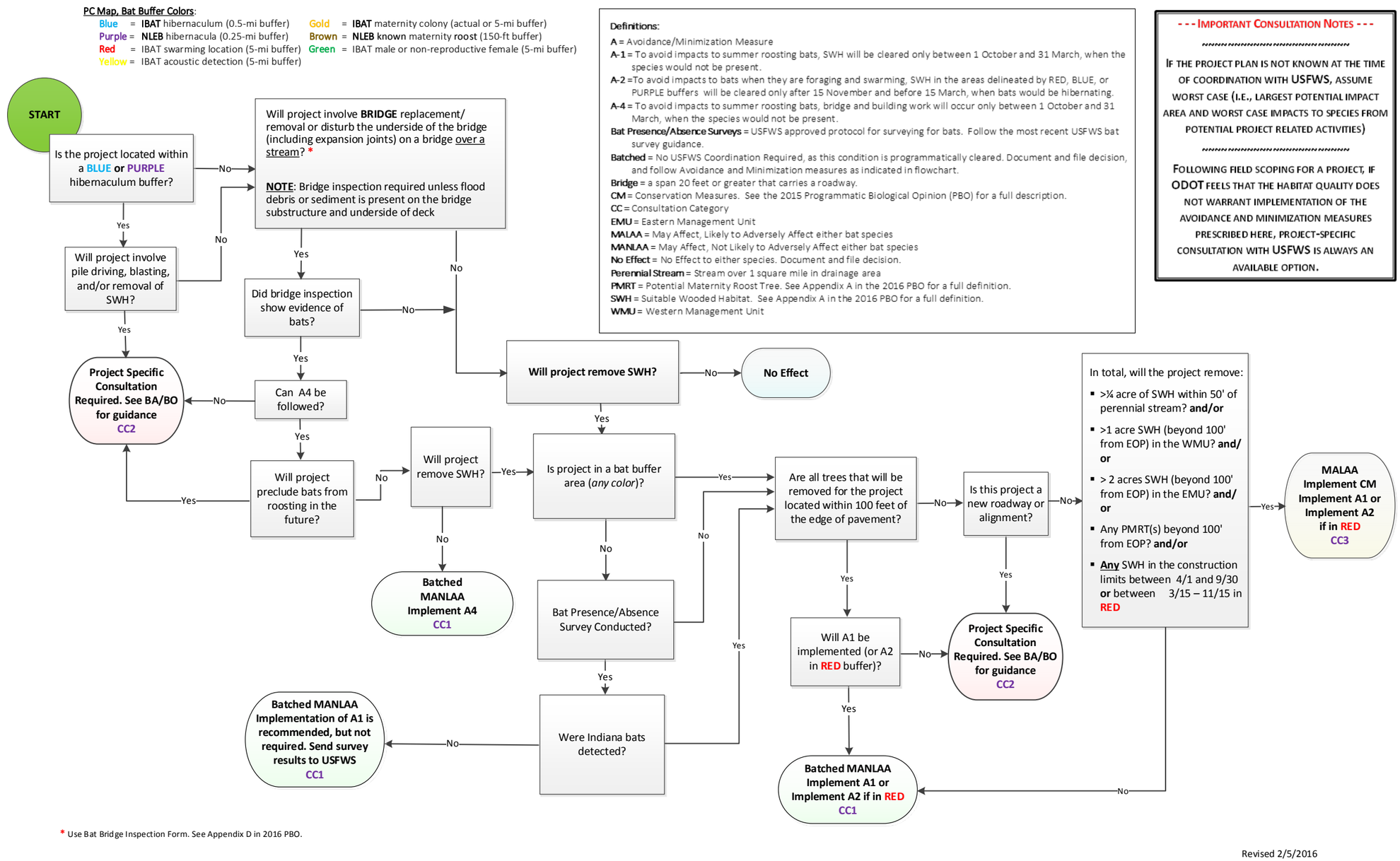


Figure 4 Flowchart: ESA Section 7 Programmatic Project-Level Consultation for the Indiana and Northern Long-Eared Bats in Ohio.

For the purposes of this PBO, ODOT and the USFWS have agreed to separate consultation under this PBO into three primary consultation categories:

- CC1: USFWS Batched Concurrence (MANLAA)
- CC2: Tier 2 Programmatic Project-Level Consultation (MANLAA or MALAA)
- CC3: Tier 2 MALAA Programmatic Project-Level Consultation

Each of these primary categories has two to seven subcategories containing additional guidance for consultation on specific project types. **It is important to note that the general description of each primary category contains general criteria that apply to each subcategory but are not restated within the subcategories**. **These primary category general criteria, along with the specific project-type criteria within the subcategory, must be met for a project consultation to be conducted under this PBO**.

Consultation Categories

****** NOTE THAT EACH OF THESE CATEGORIES HAVE SUBCATEGORIES (E.G., CC1-a, CC1-b) WITH DETAILED GUIDANCE FOR SPECIFIC PROJECT TYPES ******

CC1 – USFWS BATCHED CONCURRENCE (MANLAA)

Activities that ODOT determines *May Affect, but are Not Likely to Adversely Affect* (MANLAA) a federally listed bat species. These projects will require Avoidance Measures (described on page 26), but will not require Conservation Measures or project-specific consultation with USFWS. The required Avoidance Measures include the following:

- Avoidance Measure A-1 will be required for projects in any color buffer ***except*** **RED**
- Avoidance Measure A-2 will be required for projects within a **RED** buffer
- Avoidance Measure A-4 will be required for CC1-c, CC1-d, and CC1-f bridge projects

Complete descriptions of Avoidance Measures are provided on page 26

Based on the information provided in section *IV.Effects of the Action (pages 50-58)*, ODOT has determined that these activities *may affect, but are not likely to adversely affect* the Indiana bat, the northern long-eared bat, or their habitats. USFWS programmatically concurred with ODOT's determination (see concurrence on page 8); therefore, no further coordination with USFWS on the federally listed bats is necessary on these CC1 activities. For each project, ODOT will make their effect determination based on the following criteria.

The following general criteria must be met for a project to be coordinated under CC1:

- Project is not within 0.8 km (0.5 mi) of an Indiana bat hibernaculum or within 0.4 km (0.25 mi) of a northern long-eared bat hibernaculum (i.e., within a **BLUE** or **PURPLE** buffer, respectively), ***and***
- All SWH that must be removed for the project will be cleared only when bats would not be present, that is:
  - SWH will be cleared only between October 1 and March 31 if the project is located in an area that is ***not*** contained within a **BLUE** or **PURPLE** or **RED** buffer, ***or***
  - SWH will be cleared only between November 15 and March 15 if the project is located in an area that ***is*** contained within a **RED** buffer

For any project that is <u>not</u> located within a colored buffer on the PC Map: <u>If a bat survey[5] is conducted and does not detect Indiana bats, that project falls under this CC1 (USFWS Batched Concurrence) category.</u>

<u>ROADWAY PROJECTS</u> <u>(CC1-a)</u>

CC1-a:

Roadway project (with <u>no bridge work</u>) that will remove SWH; ***and*** all SWH that must be removed for the project is located within 30.5 m (100 ft) of the EOP of the existing roadway; **OR**:

Roadway project (with <u>no bridge work</u>) that will remove SWH; ***and*** will remove SWH located more than 30.5 m (100 ft) from the EOP of the existing roadway, ***and***:

- Will not remove any PMRTs; ***and***
- Will not remove more than a total of 0.1 ha (0.25 ac) of SWH within 50' of a perennial stream; ***and***
- Will not remove more than a total of 0.4 ha (1 ac) of SWH in the WMU further than 30.5 m (100 ft) from the road or 0.8 ha (2 ac) of SWH in the EMU further than 30.5 m (100 ft) from the road for the project

<u>BRIDGE</u>[6] **<u>PROJECTS</u>** <u>(CC1-b, CC1-c, CC1-d)</u>

CC1-b:

Projects that will replace/remove or disturb (e.g., by painting, sealing, power washing, pier or abutment patching, etc.) the underside of a bridge over a stream; ***and*** the bridge inspection did <u>not</u> show evidence that bats are roosting on the bridge; ***and*** will remove SWH; ***and*** all SWH that must be removed for the project is located within 30.5 m (100 ft) of the edge of pavement (EOP) of the existing roadway, **OR**

Projects that will replace/remove or disturb the underside of a bridge over a stream; ***and*** the bridge inspection did <u>not</u> show evidence that bats are roosting on the bridge; ***and*** will remove SWH; ***and*** will remove SWH located more than 30.5 m (100 ft) from the EOP of the existing roadway; ***and*** the SWH removal meets all of the limitations bulleted in CC1-a.

CC1-c:

Projects that will replace/remove or disturb the underside of a bridge over a stream; ***and*** the bridge inspection showed evidence that bats <u>are</u> roosting on the bridge; ***and*** SWH may or may not need to be removed; ***and*** all SWH that must be removed for the project is located within 30.5 m (100 ft) of the EOP of the existing roadway; ***and***:

- Bridge maintenance work will occur only between October 1 and March 31; ***or***
- Demolition work for bridge replacement will begin only between October 1 and March 31; ***and***

[5] Surveys must be conducted in accordance with current USFWS protocols, and surveyor permit conditions must be followed. Although CC1 projects do not require project-specific consultation with USFWS, pre-survey authorization from USFWS is required, and a report containing survey results and a brief project description must be provided to USFWS by or before January 31 of the year following the survey.

[6] Bridge = a span 20 feet or greater that carries a roadway.

- Project will not preclude bats from roosting on the bridge in the future

CC1-d:

Project that will replace/remove or disturb the underside of a bridge over a stream; ***and*** the bridge inspection showed evidence that bats are roosting on the bridge; ***and*** will remove SWH; ***and*** will remove SWH located more than 30.5 m (100 ft) from the EOP of the existing roadway, ***and***:

- Bridge maintenance work will occur only between October 1 and March 31; ***or***
- Demolition work for bridge replacement will begin only between October 1 and March 31; ***and***
- Project will not preclude bats from roosting on the bridge in the future; ***and***
- The SWH removal meets all of the limitations bulleted in CC1-a

OTHER (CC1-e)

CC1-e:

Any project that will remove SWH, but:

- Is located in an area that is not contained in a buffer of any color on the PC Map; ***and***
- Where a presence/absence survey did not detect Indiana bats

On CC1-3 projects SWH clearing only between October 1 and March 31 is recommended, but is not required.

CC2 – TIER 2 PROGRAMMATIC PROJECT-LEVEL CONSULTATION (MANLAA or MALAA)

Activities that ODOT determines *May Affect* a federally listed bat species and are either *Not Likely to Adversely Affect* **or** are *Likely to Adversely Affect* the species. These projects require project-specific consultation because USFWS retains the ability to review additional information to fully evaluate effects of the action on the federally listed species. Projects that *May Affect and are Likely to Adversely Affect* the species will require avoidance *and* conservation measures. All available Avoidance Measures and Conservation Measures are listed on pages 26-32**.** The following Avoidance measures may be required for CC2 projects (if applicable):

- Avoidance Measure A-1 for projects in any color buffer *except* **RED**
- Avoidance Measure A-2 for projects within a **RED** buffer
- Avoidance Measure A-3 for all projects within the **BLUE** or **PURPLE** buffers
- Avoidance Measure A-4 for CC2 bridge projects

Based on the information provided in section *IV. Effects of the Action* (pages 50-58), ODOT has determined that these activities will require project-specific review by USFWS, as they may or may not be likely to adversely affect the Indiana bat, the northern long-eared bat, or their habitats, depending upon the individual project size, type, and location. ODOT will make the appropriate effect determination and submit the project information to USFWS for project-specific consultation during Ecological Coordination[7].

[7] See the Consultation Process for Notifying Projects (section II.B.3.b.) in ODOT's Eco MOA (ODOT 2015) (Appendix F).

CC2-a:

Projects that are located within 0.8 km (0.5 mi) of an Indiana bat hibernaculum or within 0.4 km (0.25 mi) of a northern long-eared bat hibernaculum (i.e., within a **BLUE** or **PURPLE** buffer, respectively) ***and*** will involve pile driving, blasting, and/or removal of SWH.

CC2-b:

Projects that involve bridge replacement/removal or will disturb the underside of a bridge (including expansion joints) on a bridge over a stream; ***and***:

- Inspections noted that bats are using the bridge for roosting; ***and***
- Some or all of the work will begin between March 31 and October 1; ***and/or***
- The project will preclude bats from roosting on the bridge in the future

CC2-c:

Projects that will remove SWH, with **all** SWH to be removed for the project located within 30.5 m (100 ft) of EOP of the existing roadway; ***and***

- SWH removal will occur during the bats roosting season (between March 31 and October 1)

CC2-d:

Projects that will remove SWH; ***and***

- Some or all of the SWH to be removed for the project is located more than 30.5 m (100 ft) from EOP of the existing roadway; ***and***
- The project is constructing a new roadway or alignment; ***and***
- Do not exceed the thresholds outlined in CC3 (see bulleted items under CC3-a and CC3-b below)

CC3 – TIER 2 MALAA PROGRAMMATIC PROJECT-LEVEL CONSULTATION

Activities that *May Affect and are Likely to Adversely Affect* (MALAA) a federally listed bat(s). These projects will require avoidance ***and*** conservation measures. All available Avoidance Measures and Conservation Measures are listed on pages 26-32. The following avoidance measures are required unless ODOT is consulting on a project to allow active season tree clearing or bridge work:

- Avoidance Measure A-1 will be required for projects in any color buffer except **RED**
- Avoidance Measure A-2 will be required for projects within a **RED** buffer
- Avoidance Measure A-3 will be required for all projects within the **BLUE** or **PURPLE** buffers
- Avoidance Measure A-4 will be required for CC-2 bridge projects

Based on the information provided in section *IV Effects of the Action* (pages 50-58), ODOT has determined that these activities *May Affect, and are Likely to Adversely Affect* the Indiana bat and/or northern long-eared bat and/or their habitats. These projects will be submitted to USFWS for Tiered Programmatic Formal Consultation during Ecological Coordination[8].

[8] See the Consultation Process for Notifying Projects (section II.B.3.b.) in ODOT's 2015 Eco MOA (ODOT 2015).

CC3-a:

Projects that will remove SWH, ***and***:

- Are not located within a **BLUE** or **PURPLE** buffer, ***and***
- Will impact SWH further than 30.5 m (100 ft) from EOP of an existing roadway, ***and***
- Are located within a buffer of any color (except **BLUE** or **PURPLE**), ***and***
- Will remove more than 0.1 ha (0.25 ac) of SWH within 15.2 m (50 ft) of a Perennial Stream, ***and/or***
- Will remove any PMRTs, ***and/or***
- Will remove more than 0.4 ha (1 ac) of SWH in the WMU further than 30.5 m (100 ft) from the road or 0.8 ha (2 ac) of SWH in the EMU further than 30.5 m (100 ft) from the road

CC3-b:

Projects that will remove SWH, ***and***:

- Are <u>not</u> located within **any** color buffer on the PC Map, ***and***
- Will impact SWH further than 30.5 m (100 feet) from EOP of an existing roadway, ***and***
- Will remove more than 0.1 ha (0.25 ac) of SWH within 15.2 m (50 ft) of a Perennial Stream, ***and/or***
- Will remove any PMRTs, ***and/or***
- Will remove more than 0.4 ha (1 ac) of SWH in the WMU further than 30.5 m (100 ft) from the road or 0.8 ha (2 ac) of SWH in the EMU further than 30.5 m (100 ft) from the road, ***and/or***
- Detected Indiana bats in the project area during surveys, or ODOT assumed presence of Indiana bats within the project area.

ODOT will implement the measures described below to avoid, minimize, and/or mitigate impacts to Indiana and northern long-eared bats that may result from transportation project actions. As noted below, only certain project impacts will invoke the implementation of the measures described here. These measures shall be incorporated into projects by appropriate contracting tools that will ensure that they are performed by the construction contractor or entity. ODOT proposes several conservation measures to aid in the recovery of Indiana and northern long-eared bats and to offset take resulting from project actions. These conservation measures will only be implemented for projects that *May Affect and are Likely to Adversely Affect* one or both of these species.

To minimize the potential effects to the Indiana and northern long-eared bat, the following measures will be incorporated into **<u>all</u>** ODOT projects:

- All phases/aspects of the project (including primary construction areas as well as temporary work areas, haul roads, etc.) will be modified to avoid tree removal in excess of what is required to implement the project safely.
- Project footprint will be minimized to the extent practicable.
- Impacts to aquatic resources will be minimized.
- Impacts to forested areas and upland habitats will be minimized.
- Potential and known maternity roost trees not proposed for impact will be indicated on the contract plans for avoidance purposes, and will be marked in the field for avoidance. Bright orange flagging/fencing will be installed prior to any tree clearing to ensure contractors stay within clearing limits. ODOT will ensure that contractors understand clearing limits and how they are marked in the field.

To minimize impacts to the Indiana bat and northern long-eared bat and their summer roosting and brood-rearing habitat, in addition to the measures listed above, the following measures will be incorporated into any ODOT project consulted under this PBO that *May Affect* and is either *Likely to Adversely Affect* (CC3 and some CC2 projects) or *Not Likely to Adversely Affect* (CC1 and some CC2 projects) the bats (as outlined in the consultation categories described above) unless ODOT specifically consults to perform bridge work or tree clearing during the active season. A project-specific consultation letter will be provided to USFWS outlining all avoidance, minimization, and conservation measures that will be implemented for all CC2 and CC3 projects. As noted earlier in this opinion, the USFWS has provided batched concurrence on all CC1 projects; therefore, project-specific consultation with the USFWS is not required for that category of projects.

A-1. To avoid impacts to summer roosting bats, SWH will be cleared only between 1 October and 31 March, when the species would not be present.

A-2. To avoid impacts to bats when they are foraging and swarming (just before and after hibernation), SWH in the areas delineated by **RED** buffers (and also including areas within 0.8 km (0.5 mi) of an Indiana bat hibernaculum or within 0.4 km (0.25 mi) of a northern long-eared bat hibernaculum delineated by the **BLUE** or **PURPLE** buffers, respectively) will be cleared only after 15 November and before 15 March, when bats would be hibernating.

A-3. To avoid impacts to hibernating bats due to percussive activities, blasting and/or pile driving will only be performed after 1 May and before 30 September if within 0.8 km (0.5 mi) of an Indiana bat hibernaculum or within 0.4 km (0.25 mi) of a northern long-eared hibernaculum (i.e. **BLUE** or **PURPLE** buffers, respectively).

A-4. To avoid impacts to summer roosting bats, bridge work will occur only between 1 October and 31 March, when the species would not be present.

The following measures will be taken by ODOT to offset take from projects that *are likely to adversely affect* one or both of the listed bat species. For these projects, a project-specific Tier 2 formal consultation letter will be provided to USFWS outlining the conservation measures to be implemented.

The selection of conservation measures (CM) to be incorporated into a particular project will be limited to those presented below and will be implemented at the sole discretion of ODOT as the applicant and action agency, with CM1 being the preferred measure. The implementation of conservation measures that involve protection of land/habitat will target known high quality maternity habitat areas utilizing current occurrence data.

Note that one unit of conservation measure credit is equivalent to 0.4 ha (1 ac) of conserved habitat.

CM-1: Statewide Pooled Conservation Efforts.

CM-1 establishes two conservation efforts (CM-1a and CM-1b) that provide pre-established or “pooled” credits available to projects that ***may affect and are likely to adversely affect*** one or both species under this PBO. Note: In cases where a single project impacts habitat for both species (whether the habitat for each species overlaps with the other or not), the actual total SWH acreage impacted on the ground will be the acreage amount to be multiplied by the replacement ratio (see below). That is, “overlapping” habitat will not be counted separately for each species.

Acreage of wooded habitat impacted by projects that require use of CM-1 (see CC2 and CC3 descriptions in previous section) will be offset by the use of these pooled credits at a **3.5:1** replacement ratio. (This ratio was determined using a modified calculation of the 2015 USFWS Region 3 Habitat Equivalency Analysis (HEA) for bats.)

For example, if a total of 2 ha (5 ac) of SWH are impacted:

2 ha (5 ac) x 3.5 replacement ratio

= 7 ha (17.5 ac) will be deducted from the pooled credits

The following details the credits created by CM-1a and CM-1b.

CM-1a

Located in the Eastern Management Unit, the Sunday Creek Coal Company 2 (SCCC2) pooled conservation area (PCA) was purchased by ODOT in 2013 to conserve summer roosting and maternity habitat for federally listed bats and to mitigate stream impacts on current and future projects. Of the 1,348-ha (3,332-ac) site, 1,044 ha (2,580 ac) will be maintained as a bat conservation area.[9] The SCCC2 site meets all of the criteria for CM-2 below. The site has been reviewed by USFWS, and preliminary concurrence for the use of this site was given on January 13, 2014. ODOT and USFWS are currently working toward final approval of the ODOT SCCC2 Bat Conservation Area Final Conservation Plan. **The CM-1a provides 2,480 credits**. (Note: ODOT has subtracted 40.5 ha (100 ac) from the bat conservation area to serve as a "reservation pool." The reservation pool will be used, if needed, to cover any future impacts to the site resulting from easement/leaseholder activity. If the reservation pool should ever be exceeded, ODOT will provide contingency acreage at a 1.5:1 ratio at priority suitable habitat areas, as approved and in consultation with USFWS.)

CM-1b

ODOT commits to spend $5 million towards the conservation of endangered bats in the WMU. This funding will be implemented in one of three ways (listed below as "CM-1b1," "CM-1b2," and "CM-1b3"). The decision to implement CM-1b1, or CM-1b2, or CM-1b3 will be made by the USFWS by March 31, 2016.

CM-1b1

ODOT will enter into a separate reimbursable agreement with USFWS COFO in which ODOT will provide $5 million to the USFWS. The USFWS, through the use of a third party contractor, will identify, select, acquire, and protect bat habitat that meets the requirements of CM-2 in the WMU. Based on the use of a modified calculation of the HEA for bats, CM-1b1 **will provide 521 credits**. Once the reimbursable agreement between ODOT and USFWS is established to deliver this mitigation, 521 credits will be available to ODOT regardless of the amount of acreage actually purchased. All responsibility to locate, secure, protect, and manage the purchased habitat (credits) will be the sole responsibility of the USFWS and the selected contractor. ODOT will hold no liability for the use of the money once it is transferred to USFWS.

[9] See the *ODOT SCCC2 Bat Conservation Area Final Conservation Plan* and the *ODNR Division of Wildlife and U.S. Fish & Wildlife Service Stewardship Plan for the SCCC2 Bat Conservation and Stream Mitigation Area* for detailed information.

CM-1b2

ODOT, in cooperation with USFWS, will utilize the $5 million to advertise and select a third party to identify, select, acquire, and protect bat habitat that meets the requirements of CM-2 in the WMU. The total amount of credits created will equal the acreage of suitable habitat that is purchased and preserved meeting the criteria of CM-2 (i.e., 1 acre = 1 credit) in the WMU. That number will then become the number of credits provided by CM-1b. For purposes of establishing the credit, ODOT will submit to the USFWS a simple report outlining how the criteria of CM-2 are met by the purchased property with a delineation of suitable habitat and the number of credits the site is worth. ODOT will fully control the contract with the third party.

CM-1b3

ODOT will utilize the $5 million to advertise and select a third party to locate, purchase, and protect in perpetuity high quality summer bat habitat in the WMU. ODOT will work cooperatively with USFWS in developing an RFP and contract, as well as selecting the third party and/or property to be purchased to ensure the purchased/protected habitat meets the criteria agreed upon under this PBO. USFWS, under a separate agreement with ODOT, will manage this contract on behalf of ODOT and will have authority to direct the successful attainment of these credits. Based on the use of a modified calculation of the HEA for bats, **CM-1b3 will provide 521 credits**. Once the separate contract between ODOT, USFWS, and the contractor is established to deliver this mitigation, 521 credits will be available to ODOT regardless of the amount of acreage actually purchased. All responsibility to locate, secure, protect, and manage the purchased habitat (credits) will be the sole responsibility of the USFWS as the manager of the contractor. ODOT will hold no liability for the amount of acreage secured.

CM-1a and CM-1b will be the primary CMs implemented under this PBO to offset ODOT project impacts statewide. In the event that all established credits from CM-1a and CM-1b are exhausted prior to expiration of this PBO in 2026, CMs 2, 3, 4, and/or 5 will be used. Conversely, credits not used during the duration of this PBO will be available for future projects or agreements and will be available to offset impacts statewide.

Reporting Requirements:
Credit usage will be tracked via a balance sheet that will be updated by ODOT and posted on the associated conservation area's page of the ODOT OES Mitigation Website. An updated copy showing the debit for the project will be submitted with the consultation letter for each project in which this conservation measure is used. USFWS will keep a separate project tracking sheet that will also keep track of credits used. The total credit usage for each year will be reported in ODOT's yearly Programmatic Report.

CM-2: Preservation and/or Restoration and Preservation in perpetuity of bat summer roosting, and/or foraging, and/or swarming habitat.

For this conservation measure, preservation efforts will focus on preserving existing SWH. While areas to be preserved will focus on SWH, other features may be present on the site, including but not limited to: aquatic resources (streams, wetlands, and/or open waters), natural areas consisting of a mosaic of vegetation types (i.e. forest edges, meadows, new field, old field, etc.) and riparian corridors. These other features provide additional benefit to the species as travel corridors and foraging areas. Restoration efforts will focus on extending or re-connecting forested areas, riparian corridors, and other travel corridors. Bat habitat restoration guidance is provided in Appendix C. Both Preservation and Restoration and Preservation areas can include small scale preservation efforts for one or a small number of projects and large scale preservation efforts (ODOT "Pooled Conservation Areas" - PCAs)

that may be used for multiple projects. These areas will serve to offset project impacts that occur within the Management Unit in which the Preservation/Restoration and Preservation area is located, unless otherwise agreed upon with USFWS COFO.

Conservation areas will be protected in perpetuity by legal protection instruments (Environmental Resource Easement or similar) or Fee Simple purchase with restrictive covenants. Acreage of wooded habitat impacted by projects that require use of CM-2 (see CC2 and CC3 descriptions in previous section) will be offset, by habitat protection or replacement, at a 3.5:1 replacement ratio. (As noted under CM-1, this ratio was determined using a modified calculation of the 2015 USFWS Region 3 HEA for bats.)

For example, if a total of 2 ha (5 ac) of SWH are impacted:

2 ha (5 ac) x 3.5 replacement ratio

= 7 ha (17.5 ac) will be deducted from the credits established under a CM-2 action

Acres preserved or restored and preserved in accordance with the criteria in this section will be accounted for as follows: one credit will be created for every acre that meets the definition of SWH, meets the selection criteria below, and is protected in perpetuity.

<u>Selection Criteria for All Indiana Bat and Northern Long Eared Bat Conservation Areas</u>**:**

1. The Property must be located within the home range of a maternity colony (MC), that is:
    a. Within the home range of an Indiana bat MC if offsetting Indiana bat impacts[10] or combined Indiana and northern long-eared bat impacts; or
    b. Within an Indiana or northern long-eared bat MC if offsetting northern long-eared bat impacts.[11]

Home range of an MC can be determined using any one of the following three methods:

a. Refer to known home ranges as delineated by the **GOLD** and **BROWN** buffers on the PC Map (Figure 3). Conservation Area property must be entirely within the appropriate MC buffer. Any sites partially outside the MC buffer would have to be mutually agreed on by USFWS and ODOT and approved by USFWS prior to purchase and preservation and/or restoration;

OR

b. Show sufficient evidence that an Indiana or northern long-eared bat MC is utilizing the site for roosting and/or foraging, which requires the capture of pregnant or lactating female(s) and/or a juvenile bat(s) of these species;

OR

c. Sites outside of a known MC home range, but located in an area that is known to be a corridor heavily used by these species (eg. Big Darby Creek riparian corridor). These sites would have to be mutually agreed on by USFWS and ODOT and approved by USFWS prior to use.

[10] Projects will be categorized as impacting Indiana bats if the project is within a **GOLD** Indiana bat MC buffer on the PC Map or if a survey (conducted using USFWS bat survey protocol) detects Indiana bats in the project area.

[11] Projects will be categorized as impacting northern long-eared bats if the project is within a **BROWN** northern long-eared bat MC buffer on the PC Map.

2. A minimum of 2 ha (5 ac) must be protected.
3. Within a Conservation Area, no open space (i.e., non-forested area) will be wider than 152.4 m (500 ft) at any given point to allow connectivity for bat movements.
4. Property being preserved, without restoration, must not be otherwise protected with a legal protection instrument or owned by a conservation organization.

Additional Selection Criteria for Indiana Bat and Northern Long-eared bat **Restoration Sites:**

1. Restoration efforts must not result in any non-forested gaps on the site that are wider than 152.4 m (500 ft) between forested habitat areas (e.g., woodlots) at the nearest point.[12]
2. Restoration measures can be implemented to connect suitable forested habitat via a travel corridor (i.e., a tree line) at any distance.
3. Restoration efforts will focus on areas within the home range in which aerial forest cover is less than 35%.
4. Properties that are not otherwise protected with a legal protection instrument or owned by a conservation organization should be given highest priority for restoration and protection efforts. However, **restoration** activities funded by ODOT and conducted on lands owned and/or managed by conservation organizations can be considered if adequate protection and long-term management of the area, specifically aligned with the bats' life history requirements, are assured in writing to USFWS. The use of these sites will require site specific pre-approval by the USFWS.

Reporting and Consultation Requirements**:**

1. For pooled conservation sites, the Required Information (see list below) will be submitted to USFWS prior to the first project specific use of the pooled conservation site (i.e., balance sheet subtraction). Once the Required Information has been submitted (and approved by USFWS for restoration efforts in previously protected areas), project specific consultation letters will include the name of the conservation area used for the project with an updated balance sheet for the site.
2. For single use sites, the consultation letter will provide notification regarding the selection and implementation of this option and will include the following Required Information to advise USFWS of the adequacy of the conservation measure. As these sites will only be used for a single project, no balance sheet will be created.

Required Information for the Conservation Site Information Package (pooled sites) or in the Consultation Letter (single use sites):

- Site mapping – USGS mapping, GIS data, aerial photography
- Project Information – Description of the site to be preserved, goals and objectives of the preservation effort, existing habitats and resources present, proposed enhancements, photographs of the property, and relevant features
- Real Estate Information- property ownership information, parcel numbers, preliminary title information (if available), proposed real estate instrument type, and activity/use restrictions for long-term protection
- Proposed long-term management and/or monitoring plans
- Potential long-term owner and manager (if available)
- Balance sheet (if proposed as Pooled Conservation Area).

[12] If a naturally occurring, non-forested wetland is present on the site and is greater than 152.4 m (500 ft) wide, this is acceptable given that forested habitat exists or will be restored on the site immediately adjacent to the wetland. The 152.4-meter (500-foot) gap criterion still applies to other wooded habitat on the site. If there is any question whether this criterion is/will be met on a given site under consideration, ODOT will reach agreement with USFWS on the appropriateness of the site prior to pursuing purchase.

CM-3: Conservation fund developed under a separate agreement for the purchase and management of bat conservation areas.

This conservation measure can be implemented when/if all credits under CM-1 and CM-2 are depleted prior to the end of this 10-year PBO; when/if ODOT chooses to obtain additional acreage credits, separate from those under CM-1 and CM-2, to offset take from a large project that would otherwise substantially reduce the CM-1 and/or CM-2 pooled credits; or when/if this PBO is extended past 10 years. Similar to CM-1b, ODOT and USFWS will develop a separate agreement through which ODOT will commit to fund the purchase and management of suitable bat summer maternity habitat. The acreage purchase estimate will be based on the USFWS Region 3 HEA, and credit acres will be based on either: 1) an estimate of SWH acreage that will be purchased for the amount of money funded by ODOT for a pooled conservation area (from which replacement acreage will be subtracted at a ratio of 3.5:1); or 2) an estimate of acreage to offset a particular project impact, as calculated using the HEA tool.

After funding is transferred, the acreage estimate becomes the amount of credit available to ODOT regardless of the amount of acreage actually purchased through the agreement. ODOT will hold no liability for the use of the money once it is transferred to USFWS.

Pooled conservation area credits not used during the duration of this PBO will be available for future projects or agreements and will be available to mitigate impacts statewide.

Other in-lieu fee systems may be used under this PBO only if the system and details are mutually agreed upon by ODOT and USFWS, and will be developed under a separate MOA or other agreement.

Reporting Requirements:
Credit usage will be tracked via a balance sheet that will be updated by ODOT and posted on the OES Mitigation Website. An updated copy showing the debit for the project will be submitted with the consultation letter for each project in which this conservation measure is used. USFWS will keep a separate project tracking sheet that will also keep track of credits used. The total credit usage for each year will be reported in the yearly Programmatic Report.

CM-4: Preservation in perpetuity of Indiana bat and northern long-eared bat hibernaculum.

Based on the 2007 Indiana Bat Draft Recovery Plan, conservation and management of hibernacula and winter populations is one of the most important actions needed to conserve and recover the Indiana bat. One privately owned P2 hibernaculum and one P3 hibernaculum located on U.S. Forest Service (USFS) property have been identified and surveyed in Ohio. Because the P3 hibernaculum is located on public land and is being protected by USFS, it is not under threat and; therefore, preservation of this particular hibernaculum would not be a viable conservation measure. As noted in Table 1 of the Recovery Plan, the P2 and P3 hibernacula discussed here are the only hibernacula currently known to have extant populations of hibernating Indiana bats in Ohio.

The Federal Register listing for the northern long-eared bat states that Ohio has seven known NLEB hibernacula. At this time, ODOT does not have any information on the ownership or protection afforded these hibernacula. If any of the known hibernacula are on private property, they may be eligible for protection under this CM.

If ODOT chooses to pursue purchase/protection of a hibernaculum for Indiana and/or northern long-eared bats, they will work with the USFWS to establish whether preservation of the site could serve as a viable conservation measure and the appropriate crediting system for the site.

Reporting Requirements:
If ODOT proposes to purchase and protect into perpetuity the known P2 hibernaculum in Preble County, Ohio, a Conservation Site Information Package will be submitted to USFWS. This package will provide notification of the selection and implementation of this option, and will include the following information to advise USFWS of the adequacy of the conservation measure:

- Site mapping – USGS mapping, GIS data, aerial photography
- Project Information – Description of the site to be preserved, goals and objectives of the preservation effort, existing habitats and resources present, proposed enhancements i.e. fencing, surveillance cameras, bat gates, WNS education signs, litter removal, etc.
- Photographs of the property and relevant features
- Real Estate Information- property ownership information, parcel numbers, preliminary title information (if available), proposed real estate instrument type, and activity/use restrictions for long-term protection
- Proposed long-term management and/or monitoring proposed, as appropriate

CM-5: Utilization of private or publically owned Conservation Banks.

CM-5 allows ODOT to participate in the purchase of credits from a private or publically owned USFWS approved Conservation Bank to offset impacts to SWH from projects under this PBO. This measure has been identified as potentially providing streamlined consultation for the action agency and maximum ecological benefit to the species. The number of credits would be equal to the area (in acres) of SWH impacted multiplied by 3.5:

For example, if a total of 2 ha (5 ac) of SWH are impacted:
2 ha (5 ac) x 3.5 replacement ratio
= 7 ha (17.5 ac) would be purchased by ODOT from the USFWS approved Conservation Bank.

Action Area

The action area includes all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR 402.02). The action area is defined by measurable or detectable changes in land, air, and water. The action area is not limited to the "footprint" of the action and should consider the biotic, chemical, and physical impacts to the environment resulting from the action.

ODOT's work encompasses the entire State of Ohio Highway System and other transportation infrastructure. The State of Ohio Highway System is comprised of Interstate Routes, U.S. Routes, and State Routes. As of December 31, 2014, there were 197,763.7 km (122,884.654 mi) of publically owned roads throughout the State, with many cities, counties, and parks maintaining their own roads. Certain federal-aid highway program dollars are eligible to be spent on other non-highway transportation infrastructure. Examples may include, but are not limited to, transportation enhancements, bicycle and pedestrian improvements, rail or transit improvements, amongst others. The limited design detail (i.e., the unknown location of detour routes and staging areas) resulted in the action area for this PBO being defined as the entire State of Ohio

II. STATUS OF THE SPECIES

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

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

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

The USFWS's final 4(d) rule for the northern long-eared bat exempts some take of the species from section 9 prohibitions of the ESA. The exemptions described below apply to federal agencies for actions located partially or wholly inside the WNS zone (see Figure 1). All of the state of Ohio is inside the WNS zone. The following take of northern long-eared bats is exempted under the final 4(d) rule:

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

ODOT will use the USFWS's Optional Framework to Streamline Section 7 Consultation for the Northern Long-Eared Bat to fulfill their project-specific section 7 responsibilities, covered by the USFWS programmatic biological opinion for the final 4(d) rule (see discussion under the *Consultation History* section of this document).

Description and Distribution

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

Like the Indiana bat, the northern long-eared bat is a temperate, insectivorous, migratory bat that hibernates in mines and caves in the winter and spends summers in wooded areas. It is also a

medium-sized bat, with a wingspread between 22.6 to 25.9 cm (8.9 to 10.2 in) and weighing 5.7 to 8.5 g (0.2 to 0.3 oz). The northern long-eared's fur is typically medium to dark brown on its back and tawny to pale brown on its underside. Its ears and wing membranes are dark brown. Within its range, the northern long-eared bat can be confused with the little brown bat (*Myotis lucifugus*) or the western long-eared myotis (*Myotis evotis*). However, it can be distinguished from the little brown bat by its longer ears that, when laid forward, extend beyond the nose up to 5 mm (0.2 in), and from the western long-eared bat by its darker fur and paler membranes. The final listing rule (80 FR 17974) contains the best available information on this species' life history, biology, threats, distribution and overall status. The rule is incorporated into the present document by reference.

Life History and Population Dynamics

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

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

Fall Swarming, Mating, and Hibernation

Indiana bat

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

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

Northern long-eared bat

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

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

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

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

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

Spring Emergence

Indiana bat

Spring emergence occurs when outside temperatures have increased and insects are more abundant (Richter et al. 1993). Some bats may remain in close proximity to the cave for a few days before migrating to summer habitats. During this mid-spring period, adult females occupy trees that are similar to those used in summer in terms of species, size, and structure (Britzke et al. 2003, Butchkoski and Turner 2005, Britzke et al. 2006). This activity is known as spring staging. Others head directly to summer habitat. Migration distances range from a few miles to over 483 km (300 mi) (Winhold and Kurta 2006). Some males spend the summer near their hibernacula (Whitaker and Brack 2002), while others disperse longer distances. Males roost individually or in small groups. In contrast, reproductive females form larger groups, referred to as maternity colonies, in which they raise their offspring.

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

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

Female Maternity Colony and Summer Roosting Habitat

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

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

Densities of tree-roosting bats are generally greater in old growth forests in temperate regions where structural diversity provides more roosting options (Crampton and Barclay 1996, Brigham et al. 1997, Racey and Entwistle 2003). Within the range of the Indiana bat, particularly within the core maternity range in the Midwest (including Ohio) old growth forest has been virtually eliminated. While the forest cover in Ohio has increased since the Indiana bat became Federally listed in 1967, the composition of these forests is primarily second growth forest. Forest quantity is not necessarily a reliable indicator of increased suitable Indiana bat habitat. Habitat suitability models for the Indiana bat have been developed (Rommé et al. 1995, Farmer et al. 2002) that suggest density of suitable roost trees may be the only reliable predictor of habitat suitability

Roost trees often provide suitable habitat as a maternity roost for only a short period of time. Roost trees are ephemeral in nature; suitable trees fall to the ground or lose important structural characteristic such as bark exfoliation (Gardner et al. 1991; Britzke et al. 2003). Dead trees retain their

bark for only a certain period of time (about 2-8 years). Once all bark has fallen off a tree, it is unsuitable to the Indiana bat for roosting. Gardner et al. (1991) found that 31% of Indiana bat occupied roost sites were unavailable the summer following their discovery; 33% of the remaining occupied roost sites were unavailable by the second summer. For this reason, an area must provide a continual supply of suitable roost trees in order to support a colony over the long-term.

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

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

Table 2 A summary of Indiana bat summer roosting habitat tree characteristics compiled in USFWS (2007a) and Lacki et al. (2009).

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

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

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

widely dispersed (all within a circle ranging in size from 0.81 to 1.48 km (0.5 to 0.9 mi)) (Miller et al. 2002).

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

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

Indiana bats have been found roosting in several different species of trees, and they appear to choose roost trees based on their structural composition. Therefore, determining what species of trees are more important for roosts is difficult. However, twelve tree species have been listed in Romme et al.'s (1995) Habitat Suitability Index Model as primary species (class 1 trees), and USFWS (2007a) identified 33 species of used by female Indiana bats. These trees include silver maple (*Acer saccharinum*), shagbark hickory (*Carya ovata*), shellbark hickory (*C. laciniosa*), bitternut hickory (*C. cordiformis*), green ash (*Fraxinus pennsylvanica*), white ash (*F. americana*), eastern cottonwood (*Populus deltoides*), red oak (*Quercus rubra*), post oak (*Q. stellata*), white oak (*Q. alba*) slippery elm (*Ulmus rubra*), and American elm (*U. americana*). In addition to these species, sugar maple (*A. saccharum*), shingle oak (*Q. imbricaria*), and sassafras (*Sassafras albidum*) are listed as class 2 trees (Romme et al. 1995). The class 2 trees are those species believed to be less important, but that still have the necessary characteristics to be used as roosts. These tree species are favored by the Indiana bat, since as these trees age, their bark will slough.

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

and were generally within 80% or greater canopy cover. The roost trees averaged over 20 m (65.6 ft) tall.

An exercise in estimating the number of maternity roosts within the range of the Indiana bat was provided in USFWS 2007a. This work sheds light on the very limited number of maternity roosts that could be encountered on the landscape. The exercise assumed maternity colony size of 80 female bats. Taking the then current population estimate and dividing it in half (50% female) resulted in an estimate of 2,860 maternity colonies. A similarly calculated Ohio-specific estimate is provided in section *III. Environmental Baseline* (page 48).

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

Roosting habitat for male Indiana bats appears similar to female bats, and males and females have been caught using the same general area (e.g., Fishhook Creek, Illinois, Gardner et al. 1991). However, there are often notable gender differences in roost tree size and the juxtaposition of roosting and foraging areas. Male Indiana bats have been found roosting in trees as small as 6.4 cm (2.5 in) dbh (Gumbert 2001), although the average diameters reported in literature are much larger: 38.1 cm (14.9 in) in Indiana (n=14, Brack et al. 2004) and 28.6 cm (11.2 in) in Kentucky (n=41, Gumbert 2001). As male bats roost solitarily or in small groups, the size of the roost tree in terms of its available roosting space, is not likely a limiting factor. Male bats must thermoregulate, thus roost tree size and other characteristics affecting the microclimate of the roost site are still germane. The connectivity between roosting and foraging sites may not be as critical for males as it is for maternity colonies because the latter must have prey close to their roost trees for nursing females and newly volant bats.

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

Northern long-eared bat

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

multiple alternate roost trees. Male and non-reproductive female northern long-eared bats may also roost in cooler places, like caves and mines (Barbour and Davis 1969, Amelon and Burhans 2006).

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

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

Foraging

Indiana bat

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

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

Indiana bats will forage in small openings, but generally appear to avoid foraging over large open expanses and prefer forested areas (Humphrey et al. 1977, Brack 1983, Brack and LaVal 1985, Gardner and Gardner 1992, Murray and Kurta 2004). In Michigan, Murray and Kurta (2004) found that

Indiana bats used wooded corridors for traveling and foraging, even when this required them to significantly increase their nightly commuting distance.

Another important aspect of Indiana bat habitat is mid-story clutter. It is important to discuss forest clutter for two reasons. First, when foraging in clutter, bats must detect targets amid the echoes from non-target objects (Fenton 1990). The greater the density of non-target items the more noise bats must decipher. Second, the greater the physical and acoustical clutter, the more difficult it is for Indiana bats to maneuver to avoid collisions. Indiana bats navigate and forage during flight. Foraging in less spatially complex habitats is likely to be less energetically expensive. Hence, it is acknowledged that a relatively open mid-story (<40% of trees are 2-4.7 in (5-12 cm) dbh) (Rommé et al. 1995) is an important feature of high quality Indiana bat foraging habitat.

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

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

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

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

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

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

Northern long-eared bats

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

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

Range-wide Status

Indiana bat

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

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

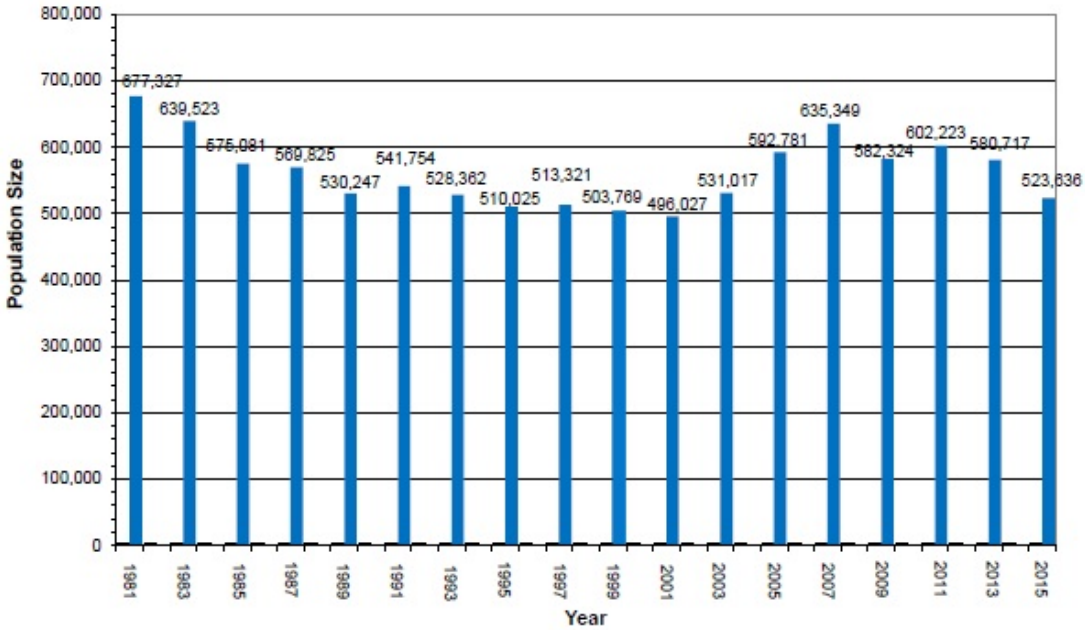
- Priority 1 (P1) hibernacula typically have a current and/or historically observed winter population of greater than or equal to 10,000 Indiana bats;
- P2 have a current or observed historic population of 1,000 or greater, but fewer than 10,000;

- P3 have current or observed historic populations of 50 to 1,000 bats; and
- P4 have current or observed historic populations of fewer than 50 bats.

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

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

From 1965 to 2001, there was an overall decline in the range-wide population of the Indiana bat (USFWS 2007a). Despite the discovery of many new, large hibernacula during this time, the range-wide population estimate dropped approximately 57 percent from 1965 to 2001, which has been attributed to causes (e.g., habitat loss/degradation, forest fragmentation, winter disturbance, and environmental contaminants). Between 2001 and 2007, the estimated range-wide population increased, from 451,554 to 590,875 Indiana bats (USFWS 2013). According to the 2015 Range-wide Population Estimate for the Indiana Bat (USFWS 2015c), the total known Indiana bat population was estimated to be approximately 523,636, a 17.6 percent decrease from the 2007 range-wide estimate (Figure 5, USFWS 2015c).



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

Figure 5 Indiana Bat Rangewide Population Estimates 1981-2015.

Northern long-eared bat

The northern long-eared bat ranges across much of the eastern and north central United States, and all Canadian provinces west to the southern Yukon Territory and eastern British Columbia (Nagorsen and Brigham 1993; Caceres and Pybus 1997; Environment Yukon 2011). In the United States, the species' range reaches from Maine to Montana, south to eastern Kansas, eastern Oklahoma, Arkansas, and east through the Gulf states to the Atlantic Coast (Whitaker and Hamilton 1998; Caceres and Barclay 2000; Amelon and Burhans 2006). The species' range includes the following 37

states (plus the District of Columbia): Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming. Historically, the species has been most frequently observed in the northeastern United States and in the Canadian Provinces, Quebec and Ontario, with sightings increasing during swarming and hibernation (Caceres and Barclay 2000). However, throughout the majority of the species' range it is patchily distributed, and was historically less common in the southern and western portions of the range than in the northern portion of the range (Amelon and Burhans 2006).

Although they are typically found in low numbers in inconspicuous roosts, most records of northern long-eared bats are from winter hibernacula surveys (Caceres and Pybus 1997). More than 780 hibernacula have been identified throughout the species' range in the United States, although many hibernacula contain only a few (1 to 3) individuals (Whitaker and Hamilton 1998). Known hibernacula (sites with one or more winter records of northern long-eared bats) include: Alabama (2), Arkansas (41), Connecticut (8), Delaware (2), Georgia (7), Illinois (21), Indiana (25), Kentucky (119), Maine (3), Maryland (8), Massachusetts (7), Michigan (103), Minnesota (11), Missouri (more than 269), Nebraska (2), New Hampshire (11), New Jersey (7), New York (90), North Carolina (22), Oklahoma (9), Ohio (7), Pennsylvania (112), South Carolina, (2), South Dakota (21), Tennessee (58), Vermont (16), Virginia (8), West Virginia (104), and Wisconsin (67).

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

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

Threats to the Species

Indiana bat

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

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

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

First documented in a New York cave in 2006, WNS has since spread to 26 states and five Canadian provinces, including over 50 known Indiana bat hibernacula (Figure 6). Affected hibernacula typically exhibit significant mortality (USFWS 2013). WNS has resulted in significant population declines in the Northeast and Appalachian Recovery Units (RU). Between 2007 and 2011, the Northeast RU lost 70% of its Indiana bat population (USFWS 2013). WNS is spreading rapidly throughout the rest of the Indiana bat's range. WNS continues to be found at an increasing number of sites throughout the Midwest RU. In March 2011, the first case of WNS was confirmed in Ohio, in an abandoned mine in Lawrence County. Currently, 16 counties in Ohio have been confirmed as WNS positive (ODNR 2014).

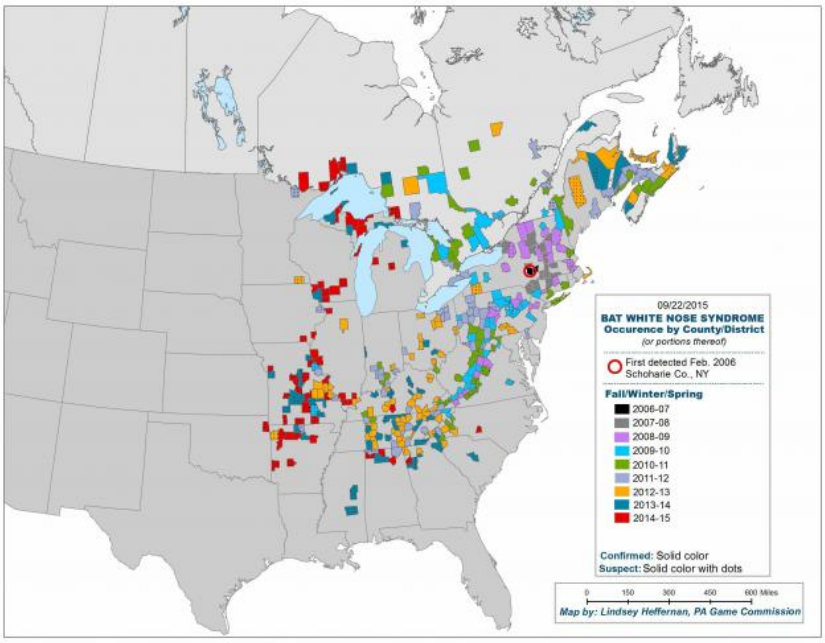


Figure 6 Bat White-Nose Syndrome Occurrence Map (as of 9/22/2015).

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

Northern long-eared bat

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

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

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

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

III. ENVIRONMENTAL BASELINE

The environmental baseline is defined as the past and present impacts of all Federal, State, or private actions and other human activities in the action area, the anticipated impacts of all proposed Federal projects in the action area that have already undergone formal or early section 7 consultation, and the impact of State or private actions that are contemporaneous with the consultation in process (50 CFR 402.02).

State or private actions that impact the species are discussed in the section "Factors Affecting Species Environment Within the Action Area" below. A review of Federal Actions that have affected the environmental baseline of the species, since and including issuance of the 2007 Programmatic Biological Opinion to ODOT/FHWA for the Indiana bat, include the following (USFWS Columbus Ohio Ecological Services Field Office 2015):

Projects	USFWS Office & Date BO Issued	Incidental Take (IT) Form	Take Exempted or Surrogate Measure to Monitor
ODOT/FHWA Programmatic BO and ITS for State Transportation Program, Indiana bat, Statewide, Ohio	Ohio FO, January 2007	IT Through harm, harassment, mortality from removal of roost habitat	Permanent loss of 8,951 ha (22,118 ac) of suitable habitat.[13]
ODOT/FHWA MOT-Byers Road, Montgomery County	Ohio FO, 2009	IT through harm and harassment from removal of roost habitat	Permanent loss of 2.8 ha (7.04 ac) of roosting habitat and habitat fragmentation.
BO and ITS, Indiana bat at the Cianci Builders-Young Explorers Daycare, Twinsburg, Ohio	Ohio FO, October 2014	IT through injury, mortality and/or harm	Permanent loss of 0.6 ha (1.5 ac) of roosting and foraging habitat during fall swarming in a known swarming area, plus temporary effects to adjacent areas from construction noise.
CO, northern long-eared bat, FHWA, Construction/ Operation/Maintenance of Portsmouth Bypass (SCI-823-0.00), Scioto County, Ohio	Ohio FO, December 2014 (converted to BO April 2015)	IT through harm from habitat loss and death by collisions with vehicles.	Permanent loss of 312.8 ha (773 ac) of suitable summer foraging and roosting habitat.
BO and ITS, Indiana and northern long-eared bat, East Ohio Gas Company's Western Access II Project, Harrison and Tuscarawas Counties, Ohio	Ohio FO, July 2015	IT through death, injury, harm, harassment	Loss of 1 Indiana bat maternity colony, 9 northern long-eared bat maternity colonies, and individual males and non-reproductive females of both species.
BO and ITS, northern long-eared bats, USDA Forest Service to complete 6 ongoing projects at WNF, Southern Ohio	Ohio FO, May 2015	IT through removal of roosting and foraging habitat	Loss of no more than 2,565 ha (6,338 ac) and 137 linear km (85.1 linear mi) of potential northern long-eared bat habitat

Status of the Species within the Action Area

Indiana Bat

All counties within Ohio have known or possible occurrences of the Indiana bat. Ohio is considered to be in the core maternity range of the species (USFWS 2007a). Ohio has one Priority 2 hibernaculum; the Lewisburg Mine in Preble County, which is the largest hibernaculum in the state. It was discovered in 1994 and subsequently monitored every two years, having consistent Indiana bat counts between 9,000 and 10,000 individuals until 2006. Ohio also has one Priority 3 hibernaculum in Lawrence County. According to the 2007 draft Indiana bat recovery plan, Ohio had 11 known maternity colonies in 11 counties (Ashtabula, Butler, Cuyahoga, Clermont, Greene, Hocking, Lawrence, Paulding, Pickaway, Summit, and Wayne). Additionally, as of July 2014, twenty other counties have records of females captured in reproductive condition (pregnant, lactating, or post lactating) or captures of juveniles (Belmont, Brown, Carroll, Champaign, Clark, Clinton, Crawford, Darke, Fayette, Franklin,

[13] Actual take reported through tiered consultation from January 26, 2007 through January 31, 2012 was approximately 283 ha (700 ac). However, see section *IV. Effects of the Action* (pages 50-58) for details of estimated project impacts and acreage of actual take.

Hamilton, Hardin, Highland, Logan, Montgomery, Richland, Ross, Seneca, Shelby, and Warren). As of July 2014, a total of 210 female Indiana bat captures had been recorded in Ohio. Current data suggest that Ohio has over 70 maternity colonies in at least 31 counties. A majority of these records have been from mist netting surveys; however, some captures have come from other methods.

The potential density of Indiana bat maternity colonies in Ohio appears to be low. Ohio contains approximately 3,277,954 ha (8,100,000 million ac) of forest (ODNR 2015a). This forest cover includes deciduous forest, evergreen forest, mixed forest, and areas of woody wetlands. The 2015 range wide population estimate for Indiana bats is 523,636 (USFWS 2015c). Region 3, which includes Ohio, had an estimated 432,297 bats in 2015. The Draft 2007 recovery plan divided the range of the Indiana bat into four recovery units. The entire state of Ohio is within the Midwest Recovery Unit, which is considered the core of the Indiana bat range, and contained an estimated hibernating population of 259,508 bats in 2015.

The average maternity colony contains 50 to 80 adult female Indiana bats (Whitaker and Brack 2002). If it was conservatively assumed that half of the population is female, and the entire population of the Midwest Recovery Unit (259,508) summers and raises young in Ohio, an estimated raw density of maternity colonies that exist in Ohio can be calculated:

259,508 x 0.50 = 129,754 females in the Midwest Recovery Unit

If we assume that 50-80 females are in each maternity colony there would be an estimated 2,595 to 1,622 colonies.

Maternity colonies appear to use 8-25 maternity roost trees (MRT) during the summer (Callahan et al. 1997, Kurta et al. 2002). If we conservatively assume that every maternity colony contains only 50 adult females, resulting in approximately 2,595 maternity colonies as calculated above, and conservatively assume that every colony requires 25 (the upper end of the range of maternity roost trees) primary and secondary maternity roost trees, then:

2,595 colonies x 25 secondary and primary maternity roost trees = 64,875 secondary and primary maternity roost trees that are needed on the landscape to support the existing population within the Midwest Recovery Unit.

If the minimum number of required maternity roost trees is divided by the acreage of forest cover in Ohio identified in 2006, a conservative density of secondary and primary maternity roost trees in Ohio per acre of forest can be calculated to 64,875 MRT per 8,100,000 acres of forest in Ohio, or 0.008 MRT per forested acre in Ohio

If we conservatively assume that:

- the entire population of females estimated for the Midwest Recovery Unit is raising young in Ohio
- every female is part of a maternity colony of 50 individuals,
- every colony requires 25 primary and secondary maternity roosts

Then based on this simple calculation, approximately one viable secondary or primary maternity roost tree is present in every 40.5 ha (100 ac) of forest in Ohio. If we assume that each individual of the entire 2015 population estimate (523,636) requires 25 primary and secondary roosts and that the entire estimated population summer roosts in Ohio, then a conservative estimate of 1.56 potential secondary or primary roost trees per acre of forest would occur in Ohio.

Because of the low density of Indiana bats in Ohio, the small amount of total land that ODOT controls (0.8%), and the low number of maternity roost trees that have been found near roadways, ODOT is very unlikely to interact with this species.

However, retention of forest cover that can provide suitable roost trees near water and foraging areas protected from further fragmentation would appear to benefit the survival and recovery of this species. Degradation of forested habitat could reduce the likelihood of survival and possibly slow the recovery of the Indiana bat.

Northern Long-Eared Bat

Prior to WNS, the northern long-eared bat was one of the most common species in Ohio and throughout the Midwest. Based on limited data, this species appears to be declining in summer populations as well as declining at one hibernaculum. Summer habitat does not appear to be a limiting factor for this species. However; due to the spread of WNS, the loss of forest cover and degradation of forested habitat may have an impact on this species, as populations are reduced or individuals are compromised.

Factors Affecting Species Environment within the Action Area

The overall threats to the Indiana bat and northern long-eared bat are described on pages 44-46. Of those threats to the species, the following are specific to Ohio, the action area for this PBO.

Land Management

Mature forest with canopy gaps and open understories is important to this species, both during the summer and during the swarming period; however, forest structure has changed over time. Researchers believe that the action area was primarily forested, but about 10 percent of the area was disturbed each decade by weather-related events or by forest pests and diseases (Runkle 1982). These disturbances ranged in size from canopy gaps to larger blowdowns, and were scattered across the landscape. In the central hardwood forest, the climate warmed and became drier 5,000 to 8,000 years ago, and an increase in fire occurred. Native American people utilized fire to clear forest from around their camps, clear brush for improved hunting, and for better visibility for protection against enemy attacks (Franlish 2004). As a result of these factors, the action area was a mosaic of early-, mid-, and late-successional forest habitats. As European immigrants moved into the action area in the late-1700s, the forest was cleared for home sites, agriculture, lumber and mining. By 1940, only about 15% of the forest cover was still present in Ohio (Ohio Division of Forestry 2004). Active fire suppression began in the 1920s. Today, the Ohio Division of Forestry estimates that almost 31% of Ohio is now covered by forest (ODNR 2015a).

While forest cover has increased from the 1940s, the structure and composition of forest differs from what was present before Europeans first started moving into the area. Based on written accounts of early settlers and travelers in the Ohio Valley, forests were described as being park-like with large, widely spaced overstory trees and relatively little undergrowth of woody vegetation. Chestnut and oak forests dominated the landscape until the early 1900s, but these changed to oak-hickory forests after the chestnut blight occurred. An analysis of the structure, composition and condition of overstory trees in research plots located in southeastern Ohio suggests that today's forests are denser than that reported for old growth oak-hickory forests and for presettlement forests (Sutherland et al. 2003; Yaussy et al. 2003). Changes in disturbance patterns over the past 75 years have been suggested as reasons why an increase in shade tolerant species (e.g., red maple) is occurring in greater abundance in the forest understory and midstory (Abrams 1992; Abrams 1998). There is no scientific information available at this time to know whether the increasing density of forest communities is a contributing factor to the Indiana bat's decline. Forested lands within the action area are managed in a variety of ways with the vast majority of land in Ohio, over 95%, being in private ownership (ODNR 2001). This has created a mosaic of habitat conditions across the action area.

Mining
The EMU contains oil, gas, and coal deposits. Other industrial minerals such as sand, gravel, limestone, clay, shale, sandstone, and salt are also found throughout the state. Extraction of these resources over the past 150 years has impacted land cover and degraded water quality. Today, remnants of this industrial era are present in the form of abandoned surface and underground mines. Features associated with these abandoned mine lands affect riparian and water quality.

Acid Mine Drainage (AMD) is water that is affected by passage through, or alteration by, coal or abandoned coal mine environments. The products of AMD formation, acidity and iron, can devastate water resources by lowering the pH and coating stream bottoms with iron hydroxide. Streams in the action area that are impacted from AMD may have a lowered productivity of aquatic biota, including insects that Indiana and northern long-eared bats prey upon. Furthermore, waterways severely impacted by AMD may not provide suitable drinking water sources for the bats. Despite the past impacts to surface water within southeastern Ohio, the area has supported a high density of bats including Indiana and northern long-eared bats and other species. The bat species diversity and density in southeastern Ohio indicates that the habitat provides ample foraging and drinking sources for bats.

WNS
As described above, WNS is a devastating disease affecting many eastern U.S. bats, including the Indiana bat and northern long-eared bat. The disease was first documented in Ohio in 2011 and has since spread to multiple hibernacula throughout the Midwest. The two largest hibernacula known in Ohio (Lewisburg Mine in Preble County and an abandoned mine in Lawrence County) are infected.

In March 2011, the first case of WNS was confirmed in Ohio, in the Lawrence County hibernaculum. In 2012 WNS was documented in the Preble County hibernaculum. Through 2013, northern long-eared bat numbers remained consistent with historical levels in the Lawrence County hibernaculum, while all other species, including the Indiana bat, declined. However, a survey in 2014 found no Indiana or northern long-eared bats (Schultes 2015). Between surveys conducted in 2012 and 2014, a 47.9% decline in Indiana bat numbers was reported from the Preble County Lewisburg Mine.

WNS has now been confirmed in 18 Ohio counties. It is anticipated that the spread of the disease across the landscape will result in continued population declines, although the extent is unknown.

Wind power facilities
Advances in wind turbine technology and increased interest in renewable energy sources have led to a rapid expansion of the wind energy industry in the U.S. Turbine-related bat deaths have been reported at every wind facility that has been monitored for bird and bat mortality. These mortality records include seven Indiana bats, three of which occurred at wind facilities in Ohio. To date, no northern long-eared bat mortalities have been reported in Ohio.

IV. EFFECTS OF THE ACTION

In evaluating the *effects of the action*, section 7 of the ESA and the implementing regulations (50 CFR §402) require the USFWS to consider both the direct and indirect effects of the action on the species, together with the effects of other activities that are interrelated or interdependent with the action that will be added to the environmental baseline. *Direct effects* are those effects that have immediate impacts on the species or its habitat while *indirect effects* are those that are caused by or will result from the proposed action and are later in time, but are still reasonably certain to occur. *Interrelated actions* are those that are part of a larger action and depend on the larger action for project

justification. *Interdependent action*s are those actions that have no independent utility apart from the action under consideration.

The *effects* evaluation is necessary to make the required determination under 7(a)(2), of insuring the Federal action does not jeopardize the continued existence of the species, or result in the destruction or adverse modification of designated critical habitat. *Jeopardize the continued existence* of a species means to engage in an action that reasonably would be expected, directly or indirectly, to reduce appreciably the likelihood of both survival and recovery of a listed species in the wild by reducing the reproduction, numbers, or distribution of that species. No critical habitat for either the Indiana bat or northern long-eared bat is present in Ohio; therefore, no adverse modifications to critical habitat will result from the proposed action. Rather this PBO evaluates potential adverse effects to these species.

The following analysis evaluates the effects of the proposed action in relation to the reproduction, numbers, and distribution of Indiana and northern long-eared bats within the action area, and then further evaluates these effects in the context of the overall range-wide species status and cumulative effects to the species.

Actual impact data for the Indiana bat, collected from 2007 to 2012 under the 2007 PBO (USFWS 2007b), was reviewed to determine approximate direct impacts over the next ten years. Based on records from USFWS and ODOT, approximately 283 ha (700 ac) of Indiana bat habitat was impacted over five years. This included impacts from projects under the American Recovery and Reinvestment Act of 2009 (ARRA) which were unanticipated at the creation of the 2007 PBO. However, this impact estimate was low because of the way that impacts from smaller projects (PC-1 and PC-2 projects) were tracked under the last PBO (some project reports only reported impact acreage for roost trees, and others reported total forested acres impacted). By changing the assessment of impacts to the acreage of Suitable Wooded Habitat (SWH) (see the specific definition of this term on page 3 and in Appendix A) as compared to the 2007 PBO that counted individual trees, ODOT's acreage of impact will be larger than 567 ha (1,400 ac) over the next 10 years, but will be significantly less than the approximately 8,903 ha (22,000 ac) that was estimated under the 2007 PBO.

Over a five-year period (2007-2012), ODOT coordinated approximately 1,200 smaller projects involving stream crossings, bank stabilizations, and minor wetland fills that met the conditions of the USACE Nationwide Permit program. In general, these projects have footprints of less than 0.4 ha (1 ac). Some of these projects, such as bike trails and minor roadway re-alignments, may have larger footprints while small bridge and culvert replacements generally are smaller than 0.2 ha (0.5 ac). In an analysis of these smaller impact projects (referred to as Level 1 projects) coordinated between May 2015 and October 2015, ODOT noted that 178 projects were submitted for coordination. Of these, 71 projects had no impact on SWH, 23 projects impacted less than 0.04 ha (0.1 ac) of SWH, 65 projects impacted between 0.04 and 0.2 ha (0.1 and 1 ac) of SWH, and 19 projects had 0.4 ha (1 ac) of impact or greater. The average impact of all projects (n=178) was 0.16 ha (0.4 ac) of SWH, and the average SWH impact for all projects with SWH impacts was 0.28 ha (0.7 ac) (n=107). If ODOT assumes that over the next five years approximately the same number of Level 1 projects will occur, and on average each of these projects will impact 0.4 ha (1 ac) of SWH, then these projects will impact approximately 971 ha (2,400 ac) of SWH during the next ten years.

Over the last three years, ODOT also coordinated approximately 60 larger impact projects that required an individual 404 or 401 Clean Water Act permit (referred to as Level 2 projects). (Data on the number of Level 2 projects only exists for the last three years because of the standardization of electronic files.) The most Level 2 projects coordinated in any one year was 20 projects in 2011. These projects have a large range of footprint sizes. The largest wooded acreage impact for any Level 2 project coordinated over the last three years was 12 ha (30 ac). If ODOT assumes that approximately 20 Level 2 projects will be coordinated in each of the next ten years, and that the

maximum wooded impact would be approximately 12 ha (30 ac), Level 2 projects may impact up to 2,428 ha (6,000 ac) over the next ten years.

Ohio is approximately 11,615,061 ha (28,701,440 ac), of which land is about 10,481,423 ha (25,900,160 ac) and water and wetlands are about 1,133,638 ha (2,801,280 ac) (Sanders and Zimmerman 2000). The State is 31% forested today, and 96% of these forests are comprised of deciduous trees (ODNR 2015a). Forests in Ohio today are highly fragmented, as seen by viewing the Ohio Land Cover Data Set created by the U.S. Geological Survey (USGS 2006). Ohio's largest section of forest is the only National Forest in the State, the Wayne National Forest (WNF). The WNF itself is fragmented by private and State lands, and is divided into three physically separated units which total approximately 97,489 ha (240,900 ac) (USFS 2015). There are over 4,000 different streams in Ohio that together create a network of an estimated 99,026 total km (61,532 total mi) of water (Sanders and Zimmerman 2000). At this time, Ohio contains approximately 3,277,954 ha (8,100,000 ac) of forests (ODNR 2015a). ODOT estimates that projects will remove up to 3,399 ha (8,400 ac) of SWH over the next 10 years. This will result in an overall loss of approximately 0.1% of the forested acreage estimated in Ohio. Overall, a loss of 0.1% of available forest does not appear meaningful in terms of Indiana bat and northern long-eared bat viability. However, the amount of forest is not the only variable that influences the fitness of these species. A loss of maternity roost trees would have an anticipated greater impact than the loss of multiple acres of young forest which may provide minimal value to these species. The paramount factors are timing and the specific ecological functions the area serves for Indiana and northern long-eared bats. Hence, our programmatic and project specific analyses must evaluate not only the impact from total amount of habitat loss, but also, the consequences of impacts to the ecological functions of the habitat for these species.

Beneficial Effects

Certain offsetting or mitigative measures performed by ODOT may provide a benefit to the Indiana and northern long-eared bats. The following activities may benefit both species through habitat restoration and enhancement:

1. Stream and/or wetland mitigation that aims to restore riparian and forested wetland areas and improve water quality completed in compliance with the Clean Water Act and Isolated Wetland permits can be beneficial to the species. Bats may benefit from the restoration and protection of stream and wetland habitats which can provide suitable roosting, foraging, and commuting habitat. Restoration and protection of stream riparian, associated wetland habitats, and vegetated recharge areas may provide suitable roosting, foraging, and commuting habitat for the species.
2. Clean Water Act Section 402 storm water mitigation through the preservation of vegetated and forested riparian and recharge areas.
3. Native tree planting along project right of way that include beautification projects, landscaping projects, and living snow fences can supply future suitable habitat for the bats.
4. Invasive species plant control along right of ways will create better quality suitable habitat for the bats. Invasive plant species, such as bush honeysuckle, can spread quickly through the forest understory creating dense vegetative clutter. Dense understory clutter decreases the suitability of a forested area for foraging by bats.
5. Retention of federally permitted bat biologists on staff within ODOT. Having staff on hand that have detailed knowledge of the species, experience with its habitat needs, and who keep current on issues and research topics relevant to the bat can continue to benefit and inform decision making at ODOT.

These measures identified above may benefit the Indiana and northern long-eared bats by creating and/or improving habitat. Restoration of wetlands and streams and tree planting activities may benefit

the species in future years as new habitat is created and/or existing habitat is improved. Control of invasive plant species may have a more immediate benefit to bats as existing habitat is improved.

Direct and Indirect Effects

Habitat Removal - General

ODOT's program may result in the loss of up to 3,399 ha (8,400 ac) of SWH over a ten year period. These 3,399 ha (8,400 ac) represent approximately 0.1 percent of the over 3,237,485 ha (8 million ac) of forest land in the action area. Large, new location projects may fall outside the PBO, requiring project-specific consultation with USFWS. The impacts from these projects are not included in the total above.

Qualified project-specific impacts implemented under the PBO have the potential to cause adverse effects on Indiana and northern long-eared bats by altering summer habitat characteristics. During the summer roosting season, both bat species roost in live, damaged, and/or dead trees with exfoliating bark. With regard to the damaged and/or dead trees, it is the physical condition of the tree, not the tree species that apparently makes a tree suitable for roosting. Stochastic events, such as strong wind, lightning strikes, or pest outbreaks and other disturbances create and distribute trees in this condition within forested tracts and across the available treed lands. Regardless of how the habitat is removed, Indiana and northern long-eared bats in a maternity colony or individually roosting bats (i.e., non-reproductive females and males) could be harmed, harassed, or killed as a result of the tree or branch striking the ground or being dislodged from the roost tree (i.e., falling to the ground). Although any volant bat could likely fly away from a tree prior to or during the direct impact, females may be less likely to leave if they have flightless (i.e., non-volant) young present (usually between June 1 and July 31). Flightless young would not be capable of leaving their roost tree and, therefore, may be harmed, harassed, and/or killed. Once the young bats become volant, their likelihood of surviving the removal of the habitat in which they are roosting likely increases. The loss of a roost is an anticipated stressor for the bats, requiring it to relocate to a new roost. The continual potential for the loss of a roost may at least in part explain the observed use of multiple roosts over the summer.

An adverse effect to the species may also occur if a roosting bat is disturbed causing the bat to exit the roost during daylight or otherwise modify its normal behavior. The noise and vibration generated from habitat removal will likely occur during daylight hours and at variable distances from occupied roost trees. The novelty and intensity of these perturbations will likely dictate bats' responses to them. For instance, bats roosting at some distance from the disturbance or habitat removal may initially be startled by unusual noises in the distance, but may habituate to the noises if they are of low volume or if some distance is maintained between the roost and the disturbance. At closer distances and increasing noise or vibration levels, bats may be startled to the point of fleeing from their roosts, which may increase the risks of injury, mortality, predation, abandonment of non-volant young, and or other adverse effects. Non-volant young that are abandoned permanently are unlikely to survive. Alternatively, bats that roost within or close to habitat removal areas will likely be subjected to increased levels of disturbance frequency and intensity.

As a result, Indiana and northern long-eared bats displaced by these activities may be forced to use different roost trees. These roost trees may be more or less suitable (e.g., less solar exposure, or easily accessed by predators) than the roosts from which they were displaced. Habitat conditions such as snag density surrounding the disturbance area will likely determine the quality of any alternative roosts that are used. Bats may also change roosting areas by temporarily or permanently abandoning their current roosts and seeking roosts that are further away from the active disturbance area. This has been supported by a few accounts in the literature. For example, Callahan (1993) noted that the likely cause of primary roost abandonment in his study of Indiana bats was disturbance from a bulldozer

clearing brush adjacent to the tree. Aversion to vibration and noise was observed in female Indiana bats in Illinois that used roosts at least 500 m (1,640 ft) from paved roadways (Garner and Gardener 1992). The adaptation to switch roost trees is assumed to be normal behavior in response to changing environmental conditions as multiple roosts being used by individuals and colonies has been reported for both species (Kurta et al. 2002, Kurta 2005, Barclay and Kurta 2007, Foster and Kurta 1999, USFWS 2007a, USFWS NLEB listing citation). Some literature has reported that Indiana bats use roosts close to significant disturbance. In one study near 1-70 and the Indianapolis Airport, a primary maternity roost was located 0.6 km (1,970 ft) south of 1-70. This primary maternity roost was not abandoned despite constant noise from the Interstate and airport runways. However, the roost's proximity to 1-70 may be related to a general lack of suitable roosting habitat in the vicinity and due to the fact that the noise levels from the airport were not novel to the bats (i.e., the bats had apparently habituated to the noise) (USFWS 2002). Therefore, it is not definitive that Indiana bats will shift or abandon their roosts as a result of any adjacent disturbances. Given the potentially relatively poor environment created by traffic moving along roads (consistent noise, reduced air quality, invasive species, etc), in general, vegetated areas immediately adjacent to existing roads are anticipated to provide less than ideal habitat for bats.

Another adverse effect of the proposed projects on the Indiana and northern long-eared bat in the action area will be the alteration and loss of foraging habitat. After clearing is completed on individual project areas, foraging habitats may no longer be available or may be reduced in quality and/or quantity. Effects to bats whose foraging areas lie entirely or mostly outside individual project areas are anticipated to be minimal. However, individuals, whose foraging areas occur entirely or mostly within a specific project area or whose foraging areas will be disconnected due to the project (i.e., loss of a suitable travel corridor), may expend an increased amount of energy to establish new commuting patterns and/or home ranges. Bats in this scenario could be harmed due to displacement from their home range, and thus incur decreased fitness. Additionally, bats may be subject to increases in inter- and intra-specific competition in situations where available foraging habitat is limited. Given the linear nature of transportation projects, even larger projects will not likely impact a substantial portion of any one foraging area. Smaller portions of several individual foraging areas are more likely to be impacted. Therefore, noticeable effects from loss of foraging habitat are not anticipated.

Impacts to surface water quality will also occur from ODOT projects. Implementation of transportation projects may require the filling or alteration of wetlands and stream habitat. Through construction activities, ODOT legally impacts wetlands and streams every year. Removal of aquatic habitat can reduce insect abundance. Sediment, herbicides, and other contaminants, could affect water quality through erosion, vegetation management, and accidental spills during any phase of a project from construction to operation. Insects associated with these aquatic habitats make up part of the diet of Indiana and northern long-eared bats (USFWS 2007a, USFWS 2014a). Therefore, a change in water quality can affect the prey base of the species. Decreases in water quality through contamination and the destruction of wetlands and stream habitats may locally reduce the availability of aquatic insects and reduce the availability or quality of suitable drinking sources.

Adverse effects to Indiana and northern long-eared bats from this decrease in aquatic insect prey and drinking sources could range from those which are insignificant to those resulting in harm by significantly impairing the ability of bats to feed. Of course, the level of impact on individual bats will vary depending upon the magnitude and duration of water quality impacts and the availability of alternative suitable foraging and drinking opportunities in the surrounding landscape. The diets of Indiana and northern long-eared bats are not restricted to aquatic insects, as they also forage on terrestrial insects. Furthermore, their diet appears to vary across their range, as well as seasonally and with age, sex and reproductive-status (Murray and Kurta 2002; Belwood 1979). Prey selection different than what is randomly available has been observed in other bat species in the Midwest (Perlik et al. 2012). Impacts to water quality associated with the federal-aid highway program will typically be temporary impacts occurring during project construction activities. The response of Indiana and

northern long-eared bats exposed to locally decreased water quality is anticipated to range from no response to a temporary modification of foraging patterns. Temporary reductions in water quality will likely not cause a decrease in fitness of individual Indiana bats and will therefore be insignificant.

The Indiana bat does not appear to be particularly sensitive to change within its summer and swarming habitats (See Previous Incidental Take Authorizations and Status of the Species in the Action Area sections above). Most known Indiana bat maternity colonies occur in disturbed landscapes and in forest habitat areas of low to moderate canopy cover. A preponderance of the data on summer roosting and foraging habitat show that Indiana bats appear to select roost trees based on proximity to natural features and anthropogenic disturbances. Some examples of this include, among others, (a) the selection of primary roost trees that are in canopy openings that will provide solar exposure and radiant heat for maternity colonies, (b) the preferential use of roost trees within various types of timber harvests in many areas, and (c) the use of edges and tree corridors for travel and foraging (USFWS 2007a). In addition to habitat loss, project-specific impacts authorized under the proposed action may result in a decrease in the quality of habitat remaining within the action area.

Northern long-eared bats appear to select roosts with generally more canopy cover than those used by Indiana bats. In studies that compared the two species directly, Timpone et al. (2010) found that the mean canopy cover around Indiana bat roosts was 25%, whereas the average was 56% for northern long-eared bats. Similarly, Carter and Feldhamer (2005) reported average canopy cover around roosts as 18% and 44% for Indiana bats and northern long-eared bats, respectively. However, the average percent canopy cover within northern bats' home ranges has not been identified.

Factors that may lead to a loss in the quality of remaining habitat include increased habitat fragmentation, loss of foraging areas and travel corridors, and the degradation of these habitats. Over time, fragmentation of habitat in the action area is expected to increase as cumulative effects continue to occur. However, the effects of landscape changes in summer habitat on populations of Indiana and northern long-eared bats are unclear (USFWS 2007a, USFWS 2015b).

Habitat Removal – Summer Roost (adult males and non-reproductive females)

Summer habitat for Indiana and northern long-eared bats occurs throughout Ohio, and qualified project-specific impacts implemented under the PBO may occur anywhere within the action area, with the exception of those areas specifically excluded in this document. Impacts to summer habitat may occur during periods of occupation by the bats (April 1 through September 30) or during periods when the habitat is unoccupied. In most cases, the death of an individual bat from summer habitat removal would require the bat to be present in the specific tree being removed at the time it is felled. However, volant bats would likely have the opportunity to escape the falling tree. The probability that a volant bat would not escape the tree, combined with the minimization measures to be implemented on projects near known maternity colonies and swarming areas, results in a correspondingly low probability of death of an individual bat. The most common adverse effect associated with the removal of summer habitat will be the harassment of bats that are disturbed from their roost(s), abandoning higher quality habitat in order to distance themselves from the disturbance, and loss of suitable roosting, foraging, and/or travel habitat. This harassment is not limited to the periods when the bats are present at the impact sites. The loss of suitable summer habitat during the period of inoccupation (i.e., while the bats are hibernating) cannot be discounted for this action. Indiana and northern long-eared bats returning to summer roosting areas have low fat reserves after hibernation and migration. Additionally, pregnant females have increased energy needs. Habitat removal results in increased habitat fragmentation, loss of foraging areas and travel corridors, and potentially increasing commuting distances to necessary resources. Therefore, the degradation of suitable habitat will further stress Indiana bats during this vulnerable stage in their life history.

The proposed action (ODOT's Federal-Aid Program) is expected to result in the loss of up to 3,399 ha (8,400 ac) of SWH. Although many of the impacts associated with proposed actions will not occur near capture records, some of the habitat removed during the timeframe covered by this PBO may be within documented homeranges of these species. This acreage combined with the cumulative effects of future State, tribal, local and private actions, may adversely affect the bats even if the removal occurs when they are not physically present.

Habitat Removal – Summer Maternity

According to the 2007 draft Indiana bat recovery plan, Ohio had 11 known maternity colonies in 11 counties (Ashtabula, Butler, Cuyahoga, Clermont, Greene, Hocking, Lawrence, Paulding, Pickaway, Summit, and Wayne). Additionally, as of July 2014, twenty other counties have records of females captured in reproductive condition (pregnant, lactating, or post lactating) or captures of juveniles (Belmont, Brown, Carroll, Champaign, Clark, Clinton, Crawford, Darke, Fayette, Franklin, Hamilton, Hardin, Highland, Logan, Montgomery, Richland, Ross, Seneca, Shelby, and Warren). As of July 2014, a total of 210 female Indiana bat captures had been recorded in Ohio. Current data suggest that Ohio has over 70 maternity colonies in at least 31 counties. A majority of these records have been from mist netting surveys; however, some captures have come from other methods. While the maternity colonies appeared to occur in the habitat that is available in their range, no mechanism or available data exist for determining the fitness of a given maternity colony relative to the amount of habitat available to each colony.

The USFWS is currently compiling data from past survey records to better understand the numbers and distribution of northern long-eared bat maternity colonies in Ohio. Preliminary data suggest that northern bat maternity colonies may occur in many of the same areas in which Indiana bat maternity colonies have been found. However, there is also evidence that a number of northern bat maternity colonies (potentially 20 or more) are distributed throughout the eastern part of the state, within the EMU (USFWS Columbus Ohio Ecological Service Field Office 2015).

The removal of PMRTs in the WMU may have an increased potential for affecting the Indiana bat, and possibly the northern long-eared bat. The WMU is primarily agricultural, and GIS land cover analysis shows the forested cover in this part of Ohio to be much less than elsewhere in the State. With lower forest cover in this unit, presumably less potential suitable summer habitat exists in this unit than in the EMU. The WMU has Indiana bat capture records that indicate several maternity colonies have roosted there (Greene, Champaign, Crawford, Darke, Hardin, Franklin, Logan, Pickaway, and Paulding counties) and the largest hibernaculum in Ohio occurs in the WMU in Preble county. Capture records are also known from southern Michigan, just beyond the northwestern border of Ohio. Indiana bats tend to migrate north to find their summer habitat, as demonstrated in the literature and field studies (Gardner and Cook 2002, Whitaker and Brack 2002). For these reasons, the western portion of Ohio may serve as a migrating/foraging corridor for the Indiana bat, in addition to summering habitat. More PMRTs are presumably present in the EMU, as well as SWH in general. Although the EMU contains more habitat, fewer Indiana bat captures have been reported in this area, and numerous negative survey records (mostly from coal mining surveys) in the extreme eastern edge of the state have been reported. This suggests that removal of potential maternity roosting habitat in the EMU may be less detrimental to the Indiana bat than removal of PMRTs in the WMU.

Unlike the Indiana bat, most of the documented northern long-eared bat captures in Ohio are in the eastern portion of the state. The northern long-eared bat was one of the most common bat species found in Ohio prior to WNS, and the eastern portion of Ohio was sampled heavily because of coal mining. This is supported by the concentration of records in the eastern counties that have a very high number of coal mines, but fewer records noted from southeastern Ohio, which contains similar percentages of wooded habitats, but less mining. Recent capture records for wind power projects and

pipeline projects in the northeastern, north-central, central and southwestern parts of the state either included both species at most sample locations, or included only northern long-eared bats, suggesting that this species may be found in most or all wooded areas in Ohio. However, some of the concentration of capture records may be due to habitat preference. This species is known to roost in interior woodlands, and in areas with higher canopy cover, so eastern and southeastern Ohio may contain more preferred habitat for this species.

In general, for projects that may impact PMRTs, the removal of habitat will occur when the species would not be potentially present within the habitat. In circumstances where potential maternity roosting habitat must be removed during the summer, project-specific coordination will occur. This conservative approach will allow the Service to more closely monitor impacts to maternity areas where available habitat may be limited.

Adverse effects to Indiana and northern long-eared bats from the removal of maternity habitat may occur as previously described under the general discussion on the effects of habitat removal. However, the likelihood of mortality is highest when maternity roosting habitat is removed between June 1 and July 31, when the majority of young are expected to be non-volant. Given the available acreage of forested habitat within the species' core maternity range and the relatively small project sizes approved under this consultation, it is unlikely that any of the projects implemented under this PBO would result in the loss of an entire maternity colony.

Direct mortality will be avoided for most (if not all) projects that will impact potential maternity roosting habitat, because tree removal will occur only during the winter months. Seasonal clearing restrictions (i.e., not cutting trees during the period when bats occupy their summer range) eliminate the threat of killing bats in an occupied maternity roost (USFWS 2007a, USFWS 2015b). Project specific coordination will be required to remove SWH within which there is a potential maternity roost tree (PMRT) (see descriptions of CC2 and CC3 on pages 23-25). While the loss of an occupied primary maternity roost would result in the greatest immediate impact, the loss of multiple alternate roost trees could cause displaced individuals to expend increased levels of energy seeking out other alternative roost trees. While the loss of roost trees is a natural phenomenon, and the benefit of utilizing several roost trees may be an adaptation to cope with the ephemeral nature of this habitat feature, the loss of multiple roosts from human-induced tree removal likely stresses individual bats and potentially the social structure of the colony constituting potential harm to these species (USFWS 2007a; USFWS 2015b). If this increased expenditure of energy occurred during a sensitive period of a bat's reproductive cycle (e.g., pregnancy) spontaneous abortion or other stress related reproductive delays or losses in fecundity may occur in some individuals, particularly those that may have already been under other environmental stresses. These stresses and delays in reproduction could also cause lower fat reserves and ultimately lead to lower winter survival rates (USFWS 2002). For example, females that do give birth may have pups with lower birth weights or their pups may have delayed development (i.e., late into the summer). This could in turn affect the overwinter survival of the young-of-the-year bats if they enter fall migration and winter hibernation periods with inadequate fat reserves. These stresses are anticipated, though to a lesser extent, even when the habitat is removed when the bats are not present.

Habitat Removal – Fall Swarming and Spring Staging

There are seven known hibernacula in the action area with historic (5), or extant (2) Indiana bat populations. In addition, records of autumn captures are located in Ashland, Athens, Hocking, Lawrence, and Summit Counties. Northern long-eared bats are also known to hibernate in the Indiana bat hibernacula described above, with no additional hibernacula yet identified for the species in Ohio. This PBO specifically excludes direct impacts to caves and other potential hibernacula. In addition to avoiding impacts to hibernacula, impacts to SWH within 8 km (5 mi) of a hibernacula record must occur

from November 15 to March 15 when the species would not be using these areas, unless project specific coordination provides an alternative approach.

Habitat Removal – Winter

No winter hibernaculum habitat will be removed or impacted under this PBO. Activities that would impact a known hibernaculum within Ohio will be coordinated on a project-specific basis, outside of this PBO.

Strong Vibrations - Near Hibernaculum

Construction activities can require pile driving and blasting activities. Pile driving and blasting activities near hibernacula could potentially disturb hibernating bats, or damage or destroy the integrity of a hibernaculum. All projects within 0.8 km (0.5 mi) of an Indiana bat hibernaculum or within 0.4 km (0.25 mi) of a northern long-eared bat hibernaculum require project-specific consultation with USFWS, and may result in consultation outside of the PBO. To minimize impacts to bats in their hibernacula, these activities occurring near a hibernaculum would only occur between April 1 and September 30 when the bats would not be present.

Global Climate Change

Humphries et al. (2002) used climate change models to predict a northern expansion of the hibernation range of the little brown bat; such modeling would likely result in predictions of range shifts for Indiana bats as well. Potential impacts of climate change on hibernacula can be compounded by mismatched phenology in food chains (e.g., changes in insect availability relative to peak energy demands of bats). Changes in maternity roost temperatures may also result from climate change, and such changes may have negative or positive effects on development of Indiana and northern long-eared bats, depending on the location of the maternity colony (USFWS 2007a). The role of climate change and its effect on temperatures in hibernacula, which can then affect bat population trends, needs investigation. Although current data are not sufficient to definitively determine the cause of regional disparities, both protection of hibernacula and suitable temperature regimes, in concert, appear to be key to understanding trends in the overall population and recovery of these species.

The geographic positions of states where Indiana bat populations historically were declining and states where they were stable or increasing must be considered in light of the possibility that regional and/or global climate change was driving some changes in Indiana bat populations. Clawson's summary reveals a clear division in population trends between states in the northern part of the Indiana bat's range versus states in the southern part of the range (2002). Overall, the southern population has apparently declined by 74% in the 45-year period from 1960 through the 2007 estimate. In contrast, there apparently has been an overall increase in population of 50% in the northern states over the same time. While of interest, this difference may be of much less significance in the face of the range-wide population declines anticipated from WNS.

V. CUMULATIVE EFFECTS

Cumulative effects include the effects of future State, tribal, local, or private actions that are reasonably certain to occur in the action area considered in this PBO. Future Federal actions that are unrelated to

the proposed action are not considered in this section because they require separate consultation pursuant to Section 7 of the Act.

Throughout the state of Ohio, the amount of suitable habitat for Indiana and northern long-eared bats that could be altered or lost by these future actions is unknown. Future State, tribal, local, or private actions would have varying degrees of effects on the bats from no effect to adverse effects. Permanent conversion of suitable forested habitat to unsuitable habitat would have potential adverse impacts on the species.

Approximately 87% of Ohio's forests are privately owned (ODNR 2015a). Although ODOT is not aware of major non-Federal actions that are reasonably certain to occur within Ohio, some activities, particularly on private lands, could have progressive negative effects on Indiana and northern long-eared bats. Ohio's human population has been growing steadily since the statewide census began. In 2010, Ohio had an estimated 11,536,504 people; and in 2014, the population was reported to have experienced a 2.1% increase since 2000 (ODOD 2015). Human population growth is typically accompanied by increased urbanization, including land development resulting in the permanent loss of potential bat habitat. Also, actions performed on private lands that may adversely affect the Indiana and northern long-eared bat include timber harvest, fire suppression, agricultural development, and pesticide application. However, some forestry practices can be compatible with bat conservation (BCI 2001). Over time, fragmentation of habitat is expected to continue in the action area, and will increase as cumulative effects continue to occur. However, effects of landscape changes in summer habitat on bat populations are unclear (USFWS 2007a).

Forest cover has been increasing in the state, and Ohio's forests are maturing (OSU 2007). In fact, tree growth continues to outpace removals by a ratio of more than 2 to 1 (OSU 2007). Approximately 31% of Ohio is currently forested in comparison with only 12% in 1940 (ODNR 2015b; OSU 2007; USGS 2006). Thus, the overall character of the forested landscape may be improving in the state. Tree removal actions by private landowners individually may result in adverse impacts to bats and these actions are difficult to calculate or predict. Assuming that Ohio's forests will continue to mature, private forestry activities collectively throughout the state may not significantly decrease the species numbers, reproduction, and distribution.

VI. CONCLUSION

After reviewing the current status of the Indiana and northern long-eared bats, the environmental baseline for the action area, the effects of the implementation of ODOT's Federal-Aid Program through January 31, 2026, and the cumulative effects, it is the USFWS's biological opinion that the proposed action is not likely to jeopardize the continued existence of the Indiana bat or northern long-eared bat No critical habitat for either species has been designated in Ohio; therefore, no destruction or adverse modification of critical habitat will occur.

As described in our effects analysis, we anticipate up to 3,399 ha (8,400 ac) of potential suitable wooded habitat for Indiana and northern long-eared bats may be removed during implementation of ODOT's Federal-Aid Program over the next 10 years. Accompanying this loss of habitat, we anticipate individuals may be injured or killed due to the removal of occupied roost trees between March 31 and October 1 on projects where ODOT is unable to implement seasonal clearing restrictions. However, we understand that ODOT is committed to seasonal clearing of trees unless it is impracticable due to unusual, project-specific requirements. In some cases, ODOT may need to formally consult with the USFWS on these projects, outside this PBO. We also anticipate indirect effects to roosting pregnant females upon return from hibernation. Although at first appearance, a loss of this magnitude seems substantial, we believe that avoidance, minimization, and mitigation measures proposed will minimize and offset adverse effects to the individuals and ensure the availability of suitable habitat for Indiana

and northern long-eared bat maternity colonies in the future. Specifically, we believe no reproductive females or young will be directly exposed to tree-felling activities. Male and non-reproductive female bats that are exposed are likely to be only a single or few roosting bats. Reproductive females may be indirectly exposed, but we believe that the responses to this indirect exposure will lead to only a short delay in parturition. Hence, we do not expect any perceivable impacts to maternity colonies or the overall Ohio Indiana bat or northern long-eared bat populations from the proposed action. As such, we also do not anticipate any reductions in the reproduction, numbers, or distribution of the species range-wide. Therefore, we believe the proposed action is not reasonably expected to appreciably reduce the likelihood of survival and recovery of these species.

FRAMEWORK PROGRAMMATIC INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and Federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by the USFWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns, including breeding, feeding, or sheltering. Harass is defined by the USFWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by ODOT so that they become binding conditions of any funding issued to ODOT, as appropriate, for the exemption in section 7(o)(2) to apply. If ODOT fails to assume and implement the terms and conditions, the protective coverage of section 7(o)(2) may lapse.

In order to monitor the impact of incidental take, ODOT must report the progress of the action and its impact on the species to the USFWS as specified in the Incidental Take Statement [50 CFR §402.14(i)(3)].

Amount or Extent of Take Anticipated

In this incidental take statement, we are evaluating the incidental take of Indiana bats and northern long-eared bats that may result from the implementation of ODOT's Federal-Aid Program through January 31, 2026. With the implementation of this Program we anticipate some adverse effects to occur to individual Indiana and northern long-eared bats. The level of take anticipated is greatly influenced by the implementation of the proposed avoidance and conservation measures (see pages 26-32). Our incidental take analysis assumes full compliance with these conservation measures. Three measures are particularly influential in our analysis: (1) seasonal tree-cutting restrictions, (2) under no scenario will known occupied maternity trees be cut during the active season, and (3) under no scenario will known or potential roost trees within 0.8 km (0.5 mi) of a known or suspected Indiana bat hibernaculum or within 0.4 km (0.25 mi) of a known northern long-eared hibernaculum be cut between March 15 and November 15.

Incidental take of Indiana bats and northern long-eared bats will be difficult to detect for the following reasons: 1) the species are highly motile, 2) the species occur in habitat (e.g., trees) that makes detection difficult, and 3) finding dead or moribund bats is unlikely due to a small body size and the likely scavenging of specimens by predators. However, we believe the level of take of these species can be monitored by tracking the level of habitat modification and adherence to avoidance and conservation measures.

Specifically, if the avoidance and conservation measures are not implemented, or if the current anticipated level of habitat loss is exceeded, we fully expect the level of incidental take to increase as well. Hence, we will monitor the level of incidental take (1) using the number of acres, and (2) by monitoring the implementation and effectiveness of key conservation measures as indicated in the Terms and Conditions below.

Projects under CC3, as well as some projects under CC2, are the only projects anticipated to result in adverse effects to Indiana and northern long-eared bats. ODOT anticipates that up to 3,399 ha (8,400 acres) of SWH will be removed due to CC1, CC2, and CC3 projects combined over the next 10 years.

EFFECT OF THE TAKE

In the accompanying PBO, the USFWS determined that, based on the proposed project and full implementation of the avoidance and conservation measures described on pages 26-32 of this biological opinion, anticipated take is not likely to result in jeopardy to the species or destruction or adverse modification of critical habitat.

REASONABLE AND PRUDENT MEASURES

As described above, the level of take that occurs is greatly influenced by the implementation of the proposed avoidance and conservation measures. To minimize incidental take to the maximum extent feasible, we believe the following reasonable and prudent measures are necessary and appropriate:

1. The implementation status of all the proposed avoidance and conservation measures and mitigation efforts on projects that MALAA one or both of the federally listed bats (i.e., CC3 projects and some CC2 projects) needs to be monitored and clearly communicated to the USFWS on an annual basis.

2. ODOT must engage in section 7(a)(2) consultation for project-specific actions that are anticipated to cause take of either the Indiana bat or northern long-eared bat (i.e., projects that MALAA) under the programmatic action.

3. ODOT needs to ensure that the impacts of take associated with future Tier 2 project-specific actions are appropriately minimized. In addition, the exemption of incidental take must be appropriately documented under the Tier 2 consultation, and anticipated levels of incidental take under each Tier 2 consultation will not be exceeded nor will any new forms of take occur that were not anticipated in this Tier 1 biological opinion.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the ESA, ODOT must comply with the following terms and conditions, which implement the reasonable and prudent measures. These terms and conditions are non-discretionary.

Terms & Conditions Associated with RPM #1

1. ODOT will prepare an annual report detailing all conservation measures, mitigation efforts, and monitoring 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 USFWS COFO by 31 January each year (the first report will be due 1/31/17) and reporting will continue through 2026 with the final report due no later than 1/31/2027 or until otherwise agreed to with the USFWS.

Terms & Conditions Associated with RPM #2

2. ODOT will submit a Tier 2 consultation letter to USFWS, along with sufficient project information[14], for the Service's review and concurrence on any project a) that ODOT determines *may affect and is likely to adversely affect* the Indiana bat and/or northern long-eared bat, or b) which impacts one or both species of bats in a manner that has not been evaluated and addressed in this biological opinion.

Terms & Conditions Associated with RPM #3

3. To monitor the level of incidental take, ODOT will track and report to the USFWS via ODOT's Tier 2 consultation letter the amount of take (using acreage of SWH as a surrogate) from the project under consultation as well as the cumulative take, and whether:
    a. the proposed project will occur within 0.8 km (0.5 mi) of an Indiana bat hibernaculum or within 0.4 km (0.25 mi) of a northern long-eared bat hibernaculum;
    b. the proposed project will impact bats roosting on a bridge between October 1 and March 31 ***or*** will preclude bats from roosting in the future;
    c. the proposed project is totally or partially located within a bat buffer of any color (on the PC Bat Buffer Map)
    d. a bat survey was conducted[15] and Indiana bats were detected ***or*** presence of Indiana bats is being assumed;
    e. any SWH will be removed for the project beyond 30.5 m (100 ft) from EOP of the existing roadway and tree removal will occur during the bats' active season (summer at any site, or fall swarming at swarming sites);
    f. the proposed project is a new roadway or alignment;
    g. the project will remove:
        i. more than 0.1 ha (0.25 ac) of SWH within 15.2 m (50 ft) of a perennial stream; and/or
        ii. more than 0.4 ha (1 ac) of SWH (beyond 30.5 m (100 ft) from EOP) in the WMU; and/or
        iii. more than 0.8 ha (2 ac) of SWH (beyond 30.5 m (100 ft) from EOP) in the EMU; and/or
        iv. any PMRT(s) beyond 30.5 m (100 ft) from EOP; and/or

[14] See sections II.B.3. and II.C. in the 2015 Eco MOA.
[15] Specific results of the survey must be summarized in the letter if a bat survey was conducted.

v. any SWH within the construction limits during the bats' active season (summer at any site, or fall swarming at swarming sites)

4. ODOT will promptly reinitiate consultation with the USFWS if the cumulative total of SWH removal exceeds 3,399 ha (8,400 ac).

5. Any dead bats located within a project area, 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.

In conclusion, the USFWS believes that implementation of ODOT's Federal-Aid Transportation Program through January 31, 2026 will result in permanent loss of no more than 3,399 ha (8,400 ac) of summer roosting and foraging habitat for the Indiana bat throughout the State of Ohio. 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, the permanent loss of SWH will exceed 8,400 acres, this will trigger reinitiation of consultation and review of the reasonable and prudent measures provided. At that time ODOT must immediately provide an explanation of the causes of this additional habitat loss and review with the USFWS the need for possible modification of the reasonable and prudent measures.

REINITIATION NOTICE

This concludes Tier I formal consultation with ODOT on the implementation of their Federal-Aid Program through January 31, 2026. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if; (1) the amount or extent of habitat loss estimated in this PBO (i.e., 3,399 ha (8,400 ac) of SWH) is exceeded; (2) new information reveals effects of the agency action that may affect Indiana bats or northern long-eared bats or their critical habitat in a manner or to an extent not considered in this opinion; or (3) the agency action is subsequently modified in a manner that causes an effect to Indiana bats or northern long-eared bats or their critical habitat not considered in this opinion. In instances where the amount or extent of habitat loss is exceeded, any operations causing such take must cease pending reinitiation.

CONSERVATION RECOMMENDATIONS

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

1) In collaboration with the USFWS, ODOT will conduct or fund transportation-related research on bats.
2) ODOT will provide federal and State funding to staff a permanent full time transportation liaison(s) within the Service's Columbus Ohio Ecological Services Field Office (COFO).

3) ODOT will develop and implement a public information and outreach program to promote bat conservation.
4) ODOT will provide continued implementation of environmental training, including information about the Indiana and northern long-eared bat, of ODOT highway staff, project managers, contractors, and consultants.
5) ODOT will retain federally permitted bat biologists on staff that have detailed knowledge of the species, experience with their habitat needs, and who keep current on issues and research topics relevant to the bats who can continue to benefit and inform project and program-level decision making at ODOT.

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