



APPENDIX GG2

Tier 2 Biological Opinion

Tier 2 Environmental Impact Statement

I-69 Section 6

Martinsville to Indianapolis

TIER 2 BIOLOGICAL OPINION

for

SECTION 6

of the

PROPOSED

**INTERSTATE 69 (I-69) EXTENSION
FROM EVANSVILLE TO INDIANAPOLIS**

for the

FEDERALLY ENDANGERED INDIANA BAT

and the

**FEDERALLY THREATENED NORTHERN LONG-
EARED BAT**

traversing portions of

MORGAN, JOHNSON, and MARION COUNTIES, INDIANA

Submitted to the Federal Highway Administration

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Prepared by:

Robin McWilliams Munson
U.S. Fish and Wildlife Service
Indiana Field Office
620 S. Walker Street
Bloomington, IN 47403
(812) 334-4261

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EXECUTIVE SUMMARY

This document contains Tier 2 Biological Opinions for Section 6 of I-69 and tiers back to the Tier 1 Revised Programmatic Biological Opinion dated August 24, 2006 and its recent amendments (May 25, 2011 and July 2013) and the Biological/Conference Opinion for the northern long-eared bat (NLEB CO/BO) (included as Amendment 3 in April 2015) for the proposed extension of I-69 from Evansville to Indianapolis, Indiana. The Federal Highway Administration originally reinitiated formal consultation on Tier 1 of the proposed I-69 extension on March 7, 2006 and submitted an addendum to the original Biological Assessment (2003) that detailed significant new information regarding potential impacts to the Federally endangered Indiana bat (*Myotis sodalis*) that were not known or available for analysis during the original formal consultation period. Subsequently, on April 11, 2011, the Federal Highway Administration again reinitiated Tier 1 consultation based on new maternity colony information, as well as documentation of the newly discovered disease White Nose Syndrome within the action area. On May 25, 2011, the U.S. Fish and Wildlife Service issued an amendment to the August 24, 2006 Tier 1 Revised Programmatic Biological Opinion, including a revised Incidental Take Statement. In 2013, based on new impact and colony information, the Federal Highway Administration re-initiated consultation on Tier 1 of the project. The U.S. Fish and Wildlife Service issued a second amendment to the Tier 1 Revised Programmatic Biological Opinion on July 24, 2013. Finally, in October of 2014, the Federal Highway Administration submitted a Tier 1 Biological Assessment Addendum for the northern long-eared bat (*Myotis septentrionalis*) (NLEB) and requested a formal “Conference” for the species. The U.S. Fish and Wildlife Service issued a third amendment to the Tier 1 Revised Programmatic Biological Opinion in the form of a Conference Opinion for the northern long-eared bat in April of 2015; the Conference Opinion was adopted as a Biological Opinion in May 2015.

The effects associated with the proposed construction, operation, and maintenance of Section 6 of I-69 are within the scope of effects contemplated in the Tier 1 Revised Programmatic Biological Opinion (and its amendments) for the Indiana bat and the Conference Opinion/Biological Opinion (Amendment 3) for the northern long-eared bat. Upon evaluation of the proposed project, we believe incidental take of Indiana bats and northern long-eared bats in the Section 6 Action Area is likely, but the impact of such taking is not likely to jeopardize the continued existence of the Indiana bat or the northern long-eared bat. No Critical Habitat for either species is designated within the Section 6 action area. A Tier 2 Incidental Take Statement for Section 6 has been included at the end of this Biological Opinion with its non-discretionary Reasonable and Prudent Measures and associated Terms and Conditions to further minimize the incidental take of Indiana and northern long-eared bats in Section 6.

INTRODUCTION

This document transmits the U.S. Fish and Wildlife Service's (Service or USFWS) Tier 2 Biological Opinion (BO) for Section 6 of the proposed Interstate 69 (I-69) project. The Service's Indiana Field Office (INFO) received the Federal Highway Administration's (FHWA) Tier 2 Biological Assessment (BA; dated June 6, 2017) for Section 6 on June 9, 2017 along with a letter requesting the Service to initiate formal consultation on the proposed construction, operation, and maintenance of Section 6 of I-69 from Indianapolis to Evansville, Indiana and its effects on the federally endangered Indiana bat (*Myotis sodalis*) and federally threatened northern long-eared bat (*Myotis septentrionalis*) (NLEB).

The original formal consultation for Tier 1 of I-69 was concluded with the issuance of the Service's Programmatic BO (PBO) on December 3, 2003. On March 7, 2006, the FHWA requested to reinitiate formal consultation for the Indiana bat and submitted a very thorough and updated Tier 1 BA Addendum that detailed additional impacts to Indiana bats stemming from significant new information regarding this species' presence and abundance within the project's action areas, as revealed during Tier 2 field studies. The Service's August 24, 2006 Revised Tier 1 Programmatic BO (RPBO) replaced the December 3, 2003 PBO. On April 11, 2011 the FHWA again requested to reinitiate formal consultation for Tier 1 based on new maternity colony information and documented presence of the devastating disease White Nose Syndrome (WNS). The USFWS issued an amendment to the 2006 Tier 1 RPBO on May 25, 2011, which included an updated Incidental Take Statement. On July 24, 2013, another amendment (#2) to the Tier 1 RPBO, along with an updated Incidental Take Statement, was issued. Most recently, in October of 2014, the FHWA submitted a Tier 1 BA Addendum for the northern long-eared bat (NLEB) and requested a formal "Conference" for the species. The USFWS issued a third amendment to the Tier 1 RPBO in the form of a Conference Opinion (CO) for the NLEB in April of 2015; the CO was adopted as a Biological Opinion in May 2015.

This Tier 2 BO for Section 6 of I-69 is prepared in accordance with Section 7 of the Endangered Species Act (ESA or the Act) of 1973, as amended (16 U.S.C. 1531 et seq.) and is the culmination of formal Section 7 consultation under the Act. The purpose of formal Section 7 consultation is to insure that any action authorized, funded, or carried out by the Federal government is not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of any officially designated critical habitat of such species. This Tier 2 BO covers the proposed actions of the FHWA, as this agency will partially fund the road construction associated with this project. To reduce redundancy between the Tier 1 RPBO (dated August 24, 2006 and amended May 25, 2011, July 24, 2013, and April 1, 2015) and this section-specific Tier 2 BO, the Service has incorporated portions of the Tier 1 RPBO and its recent amendments by reference in this Tier 2 BO. Similarly, portions of the Tier 2 Biological Assessment (Tier 2 BA) for Section 6 have been incorporated by reference in this Tier 2 BO.

This BO includes a separate discussion each for the Indiana bat and the northern long-eared bat. Even though the two bat species are similar in habitat, feeding, roost tree selection and their maternity colonies overlap, they differ in Summer Action Areas (SAAs), capture sites, roost tree locations, and impacts (e.g., direct, indirect and cumulative). Where appropriate, and to avoid redundant text, references to earlier parts of the Opinion, as well as previous Tier 1 and Tier 2 opinions and amendments, may be incorporated.

The Section 6 Tier 2 BO is primarily based on information provided from the following sources:

- 1) Tier 1 BA (dated July 18, 2003, revised October 27, 2003; prepared by Bernardin-Lochmueller and Associates, Inc.),
- 2) Tier 1 BA Addendum (dated March 7, 2006; prepared by BLA),
- 3) Tier 1 Revised Programmatic BO (RPBO) dated August 24, 2006,
- 4) Tier 2 Draft Environmental Impact Statement (DEIS) for Section 6 (dated March, 2017),
- 5) Tier 2 BA for Section 6 (dated June 6, 2017),
- 6) Indiana Bat (*Myotis sodalis*) Draft Recovery Plan: First Revision (dated April 2007),
- 7) Reports and scientific literature on Indiana bat research conducted in the action area and elsewhere,

- 8) Meetings, phone calls, e-mails, other written correspondence with FHWA, INDOT, and their consultants. A limited number of field visits and site investigations were also conducted by personnel from the Service's INFO,
- 9) Tier 1 RPBO amendment (dated May 25, 2011)
- 10) Tier 1 RPBO amendment #2 (dated July 24, 2013), and
- 11) Tier 1 RPBO amendment #3 (Conference Opinion for the NLEB dated April 1, 2015)

In conducting our Tier 2 evaluation, we determined whether (1) Section 6 of the proposed project falls within the scope of the I-69 amended Tier 1 RPBO, (2) the effects of this proposed action are consistent with those anticipated in the amended Tier 1 RPBO, and (3) the appropriate Terms and Conditions associated with the Reasonable and Prudent Measures identified in the amended Tier 1 Incidental Take Statement (ITS) are being adhered to (See Appendix A of this document and page 6-20 of the Section 6 Tier 2 BA for the list of conservation measures). This document serves as the Tier 2 BO for Section 6 of the I-69 Project. As such, it also provides the anticipated level of incidental take and a cumulative tally of incidental take that has been exempted under the amended Tier 1 RPBO.

Road construction that will occur as part of this proposed project will also require a federal permit(s) from the U.S. Army Corps of Engineers (COE). However, issuance of the COE permit will not result in any impacts to Indiana bats beyond those addressed in this consultation with the FHWA. Therefore, the Service intends to provide a copy of this BO to the COE (and the Environmental Protection agency, Indiana Department of Environmental Management, and Indiana Department of Natural Resources) to demonstrate that the FHWA has fulfilled its obligations under Section 7 of the Act to consult with the Service for Section 6 of the project.

CONSULTATION HISTORY

The proposed action has a background that encompasses several decades of planning and environmental studies by INDOT and is outlined in Chapter 1 of the Tier 1 Final Environmental Impact Statement (FEIS), and the Tier 2 DEIS for Section 6 of the I-69 Project. A chronological summary of important consultation events and actions associated with this project is presented in the Section 6 Tier 2 BA (pg. 1-3) and is hereby incorporated by reference. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action (*e.g.*, highway construction and associated development) is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action.

BIOLOGICAL OPINION

I. DESCRIPTION OF THE PROPOSED ACTION

The Federal Highway Administration (FHWA) and the Indiana Department of Transportation (INDOT) are proposing to construct a 142-mile extension of I-69 from Evansville to Indianapolis, Indiana. A detailed discussion of the whole project is contained in the Tier 1 RPBO. The Alternative 3C corridor selected in Tier 1 was divided into six (6) sections for the Tier 2 NEPA process:

1. From I-64 (near Evansville) via the SR 57 corridor to SR 64 (near Princeton/Oakland City)
2. From SR 64 (near Princeton/Oakland City) via the SR 57 corridor to US 50 (near Washington)
3. From US 50 (near Washington) via the SR 57 corridor and cross country to US 231 (near the Crane Division, Naval Surface Warfare Center (NSWC Crane))
4. From US 231 (near NSWC Crane) via cross country to SR 37 (south of Bloomington)
5. From SR 37 (south of Bloomington) via SR 37 to just south of SR 39 (Martinsville)
6. From SR 39 (Martinsville) via SR 37 to I-465 (Indianapolis)

Due to a lag in time, changed local conditions, and the potential for increased impacts, a new scoping and screening process was initiated in October 2014 to select the route for I-69 in Section 6. In 2016, the SR 37 corridor was confirmed as the preferred route for I-69 Section 6, consistent with Alternative C originally identified in Tier 1. This route has recently been refined and is now referred to as the refined preferred alternative (RPA).

This Tier 2 BO for Section 6 of I-69 considers impacts associated with FHWA's and INDOT's refined preferred alternative to construct, operate, and maintain a new interstate facility within the Alternative 3C corridor in Morgan, Johnson, and Marion Counties, Indiana (Figure 1, page 8). The Proposed Action for Section 6 of I-69 includes the following:

1. Alternative C4 (as described in the DEIS and recently refined) is the preferred alternative. The refined preferred alternative could be further refined in the FEIS to reduce impacts and select a final interchange design at Southport Road.
2. Upgrading approximately 27 miles of an existing, multi-lane, divided transportation facility (SR 37) just south of SR 39 south of Martinsville in Morgan County to I-465 in Indianapolis, Marion County (see Section 6 BA or DEIS for specifications and typical cross-sections).
3. Construction of turn-arounds and new access roads along the length of the project. Approximately 18 miles of new access roads will be developed. (See Section 6 DEIS for details)
4. Use of 2,07 acres of right-of-way (ROW) of which 1,047 acres is existing ROW;
5. Mechanical clearing/grubbing/demolition of existing forest/vegetation and man-made structures from right-of-way. Some construction-related debris may be burned on-site.
6. INDOT contractors following safeguards established in INDOT's Standard Specifications (Section 203.08 Borrow or Disposal) that include obtaining

required permits, and identifying and avoiding or mitigating impacts at borrow/disposal sites that contain wetlands or archaeological resources. Special Provisions will also include prohibiting tree clearing from April 1 to September 30 within the Summer Action Areas (SAAs), as identified in the Tier 2 BA for Section 6, and prohibiting the filling of wetlands outside the construction limits.

7. Clearing of approximately **158** acres of upland forest and **2** acres of forested wetlands (>3" diameter-at-breast height/DBH) from the right-of-way (ROW) while Indiana bats are not present [*i.e.*, between 1 October and 31 March (SAA)]
8. Relocating numerous utilities and billboards that are situated within the right-of-way. Based on the estimated location of these anticipated relocations, and the adjacent land uses, forest impacts from utility relocations are expected to be about **43** acres and billboards, **10** acres.
9. Filling/converting of approximately 7 acres of wetlands, including emergent (1.9 ac.), forested (1.7 ac.), scrub-shrub (0.4 ac.), and open water ponds (2.8 ac.)
10. Impacting approximately 47,000 linear feet of stream habitat (perennial, ephemeral, and intermittent).
11. Constructing/upgrading nine interchanges: SR 39, Ohio Street, SR 252/SR44, Henderson Ford Road, SR 144, Smith Valley Road, County Line Road, Southport Road and I-465.
12. Rehabilitating or reconstructing numerous stream crossings including bridges, 3-sided structures, culverts, etc. Some new structures will be required for interchange ramps and access roads. Detailed design information is not available until the final design phase, after the Final EIS and Record of Decision (ROD).
13. Constructing approximately 13 overpasses/grade separations (see list in Tier 2 BA, page 2-8).
14. Relocating 142 residential dwellings, 81 commercial businesses, 28 apartment units, 9 mobile homes, 8 duplex units, 1 fire station, and 2 non-profit.
15. Incorporating and/or maintaining wildlife crossings. [REDACTED] and the [REDACTED] will continue to provide wildlife crossing corridors. Other bridges and larger culverts will also provide additional crossing opportunities for smaller wildlife. Natural bottoms for box culverts will be used for crossings where feasible.
16. Installation of lighting at least 40 feet above the highway in order to avoid collisions between bats and vehicles. Lighting locations will be identified during final design. Lighting is anticipated at interchanges as well as along the mainline in highly developed areas.
17. Revegetating disturbed areas in accordance with INDOT standard specifications. Woody vegetation will only be used at a reasonable distance beyond the clear zone to ensure a safe facility. Revegetation of disturbed soils in the right-of-way, interchange areas, and medians will utilize native grasses and native wildflowers, where practical.

18. Implementing all mitigation and “Conservation Measures” detailed in the Tier 1 RPBO and its amendments. A summary table of the I-69 Conservation Measures is provided in Appendix A.
19. Proposed mitigation for impacts to forests and wetlands in Section 6 are as follows:

<u>Required Mitigation (ac.)*</u>	<u>Description</u>	<u>Theme</u>
173.58**	Upland forest	Replacement (1:1)
347.16**	Upland forest	Preservation (2:1)
5.10	Forested wetland	Replacement (3:1)
5.70	Emergent wetland	Replacement (3:1)
1.17	Scrub-Shrub wetland	Replacement (3:1)
47,253 linear feet	Stream Channel	Replacement

Total: 532.71* acres (also another 2.8 ac of open water mitigation)

* Required forest mitigation acreage includes a 10% buffer over projected impacts. Impact amounts and required mitigation amounts will continue to be refined in the FEIS and design phase and are expected to further decrease. Most wetland mitigation based on 3:1 and is estimate. Open water is assumed 1:1.

**Forest mitigation commitment 3:1 with a minimum of 1:1 replacement and the remaining in preservation; currently approximately 533 ac. of forest replacement and 709 ac. of forest preservation are currently being pursued. Final mitigation acreages will be based on final impacts.

- INDOT will monitor and oversee maintenance of Section 6 mitigation lands while they are being established. INDOT will monitor forest mitigation lands for a minimum of 10 years.
- Operation of the interstate will occur in phases as construction of sections and subsections are completed. Local access and traffic volumes and patterns will change over time as portions of I-69 become operational. Assuming all sections of I-69 are completed by the year 2045 as non-toll facilities, then traffic on some local roadways will appreciably decrease and in some instances increase (see DEIS chapter 5.6).
- Section 6 of I-69 will be operated as a non-toll facility and thus no toll readers or other toll-collecting infrastructure will be installed along the interstate.
- Maintenance of the interstate will include the removal and disposal of roadkilled animals and trash, snow plowing, application of road salt and/or sand, and maintenance and mowing of right-of-ways.
- Over time, all sections of I-69 will need to be resurfaced/repaved and bridges will need to be repaired or replaced.

Project Schedule

Construction for Section 6 has been scheduled to begin in 2020.

Mitigation

Upland forests impacted by the I-69 Evansville-to-Indianapolis project will be mitigated at a 3:1 ratio. This commitment, made in the Tier 1 FEIS and reaffirmed in the Tier 1 ROD, considers upland forests as all those not classified as wetlands. Mitigation may be in the form of planting unforested areas (with a minimum goal of 1 to 1 replacement) and/or protecting existing forests by fee simple purchase, permanent protective easements, or a combination of actions with a maximum goal of 2 to 1 protective measures or preservation. The 3:1 ratio will be achieved for the overall I-69 Evansville-to- Indianapolis project; the ratio for an individual Tier 2 section could be higher or lower than 3:1.

Currently, INDOT has identified 12 willing property owners and one landlocked site (totaling 1,317.3 acres of upland forest) for upland forest preservation and/or reforestation. At this time, INDOT is in the early stages of the acquisition process.

INDOT will be responsible for monitoring and maintaining the mitigation areas while they are being established, as well as addressing long-term management for sites currently without an identified steward. Table 4 provides a list of the properties being pursued as well as the breakdown of anticipated mitigation acreage for each site. See the Section 6 Tier 2 BA for detailed descriptions, photos, maps and other information for each mitigation site.

Action Area

“Action area” is defined by regulation as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR § 402.02). The action area is not limited to the “footprint” of the action nor is it limited by the Federal agency’s authority. Rather, it is a biological determination of the reach of the biological, chemical and physical impacts associated with the proposed action.

In the Tier 1 Section 7 consultation process, the FHWA, INDOT and the USFWS Bloomington Indiana Field Office jointly developed two seasonally based action areas for the Indiana bat. The summer impact area is referred to as the Summer Action Area (SAA) and the winter impact area is referred to as the Winter Action Area (WAA). The SAA for the Indiana bat has been generally defined as a 5-mile band, 2.5 miles either side of the centerline of Alternative 3C (including the maternity colony areas), that runs the entire length of the proposed project. The WAA for Indiana bats is the total area that falls within a 5-mile radius centered on each of the known Indiana bat hibernacula that have entrances located within 5 miles of the proposed 3C corridor because indirect effects to swarming bats could reach that distance.

As with the Indiana bat, during the Tier 1 Section 7 consultation process, the FHWA, INDOT and the USFWS Bloomington Field Office (INFO) jointly developed two seasonally based action areas for the northern long-eared bat; the summer impact area is referred to as the Summer Action Area (SAA) and the winter impact area is referred to as the Winter Action Area (WAA). The SAA for the northern long-eared bat has been generally defined as a 3-mile band, 1.5 miles either side of the centerline of the refined preferred alternative (including any maternity colony areas that fall within all or part of the 1.5 mile band), that runs the entire length of the proposed project.

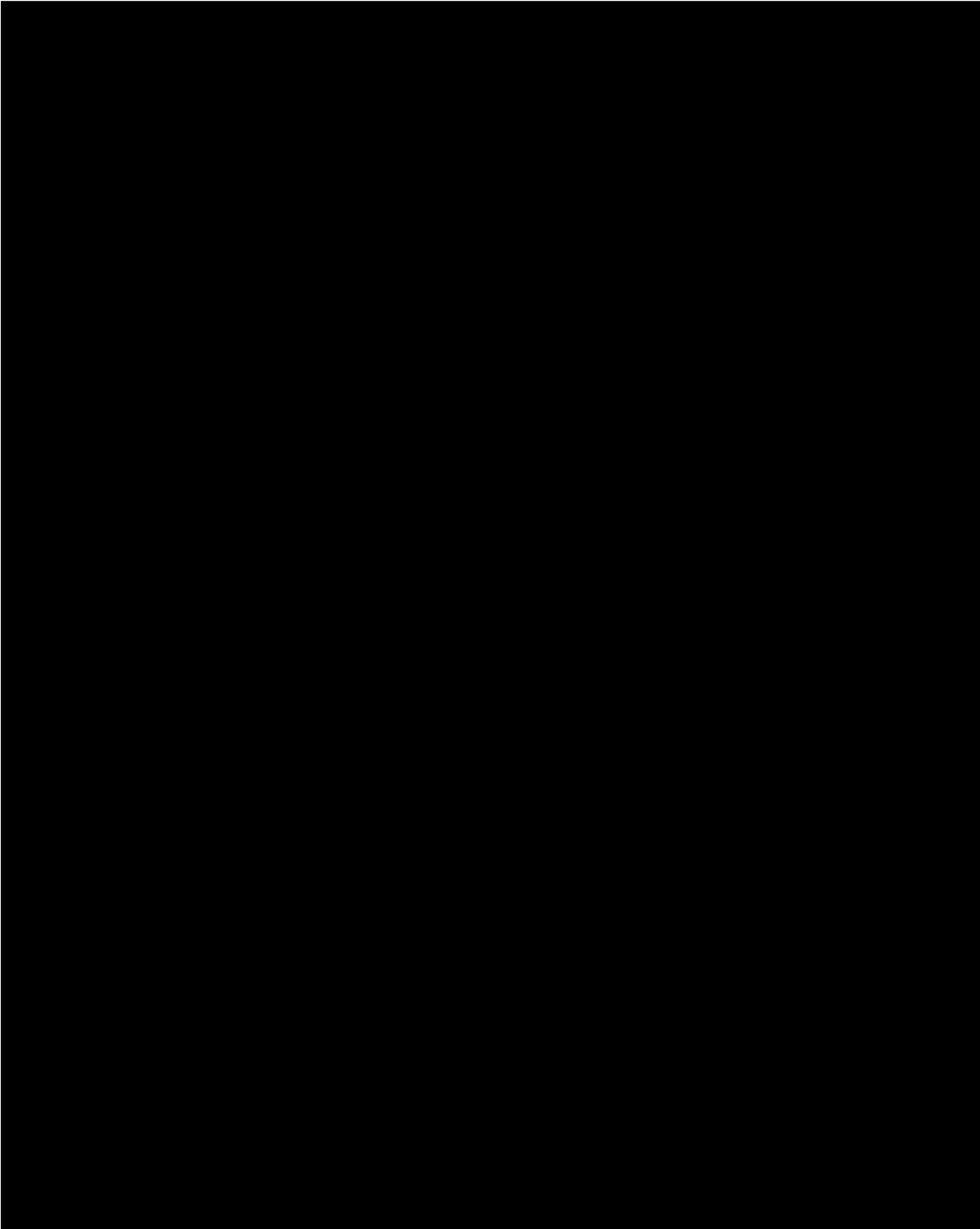


Figure 1. Refined preferred alignment for Section 6 of I-69, Indiana bat maternity colony areas, northern long-eared bat maternity colonies and the Section 6 Expanded Summer Action Area (which together make up the formal Action Area).

The Tier 2 SAA has been expanded to include all areas where indirect development was forecasted contiguous with the SAA based on the induced growth expectations in TAZs (Traffic Analysis Zones). The summer action area (SAA) has been recently updated based on reasonably foreseeable indirect/induced growth predicted in the I-69 Section 6 Tier 2 DEIS. Section 6 is entirely outside the WAA and therefore no analysis of the WAA will be performed.

See page 32 of the Tier 1 RPBO for a detailed discussion of the I-69 Action Area and pages 3-5 through 3-8 of the Section 6 Tier 2 BA for additional rationale behind the expanded Action Areas for Section 6.

Analytical Framework for Jeopardy Determinations

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

II. STATUS OF THE SPECIES

Indiana Bat

Indiana bat species description, life history, population dynamics, status and distribution and threats are fully described on pages 38-54 of the Tier 1 RPBO, and are hereby incorporated by reference. Since the completion of the Tier 1 RPBO in 2006, species information and population data continues to be updated. Much of this more recent information is reflected in the recent amendments to the Tier 1 RPBO (dated May 25, 2011 and July 24, 2013); following is a brief summary of this more recent information, as well as the most current population estimate for the species.

On 15 April 2007, the Service released the *Indiana Bat (Myotis sodalis) Draft Recovery Plan: First Revision* (USFWS 2007), which contains a summary of the current status of the Indiana bat. In addition, the Bloomington Field Office (INFO) completed a 5-Year Review of the Indiana bat (USFWS 2009), which summarizes the status of the species, progress towards recovery, and remaining threats to the bat. The review found that the required recovery criteria for the Indiana bat had not been achieved and thus it should remain at its current 'endangered' status. The Recovery Priority Number for the Indiana bat was changed from "8" to "5", reflecting a species that currently faces a high degree of threat and has a low recovery potential. Both the draft recovery plan and 5-Year Review are available on the Service's Indiana bat

website at <http://www.fws.gov/midwest/Endangered/mammals/inba/index.html> and are hereby incorporated by reference.

The USFWS INFO has collated the most recent population data gathered during 2017 biennial winter hibernacula surveys throughout the range. This draft information represents the best available data at this time and includes population information for a recently discovered (2012) hibernaculum which has resulted in the addition of over 120,000 Indiana bats to the population estimate. Based on the 2017 surveys, it was determined that the Indiana bat's current range-wide population stands at approximately 530,705 bats, which is a decrease over the 2015 range-wide population estimate of 550,207 (USFWS, unpublished data, 2017). (Prior to 2009, the range-wide, biennial population estimates had been increasing since at least 2001, indicating that the species' long-term decline had been, at least temporarily, arrested and likely reversed (USFWS, unpublished data, 2010). The observed range-wide decline in is partly attributable to the disease White-Nose Syndrome, especially for decreased population estimates in the Northeast). In 2017, an estimated 34% of the range-wide population of Indiana bats hibernated in caves within the bat's namesake state of Indiana. The species' range-wide, regional, state, and hibernacula-specific population trends are being closely monitored by the INFO.

Given the 2017 range-wide Indiana bat population estimate of 530,705, we assume that there are approximately 3,317 to 4,423 maternity colonies throughout the species' entire range [assuming a 50:50 sex ratio (Humphrey et al. 1977) with an average maternity colony size of 60 to 80 adult females (Whitaker and Brack 2002)]. As of publication of the Indiana Bat Draft Recovery Plan (USFWS 2007), we had records of 269 maternity colonies in 16 states that were considered locally extant. Based on the assumptions above, those colonies represent only 6% to 8% of the assumed number of maternity colonies in existence.

Recovery Efforts

The existing recovery program for the Indiana bat focuses on protection of hibernacula (USFWS 1983). The proposed recovery program has four broad components: 1) range-wide population monitoring at the hibernacula with improvements in census techniques; 2) conservation and management of habitat (hibernacula, swarming, and to a degree, summer); 3) further research into the requirements of and threats to the species; and 4) public education and outreach (USFWS 2007). This recovery program continues to have a primary focus on protection of hibernacula but also increases the focus on summer habitat and proposes use of Recovery Units to establish and focus recovery efforts.

Recovery Units

The Service's proposed delineation of Recovery Units (RUs) relied on a combination of preliminary evidence of population discreteness and genetic differentiation, differences in population trends, and broad-level differences in macro-habitats and land use (USFWS 2007). The Indiana Bat Draft Recovery Plan proposes four RUs (Figure 2) for the species: Ozark-Central, Midwest, Appalachian Mountains, and Northeast (USFWS 2007). The proposed project lies entirely within the Midwest RU. The 2017 Indiana bat population estimate for the Midwest RU is 243,402. This was a decrease from the 2015 estimate (257,748), as well as a decrease from 2009 (281,977) (when current survey techniques were established). Over the last 10 years the Midwest Recovery Unit has seen an overall decrease in the Indiana bat population, much of which may be attributed to the onset of WNS in the Midwest Recovery Unit.

Indiana Bat Status in Indiana

Historic hibernating population levels in Indiana were comprehensive enough to estimate on a statewide level for the first time in 1981, resulting in an estimate of 151,676 hibernating bats (USFWS, unpublished data, 2010). Since that time, the statewide estimate fell to a low of 104,680 bats in 1985 and then rose steadily through 2007 when it reached 238,068 bats. In 2011, the state-wide population was estimated to be 225,477. The most recent survey data for Indiana indicates approximately 180,583 bats are hibernating in the state, indicating a continued downward trend. In 2017, Indiana's 37 hibernacula harbored approximately 34% of the range-wide population of Indiana bats and approximately 74% of the Midwest Recovery Unit population.

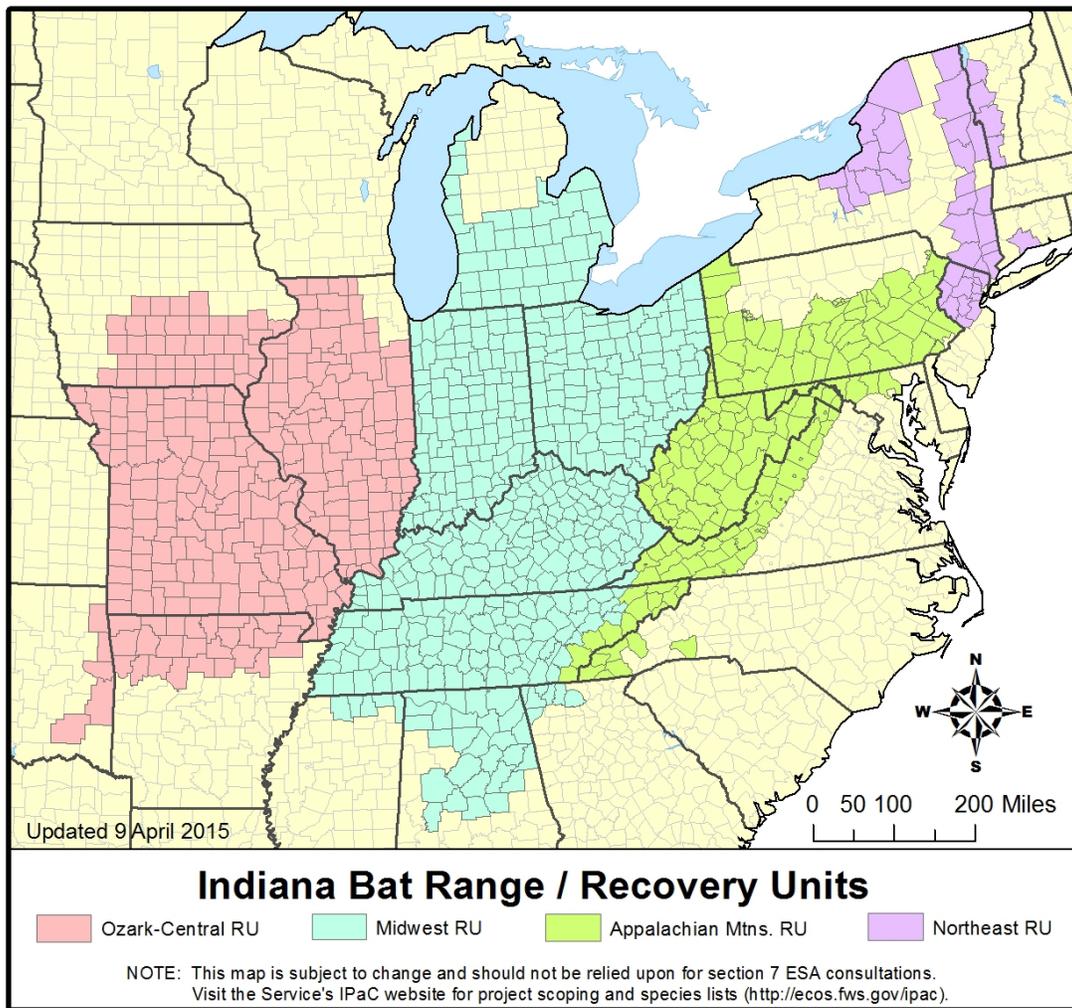


Figure 2. Indiana bat Recovery Units and range map.

The State's two most populous Indiana bat hibernacula are ██████████ (n=68,681 bats in 2017) and ██████████ (n=50,680 bats in 2017), which are both located in southern Indiana approximately ██████████ from the I-69 project corridor. ██████████ near ██████████ IN is a close third with 31,503 hibernating bats reported this past winter. The status of Indiana bats in Indiana greatly influences the status of the species within the Midwest RU and rangewide.

Recent Threats

Since its listing, a new threat has emerged with serious implications for the well-being of North American bats, including the Indiana bat. White-Nose Syndrome was first documented in a photograph taken in a New York cave in February 2006. Since that time, sites in 31 states (New York, Massachusetts, Delaware, Vermont, New Hampshire, Maine, Connecticut, Virginia, West Virginia, Pennsylvania, New Jersey, Maryland, Missouri, Tennessee, North Carolina, Indiana, Ohio, Alabama, Georgia, Illinois, South Carolina, Minnesota, Texas, Washington, Nebraska, Iowa, Arkansas, Mississippi, Oklahoma, Michigan, and Kentucky) and five Canadian provinces (Ontario, Quebec, Prince Edward Island, Nova Scotia, and New Brunswick) have been documented with WNS, including over 50 known Indiana bat hibernacula (Figure 3). In some affected hibernacula in New York and New England, 90 to 100 percent of the bats have died. Some scientists estimate that WNS has killed more than 5.7 million hibernating bats. The Northeast Recovery Unit population of Indiana bats suffered an approximate 70% decline (loss of at least 37,703 bats, primarily in New York) between 2007 and 2011 (USFWS unpublished data 2012), much of which is attributed to WNS. Ongoing surveys indicate that numbers continue to decline.

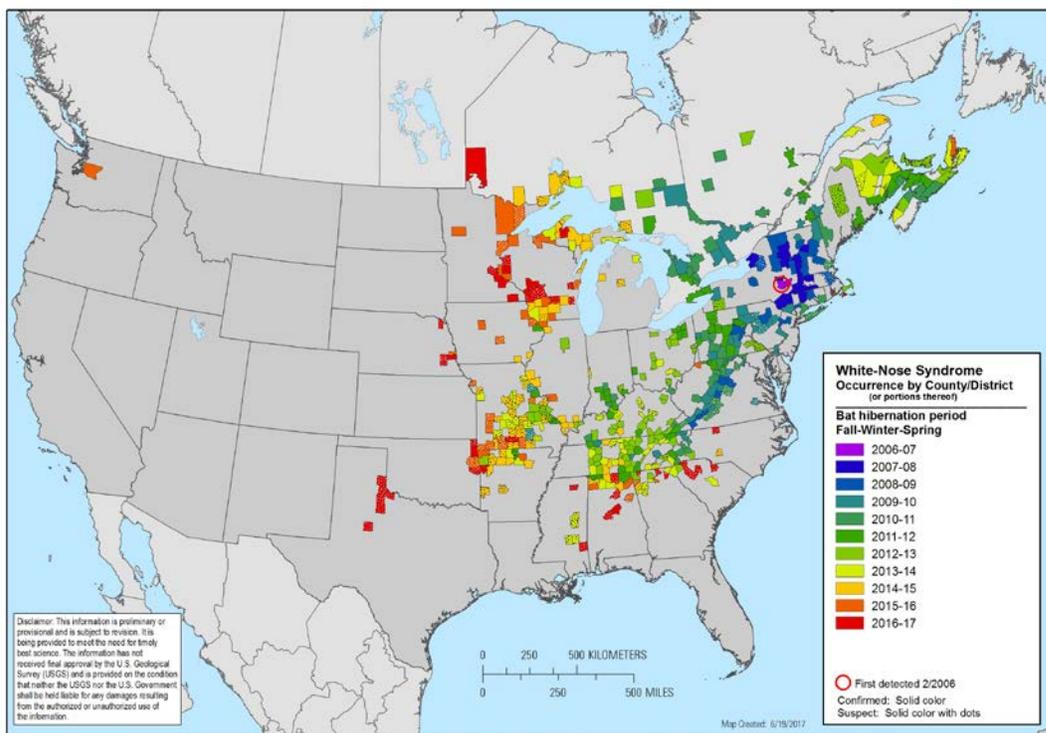


Figure 3. Geographic Distribution of White Nose Syndrome as of June 19, 2017 (www.whitenosesyndrome.org website accessed 07-09-2017).

WNS has been characterized as a condition primarily affecting hibernating bats. Affected bats usually exhibit a white fungus on their muzzles and often on their wings and ears as well (Blehert *et al.* 2009). Some affected bats may display abnormal behavior including flying during the day and in cold weather (before insects are available for foraging) and roosting towards a cave's entrance where temperatures are much colder and less stable. Many of the affected bats appear to have little-to-no remaining fat reserves which are necessary to survive until spring emergence. The fungus associated with WNS has been identified as *Pseudogymnoascus destructans*, or Pd, (formerly *Geomyces destructans*). The fungus thrives in

the cold and humid conditions of bat hibernacula. All of the possible modes of transmission are not currently known, although biologists suspect it is primarily spread by 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 their clothing and gear. Interestingly, Pd has been documented growing on hibernating bats in several European countries, but the fungus does not appear to be causing widespread mortality there (Puechmaille *et al.* 2010). Within the U.S., WNS has been confirmed in the Indiana bat, little brown bat, small-footed bat, northern long-eared bat, gray bat, tricolored bat, southeastern bat, Yuma bat and big brown bat. The Pd fungus has also been detected on six additional bat species: the cave myotis, eastern red bat, silver-haired bat, Rafinesque's big-eared bat, Virginia big-eared bat, and Townsend's big-eared bat.

WNS has been documented in all four recovery units (RUs). The Midwest RU is comprised of the states of Indiana, Kentucky, Ohio and portions of Alabama, Georgia, Michigan and Tennessee. WNS has been present in the state of Indiana for the past seven winters, and Indiana's hibernating population of Indiana bats continues to slowly decline.

There are many factors regarding WNS that remain unknown including if there are species' and/or regional differences in susceptibility and mortality rates, how long symptoms may take to manifest, and the long-term population effects. Meanwhile, the Service, States and multiple researchers are continuing to learn more about the disease and options for minimizing its spread and impacts. We believe the disease will continue to spread throughout the regions within the next several winters, with some level of mortality continuing to occur. For more information on WNS, go to: <http://whitenosesyndrome.org/>.

Lastly, there is growing concern that Indiana bats (and other bat species) may be threatened by the recent surge in construction and operation of wind turbines across the species' range. Until the fall of 2009, no known mortality of an Indiana bat had been associated with the operation of a wind turbine/farm. The first documented wind-turbine mortality event occurred during the fall migration period in 2009 at a wind farm in Benton County, Indiana. Since that time, one additional Indiana bat death has been documented. The Service is now working with wind farm operators to avoid and minimize incidental take of bats and assess the magnitude of the threat. There are no known wind farms within the I-69 project area. For more information see <https://www.fws.gov/Midwest/endangered/permits/hcp/r3wind/index.html>.

Northern Long-eared Bat

The Service published its decision to list the northern long-eared bat (NLEB) as a threatened species on April 2, 2015 (80 FR 17974-18033) and the effective date of this final rule was May 4, 2015. The final rule determined that critical habitat designation for the NLEB was not determinable at the time. The following information on NLEB species description, life history, biology, threats, distribution, and overall status is taken from the rule. Additional details can be found in the rule as well.

Species Description

The NLEB is a medium-sized bat species with an adult body weight averaging five to eight grams (0.2 to 0.3 ounces). Females tend to be slightly larger than males (Caceres and Pybus 1997 *in* USFWS 2015). Average body length ranges from 77 to 95 mm (3.0 to 3.7 in), tail length between 35 and 42 mm (1.3 to 1.6 in), forearm length between 34 and 38 mm (1.3 to 1.5 in), and

wingspread between 228 and 258 mm (8.9 to 10.2 in) (Caceres and Barclay 2000 and Barbour and Davis 1969 *in* USFWS 2015). Pelage (fur) colors include medium to dark brown on its back, dark brown, but not black, ears and wing membranes, and tawny to pale-brown fur on the ventral side (Nagorsen and Brigham 1993 and Whitaker and Mumford 2009 *in* USFWS 2015). As indicated by its common name, the northern long-eared bat is distinguished from other *Myotis* species by its long ears (average 17 mm (0.7 in); Whitaker and Mumford 2009 *in* USFWS 2015) that, when laid forward, extend beyond the nose but less than five mm (0.2 in) beyond the muzzle (Caceres and Barclay 2000 *in* USFWS 2015). The tragus (projection of skin in front of the external ear) is long (average 9 mm (0.4 in); Whitaker and Mumford 2009 *in* USFWS 2015), pointed, and symmetrical (Nagorsen and Brigham 1993 and Whitaker and Mumford 2009 *in* USFWS 2015).

Life History

Habitat

Winter habitat - The northern long-eared bat predominantly overwinters in hibernacula that include caves and abandoned mines. Hibernacula used by northern long-eared bat are typically large, with large passages and entrances (Raesly and Gates 1987 *in* USFWS 2015), relatively constant, cooler temperatures (0 to 9 degrees C (32 to 48 degrees F)) (Raesly and Gates 1987, Caceres and Pybus 1997, and Brack 2007 *in* USFWS 2015), with high humidity and no air currents (Fitch and Shump 1979, Van Zyll de Jong 1985, Raesly and Gates 1987, and Caceres and Pybus 1997 *in* USFWS 2015). The northern long-eared bat is typically found roosting in small crevices or cracks in cave or mine walls or ceilings, often with only the nose and ears visible.

Caire *et al.* (1979) and Whitaker and Mumford (2009) (cited in USFWS 2015) commonly observed individuals exiting caves with mud and clay on their fur, suggesting the bats were roosting in tighter recesses of hibernacula. They are also found hanging in the open, although not as frequently as in cracks and crevices (Barbour and Davis 1969 and Whitaker and Mumford 2009 *in* USFWS 2015). To a lesser extent, the northern long-eared bat has been found overwintering in other types of habitat that resemble cave or mine hibernacula (*e.g.*, abandoned railroad tunnels and storm sewer drains, wells, aqueducts, etc.) (Goehring 1954, Kurta and Teramino 1994, French 2011, pers. comm., and Griffin 1945 *in* USFWS 2015).

Summer habitat - During the summer, northern long-eared bats typically roost singly or in colonies underneath bark or in cavities or crevices of both live trees and snags. Male and non-reproductive female summer roost sites also may include cooler locations (*e.g.*, caves and mines) (Barbour and Davis 1969 and Amelon and Burhans 2006 *in* USFWS 2015). The northern long-eared bat also has been observed roosting in colonies in human-made structures (*e.g.*, buildings, barns, a park pavilion, sheds, cabins, under eaves of buildings, behind window shutters, and bat houses).

The northern long-eared bat appears to be somewhat flexible in tree roost selection, selecting varying roost tree species and types of roosts throughout its range (*e.g.*, black oak (*Quercus velutina*), northern red oak (*Quercus rubra*), silver maple (*Acer saccharinum*), black locust (*Robinia pseudoacacia*), American beech (*Fagus grandifolia*), sugar maple (*Acer saccharum*), sourwood (*Oxydendrum arboreum*), and shortleaf pine (*Pinus echinata*)) (Mumford and Cope 1964; Clark *et al.* 1987; Sasse and Pekins 1996; Foster and Kurta 1999; Lacki and Schwierjohann 2001; Owen *et al.* 2002; Carter and Feldhamer 2005; Perry and Thill 2007; and

Timpone *et al.* 2010 *in* USFWS 2015). The northern long-eared bat most likely is not dependent on a certain species of tree for roosts throughout their range; rather, certain tree species will form suitable cavities or retain bark suitable for their use (Foster and Kurta 1999 *in* USFWS 2015). A significant preference for dead or dying trees was reported for northern long-eared bats in Kentucky (Silvis *et al.* 2012, p. 3 *in* USFWS 2015), Illinois, and Indiana. The use of live trees versus snags may reflect the availability of such structures in study areas (Perry and Thill 2007 *in* USFWS 2015) and the flexibility in roost selection when there is a sympatric bat species present (*e.g.*, Indiana bat) (Timpone *et al.* 2010 *in* USFWS 2015).

The northern long-eared bat is typically found beneath loose bark or within cavities and has been found to use both exfoliating bark and crevices for summer roosting habitat.

Northern long-eared bat females typically roost in tall, large-diameter trees (Sasse and Pekins 1996 *in* USFWS 2015). Lacki and Schwierjohann (2001; cited *in* USFWS 2015) found northern long-eared bat roosts are located more often on upper and middle slopes than lower slopes, which suggests a preference for higher elevations due to increased solar heating.

Hibernation

Northern long-eared bats hibernate during the winter months to conserve energy from increased thermoregulatory demands and reduced food resources. In general, northern long-eared bats arrive at hibernacula in August or September, enter hibernation in October and November, and leave the hibernacula in March or April (Caire *et al.* 1979; Whitaker and Hamilton 1998; and Amelon and Burhans 2006 *in* USFWS 2015). Northern long-eared bats have shown a high degree of philopatry (using the same site multiple years) for a hibernaculum (Pearson 1962 *in* USFWS 2015), although they may not return to the same hibernaculum in successive seasons (Caceres and Barclay 2000 *in* USFWS 2015).

Typically, the northern long-eared bat is not abundant and comprises a small proportion of the total number of bats hibernating in a hibernaculum (Barbour and Davis 1969; Mills 1971; Caire *et al.* 1979; and Caceres and Barclay 2000 *in* USFWS 2015). Although usually found in small numbers, the species typically inhabits the same hibernacula with large numbers of other bat species, and occasionally are found in clusters with these other bat species. Other species that commonly occupy the same habitat include: little brown bat, big brown bat, eastern small-footed bat, tri-colored bat, and Indiana bat (Swanson and Evans 1936; Griffin 1940; Hitchcock 1949; Stones and Fritz 1969; and Fitch and Shump 1979 *in* USFWS 2015). Whitaker and Mumford (2009) (cited *in* USFWS 2015), however, infrequently found northern long-eared bats hibernating beside little brown bats, Indiana bats, or tri-colored bats, since they found few hanging on side walls or ceilings of cave passages. Barbour and Davis (1969) (cited *in* USFWS 2015) indicated that the species is rarely found in concentrations exceeding 100 individuals in a single hibernaculum.

Migration

While the northern long-eared bat is not considered a long-distance migratory species, short migratory movements (56 km (35 mi) to 89 km (55 mi)) occur between summer roost and winter hibernacula (Nagorsen and Brigham 1993 and Griffith 1945 *in* USFWS 2015). However, movements from hibernacula to summer colonies may range from 8 to 270 km (5 to 168 mi) (Griffin 1945 *in* USFWS 2015). Several studies show a strong homing ability of northern long-eared bat in terms of return rates to a specific hibernaculum, although bats may not return to the

same hibernaculum in successive winters (Caceres and Barclay 2000 *in* USFWS 2015). Banding studies in Ohio, Missouri, and Connecticut show return rates to hibernacula of 5.0 percent (Mills 1971), 4.6 percent (Caire *et al.* 1979 *in* USFWS 2015), and 36 percent (Griffin 1940 *in* USFWS 2015), respectively.

Summer roosting

Northern long-eared bats switch roosts often (Sasse and Perkins 1996 *in* USFWS 2015), typically every two – three days (Foster and Kurta 1999; Owen *et al.* 2002; Carter and Feldhamer 2005; and Timpone *et al.* 2010 *in* USFWS 2015). In Missouri, the longest time spent roosting in one tree was three nights. However, a maximum of 11 nights spent roosting in a human-made structure has been documented (Timpone *et al.* 2010 *in* USFWS 2015). Bats switch roosts for a variety of reasons, including, temperature, precipitation, predation, parasitism, and ephemeral roost sites (Carter and Feldhamer 2005 *in* USFWS 2015). Ephemeral roost sites, with the need to proactively investigate new potential roost trees prior to their current roost tree becoming uninhabitable (*e.g.*, tree falls over), may be the most likely scenario (Kurta *et al.* 2002; Carter and Feldhamer 2005; and Timpone *et al.* 2010 *in* USFWS 2015).

Roosts trees used by northern long-eared bats are often in fairly close proximity to each other within the species' summer home range. For example, in Missouri, Timpone *et al.* (2010)(cited *in* USFWS 2015) radio-tracked 13 northern long-eared bats to 39 roosts and found the mean distance between the location where captured and roost tree was 1.7 km (1.1 mi) (range 0.07–4.8 km (0.04–3.0 mi), and the mean distance traveled between roost trees was 0.67 km (0.42 mi) (range 0.05–3.9 km (0.03–2.4 mi)).

Some studies have found tree roost selection to differ slightly between males and females. Northern long-eared bat males have been found to more readily use smaller diameter trees for roosting than females, suggesting males are more flexible in roost selection than females (Lacki and Schwierjohann 2001 and Perry and Thill 2007 *in* USFWS 2015).

The northern long-eared bat is comparable to the Indiana bat in terms of summer roost selection, but appears to be more opportunistic (Carter and Feldhamer 2005 and Timpone *et al.* 2010 *in* USFWS 2015). In southern Michigan, northern long-eared bats used cavities within roost trees, living trees, and roosts with greater canopy cover more often than the Indiana bat, which occurred in the same area (Foster and Kurta 1999 *in* USFWS 2015). Similarly, in northeastern Missouri, Indiana bats typically roosted in snags with exfoliating bark and low canopy cover, whereas northern long-eared bats used the same habitat in addition to live trees, shorter trees, and trees with higher canopy cover (Timpone *et al.* 2010 *in* USFWS 2015). Although northern long-eared bats are more opportunistic than Indiana bats, there may be a small amount of roost selection overlap between the two species (Foster and Kurta 1999 and Timpone *et al.* 2010 *in* USFWS 2015).

Spring Staging

Spring staging for the northern long-eared bat is the time period between winter hibernation and spring migration to summer habitat. During this time, bats begin to gradually emerge from hibernation, exit the hibernacula to feed, but re-enter the same or alternative hibernacula to resume daily bouts of torpor (state of mental or physical inactivity) (Whitaker and Hamilton 1998, p. 80 *in* USFWS 2015). The staging period for the northern long-eared bat is likely short in duration (Whitaker and Hamilton 1998, p. 80 and Caire *et al.* 1979, p. 405, *in* USFWS 2015).

Variation in timing (onset and duration) of staging for Indiana bats was based on latitude and weather (Service 2007, pp. 39–40, 42 *in* USFWS 2015); similarly, timing of staging for northern long-eared bats is likely based on these same factors.

Fall Swarming

The swarming season fills the time between the summer and winter seasons (Lowe 2012, p. 50) and the purpose of swarming behavior may include: Introduction of juveniles to potential hibernacula, copulation, and stopping over sites on migratory pathways between summer and winter regions (Kurta *et al.* 1997, p. 479; Parsons *et al.* 2003, p. 64; Lowe 2012, p. 51; and Randall and Broders 2014, pp. 109–110 *in* USFWS 2015). For the northern long-eared bat, the swarming period may occur between July and early October, depending on latitude within the species' range (Fenton 1969, p. 598; Kurta *et al.* 1997, p. 479; Lowe 2012, p. 86; Hall and Brenner 1968, p. 780; and Caire *et al.* 1979, p. 405, *in* USFWS 2015).

Reproduction

Breeding occurs from late July in northern regions to early October in southern regions and commences when males begin to swarm hibernacula and initiate copulation activity (Whitaker and Hamilton 1998; Whitaker and Mumford 2009; Caceres and Barclay 2000; and Amelon and Burhans 2006 *in* USFWS 2015). Copulation occasionally occurs again in the spring (Racey 1982). Hibernating females store sperm until spring, exhibiting a delayed fertilization strategy (Racey 1979 and Caceres and Pybus 1997 *in* USFWS 2015); gestation is approximately 60 days (Kurta 1994 *in* USFWS 2015). Males are reproductively inactive until late July, with testes descending in most males during August and September (Caire *et al.* 1979 and Amelon and Burhans 2006 *in* USFWS 2015).

Maternity colonies, consisting of females and young, are generally small, numbering from 30 to 60 individuals (Whitaker and Mumford 2009 and Caceres and Barclay 2000 *in* USFWS 2015). However, one group of 100 adult females was observed in Vermilion County, Indiana (Whitaker and Mumford 2009 *in* USFWS 2015). In West Virginia, maternity colonies in two studies had a range of 7–88 individuals and 11–65 individuals, with a mean size of 31 (Owen *et al.* 2002 and Menzel *et al.* 2002 *in* USFWS 2015). Lacki and Schwierjohann (2001) (*in* USFWS 2015) found population size of colony roosts declined as summer progressed with pregnant females using the largest colonies (mean=26) and post-lactating females using the smallest colonies (mean=4), with the largest overall reported colony size of 65 bats. Other studies also found number of individuals within a maternity colony typically decreases from pregnancy to postlactation (Foster and Kurta 1999; Lacki and Schwierjohann 2001; Garroway and Broders 2007; Perry and Thill 2007; and Johnson *et al.* 2012 *in* USFWS 2015).

Adult females give birth to a single pup. Birthing within the colony tends to be synchronous, with the majority of births occurring around the same time (Krochmal and Sparks 2007 *in* USFWS 2015). Parturition (birth) likely occurs in late May or early June (Caire *et al.* 1979; Easterla 1968; and Whitaker and Mumford 2009 *in* USFWS 2015), but may occur as late as July (Whitaker and Mumford 2009 *in* USFWS 2015). Lactating and post-lactating females were observed in mid-June in Missouri (Caire *et al.* 1979 *in* USFWS 2015), July in New Hampshire and Indiana (Sasse and Pekins 1996 and Whitaker and Mumford 2009 *in* USFWS 2015), and August in Nebraska (Benedict 2004 *in* USFWS 2015). Juvenile volancy (flight) occurs by 21 days after parturition (Krochmal and Sparks 2007 and Kunz 1971 *in* USFWS 2015) and as early

as 18 days after parturition (Krochmal and Sparks 2007 *in* USFWS 2015). Adult longevity is estimated to be up to 19 years (Hall 1957 and Kurta 1995 *in* USFWS 2015).

Foraging behavior and home range

The northern long-eared bat has a diverse diet including moths, flies, leafhoppers, caddisflies, beetles (Nagorsen and Brigham 1993; Brack and Whitaker 2001; and Griffith and Gates 1985 *in* USFWS 2015) and arachnids (spiders) also being a common prey item (Feldhamer *et al.* 2009 *in* USFWS 2015); diet composition appears to differ geographically and seasonally (Brack and Whitaker 2001 *in* USFWS 2015).

Foraging techniques include hawking and gleaning, in conjunction with passive acoustic cues (Nagorsen and Brigham 1993 and Ratcliffe and Dawson 2003 *in* USFWS 2015). Hawking is aerial foraging; catching insects in flight through the use of echolocation. Observations of northern long-eared bat foraging on arachnids (Feldhamer *et al.* 2009 *in* USFWS 2015), presence of green plant material in their feces (Griffith and Gates 1985 *in* USFWS 2015), and non-flying prey in their stomach contents (Brack and Whitaker 2001 *in* USFWS 2015) suggest considerable gleaning behavior. The northern long-eared bat has the highest frequency call of any bat species in the Great Lakes area (Kurta 1995 *in* USFWS 2015). Gleaning allows this species to gain a foraging advantage for preying upon moths because moths are less able to detect these high frequency echolocation calls (Faure *et al.* 1993 *in* USFWS 2015).

Emerging at dusk, most hunting occurs above the understory, 1 to 3 m (3 to 10 ft) above the ground, but under the canopy (Nagorsen and Brigham 1993 *in* USFWS 2015) on forested hillsides and ridges, rather than along riparian areas (Brack and Whitaker 2001 and LaVal *et al.* 1977 *in* USFWS 2015). This coincides with data indicating mature forests are an important habitat type (Caceres and Pybus 1998 *in* USFWS 2015). Occasional foraging also takes place over forest clearings and water and along roads (Van Zyll de Jong 1985 *in* USFWS 2015).

Female home range size may range from 19 to 172 ha (47–425 acres) (Lacki *et al.* 2009 *in* USFWS 2015). Owen *et al.* (2003) (cited *in* USFWS 2015) estimated average maternal home range size to be 65 ha (161 ac). Home range size of northern long-eared bat in this study site was small relative to other bat species, but this may be due to the studies timing (during the maternity period) and the small body size of northern long-eared bat (Owen *et al.* 2003 *in* USFWS 2015). The mean distance between roost trees and foraging areas of radio-tagged individuals in New Hampshire was 620 m (2034 ft) (Sasse and Pekins 1996 *in* USFWS 2015).

Status and Distribution

The northern long-eared bat ranges across much of the eastern and northcentral United States, and all Canadian provinces west to the southern Yukon Territory and eastern British Columbia (Nagorsen and Brigham 1993, p. 89; Caceres and Pybus 1997, p. 1; and Environment Yukon 2011, p. 10 *in* USFWS 2015). In the United States, the species' range reaches from Maine west to Montana, south to eastern Kansas, eastern Oklahoma, Arkansas, and east to South Carolina (Whitaker and Hamilton 1998, p. 99; Caceres and Barclay 2000, p. 2; Simmons 2005, p. 516; and Amelon and Burhans 2006, pp. 71–72 *in* USFWS 2015). The species' range includes all or portions of the following 37 States and the District of Columbia: Alabama, Arkansas, Connecticut, Delaware, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma,

Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming.

The October 2, 2013, proposed listing rule included Florida within the range of the northern long-eared bat; however, since that time we have learned that the species was known from only a single historical winter (1954) record in Jackson County, Florida, and all other historical and recent surveys at this cave and 12 other caves (all in Jackson County) since this record was observed have not found the northern long-eared bat. Further, there are no known summer records for the State (Florida Fish and Wildlife Conservation Commission 2013, in litt. *in* USFWS 2015).

Unfortunately, there are no firm population size estimates for the northern long-eared bat rangewide; however, in 2015, as part of the Midwest Wind Energy Multi-Species Habitat Conservation Plan (MSHCP), an estimate for the six-state area that included the States of Illinois, Indiana, Iowa, Ohio, Michigan, and Missouri, showed there may have been more than four million bats in the area. The estimate was calculated by adjusting the 2013 Indiana bat winter population size in those states based on the ratio of northern long-eared bats compared to Indiana bats in summer mist-net surveys. This information is limited since most of the mist-net data was gathered prior to the onset of WNS in the Midwest. We assume that the number has dropped significantly over the past few years.

Northern long-eared bats have been observed in both winter hibernacula surveys and, more commonly, in summer surveys in Indiana. Indiana has over 90 hibernacula with fall, spring, and winter records of one or more northern long-eared bat (based on late 2016 data; A. King, pers. Comm.). However, it is difficult to find large numbers of individuals in caves and mines during hibernation in Indiana (Whitaker and Mumford 2009, p. 208 *in* USFWS 2015). Therefore, reliable winter population estimates are largely lacking in Indiana. WNS was confirmed in the State in the winter of 2010–2011. Although population trends are difficult to assess because of historically low numbers and data, mortality of northern long-eared bats due to WNS has been confirmed in the State (R. Geboy, USFWS, pers. comm.).

Historically, the northern long-eared bat was considered common throughout much of Indiana, and was the fourth or fifth most abundant bat species captured during summer surveys in the State in 2009. The species has been captured in at least 51 of 92 counties, often captured in mist-nets along streams, and was the most common bat taken by trapping at mine entrances (Whitaker and Mumford 2009, pp. 207–208 *in* USFWS 2015). The abundance of northern long-eared bats appears to vary geographically within Indiana during the summer. For example, during three summers (1990, 1991, and 1992) of mist-netting in the northern half of Indiana, 37 northern long-eared bats were captured at 22 of 127 survey sites and represented only 4 percent of all bats captured (King 1993, p. 10). In contrast, northern long-eared bats were the most commonly captured bat species (38 percent of all bats captured) during three summers (2006, 2007, and 2008) of mist-netting on two State forests in south-central Indiana (Sheets *et al.* 2013, p. 193 *in* USFWS 2015). The differences in abundance in north versus south Indiana are likely due to there being few hibernacula in northern Indiana; consequently, migration distances to suitable hibernacula are farther, and the species is not as common in summer surveys in the northern as in the southern portion of the State (Kurta 2013, in litt. *in* USFWS 2015).

Long-term summer mist-netting surveys in Indiana have started to show a potential downward trend in northern long-eared bat numbers (*e.g.*, Indianapolis airport project, Interstate Highway 69 project; Service 2015, unpublished data); however, there was fluctuation in the count numbers

from these surveys prior to WNS detection in the State, and it may be too early to confirm a downward trend based on these data. In Indiana, the Hardwood Ecosystem Experiment has collected summer mist-net data from 2006 through 2014 for the northern long-eared bat in Morgan-Monroe and Yellowwood State Forests, and has found consistent numbers of bats captured each year (Service 2015, unpublished data).

Reasons for Listing

No other threat is as severe and immediate as the disease white-nose syndrome. If this disease had not emerged, it is unlikely the northern long-eared population would be declining so dramatically. Since symptoms were first observed in New York in 2006, white-nose syndrome has spread rapidly from the Northeast to the Midwest and Southeast - an area that includes the core of the northern long-eared bat's range where it was most common before this disease.

WNS has been present in the eastern portion of the northern long-eared bat's range the longest; therefore, there is a greater amount of post-WNS hibernacula and summer data available from that region to discuss and examine the impacts of the disease on the species. Turner *et al.* (2011, p. 22 *in* USFWS 2015) compared the most recent pre-WNS count to the most recent post-WNS count for 6 cave bat species and reported a 98 percent total decline in the number of hibernating northern long-eared bats at 30 hibernacula in New York, Pennsylvania, Vermont, Virginia, and West Virginia through 2011. Data analyzed in this study were limited to sites with confirmed WNS mortality for at least 2 years and sites with comparable survey effort across pre- and post-WNS years.

The Service conducted an analysis of additional survey information at 103 sites across 12 U.S. States and Canadian provinces and found a similar decline of 96% after the arrival of WNS.

Early reports from WNS-affected States in the Midwest reveal that similar rates of decline in northern long-eared bats are already occurring or are fast approaching. In two Ohio mines, where an estimated 90 percent of Ohio's winter bat population hibernates, northern long-eared bat numbers decreased by 94 percent (combined for both hibernacula) from pre-WNS average counts (ODNR 2014, unpublished data *in* USFWS 2015). During the summer, ODNR Statewide acoustic surveys show a decline in northern long-eared bats of 56 percent since the pre-WNS years (ODNR 2014, unpublished data *in* USFWS 2015). Summer capture rates of northern long-eared bats from mist-net surveys (mostly conducted for Indiana bat presence) have declined by 58 percent per mist-net site post-WNS (Service 2014, unpublished data, *in* USFWS 2015). Also, at two Illinois' major hibernacula, significant mortality of northern long-eared bats was observed in the first year after WNS was first detected, and the population at one site experienced a 97 percent decline, while the population decline at the second site was over 99 percent (Illinois Department of Natural Resources 2014, unpublished data *in* USFWS 2015).

While there is uncertainty about the rate that white-nose syndrome will spread within the species' range, it is expected to spread throughout the United States. For a map of the current geographic distribution of WNS and a brief discussion of the disease, see page 12 of this document.

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

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

Loss or Degradation of Summer Habitat- Highway and commercial development, surface mining, and wind facility construction permanently remove habitat and are prevalent in many areas of the northern long-eared bat's range. Timber harvest and forest management can remove or alter (improving or degrading) summer roosting and foraging habitat. There is some indication that northern long-eared bats prefer more interior forest habitat and therefore are more sensitive to forest fragmentation.

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

III. ENVIRONMENTAL BASELINE

Existing Forest Habitat Conditions within the Refined Preferred Alternative Alignment

To better characterize the forest maturity (*i.e.*, diameter of tree trunks at breast height - DBH), tree species composition, sub-canopy conditions (*i.e.*, degree of vegetative clutter and presence/absence of invasive plant species), and amount of currently available Indiana bat roosting habitat (*i.e.*, number/size/density of suitable snags with exfoliating bark) within the forested areas that will be directly impacted by the refined preferred Section 6 alignment of I-69, Lochmueller staff conducted surveys along 38 linear transects along the project corridor. These 38 transects were approximately 60 feet wide and varied from 285 feet to 1,786 feet in length. Nineteen of the transects were within the refined preferred alternative impact area and accounted for a total of 12.1% (19.4 acres) of the 160 acres of upland and wetland forest habitat that will be directly impacted. For comparison, the other 19 transects were within the same woodlots, but outside of the proposed alignment. These samples totaled 19.3 acres (12.1%). The total linear distance sampled within the alignment was approximately 2.7 miles which equals about 10% of the total length (26.9 miles) of proposed highway. The transects are presumed to be representative of the existing upland forest habitat conditions within the 160 acres of impacted forest. The resulting snag characteristics and projected snag estimates for Section 6 are presented below in Table 1.

Lochmueller estimated the diameters of upper canopy dominant trees along the transects and estimated the percentage of trees that fell into each of three different size classes: small (<9"), medium (9"-18"), and large (>18") trees. There was a slight difference in the size distribution of trees between transects that were within the alignment and those outside the alignment. On average, transects surveyed **within** the alignment had 16% small, 78% medium, and 6% large diameter trees. For transects surveyed **outside** the alignment, there were 12% small, 81% medium, and 7% large-sized trees. The majority of trees both inside and outside the alignment had small to medium-sized diameters (less than or equal to 18" DBH) indicating that most of the forest that will be directly impacted by in Section 6 is relatively young, second-growth stands

Snag Characteristics Snags evaluated starting at $\geq 9''$ dbh	Transects Within Alignment	Transects Outside Alignment
Total number of snags ($\geq 9''$ dbh) within transects (approx. 60' wide x variable length)	78	62
Range of snag diameters (inches)	9 – 36	9 – 40
Total area sampled within transects (acres)	19.4	19.3
Density of snags in transect area (snags/acre)	4.1 \pm 3.2	3.3 \pm 2.9
Average Density for all transects (snags/acre)	3.6	
Estimated total number of snags ($\geq 9''$ dbh) that will be cleared within footprint of Refined Preferred Alternative Alignment for Section 6 of I-69 (using an average of 3.6 snags/acre x 160 direct impacted forest acres)	576	
Rough estimate of total number of snags ($\geq 9''$ dbh) that may be present in forested areas of the Section 6 Indiana bat Expanded SAA, including maternity colony areas (31,866 acres) (an average of 3.6 snags/acre was used)	Section 6 Expanded SAA = 114,790 snags	
Rough estimate of total number of snags ($\geq 9''$ dbh) that may be present in forested areas of the Section 6 NLEB Expanded SAA, including maternity colony areas (21,826 acres) (an average of 3.6 snags/acre was used)	Section 6 Expanded SAA = 78,574 snags	
% of estimated number of snags in Section 6 Indiana bat Expanded SAA that would be directly impacted by I-69 (using an average of 3.6 snags/acre)	0.5%	
% of estimated number of snags in Section 6 NLEB Expanded SAA that would be directly impacted by I-69 (using an average of 3.6 snags/acre)	0.7%	

Table 1. Snag sizes, densities, and estimated totals based upon line transect surveys conducted within and adjacent to woodlots that will be directly impacted by Section 6 of I-69.

that have been previously harvested. The tendency for those transects outside of the right of way to have slightly larger trees could be due to the fact that most of the area within the proposed right of way is already dedicated to transportation purposes and has been more recently altered.

In regard to quality as foraging habitat, 61% of the total area sampled was categorized as having moderate or dense understory vegetation, a characteristic that can deter foraging Indiana bats, which prefer more open understory conditions.

As discussed in the Section 6 BA, dominant trees in the upper canopy from line transect samples both within and outside the refined preferred alternative consisted of sugar maple (*Acer saccharum*), tulip poplar (*Liriodendron tulipifera*), black cherry (*Prunus serotina*), shagbark hickory (*Carya ovata*), white oak (*Quercus alba*), American beech (*Fagus grandifolia*), red oak (*Quercus rubra*), black walnut (*Juglans nigra*), silver maple (*Acer saccharinum*), cottonwood (*Populus deltoides*), red maple (*Acer rubrum*), pignut hickory (*Carya glabra*), and black locust (*Robinia pseudoacacia*).

Dominant trees found within the transects of the refined preferred alternative in order of abundance were sugar maple, tulip poplar, black cherry, white oak, red oak, red maple, shagbark

hickory, pignut hickory, black walnut (*Juglans nigra*), and silver maple. Dominant trees found outside the transects of the refined preferred alternative in order of abundance were sugar maple, black locust, shagbark hickory, black cherry, silver maple, cottonwood, pignut hickory, red maple, American beech, and black walnut. Species diversity within and outside the right of way appeared similar.

The majority of trees constituting the upper canopy sampled in all 38 line transects were nine to 46" dbh. The overall sub-canopy density for these 38 line transects ranged from open areas to dense areas. Invasive plants (principally Amur honeysuckle (*Lonicera maackii*), Japanese honeysuckle (*Lonicera japonica*), garlic mustard (*Alliaria petiolata*), creeping Charlie (*Glechoma hederacea*), multiflora rose (*Rosa multiflora*), winter creeper (*Euonymus fortunei*), burning bush (*Euonymus alata*), and Russian olive (*Elaeagnus angustifolia*)) were growing in the sub-canopy in 100% (19 of 19 sites) transects within the right of way, and in 95% (18 of 19 sites) outside of the right of way. These species, if left unchecked, can take over and quickly lead to low quality bat foraging habitat. Based on our review of the best available data, it appears the majority of the acres of upland forest that will be permanently lost to construction of I-69 in Section 6 is currently of low to moderate quality for roosting and foraging Indiana bats.

Existing Wetland Habitat within the Refined Preferred Alignment

Ninety-seven individual wetlands or open waters, totaling 191.31 acres, were identified within the field survey study area which includes the proposed right of way of Alternatives C1, C2, C3 and C4 (refined preferred) plus an approximate additional 50 feet (pers. comm. Lochmueller Group).

General characteristics of the wetland sites were recorded using the Indiana Wetland Rapid Assessment Protocol (InWRAP) methodology. Evaluation of each of the non-open water complexes potentially impacted by the project yielded quality ratings for animal habitat, botanical measures and hydrology. Each individual wetland unit was assigned a rating of poor, fair or good. The majority of the wetlands scored as poor for both animal habitat and botanical measures. The hydrology score was generally fair. Table 5.19-7 of the Section 6 EIS provides a summary of the ratings for the non-open water complexes.

Status of the Species within the Action Area

INDIANA BAT

The environmental baseline for Indiana bats and their habitat in the I-69 Action Areas, including Section 6, was fully described on pages 59-79 of the Tier 1 RPBO and is hereby incorporated by reference. Additional baseline information is presented in the May 24, 2011 Amendment to the Tier 1 RPBO, Amendment 2 to the Tier 1 RPBO (July 24, 2013), the Tier 2 DEIS for Section 6 (see Chapter 5– Environmental Consequences) and the Tier 2 Section 6 BA. A summary of this information is presented below. The following information also summarizes the effects of past and ongoing environmental factors affecting Indiana bats and reviews and updates the status of the species within the Section 6 Action Area.

No critical habitat for the Indiana bat is present within the Section 6 project area. [REDACTED] has been designated as critical habitat for the Indiana bat and is approximately [REDACTED]

southwest of the Section 6 I-69 corridor. [REDACTED] in [REDACTED] County, also designated critical habitat, is approximately [REDACTED] from the [REDACTED] end of Section 6.

Indiana Bats within the Section 6 Action Area

2004/2005 Indiana bat Presence Surveys

In 2004, mist netting surveys were conducted at 29 sites in I-69 Section 6. A total of ten Indiana bats were captured within I-69 Section 6 in 2004. This includes four post-lactating adult females, one adult male and five juveniles. Five Indiana bats were radio-tagged and four roost trees were identified with emergence counts. Other bats captured included: 72 little brown bats (*Myotis lucifugus*), 67 big brown bats (*Eptesicus fuscus*), 30 eastern pipistrelles (*Pipistrellus subflavus*), 28 evening bats (*Nycticeius humeralis*), 25 eastern red bats (*Lasiurus borealis*), and 21 northern long eared bats. Eighteen bridges in the I-69 Section 6 SAA were also inspected for bats. No Indiana bats were observed roosting under any of these bridges. The only bats observed roosting under bridges in I-69 Section 6 were under two bridges over [REDACTED] [REDACTED] [REDACTED]. These bats were big brown bats.

Additional mist netting surveys were completed during the summer of 2005. These surveys focused around the location of Indiana bat captures where no primary roost trees were identified in 2004. Seven mist net sites were surveyed in I-69 Section 6. Three Indiana bats were captured in 2005; two lactating females and one post-lactating female. Bats were radio-tagged and successfully tracked to six new roost trees, one primary (6-4) and five secondary (6-1, 6-2, 6-3, 6-5, and 6-6). Based on the evidence obtained through the mist netting surveys during these efforts in 2004 and 2005, there were three maternity colonies identified in I-69 Section 6. They were (from south to north) White River - Clear Creek Maternity Colony, White River - Crooked Creek Maternity Colony, and White River - Pleasant Run Creek Maternity Colony. Lambs Creek Maternity Colony (Section 5) has been added to I-69 Section 6 discussion due to its proximity to Section 6 and because of updated impacts in Section 6 as the result of identifying a refined preferred alternative compared to the representative alignment presented in the Section 5 Tier 2 BA. All four Indiana bat colonies are located/centered on [REDACTED] of the [REDACTED] [REDACTED] and contain portions of the [REDACTED] [REDACTED] floodplain. The [REDACTED] [REDACTED] has been identified by INFO as an important area to focus mitigation.

A full discussion of the methods and results of the surveys with maps of the maternity colonies and other summer habitat in I-69 Section 6 is more fully discussed in the Tier 1 BA Addendum and incorporated in the analysis in the Tier 1 Revised BO as amended.

2012 Section 5 Indiana Bat Surveys

An Indiana bat presence survey was completed in May/June 2012 in Section 5 that included mist net Site 24 along [REDACTED] [REDACTED]. This survey effort was conducted to update Indiana bat presence status within the Section 5 SAA due to the amount of time elapsed since the previous surveys which were completed in 2004/2005. A total of 12 Indiana bats were captured, five of which were radio-tagged, but only one was captured at Site 24 in the [REDACTED] [REDACTED] area. It was tracked to two primary roost trees (768-1 and 768-2) outside of any previously existing colony in Section 5 or Section 6. Based on the discovery of these roost trees, USFWS determined that an additional maternity colony was identified in Section 5, the Lambs Creek Maternity Colony. See Tables 3.2-1 through 3.2-4 of the Tier 2 Section 6 BA for a summary of Indiana bats tracked during the

mist netting surveys in or associated with the four Indiana bat maternity colonies in I-69 Section 6, and the roost trees and emergence counts for those roosts.

2014 Section 5 Bat Surveys

During 2014, Indiana bat 141 captured from Section 5, Site 24, went to three secondary roost trees in the Lambs Creek Maternity Colony. See Tables 3.2-1 through 3.2-4 of the Tier 2 Section 6 BA for a summary of these roost trees and emergence counts for those roosts.

2015 Indiana Bat Presence Surveys

An Indiana bat presence survey was completed for Section 6 between July 3 and August 6, 2015 (see Appendix H of the Tier 2 Section 6 BA). This survey effort was conducted to update Indiana bat presence status within the I-69 Section 6 SAA due to the amount of time elapsed since the previous surveys which were completed in 2004/2005. It was also conducted for the recently listed federally threatened northern long-eared bat using mist net capture techniques and the use of radio-telemetry tracking to identify maternity roost trees. While the primary objective of the survey was to provide information on the Indiana bat and northern long-eared bat presence in the I-69 corridor, data was also collected on other species native to Indiana, including the possible presence of the state endangered evening bat.

The 2015 survey included 19 sites, 15 of which were previously surveyed in 2004 and in part again in 2005. The 2015 survey captured 126 bats representing seven species: 72 big brown bats, 18 eastern red bats, 24 evening bats, four little brown bats, three Indiana bats, three northern long-eared bats, and one tri-colored bat. One captured bat escaped before identification could be obtained. Overall capture rates for the survey were 1.5 bats per net night.

Radio transmitters were attached to all three of the Indiana bats (all juvenile females) in 2015, but only one captured at Site 21 was tracked to two different dead cottonwood trees with diameter at breast height (dbh) of approximately 18 inches and 14 inches. These trees were located [REDACTED] of the [REDACTED] [REDACTED] in [REDACTED] [REDACTED] County. Emergence counts from four nights of observation for these two roosts ranged from seven to 35. The capture of these three Indiana bats has not changed the location of the three Indiana bat maternity colonies (Clear Creek, Crooked Creek, and Pleasant Run Creek) in Section 6.

In 2015, Site 24 in northern Section 5 at [REDACTED] [REDACTED] was also surveyed and resulted in the capture of a pregnant female Indiana bat. However, it was not possible to track this bat to any roosts in the area. The location of the Lambs Creek maternity colony remained unchanged. See Tables 3.2-1 through 3.2-4 of the Tier 2 Section 6 BA for a summary of Indiana bats tracked during the mist netting surveys and the roost trees and emergence counts for those roosts that are within or associated with the four maternity colonies in I-69 Section 6.

2016 Indiana Bat Presence Surveys

An Indiana bat survey was completed for Section 5 in 2016, and again Site 24 yielded an Indiana bat. On August 2, 2016, a radio-transmitter was attached to an adult male Indiana bat and tracked to three different roost trees within the Lambs Creek Maternity Colony. These trees were secondary roost trees and emergence counts ranged from 0-1 from observations on August 3-9, 2016.

Maternity Colonies within the Section 6 Action Area

Based on the minimum colony estimates generated during I-69 Tier 2 studies and other Indiana bat studies within Indiana (see Whitaker and Brack 2002), the Service assumes that each maternity colony likely contains 80 adult females plus their single offspring. This would result in a maximum of 160 bats per colony by mid-June when the young are born and when they become volant (*i.e.*, capable of flight) around mid-July.

Each maternity colony's roosting and foraging area was assumed to fall within a circle with a 2.5-mile radius centered on primary roosts, placed between multiple roosts, or centered on mist net sites of Indiana bat captures if no roosts were identified. A full discussion of the methods and results of these surveys with maps of the maternity colonies and other summer habitat in Section 6 is more fully discussed in the Tier 1 BA Addendum and incorporated in the analysis in the Tier 1 RPBO. The Tier 1 BA Addendum and RPBO also characterize habitat conditions for the various colonies, as does the Tier 2 BA for Section 6 (beginning on page 3-32 and Appendices D, G and H).

Lambs Creek Maternity Colony

As previously mentioned, the Lambs Creek Maternity Colony (Section 5) has been included in the I-69 Section 6 discussion due to its proximity to Section 6. A small stretch of the Section 6 right of way occurs within the colony area. Although this colony was analyzed during the Section 5 consultation, because of updated impact information in Section 6 as a result of identifying the refined preferred alternative, a new analysis is included in this consultation.

In 2012, a pregnant female Indiana bat was captured at site 24 in Section 5. She was tracked to two primary roosts. These roosts were not already within an existing maternity colony. One was a dead eastern cottonwood (*Populus deltoides*) (768-1) and had an emergence count between 29 and 80. This tree was located [REDACTED] [REDACTED] from the proposed corridor. It was classified as a primary roost since the emergence count was above 30. The second roost was a dead American elm (*Ulmus americana*) (768-2). This tree had an emergence count between one and 43. This roost tree was approximately [REDACTED] [REDACTED] from the corridor. Based on emergence counts over 30, we considered this to be a new maternity colony. The epicenter of this new maternity colony is the midpoint of the two primary roosts. Because this maternity colony was identified subsequent to the Tier 1 BA Addendum, an assessment of the maternity colony area was completed in the earlier Section 5 BA in its Appendix I. Since 2012, surveys in 2014 and 2016 have found Indiana bats in this maternity colony as associated with Site 24. This site is not far from the Nutter Ditch mitigation site. The Nutter Ditch mitigation site was purchased by INDOT and has over 300 acres of bottomland forest and reforestation, open water, and other wetlands. This mitigation site is directly across from the confluence of [REDACTED] [REDACTED] with the [REDACTED] [REDACTED] and Indiana bat primary roost tree 768-1.

This colony is assumed to consist of 80 reproductively active adult females and their offspring, for a total of 160 individuals once the young become volant. Based on emergence counts, the Lamb's Creek Maternity Colony is comprised of a minimum of 80 individuals.

Clear Creek Maternity Colony

Within the Clear Creek Maternity Colony, four Indiana bats were captured in 2004; two Indiana bats in 2005; and two Indiana bats in 2015. Females made up 70% (7 of 10) in 2004; 100% (1 of

1) in 2005; and 100% (3 of 3) in 2015. Adults made up 50% in 2004 (5 of 10); 100% in 2005 (1 of 1); and 0% in 2015. In 2004, two roost trees were located within this maternity colony (203-1 and 022R1). The former (203-1) was a primary roost (dead ash (*Fraxinus* sp.)) that showed emergence counts of 64, 61, 23, 53, 67, 7 and one. It could be seen [REDACTED] from [REDACTED] [REDACTED]. The latter roost tree (022R1) was a secondary roost and was also a dead elm. It showed emergence counts of 12, 11, 15 and 12, and was about one mile west of SR 37.

In 2005, four roost trees were located in this maternity colony (6-1, 6-2, 6-3 and 6-4). Roost 6-4 was a primary roost tree, while roosts 6-1, 6-2 and 6-3 were secondary roost trees. Emergence counts for 6-4 were 40, 42, 52, 29 and 41. For the secondary roosts, emergence counts ranged from zero to 15. Roost trees 6-1 and 6-4 were dead silver maples, while roost tree 6-2 was a dead elm. Roost tree 6-3 was a live silver maple (*Acer saccharinum*). These trees were located 0.4 to 1.3 miles west of SR 37.

In 2015, no additional roost trees were found in this maternity colony for the Indiana bat.

This colony is assumed to consist of 80 reproductively active adult females and their offspring, for a total of 160 individuals once the young become volant. Based on emergence counts, the Clear Creek Maternity Colony is comprised of a minimum of 67 individuals.

Crooked Creek Maternity Colony

In the Crooked Creek Maternity Colony, two Indiana bats were captured in 2004 and no Indiana bats were captured in 2005 and 2015. Females made up 14% of the Indiana bats netted in 2004 and adults made up 86%. In 2004, two roost trees were located within this maternity colony (105-1 and 105-2). The 105-1 was a primary roost ([REDACTED] [REDACTED]) that showed emergence counts ranging from one to 98. It is located approximately [REDACTED] [REDACTED] of [REDACTED] [REDACTED]. The 105-2 was also a primary roost (live shagbark hickory). It showed emergence counts of zero to 30. It was roughly [REDACTED] [REDACTED] [REDACTED] of [REDACTED] [REDACTED].

This colony is assumed to consist of 80 reproductively active adult females and their offspring, for a total of 160 individuals once the young become volant. Based on the telemetry data, we assume a minimum colony size of 98 Indiana bats.

Pleasant Run Creek Maternity Colony

Within the Pleasant Run Creek Maternity Colony Area and slightly north (mist net Sites 24 and 25), three Indiana bats were captured in 2004; one Indiana bat in 2005; and one Indiana bat in 2015. Females made up 67% in 2004; 100% in 2005; and 100% in 2015. Adults made up 33% in 2004; 100% in 2005; and 0% in 2015. In 2004, no roost trees were located within this maternity colony. In 2005, two roost trees were located in this maternity colony (6-5, 6-6). Roost 6-5 was a dead cottonwood, while 6-6 was a live silver maple. Both were secondary roost trees with emergence counts of zero for roost tree 6-5 and one for roost tree 6-6. These trees were located [REDACTED] to [REDACTED] [REDACTED] [REDACTED] of [REDACTED] [REDACTED].

In 2015, two additional roost trees were found in this maternity colony (283-1 and 283-2). Roost tree 283-1 was a dead cottonwood with exfoliating bark. It was a secondary roost with emergence counts of seven and 13 and was located about [REDACTED] [REDACTED] [REDACTED] of [REDACTED] [REDACTED]. Roost tree 283-2 was a dead cottonwood and considered a primary roost. It had emergence counts of 30 and 35 and was located about [REDACTED] [REDACTED] [REDACTED] of [REDACTED] [REDACTED]. Based on telemetry data, this colony is assumed to have a minimum colony size of 35 Indiana bats.

Camp Atterbury Maternity Colonies

There have been several roost and bat captures identified around the Camp Atterbury area in Johnson County. These surveys were completed separate from the I-69 study. The closest of the three maternity colonies that have been identified is estimated to be over [REDACTED] [REDACTED] from the nearest Refined preferred Alternative right-of-way. It is not anticipated that any of these maternity colonies will be affected by I-69.

Indianapolis Airport Maternity Colony

An Indiana bat maternity colony has been identified near the [REDACTED] [REDACTED] proximate to the junction of [REDACTED] [REDACTED] and [REDACTED] Counties. Numerous roost trees, artificial roosts and bat captures have occurred in an area around [REDACTED] just west of the airport. Based on counts conducted in 1999, a maternity colony consisting of at least 146 bats (adult reproductive females and their young-of-the-year) uses the project area. Traffic forecasts (2045) along [REDACTED] near the airport colony are not expected to change dramatically with the construction of I-69 Section 6. Approximately 55 acres of induced growth is predicted to occur in the vicinity of the airport colony as a result of the project. Of these 55 acres, approximately 9 acres are estimated to be forested.

Roost Tree Updates

The twenty Indiana bat roost trees originally discovered in 2004, 2005, 2012, 2014, 2015 and 2016 through mist netting surveys and radio telemetry were revisited in 2016 by INDOT's consulting group, Lochmuller Group. The following summarizes the current condition of these roost trees. Photo documentation and more detailed roost tree information is provided in Chapter 3 of the Section 6 Tier 2 BA.

Roost 203-1 – This dead ash tree was discovered in 2004 along the [REDACTED] side of [REDACTED] [REDACTED]. In 2016, this tree could not be found and is presumed to have been cut down.

Roost 105-1 – This roost is a transmission pole discovered in 2004 as a primary roost. The pole is still present although some of the tar paper is missing. A sign is placed on the pole warning people to not climb on the pole.

Roost 105-2 – This live shagbark hickory was discovered in 2004 as a primary roost tree. The tree is still standing and in good condition.

Roost 022R1 – This dead elm was discovered in 2004 and was considered a secondary roost. In 2016 it was still intact and at a stage of decay of 5-6.

Roost 6-1 -This dead silver maple was discovered in 2005 and was a secondary roost. In 2016 the tree was found lying on the ground.

Roost 6-2 – This dead elm was discovered in 2004 and used again in 2005 as a secondary roost. In 2016 the tree was located and found to be in stage 6 decay.

Roost 6-3 – This live silver maple, discovered in 2005, was a secondary roost tree for the Indiana bat. It was located within the Clear Creek Maternity Colony. In 2016, it was observed and appeared alive, but it had fallen on two other silver maples.

Roost 6-4 - This dead silver maple, discovered in 2005, was a primary roost tree for the Indiana bat and was located within the Clear Creek Maternity Colony. In 2016, it was observed with its upper top broken off and lying on the ground. Stage of decay for this tree in 2016 was 4-5.

Roost 6-5 – This dead cottonwood, discovered in 2005, was a secondary roost tree for the Indiana bat. In 2016, it was not observed in the vicinity of the original coordinates.

Roost 6-6 – This live silver maple, discovered in 2005, was a secondary roost tree for the Indiana bat. In 2016, it was observed still standing.

Roost 768-1 – This dead cottonwood, discovered in 2012, was a primary roost tree for the Indiana bat. In 2016, a dead cottonwood at the original coordinates was not observed.

Roost 768-2 – This dead American elm, discovered in 2012, was a primary roost tree for the Indiana bat. It was located within the Lambs Creek Maternity Colony. In 2016, it was not observed. It appeared the tree has been cut with a chainsaw and removed.

Roost 141-1 – This dead white ash, discovered in 2014, was a secondary roost tree for the Indiana bat. It was located in the Lambs Creek Maternity Colony. In 2016, it was still standing within a cattle pasture along ■■■ but it was in an early stage of decay (Stage 2). Approximately 95% of the bark remains. It has numerous dead branches and areas of exposed wood.

Roost 141-2 – This dead silver maple, discovered in 2014, was a secondary roost tree for the Indiana bat. It was located within the Lambs Creek Maternity Colony. In 2016, it had fallen and was dead with a stage of decay of 4.

Roost 141-3 – This dead silver maple, discovered in 2014, was a secondary roost tree for the Indiana bat. It was located within the Lambs Creek Maternity Colony. In 2016, it was observed at its original location which was approximately ■■■ from the ■■■■

Roost 283-1 – This partially dead cottonwood, discovered in 2015, was a secondary roost for the Indiana bat. It was located within the Pleasant Run Creek Maternity Colony. In 2015, it was described as partially dead. In 2016, it appeared completely dead.

Roost 283-2 - This dead cottonwood, discovered in 2015, was a primary roost tree for the Indiana bat. It was located within the Pleasant Run Creek Maternity Colony. In 2016, the stage of decay was 4-5.

Roost 433-1 – This dead oak, discovered in 2016, was a secondary roost for the Indiana bat. It was located within the Lambs Creek Maternity Colony. It was dead and had a stage of decay of 3.

Roost 433-2 - This shagbark hickory, discovered in 2016, was a secondary roost tree for the Indiana bat. It was located within the Lambs Creek Maternity Colony. It was alive and had a stage of decay of 1.

Roost 433-3 – This shagbark hickory (Figure 3.2-17), discovered in 2016, was a secondary roost for the Indiana bat. It was alive and had a stage of decay of 1. It was located within the Lambs Creek Maternity Colony.

Adult Males within the Section 6 Action Areas

One adult male and three juvenile male Indiana bats were captured during mist net surveys within the originally defined (*i.e.* not expanded) Section 6 Action Area in 2004; none were captured during the 2005, 2012 (Section 5 only) and 2015 surveys. During the 2016 survey (Section 5 only), one adult male was captured in the northern end of Section 5 within the Lamb's Creek maternity colony area and tracked to three different secondary roosts. Based on this data, the Service assumes that a small number/low density of adult male Indiana bats may occur in the Section 6 area.

Indiana Bat SAA Habitat Conditions

INDOT's primary I-69 consultant, Lochmueller Group, has recently provided the Service with more up-to-date forest coverage data for the Section 6 Tier 2 analyses and thus the forest acreages reported in this Tier 2 BO supersede those previously reported in the 2006 Tier 1 RPBO and Tier 1 BA Addendum and the 2013 amendment to the Tier 1 RPBO. For Section 6, tree cover data is based on field verified forests and forest fragments within the right of way and adjacent survey area, and 2011 National Land Cover Database (NLCD) forest data for areas outside of the survey locations. The 2011 NLCD forest cover data, updated aerial photographs, field verification information produced by the Engineering and Environmental Assessment Consultants (EEACs) during Tier 2 studies, and images accessed via Google™ Earth represent the best available data for purposes of this consultation.

In order to evaluate the anticipated reach of direct and indirect affects, the original Action Area has been expanded to include those areas where growth/development, induced by the construction and operation of the project, is reasonably foreseeable. Estimated forest cover within the maternity colony areas and the Section 6 Expanded SAA is summarized below in Table 2. The original maternity colony areas were evaluated using 2003 refined tree cover data; however, the updated information is very similar. For the Expanded SAA, information is based on 2011 NLCD, as well as field data verified by the EEACs during development of the Section 6 DEIS.

Key parameters that may affect the quality of the summer habitat for bats within the action area are the overall percentage of forest cover in a specified area, the size of existing forest patches, and the degree of connectivity among forest patches. Based on a thorough review of literature on Indiana bat summer habitat, Rommé et al. (1995) concluded that areas with less than 5% deciduous forest coverage will not support summering Indiana bats. Localized areas considered as optimal habitat tend to have greater than 30% forest cover.

Based on the analysis conducted by Lochmueller Group, the percentage of forest habitat per maternity colony area (2.5-mile radius area = 12,566 acres) ranges from 17% to 43% (Table 2). There is an overlap of 600 acres (of which 85 acres are forested) between the Clear Creek and Crooked Creek colonies. The Expanded Remaining SAA (excluding the maternity colony areas) is approximately 18% forested. Based on the low percentage of forest cover in this area, it is important that forest impacts be kept to a minimum and mitigation efforts be focused near the action area.

I-69 Project Section 6 area	Total Acres	Total Forest/Tree Cover Acreage	Percent of the area that is Forested	Core Forest acreage
Lambs Creek MCA*	12,566	5,023	40%	2,258
Clear Creek MCA*	12,566	5,392	43%	1,434
Crooked Creek MCA*	12,566	3,636	29%	606
Pleasant Run MCA	12,566	2,075	17%	136
Expanded Remaining SAA(excludes maternity colony areas)	88,937	15,845	18%	3,412

* MCA = Maternity Colony Area

Table 2. Estimated amount of forest within Maternity Colony Areas and the Expanded Section 6 Summer Action Area.

Habitat Fragmentation and Core Forests

The number of total tree cover “patches” for each of the Indiana bat maternity colony areas in the Alternative 3C corridor of I-69 ranged from 8 patches in the Beanblossom Bottoms Colony (Section 5) to 421 patches in the Pigeon Creek Colony (Section 1) in the Tier 1 BA Addendum analysis. Generally, a higher number of patches translates to more fragmentation and lower connectivity. Few, large class patches, with no mid-size patches and then a scattering of very small patches suggests a high level of connectivity. Overall, fragmentation is high in Section 6. GIS-based maps depicting tree cover patches and degree of connectivity within the Section 6 maternity colonies are found in Appendix A of the 2006 Tier 1 BA Addendum (and Appendix I of the Section 5 BA for the Lambs Creek colony) and are hereby incorporated by reference.

Analysis of tree cover data, where available, and NLCD and EEAC field data in the remaining areas, indicate there are 3,412 acres of core forest within the Indiana bat Expanded Remaining SAA (area not including maternity colony use areas). This is an increase from the acres of core forest reported in the Tier 1 BA Addendum using the Tier 1 Remaining SAA. This difference is primarily due to an expansion of the SAA to include the induced Traffic Analysis Zones (TAZs); in addition, the original corridor did not expand along existing I-465. Within the four Section 6 colony areas there are a total of 4,434 acres of core forest.

The Service will use the forest data summarized in Table 2 as an approximate baseline of currently existing forest habitat available within the Section 6 Indiana bat maternity colony areas and the Indiana bat Expanded SAA. Based on the amount and distribution of core and edge forest, the degree of connectivity among forest patches (see BA Addendum and Tier 2 BA), and the location of the White River floodplain within and adjacent to the corridor, the majority of the forest habitat within the Expanded Action Area represents moderate to high quality roosting and foraging habitat for Indiana bats. We believe this is a reasonable characterization of habitat because the project is within the core of the Indiana bat’s summer and winter range. GIS-based analyses presented in the BA Addendum, field data derived from forest plots and transects collected by BLA (see below) and review of aerial photographs (*e.g.*, via Google™ Earth), also support this characterization.

NORTHERN LONG-EARED BAT

The environmental baseline for northern long-eared bats and their habitat in the I-69 Action Areas, including Section 6, was fully described beginning on page 16 of the Tier 1 CO/BO and is hereby incorporated by reference. Additional baseline information is presented in the Tier 2 Section 6 BA. A summary of this information is presented below. The following information also summarizes the effects of past and ongoing environmental factors affecting northern long-eared bats and reviews and updates the status of the species within the Section 6 Action Area.

No critical habitat has been designated for the northern long-eared bat.

Northern Long-eared Bats within the Section 6 Action Area

As required by the December 3, 2003 Tier 1 BO, INDOT and FHWA conducted an extensive research program designed to obtain information on the presence of the Indiana bat; however mist netting efforts also provided the additional benefit of recording northern long-eared bats and other species within the action area for all years from 2004 to present. Radio-telemetry on the northern long-eared bats started in 2015 because it was not a federally listed species before that time.

In 2004, mist netting surveys were conducted at 29 sites in I-69 Section 6. A total of 26 northern long-eared bats (*Myotis septentrionalis*) were captured within I-69 Section 6 in 2004, including five from Site #24 in I-69 Section 5. This included three post-lactating adult females, two adult females (non-reproductive), four juvenile females, 14 adult males and three juvenile males. No northern long-eared bats were radio-tagged and no roost trees were identified with any emergence counts because the northern long-eared bat was not a federally listed species at that time and no telemetry was conducted.

Eighteen bridges in the I-69 Section 6 action area were also inspected for bats. No northern long-eared bats were found roosting under any bridges in I-69 Section 6. Additional mist netting surveys were completed during the summer of 2005. The 2005 surveys focused around the location of Indiana bat captures where no primary roost trees were identified in 2004. Seven mist net sites were surveyed in I-69 Section 6 and six northern long-eared bats were captured including one lactating female, four non-reproductive females, and one adult male. No northern long-eared bats were radio-tagged in 2005 and no maternity colonies were identified either year for this species. In all, 32 northern long-eared bats were captured in 2004 and 2005 in Section 6.

2015 Northern Long-Eared Bat Presence Surveys

A northern long-eared bat presence survey was completed for Section 6 between 3 July and 6 August 2015. This survey effort was conducted to update northern long-eared bat presence status within the I-69 Section 6 action area due to the amount of time that had elapsed since the 2004 and 2005 surveys. The presence surveys were conducted using mist net capture techniques and radio-telemetry tracking to identify maternity roost trees. While the primary objective was to provide a presence/absence survey for the Indiana bat and northern long-eared bats in the I-69 corridor, data was also collected on other species native to Indiana, including the possible presence of the state endangered evening bat (*Nycticeius humeralis*).

The 2015 survey included 19 sites following USFWS's new protocol, 15 of which were previously surveyed in 2004 and in part again in 2005. The 2015 survey captured 126 bats representing seven species: 72 big brown bats (*Eptesicus fuscus*), 18 eastern red bats (*Lasiurus borealis*), 24 evening bats (*Nycticeius humeralis*), four little brown bats (*Myotis lucifugus*), three Indiana bats (*Myotis sodalis*), three northern long-eared bats (*Myotis septentrionalis*), and one tri-colored bat (*Perimyotis subflavus*). One captured bat escaped before identification could be obtained. Of the three northern long-eared bats captured, one was a post-lactating female, one was a juvenile female, and one was a juvenile male.

Based upon mist netting efforts during the summers of 2004, 2005 and 2015 in Sections 5 and 6, and mist netting/monitoring efforts in Section 5 for Site 24 in 2012, 2014, 2015 and 2016, 34 northern long-eared bats were captured. (See Table 4.2-1 in the Section 6 BA for a summary of capture and roost data for the northern long-eared bat in 2004, 2005, and 2015. Since survey site #24 in the Section 5 Lambs Creek Maternity Colony overlaps with I-69 Section 6, information on one northern long-eared bat from I-69 Section 5 surveys is included. It was an adult male captured on 24 May 2014. It was not radio-tagged).

Radio transmitters were attached to two of the three northern long-eared bats captured in 2015. One northern long-eared bat (#189), a post-lactating female captured at Site 20, was tracked to a dead black cherry located east of the White River in Morgan County. The black cherry had a dbh of about 15 inches. Emergence counts from two nights of observation for this roost were three and six.

NLEB Maternity Colonies within the Section 6 Action Area

In the Tier 1 BA Addendum for the NLEB (10 October 2014), the USFWS (INFO) identified 38 northern long-eared bat maternity colonies and their associated foraging areas within the I-69 SAA for the entire project from Section 1 to Section 6. Based on that, we assume there are five northern long-eared bat maternity colonies in I-69 Section 6. They are, from south to north: the NLEB Lambs Creek, NLEB Clear Creek East Fork, NLEB White River, NLEB White River - Goose Creek and NLEB Pleasant Run.

A maternity colony consists of reproductively active female northern long-eared bats and their young. A maternity colony was determined to exist if there was evidence of reproduction (the capture of a reproductive female or juvenile) in an area during the summer reproductive season. Each maternity colony foraging area is defined by a circle with a 1.5-mile radius from either a roost tree(s) or capture site or a combination of both. A 1.5-mile distance was also used to determine the width of the SAA by buffering the right of way and the refined preferred alternative for I-69 Section 6. Maternity colony foraging area circles were centered on mist net sites of northern long-eared bat captures or centroids from multiple mist net capture locations where such locations were in generally close proximity to each other. These maternity colonies were determined by using the best data available, which included capture data (especially reproductive females and juveniles); habitat descriptions in scientific publications; and use of existing maps (e.g., USGS, NWI, Soil Survey, aerials, etc.)

Based on northern long-eared bat literature, the Service has decided to conservatively assume that each maternity colony is comprised of 50 adult females and their single offspring. This would result in a maximum of 100 bats per colony by mid- June when the young are born and when they become volant (i.e., capable of flight) around mid-July. The Service believes a 50-adult female colony size is a reasonable assumption based on the information presented in the

Services's Northern Long-eared Bat Interim Conference and Planning Guidance and other studies (Arnold, 2007; Caeceres and Barclay, 2000; Johnson et. al. 2011).

Lambs Creek Maternity Colony

As previously mentioned, the Lambs Creek Maternity Colony (Section 5) has been included in the I-69 Section 6 discussion due to its proximity to Section 6. Although this colony was analyzed during the Section 5 consultation, because of updated impact information in Section 6 as a result of identifying the refined preferred alternative, a new analysis is included in this consultation.

In 2004, several northern long-eared bats were captured. This included two adult males, two adult females (one post-lactating), and one juvenile female. One adult male was captured in this colony area in 2014. No NLEBs were captured in 2005, 2012, 2015, or 2016.

This colony is assumed to consist of 50 reproductively active adult females and their offspring, for a total of 100 individuals once the young become volant.

Clear Creek East Fork Maternity Colony

There are nine capture records for the Clear Creek Colony. In 2004, one adult female (post-lactating), three juvenile females, and two juvenile males were captured. In 2005, one juvenile male was captured. In 2015, one juvenile female was captured. This bat was radio-tagged although no roost was found.

This colony is assumed to consist of 50 reproductively active adult females and their offspring, for a total of 100 individuals once the young become volant.

White River Maternity Colony

One juvenile female was captured in this colony area in 2004 and two juvenile females were captured in 2005. One juvenile male was captured in 2015 and fitted with a radio transmitter; however, no roosts were located for this bat.

This colony is assumed to consist of 50 reproductively active adult females and their offspring, for a total of 100 individuals once the young become volant.

White River Goose Creek Maternity Colony

Eight NLEBs were captured in the Whiter River Goose Creek colony area. In 2004, five adult males and one adult female (post-lactating) were found. In 2005, one adult female (lactating) was captured and in 2015, one adult female (post-lactating) was captured. This adult female was captured at Site 20 and was tracked to a dead black cherry located east of the White River in a forest swamp in Morgan County. The black cherry had a dbh of about 15 inches. Emergence counts from two nights of observation for this roost were three and six.

This colony is assumed to consist of 50 reproductively active adult females and their offspring, for a total of 100 individuals once the young become volant.

Pleasant Run Maternity Colony

One juvenile male was captured here in 2004 and one adult male and one juvenile female in 2005. No NLEBs were captured in this colony area in 2015.

This colony is assumed to consist of 50 reproductively active adult females and their offspring, for a total of 100 individuals once the young become volant.

Other Known Local Maternity Colonies

Camp Atterbury Maternity Colonies

There have been several NLEB bat captures and roosts identified around the Camp Atterbury area in southern Johnson County/northern Bartholomew County. These surveys were completed separate from the I-69 study. The closest of the roosts that have been identified is estimated to be about 17 miles from the refined preferred alternative right-of-way. It is not anticipated that any of these maternity colonies will be affected by I-69.

Indianapolis Airport Maternity Colony

In addition to the Indiana bat colony identified near the Indianapolis Airport, there are several capture records for the northern long-eared bat. It does not appear that any telemetry for NLEBs has occurred in this area and no roosts have been identified. Traffic forecasts (2045) along I-70 in the vicinity of the airport colony are not expected to change dramatically with the construction of I-69 Section 6. Approximately 55 acres of induced growth is predicted to occur in the vicinity of the airport as a result of the project. Of these 55 acres, approximately 9 acres are estimated to be forested.

Hardwood Ecosystem Experiment (HEE) Project (<https://heeforeststudy.org/>)

The HEE project has resulted in the identification of numerous NLEB roosts in Morgan-Monroe and Yellowwood Forest in south-central Indiana, just south and east of the I-69 Action Area. The closest known roost is approximately 3 miles from the I-69 right-of-way although no impacts to this area are expected as a result of the project.

Roost Tree Update

There was one roost tree found in 2015 for the northern long-eared bat in Section 6. It was 189-1, and identified as a dead black cherry. It was located east of the White River in the NLEB Goose Creek Maternity Colony. It was labelled as a secondary roost tree for the northern long-eared bat. In 2016, it was re-visited and identified as a silver maple. Please see Figure 4.2-1 in the Tier 2 BA. It appears it was misidentified in 2015. It is standing, has an approximate dbh of 15 inches and a stage of decay of four.

Adult Males within the Section 6 Action Area

Thirteen adult males have been captured in the Section 6 Action Area during 2004, 2005, 2014, and 2015 (including three from the Lambs Creek Colony in 2014 in Section 5). Based on this data, the Service assumes that a small number/low density of adult male NLEBs may occur in the Section 6 area.

NLEB General Habitat in the SAA

Forest/Tree Cover

INDOT’s primary I-69 consultant, Lochmueller Group, has recently provided the Service with more up-to-date forest coverage data for the Section 6 Tier 2 analyses and thus the forest acreages reported in this Tier 2 BO supersede those previously reported in the Tier 1 BA Addendum (NLEB CO/BO 2015).

Tree cover data is based on field verified forests and forest fragments within the right of way and adjacent survey area, and 2011 National Land Cover Database (NLCD) forest data for areas outside of the survey locations. The 2011 NLCD forest cover data, updated aerial photographs, field verification information produced by the Engineering and Environmental Assessment Consultants (EEACs) during Tier 2 studies, and images accessed via Google™ Earth represent the best available data for purposes of this consultation.

In order to evaluate the anticipated reach of direct and indirect affects, the Action Area has been expanded to include those areas where growth/development, induced by the construction and operation of the project, is reasonably foreseeable. Estimated forest cover within the maternity colony areas and the Section 6 Expanded RSAA is summarized below in Table 3. The maternity colony areas were originally evaluated using similar tree cover data and therefore, the difference from Tier 1 to Tier 2 is minimal.

I-69 Project Section 6 area	Total Acres	Total <u>Forest/Tree Cover</u> Acreage	Percent of the area that is Forested	Core Forest acreage
Lambs Creek MCA*	4,524	1,946	43%	756
Clear Creek MCA*	4,524	1,728	38%	356
White River MCA*	4,524	894	20%	83
White River –Goose Cr MCA*	4,524	818	18%	35
Pleasant Run MCA*	4,524	1,030	23%	126
Expanded Remaining SAA(excludes maternity colony areas)	73,719	15,557	21%	3,109

Table 3. Estimated amount of forest within NLEB Maternity Colony Areas and Expanded Section 6 Summer Action Area.

Core Forests

Analysis of forest data indicates there are 3,109 acres of core forest in the Section 6 NLEB RSAA. This is a decrease from the Tier 1 acreage, primarily because of a significant reduction in the area included for induced TAZs. Within the five maternity colonies, there are 1,356 acres of core forest. There will be approximately 11.5 acres of core forest impacted by the refined preferred alternative right of way. Of these 11.5 acres, 4.1 acres are located within the RSAA, zero acres are located within the Lambs Creek Maternity Colony, 2.1 acres are located within the Clear Creek East Fork Maternity Colony (originally no core was impacted in this area), 5.3 acres are located within the White River Maternity Colony, zero acres are located within the White

River – Goose Creek Maternity Colony, and zero acres are located within the Pleasant Run Maternity Colony. There is no core forest impact within the overlap between Clear Creek East Fork and White River Maternity Colonies. There is an increase from 6 acres to 11.5 acres from the finding in the analysis of the representative alignment in the Tier 1 BA Addendum compared to the refined preferred alternative. Table 4.4-3 of the Section 6 BA shows the direct impacts to forest and tree cover in the northern long-eared bat maternity colonies.

Other Factors Affecting the Indiana bat and NLEB in the Action Area

The following State, local, and private actions within the Action Area are likely adversely affecting Indiana bats to variable degrees, and are likely to continue into the reasonably foreseeable future: 1) loss and degradation of roosting, foraging, swarming and staging habitat, 2) commercial and private timber harvesting, 3) cutting of snags, 4) degradation of water quality, 5) roadkill along existing roadways, and 6) repeated human disturbance of hibernating bats. The baseline acreages (*e.g.*, % tree cover), habitat conditions, and general ongoing stressors of the maternity colonies and winter habitat are discussed on pages 73-75 and 79 of the Tier 1 RPBO and also within the Tier 2 BA and are hereby incorporated by reference. (Note: some of the forest data presented in the Tier 1 RPBO has been revised in the Tier 2 BA).

According to the Tier 2 BA, there are several legal drains within Section 6. GIS layers showed five legal drains in Marion County. They are State/Harmon Ditch, Fowler-Haueisen or Thompson Run/Haueisen Ditch, Hare-Marea Ditch, Alcorn Ditch or Little Buck Creek, and Orme Ditch. No legal drains are known to occur in Johnson County, and there is one legal drain in Morgan County (Sartor Ditch). None of these legal drains are within any Indiana bat maternity colony, and as such, there would be no removal of any tree cover related to any known legal drain in any Indiana bat colony in I-69 Section 6.

Another stressor specific to the Section 6 Action Area includes limestone and sand/gravel quarrying. The I-69 Section 6 Tier 2 DEIS discussed the gravel quarrying in Section 5.24:

“There are active limestone and sand/gravel quarries in the project area, as described in Section 5.15. Active quarry sites are Hanson Aggregates, Irving Materials and Jones Gravel Pit. The impacts of these active quarries to forest and agricultural land is included as other projected growth in the cumulative impact analysis.”

Commercial and private timber harvesting occurs statewide on a regular basis. In general, data from the U.S. Forest Service, North Central Research Station’s 2005 report “Indiana Forests: 1999-2003, Part A” indicate that while there has been a loss of continuous forests (resulting in smaller, more fragmented stands), there has been an overall increase in forested land across the state. This trend appears to continue (Gormanson 2016).

In the fall of 2010 the USFWS became aware of private timbering occurring in the future I-69 right-of-way in Section 4. The private timbering was presumably being conducted to gain additional monetary compensation for the property prior to INDOT acquiring the land. In one instance, two landowners selectively cut approximately 110 acres in and around the planned right-of-way near the proposed SR 45 interchange in Section 4. In March, 2011, INDOT sent out a letter to local logging companies to curtail any distribution of misinformation. These letters indicated that seasonal tree-clearing guidelines had been adopted by INDOT for the entire project area in order to protect the Indiana bat and encouraged all logging companies and local

landowners to adhere to these guidelines and to contact the USFWS for more information. Subsequently, the USFWS issued a letter to all local landowners in Section 4 advising them of the presence of the Indiana bat in the area and ways to avoid potentially taking the species. In an effort to be proactive for Section 6, INDOT will develop a similar letter and send it out to all landowners in the right-of-way. These letters will be sent out prior to the appraisal process to assure owners are informed early in the process. Furthermore a new Conservation Measure has been developed which includes additional coordination with landowners to avoid and minimize private tree clearing in the Action Area.

IV. EFFECTS OF THE ACTION

Based on our analysis of information provided in the June 6, 2017 Tier 2 BA for Section 6 of I-69, we have determined that the adverse effects of the proposed action are consistent with those contemplated in the August 24, 2006 Tier 1 RPBO and recent amendments (dated May 25, 2011, July 24, 2013, and April 1, 2015). Therefore, the previous discussions of adverse effects and incidental take analyses on pages 81-91 and Appendix A of the Tier 1 RPBO, pages 29-48 and Appendix B of Amendment 3 (NLEB CO/BO), and discussions contained in the other recent amendments to the Tier 1 RPBO (including updated impact tables B1-B5 included in the 2013 Amendment 2 and 2014 Amendment 3) remain valid and are hereby incorporated by reference. No additional adverse effects beyond those discussed in the Tier 1 RPBO and the recent amendments are anticipated from the Proposed Action. Both the harmful and beneficial effects of the Tier 2 BA estimated impacts and proposed mitigation acreages were taken into consideration for our incidental take and jeopardy analyses for this Tier 2 BO. Anticipated effects are summarized below:

Indiana and northern long-eared bats within the Section 6 Action Area may be exposed to adverse effects and incidentally taken from several I-69 related activities. The following forms of incidental take are possible:

- Harm from permanent direct loss of roosting/foraging/swarming/staging habitat and loss of habitat connectivity/travel corridors among forested patches in Section 6
- Harass/wound/kill/harm from disturbance and habitat loss associated w/demolition and subsequent relocation of 142 homes, 28 apartment buildings and 8 duplexes, 9 mobile homes, 81 commercial buildings, a firestation, and two non-profit facilities in Section 6 (assuming one or more home owner/business owner will choose to construct a new building in a forested area, no seasonal tree-clearing restrictions, and Indiana bats assumed present)
- Harass/wound/kill/harm from disturbance and habitat loss associated w/private landowner clearing and timber salvage prior to INDOT purchasing property (assuming home owner/business owner chooses to not work with INDOT to avoid timbering property during maternity season and assuming Indiana bats are present)
- Harass/wound/kill/harm from indirect/induced loss of roosting, swarming, staging and/or foraging habitat (assuming no restrictions/bats present)
- Harm from permanent habitat loss due to I-69 related utility and billboard relocations (timing restrictions will prevent direct mortality). Several utility crossings and billboard relocations may result in a potential conflict that could result in pipelines, power lines, or billboards being relocated in wooded areas in Section 6. Approximately 43 acres of

utility impacts within forested areas is anticipated, as well as 7 acres of billboard impacts; these are being closely coordinated with INDOT and FWS

- Death/kill from collisions with an increased volume of vehicles traveling at high speeds (*i.e.*, roadkill) on I-69 and/or increased traffic volumes on other local roadways and new access roads
- Harassment of bats roosting near construction activities and/or from noises/vibrations/disturbance levels due to operation of I-69 causing roost-site abandonment and atypical exposure to day-time predators while fleeing and seeking new shelter during the day-time

Although incidental take may occur in various forms, the total amount of incidental take anticipated of individual bats is fairly small. Based on habitat impacts discussed in the Tier 2 BA, the Service anticipates the incidental take during the summer months to be consistent with or less than that which was determined in the Tier 1 RPBO and recent amendments (May 25, 2011, July 24, 2013, and April 1, 2015): No more than 27 Indiana bats from the four maternity colonies in Section 6 (Clear Creek – 5; Crooked Creek – 16; Pleasant Run Creek – 6; and Lambs Creek – 0) will be taken as a result of all project-related *habitat modifications* (direct and indirect) through 2030 (see Table B4 in 2013 Amendment to Tier 1 RPBO); no more than 10 northern long-eared bats from the five Section 6 colonies (including Lambs Creek) are expected to be taken (Lambs Creek - 0; Crooked Creek - 3; White River – 5; White River Goose Creek – 2; and Pleasant Creek – 0 [see Table B4 in the 2014 NLEB CO/BO (Amendment 3)]).

We estimate no more than 24 Indiana bats total in the Section 6 colonies will be taken as a result of roadkill from 2013 to 2030, and no more than 7 northern long-eared bats. This estimate is likely an overestimate due to the fact that the project is upgrading an existing four-lane highway in this section (as opposed to new construction); any increase in roadkill would be a result of increased traffic volume (not a new roadway), assuming Indiana bats currently cross existing SR37. Although there are a couple of records east of the existing roadway within the SAA, most of the White River floodplain and documented habitat is on the west side. We feel it is unlikely bats will frequently cross back and forth across the highway. Furthermore, some recent research has indicated that bats may avoid larger roadways if their roosting and foraging habitat is not divided or if over- or underpasses are available; one study by Zurcher *et. al.* (2010) indicated that bats may avoid on-coming traffic.)

Direct Impacts

General Habitat Impacts

Forest

There are about 160 acres of forested land (including both upland forest and wetland forest) estimated to be directly impacted within the refined preferred alternative right of way for I-69 Section 6. Of the nearly 160 acres of forest impacted, approximately 158 acres are upland forests or non-wetland forests and 2 acres are considered forested wetland. In addition, there are an estimated 50.2 acres of forest impacts from utility and billboard relocations (see Chapter 2 of the revised Tier 2 BA). The total anticipated loss of forest (210 acres) is roughly 33% **less** than what was previously estimated in Tier 1. Approximately 0.7% of the available forest within the larger Indiana bat Section 6 Expanded SAA will be impacted by project activities (including utility and

billboard relocations). Appendix F of the BA contains a summary of forest impacts for all sections of I-69.

In April of 2016, 38 transects were surveyed within forested areas that would be impacted by Section 6 of I-69 (See Environmental Baseline Section of this document for details). Based upon their findings, it is estimated that approximately 576 currently existing snags (*i.e.*, dead trees >9” in diameter with exfoliating bark that may serve as potential roost sites for Indiana bats and NLEBs) may be destroyed within the 160 acres that will be permanently cleared for construction of I-69 (Table 1). In the maternity colony areas, the percent of snags impacted ranged from 0.0% (NLEB Lambs Creek) to 1.4% (NLEB Clear Creek East Fork) and in the expanded remaining SAA impacts included approximately 0.4% of available snags for the Indiana bat and 0.7% for NLEBs. Based on this level of impact, the construction of I-69 is anticipated to have an insignificant and discountable effect on snag availability for Indiana bats and NLEBs within the Expanded Action Area. Furthermore, only a fraction of these snags, those with direct solar exposure (along edges or within canopy openings, etc.), are likely to be suitable as potential primary maternity roost trees.

Core Forest

There will be an estimated 11.5 acres of core forests impacted by the refined preferred alternative right-of-way. This impact is a slight decrease from the finding of 15 acres of core forest impact in the analysis of the representative alignment (RA) in the Tier 1 BA Addendum. Table 3.4-3 of the Tier 2 BA shows the direct impacts to forest and tree cover in the Indiana bat maternity colonies and Table 4.4-3 shows direct forest impacts to the NLEB colonies.

Wetlands

Appendix F of the Section 6 BA contains a summary of wetland impacts for all sections of the I-69. For the Section 6 refined preferred alternative, 1.9 acres of emergent wetlands, 0.4 acres of scrub-shrub wetlands, 1.7 acres of forested wetlands, and 2.8 acres of open water (both palustrine and lacustrine) are expected to be impacted, for a total of 6.8 acres. See Table 3.4-7 of the Tier 2 BA for Indiana bat maternity colony details and Table 4.4-6 for the NLEB.

Overall, wetland impacts are minimal and will continue to be minimized as the project progresses.

Streams/Floodplains

The refined preferred alternative crosses 43,536 linear feet of stream. The impacts are as follows:

- Perennial Streams – 16,944 linear feet in the right of way
- Intermittent Streams – 11,797 linear feet in the right of way
- Ephemeral Streams – 18,512 linear feet in the right of way
- Riparian Habitat – 40.47 acres

The Section 6 corridor also crosses several 100-year floodplains. These mapped floodplains include: The White River, Buck Creek, Pleasant Run Creek, Honey Creek, Messersmith Ditch, North Bluff Creek, Stott’s Creek, Crooked Creek, Clear Creek, and Indian Creek. The Section 6 refined preferred alternative is estimated to impact 458 acres of floodplains.

Although it is not anticipated that any floodplains in Section 6 will be bridged in their entirety, floodplain encroachments will be minimized, where reasonable, by utilizing existing bridge crossings and through design practices such as longer bridges and perpendicular stream crossings where new crossings are warranted.

Approximately 63% of the forest impacts will occur within Indiana bat colony areas and 30% in NLEB colony areas, although the percent of total impacted forest is relatively low. While the project corridor comes near to the White River floodplain in several areas, it does not cross the river. Based on the location and quality of current roosting and foraging areas within Section 6 (primarily along the White River floodplain), the Service anticipates that Indiana bats and NLEBs may attempt to use/cross over the proposed interstate at only a few locations including stretches where more heavily wooded areas exist along the proposed alignment and/or where the alignment crosses riparian corridors such as Indian Creek, Clear Creek, Stott's Creek, and Crooked Creek. Based on the forest transect information, some of the forest areas have younger growth with moderate to dense understories and may not be suitable habitat; therefore, not all of the 160 acres that will be removed for construction of the refined preferred alignment is likely to serve as Indiana bat habitat.

Other Direct Impacts

Construction Impacts

Noise

The construction of I-69 Section 6 will result in increased noise levels from the noise levels of the existing SR 37. Most noise generated from project-related construction activities will likely occur during daylight hours when Indiana bats are roosting in trees. Unfamiliar noises from the operation of chainsaws, bulldozers, skidders, trucks, etc. may occur in relatively close proximity to occupied primary and alternate roost trees during the summer reproductive season. The novelty of these noises and their relative volume levels will likely dictate the range of responses from individuals or colonies of bats. At low noise levels (or farther distances), bats initially may be startled and have increased respiration/heart rates, but they would likely habituate to the low background noise levels. At closer range and louder noise levels (particularly if accompanied by physical vibrations from heavy machinery and the crashing of falling trees) many bats would probably be startled to the point of fleeing from their day-time roosts and in a few cases may experience increased predation risk. Because the noise levels in construction areas will likely continue for more than a single day the bats roosting within or close to these areas are likely to shift their focal roosting areas further away or may temporarily abandon these roosting areas completely. In Section 6, no known existing roosts are within a quarter-mile of the project area. One roost, which was not located during a recent survey, was very near the project area.

Hazardous releases

The release of hazardous materials into surface and subsurface waters from spills along highways is a concern both during and after construction. During construction of I-69 Section 6, contractors will be required to provide a spill response plan. This response plan will include telephone numbers for emergency response personnel and copies of agreements with agencies that are part of the spill-response effort.

Blasting

Some blasting may occur in Section 6. While the effects of blasting are unknown, the occurrence will be intermittent, short-term, and very limited in scope.

Private Landowner Clearing

One effect of the action that was not originally contemplated during the Tier 1 consultation was the potential for private landowners to conduct timber harvests on their property prior to selling their land to the State for the project construction. INDOT's approach to purchasing right of way involves paying a landowner an amount comparable to other local, forested properties in the same market. This method of appraisal and valuation is known as the comparable sales approach, and is described in INDOT's 2011 Appraisal Manual. In some cases, it appears, landowners have found it more economically beneficial to conduct some amount of harvest on their properties prior to selling to the State. Unfortunately, most of this cutting often occurs during the time period that bats are present.

In an effort to avoid and minimize this issue, INDOT and FHWA, in coordination with the FWS, developed a new conservation measure which is now included in the official proposed action for the I-69 project (see Appendix D, item A16, of Amendment 2 of the Tier 1 RPBO, 2013). FHWA, through INDOT, plans to mitigate impacts of out-of-season logging by providing private landowners within the approved right-of-way, who express an interest or intent to harvest timber, a mechanism to avoid or limit their harvesting activities to the October 1-March 31 timeframe in the SAA. Options may include a "right of entry" agreement or other type of covenant or agreement between FHWA/INDOT and the landowner. FHWA, through INDOT, will contact landowners of property within the right-of-way to discuss opportunities for deferring tree clearing activities to the approved tree-clearing timeframes. This will voluntarily limit the timing of private timber harvest to a period when bats are not present in the Action Area. These offers will be made on a case by case basis in coordination with the USFWS's Bloomington, Indiana Field Office.

Furthermore, INDOT/FHWA will provide information to landowners in the Section 6 project area informing them of the presence of the Indiana bat and NLEB within the Action Area and the potential for violations under the Endangered Species Act if timber activities occur during the restricted time period. Fortunately, these potential impacts are less likely to occur in Section 6 than Section 4 because much of the proposed alignment falls within existing INDOT ROW.

Implementation of the above measures should significantly reduce any impacts to bats as a result of private landowner tree clearing. Furthermore, because the amount of acquisition of private properties will be much less than what occurred in Section 4 and because a fewer number of landlocked parcels is anticipated, forest impacts from private landowners in Section 6 is anticipated to be considerably less than what occurred previously in Section 4. Additional information related to private landowner clearing can be found in Amendment 2 to the Tier 1 RPBO (2013).

Roadkill

Roadkill may also result in direct death of maternity colony members (and is likely currently occurring to some extent); as with take from induced development, the full effect of the take is not anticipated to occur until the entire interstate is constructed and fully operational (*i.e.* free flowing traffic on all six sections). Until such time we expect more localized changes in traffic.

In addition, some direct mortality from roadkill may be compensatory rather than additive as the number of roadkills currently occurring on other local roads may decrease as traffic shifts to completed segments of the new I-69 roadway. Because the project consists primarily of upgrading an existing 4-lane facility, we do not expect roadkill deaths to rise significantly. Some increase could occur due to overall increased traffic volume and higher speed limits.

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

Therefore, although it is logical to assume that some roadkill may occur, the amount of roadkill attributable to I-69 is somewhat speculative and will be difficult to detect. As the Service does not have a standard means for estimating the likelihood of roadkill, in Tier 1 we estimated roadkill for each colony by starting with the assumption that all bats in a colony would be exposed to I-69 traffic (160 bats/colony for Indiana bats and 100 bats/colony for NLEBs) and had a 5% risk of being hit and killed over the course of a 17 year period (this assumes a fully operational, completed interstate). The roadkill estimates used for this project represent what we believe to be a reasonable worst-case scenario and could be reevaluated during subsequent consultations if more detailed information or data becomes available. The refined preferred alternative for Section 6 runs through some portion of all maternity colonies, however it likely does not separate large portions of roosting and foraging habitat, therefore further reducing the likelihood that roadkill is a significant form of take of Indiana and northern long-eared bats in Section 6.

Maternity Colony Impacts in the Section 6 Action Area

Based on our assumptions as described in the Tier 1 RPBO, each Indiana bat maternity colony is comprised of 80 adult females and their single offspring. This results in a maximum of 160 bats per colony by mid-June after the young are born and become volant (*i.e.*, capable of flight) around mid-July. Therefore, given the documented presence of 4 maternity colonies in the Section 6 Action Area (including the Lambs Creek Colony which has a very small portion of the colony area within the Section 6 Action Area), and an approximate total of 160 females and their pups per colony, we can assume that there are a combined total of approximately 640 (4 x 160 = 640) adult females (n=320) and juveniles (n=320) within or adjacent to the Action Area during the summer active period and that varying proportions of the bats in these colonies are likely to be exposed to direct and/or indirect effects from I-69.

For the NLEB, we have assumed that each colony is comprised of 50 adult females and their single offspring, for a total of 100 bats per colony by mid-June. Based on the presence of five maternity colonies in the area, we can assume there is approximately 500 adult females and juveniles within or adjacent to the Action Area during the summer active period and that some portion of these bats are likely to be directly or indirectly exposed to effects from I-69.

Estimates of the number of Indiana bats and NLEBs exposed and adversely affected (*i.e.* disturbed, injured, or killed, henceforth referred to as take) during the summer maternity season as a result of the various project stressors are shown in Appendix A, Table B4 of the 2013 amendment to the 2006 Tier 1 RPBO and Table B4 of the 2014 amendment (NLEB CO/BO), respectively.

The impact WNS may have on the ability of Indiana or northern long-eared bats to persist and recover is presently unknown. We currently do not have estimates of adult survivorship, juvenile survivorship, or fecundity for Indiana bat and NLEB populations affected by WNS. WNS was detected in the state of Indiana, and the Tier 1 Action Area, in the winter of 2010-2011 and the observed decrease in bat populations within the state is likely, at least in part, a result of the disease. Based on a limited amount of survey data from New York (2007 to 2010), Indiana bat hibernating populations in New York appear to have declined by almost 70% overall with affected individual hibernacula having population growth rates ranging from -99% to -21% during this time period. More recently, an analysis by Pettit and O'Keefe (2017) indicated that the relative summer abundance of Indiana bats (and other species) has decreased significantly since the onset of WNS in Indiana. Furthermore, the study concluded that WNS may affect the reproductive success of several bat species, including Indiana and northern long-eared bats. The anticipated impact the project take will have in light of the presence of WNS is discussed in more detail in the 2011 amendment to the Tier 1 RPBO (pages 10-16) and is hereby incorporated by reference.

Impacts to the maternity colonies in Section 6 are expected to be fewer compared to most of the previous sections because the project consists primarily of upgrading an existing four lane divided highway. Colonies currently inhabiting the action area are doing so despite the present transportation infrastructure already in place. Project impacts to the maternity colonies will include direct and indirect loss of roosting and/or foraging habitat, and impacts from construction noise and/or vibrations. These impacts will be temporary in nature and occur at different times over a period of years. Pre- and post-construction monitoring is being conducted in all sections to help evaluate the on-going status of the maternity colonies in the Action Area.

No mortality due to direct impacts during the construction period (first 1-3 years of the project) is anticipated due to seasonal tree clearing restrictions and increased coordination with private landowners; therefore, direct mortality of individual adult females (which are considered the most sensitive individuals) from highway construction activities is not expected.

Indiana Bat Maternity Colony Impacts

Lambs Creek Colony

The proposed alignment passes through the southeastern corner of the Lambs Creek Maternity Colony. Because the alignment includes portions of both Section 5 and Section 6, impacts to the colony associated with the I-69 roadway were originally addressed in the Section 5 BA and BO using the Section 5 Preferred Alignment and the Representative Alignment for Section 6. Since details of the Section 6 refined preferred alignment are now available, the impacts to Lambs

Creek will be revised in this Section 6 BO; the changes are very minor and typically indicate fewer impacts to the colony.

The Lambs Creek Maternity colony contains approximately 5,000 acres of tree cover. Approximately 7 acres of tree cover impacts will occur within the maternity colony area (4.7 acres are actually within the Section 6 project area); this has decreased slightly since the Section 5 Tier 2 BA was developed. Another 1.8 acres of forest impact may occur as a result of utility relocations. Impacts along this portion of the project corridor were originally described and included within the Tier 1 Remaining SAA totals until the 2012 discovery of a maternity colony at this location; therefore, there are no Tier 1 colony impacts to compare to.

In the Lambs Creek maternity colony, 5,023 acres of tree cover are available. This equates to 18,083 available snags in the colony area (calculated at the Section 6 mean density of 3.6 snags/acre density which is slightly higher than the mean density for Section 5). Based on Section 6 data, 3.5 acres of forest cover (or 4.7 acres of tree cover) will be impacted within the maternity colony by the refined preferred alternative. This equates to 13 snags impacted within the refined preferred alternative which is approximately 0.07% of the available snags in the maternity colony circle.

There are eight roost trees and one bat capture point in the Lambs Creek Maternity Colony. USFWS identified Roost 141-1 as the centroid of the maternity colony. Seven other roost trees were identified by USFWS. Within the Lambs Creek Maternity Colony, connectivity to I-69 from the roost trees and capture points occurs along various tree lines and [REDACTED] [REDACTED] to [REDACTED] [REDACTED] and the [REDACTED] [REDACTED]. The shortest connectivity route distance to I-69 from the one Indiana bat capture point is approximately [REDACTED] [REDACTED] (Site 24). The shortest connectivity route distance to I-69 from the eight known roost trees are approximately [REDACTED] [REDACTED] (768-1), [REDACTED] [REDACTED] (768-2), [REDACTED] [REDACTED] (141-1), [REDACTED] [REDACTED] (141-2), [REDACTED] [REDACTED] (141-3), [REDACTED] [REDACTED] (433-1), [REDACTED] [REDACTED] (433-2) and [REDACTED] [REDACTED] (433-3). The shortest straight-line distance from an Indiana bat capture point to I-69 is [REDACTED] [REDACTED] (Site 24). The shortest straight-line distance from any roost tree to I-69 is approximately [REDACTED] [REDACTED] (768-1), while the longest straight-line distance is approximately [REDACTED] [REDACTED] (433-2).

Substantial alternative roosting and foraging habitat is located on the west side of the I-69 Section 6 alternative in this area. Figure 3 shows the Indiana bat connectivity associated with Lambs Creek maternity colony.

No impact to the identified roost trees is anticipated. Since a four-lane interstate already occupies the proposed alignment right-of-way, it is doubtful that any unknown roost trees (including a primary roost) would be affected by project construction. In the unlikely event that a primary roost or other alternate roost is felled by construction activities, additional roosting and foraging habitat is available within the area.

Two mitigation sites (Nutter Ditch and Principal) consisting of 288 acres of upland forest preservation and 55 acres of reforestation are proposed within the Lambs Creek Maternity Colony area. Connectivity routes were calculated for both the roost tree sites and the bat capture sites to the nearest mitigation site. The eight roost trees are located [REDACTED] [REDACTED] (141-2 and 141-3), [REDACTED] [REDACTED] (768-1), [REDACTED] [REDACTED] (141-1), [REDACTED] [REDACTED] (433-2), [REDACTED] [REDACTED] (768-2) and [REDACTED] [REDACTED] (433-1 and 433-3) away from the [REDACTED] [REDACTED] mitigation site (Section 5 mitigation site). Capture Site 24 is

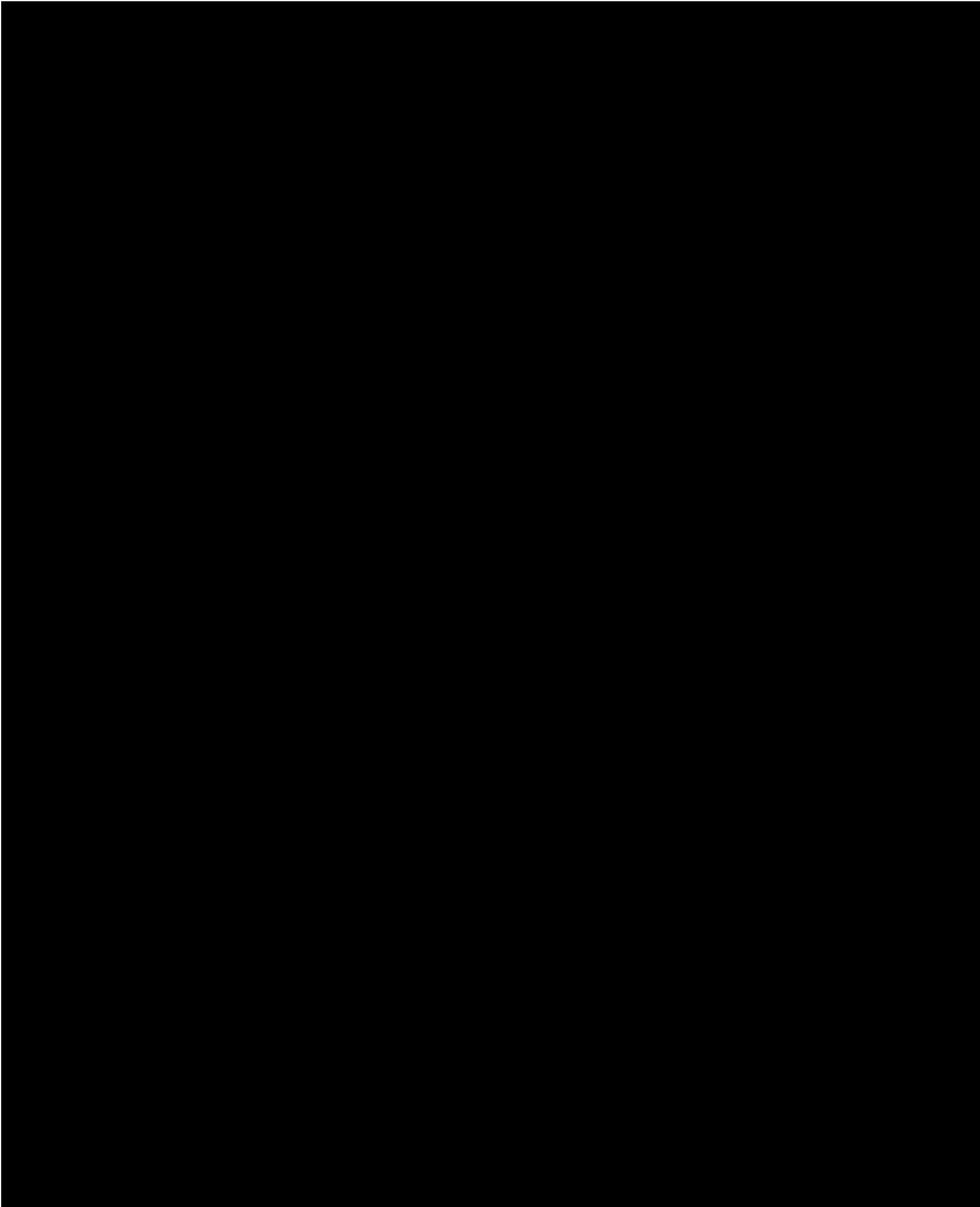


Figure 3. Lambs Creek Maternity Colony Connectivity to the Nearest I-69 Alignment and Mitigation Sites.

located [redacted] miles away from the [redacted] [redacted] mitigation site. See Figure 3 above and Table 3.4-5 in the Tier 2 BA for additional information.

Based on the amount of surrounding forest habitat and stream crossings, bats from the Lambs Creek Colony may attempt to cross the interstate along the Indian Creek corridor. We anticipate that the I-69 bridge over Indian Creek will remain at least the same size as it currently is and continue to allow bats to fly under the roadway and connect to other habitat areas east of the alignment if, in fact, they are currently using the stream corridor (M. Allen, FHWA, pers. comm.).

We believe the Tier 1 method for estimating roadkill is reasonable (and conservative) and anticipate that no more than 8 bats may be killed by vehicle collision between 2013 and 2030 within Lambs Creek Maternity Colony, or approximately 1 bat every two years (see roadkill estimate discussion above). The loss of a few individuals due to roadkill may cause short-term

(i.e., 2 to 3 years) reductions in reproductive success, but we do not anticipate an appreciable long-term change in reproductive success or viability of the Lambs Creek Maternity Colony.

Some take in the form of harassment due to construction noise/vibration may be possible. Loud noises during the day may cause increased heart rates/respiratory rates and disturbance from the roost. This could lead to roost abandonment and/or atypical exposure to daytime predation. No impacts are anticipated to nighttime foraging activities. These construction activities will be short term and no long term effects are anticipated.

Clear Creek Maternity Colony

The Clear Creek Maternity Colony contains 5,392 acres of tree cover. This equates to 19,411 available snags at 3.6 snags/acre density. Within the refined preferred alternative right of way, 52 acres of tree cover (or 42.4 acres of forest) will be impacted. This impact has decreased from the 99 acres reported in the analysis of the 2006 representative alignment. Forest impacts would equate to 153 snags impacted within the refined preferred alternative. This is less than 1% of the available snags in the maternity colony. Figure 3.4-3 in the Tier 2 BA shows the tree cover within the Clear Creek Maternity Colony and potential impacts. The project corridor bisects the colony area (Figures 1 and 4). Suitable habitat will remain on both sides of the alignment. Although the upgrade of the highway in this area could theoretically increase any potential barrier effect once constructed, there is ample habitat on either side of the alignment and Indiana bats have been able to persist in the area. Utility and billboard relocations could result in another 10 acres of forest impacts in the colony area.

Five Indiana bat capture locations are found within the Clear Creek colony area. In addition, several alternate roost trees have been identified in the colony area, along with two primary roosts, one on each side of existing [REDACTED]. The primary roost identified on the east side of [REDACTED] is no longer present. No project impacts to any identified roost trees are anticipated. Most of the roost trees found to date are located along the floodplain of the [REDACTED] [REDACTED] [REDACTED] [REDACTED] the closest impact to any of the roost tree locations is [REDACTED] [REDACTED] however, this roost tree is no longer standing. It is possible that another roost tree is being utilized in the vicinity of the original tree. In the unlikely event that an unknown primary roost or other alternate roost is felled by construction activities, additional roosting and foraging habitat will be available within the area.

Connectivity to I-69 from the Indiana bat capture points occurs primarily along tree lines, the [REDACTED] [REDACTED] [REDACTED] [REDACTED] and the [REDACTED] [REDACTED] [REDACTED] [REDACTED]. The shortest connectivity route to I-69 from the Indiana bat capture points is less than [REDACTED] [REDACTED] (Site 5), while the longest is approximately [REDACTED] [REDACTED] (Site 10). The shortest connectivity route to I-69 from the roost trees is [REDACTED] [REDACTED] (203-R1), while the longest is [REDACTED] [REDACTED] (6-2, 6-4, and 022R1). The shortest straight-line distance from an Indiana bat capture point to I-69 is less than [REDACTED] [REDACTED] (Site 5), while the longest was approximately [REDACTED] [REDACTED] (Site 8). The shortest straight-line distance from a roost tree to I-69 is [REDACTED] [REDACTED] (203-R1), while the longest is approximately [REDACTED] [REDACTED] (6-1 and 022R1).

Connectivity routes were also calculated for both the roost tree sites and the bat capture sites to the mitigation sites. Over 400 acres of land are proposed for reforestation and/or preservation within and adjacent to the Clear Creek colony on the [REDACTED] side of the proposed alignment. Sites 7 and 8 are both located within a mitigation site, the [REDACTED] and [REDACTED] [REDACTED] mitigation sites, respectively. Site 3 was located the farthest from a mitigation site at approximately [REDACTED] [REDACTED] from the Mapleturn mitigation site. Roost trees 6-2 and 022R1 are located the closest to a mitigation site at approximately [REDACTED] [REDACTED] away from the [REDACTED]

■■■■ mitigation site. Roost tree 203-R1 was located the farthest from a mitigation site at approximately ■■■■ away from the ■■■■ mitigation site.

Some impacts could occur as a result of the project increasing the barrier to Indiana bat movement within their maternity area. Indiana bats associated with a maternity colony near the Indianapolis Airport have been observed to readily cross small roads (e.g., dirt, gravel, and paved) while foraging at night, but multilane divided highways were only rarely crossed and most of those crossings occurred when bats followed a stream under Interstate 70 (pers. comm. with Dale W. Sparks, Indiana State University, 2007). Sparks and his colleagues have concluded that if Indiana bats don't cross major interstates and highways often, that the presence of such transportation infrastructure in a landscape could essentially be reducing the amount of possible foraging grounds bats would otherwise be willing to visit, thus reducing the amount of food potentially available to the bats. Another recent publication by Zurcher *et. al* also supports this conclusion (see roadkill discussion above). Consequently, high-traffic volume roads could be acting as barriers and restricting access to traditional foraging areas. Following this logic, with the addition of access roads, interchanges, and larger right of ways, some of the Clear Creek Maternity Colony members may no longer be willing to cross over I-69 while foraging (Note: I-70 in the vicinity of the Indianapolis airport is significantly wider than what I-69 in Section 6 will be). Although we do not have roost tree information for bats caught east of existing SR 37, we do know that at least one bat caught just west of the roadway was found roosting on the ■■■■ side along ■■■■. If bats currently use the bridged areas to fly under the road, then no reduction in access to the majority of their assumed colony area is expected.

Based on the location of the alignment throughout the colony area and the locations of the known roosts and capture points, some take in the form of harassment due to construction noise/vibration may be possible. Loud noises during the day may cause increased heart rates/respiratory rates and disturbance from the roost. This could lead to roost abandonment and/or atypical exposure to daytime predation. These activities will be short term and no long term affects are anticipated.

As previously discussed, once Section 6 of I-69 is operational, an increased volume of fast-moving vehicles may result in additional bat/vehicle collisions. Assuming that some individual bats from the colony do and will continue to use this area, we estimate a small, additional number of these bats may be struck by vehicles and killed. As stated above, some recent research suggests that bats may attempt to avoid large multi-lane roads, as well as approaching vehicles; however, based on one report of roadkilled Indiana bats at a site in Pennsylvania (Butchkowski 2002), there still exists some potential for bats to be struck by vehicles along highways. We believe the Tier 1 estimate for roadkill for the Clear Creek Maternity Colony will not be exceeded and no more than 8 bats will be killed by vehicle collision between 2013 and 2030, or approximately 1 bat every two years, as a result of the upgrade of ■■■■ for the Section 6 refined preferred alignment (see previous roadkill discussion). The loss of 1 individual every two years from vehicular collision may cause short-term (*i.e.*, 2 to 3 years) reductions in reproductive success, but we do not anticipate an appreciable long-term change in reproductive success or viability of the colony.

Partial bridging of the floodplain of ■■■■ ■■■■ will provide an area for the bats to cross under the roadway therefore reducing the likelihood of roadkilled bats at that location.

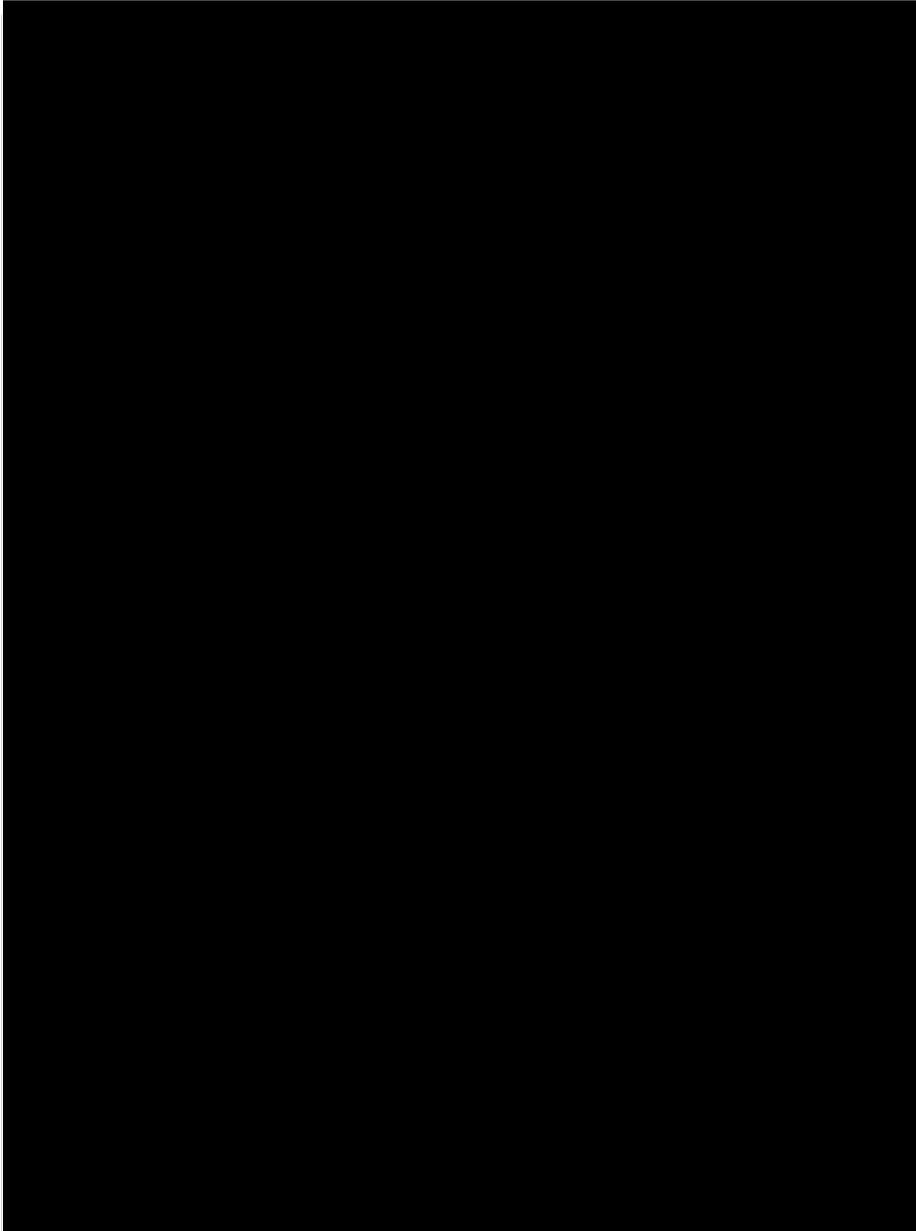


Figure 4. Clear Creek Maternity Colony Connectivity to the Nearest I-69 Alignment and Mitigation Sites.

Crooked Creek Maternity Colony

The Crooked Creek Maternity Colony contains 3,636 acres of tree cover. Within the refined preferred alternative right of way, 57.1 acres of tree cover (46.3 acres of forest cover) will be impacted. This impact has decreased from the 170 acres reported in the analysis of the 2006 representative alignment. Figure 3.4-4 of the BA shows the tree cover within the Crooked Creek Maternity Colony and potential impacts. The tree cover estimate equates to 13,090 available snags at the 3.6 snags/acre density. Based on I-69 Section 6 forest data, 46.3 acres of these trees will be impacted resulting in 167 snags affected within the refined preferred alternative. This is approximately 1.3% of the available snags in the maternity colony circle. Another 13 acres of forest impact may result from utility and billboard relocations in the colony area.

One Indiana bat capture point and two roost trees are located within the Crooked Creek Maternity Colony. Connectivity to I-69 from the Indiana bat capture point occurs primarily along [REDACTED] [REDACTED] [REDACTED] and [REDACTED] [REDACTED] to the [REDACTED] [REDACTED]. The connectivity route to I-69 from the Indiana bat capture point is less than [REDACTED] [REDACTED] (Site 14). The shortest connectivity route to I-69 from the roost trees is approximately [REDACTED] [REDACTED] (105-2). The shortest straight-line distance from the Indiana bat capture point to I-69 is less than [REDACTED] [REDACTED] (Site14). The shortest straight-line distance from the roost trees to I-69 is approximately [REDACTED] [REDACTED] (105-2) and [REDACTED] [REDACTED] (105-1).

Three mitigation sites have been proposed for this area, totaling over 375 acres. Connectivity routes were calculated for both the roost tree sites and the bat capture site to the nearest mitigation site. Site 14 is approximately [REDACTED] [REDACTED] away from the [REDACTED] [REDACTED] mitigation site. Roost tree 105-1 is approximately [REDACTED] [REDACTED] away from the [REDACTED] [REDACTED] mitigation site. Roost tree 105-2 is approximately [REDACTED] [REDACTED] away from the [REDACTED] [REDACTED] mitigation site.

All capture locations and known roost trees are located west of the existing roadway. Substantial alternative roosting and foraging habitat is located to the west of the I-69 Section 6 refined preferred alternative in this area. Figure 5 shows the Indiana bat connectivity pertaining to the Crooked Creek Maternity Colony.

Assuming that some individual bats from the colony currently use and will continue to use this area, we estimate a small, additional number of these bats may be struck by vehicles and killed. We believe the Tier 1 estimate for roadkill for the Crooked Creek Maternity Colony will not be exceeded and no more than 8 bats will be killed by vehicle collision between 2013 and 2030, or approximately 1 bat every two years, as a result of the upgrade of SR 37 for the Section 6 refined preferred alignment (see roadkill discussion above). The loss of 1 individual every two years from vehicular collision may cause short-term (*i.e.*, 2 to 3 years) reductions in reproductive success, but we do not anticipate an appreciable long-term change in reproductive success or viability of the colony, particularly since a four-lane highway is already in existence. Partial bridging of the floodplains of [REDACTED] [REDACTED] and [REDACTED] [REDACTED] will provide an area for the bats to cross under the roadway therefore reducing the likelihood of roadkilled bats at those locations.

The [REDACTED] [REDACTED] [REDACTED] [REDACTED] and its floodplain are very near the construction area in this segment of Section 6. Based on the location of the alignment throughout the colony area and the locations of the known roosts and capture points, some take in the form of harassment due to construction noise/vibration may be possible. Loud noises during the day may cause increased heart rates/respiratory rates and disturbance from the roost. This could lead to roost abandonment and/or atypical exposure to daytime predation. No noise/vibration impacts are anticipated to occur to nighttime foraging activities. If any bats are roosting in the vicinity of the construction activity, it is likely they are already somewhat acclimated to noise and vibrations from traffic and typical maintenance activities. The construction activities will be short term and no long term affects are anticipated.

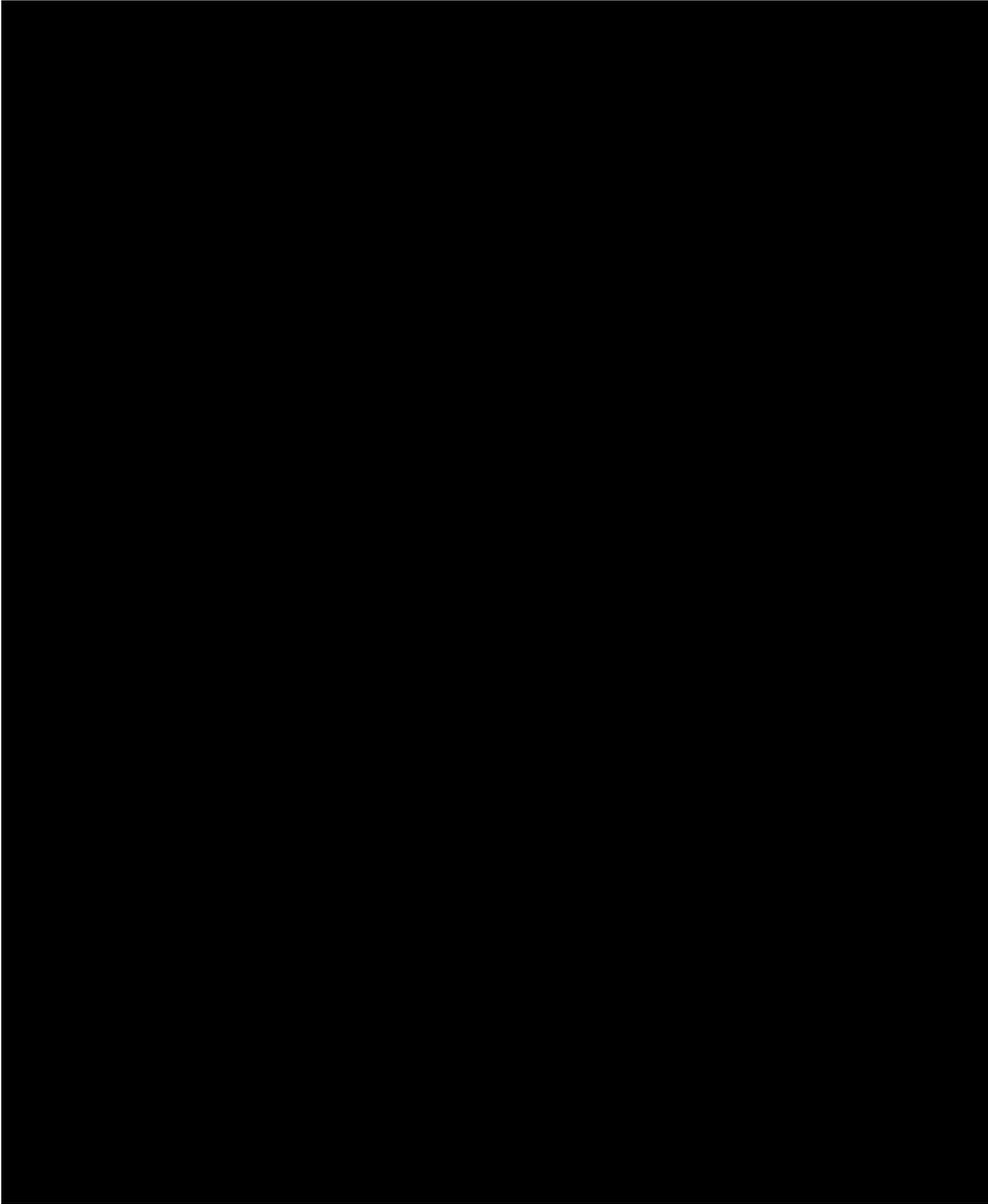


Figure 5. Crooked Creek Maternity Colony Connectivity to the Nearest I-69 Alignment and Mitigation Sites

Pleasant Run Creek Maternity Colony

The Pleasant Run Creek Maternity Colony contains 2,075 acres of tree cover and an estimated 7,470 available snags at 3.6 snags/acre density. Within the refined preferred alternative right of way, 8.7 acres of forest (15.8 acres of tree cover) in the maternity circle, including 31 snags (0.41%), will be impacted. This impact acreage has decreased from the 29 acres reported in the analysis of the 2006 representative alignment. Figure 3.4-5 of the Tier 2 BA shows the tree cover within the Pleasant Run Creek Maternity Colony and potential impacts. An estimated 3 acres of additional forest impacts may occur as a result of utility relocations.

Three Indiana bat capture points and four roost trees are located within the Pleasant Run Creek Maternity Colony. Connectivity to I-69 from the Indiana bat capture points occurs primarily along tree lines, [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] [REDACTED] and [REDACTED] [REDACTED] to the

■■■■. The shortest connectivity route to I-69 from the Indiana bat capture points is less than 0.1 mile (Site 19), while the longest is approximately ■■■■ (Site 23). The shortest connectivity route to I-69 from the roost trees is approximately ■■■■ (6-5), while the longest is approximately ■■■■ (283-1 and 283-2). The shortest straight-line distance from an Indiana bat capture point to I-69 is less than ■■■■ (Site 19), while the longest is approximately ■■■■ (Site 23). The shortest straight-line distance from a roost tree to I-69 is approximately ■■■■ (6-6), while the longest is approximately ■■■■ (283-1 and 283-2).

Connectivity routes were also calculated for both the roost tree sites and the bat capture sites to the mitigation sites. Sites 21 and 22 are located the closest to a mitigation site at approximately ■■■■ away from the ■■■■ mitigation site. Site 19 was located the farthest from a mitigation site at approximately ■■■■ away from the ■■■■ mitigation site. Roost tree 6-5 is located the closest to a mitigation site at approximately ■■■■ away from the ■■■■ mitigation site. Roost trees 283-1 and 283-2 are located the farthest from a mitigation site at approximately ■■■■ away from the ■■■■ mitigation site.

The upgraded alignment bisects the eastern quarter of the maternity colony area and moves further away from the White River. Substantial alternative roosting and foraging habitat is located to the west of the I-69 Section 6 refined preferred alternative in this area. Figure 6 shows the Indiana bat connectivity pertaining to the Pleasant Run Creek Maternity Colony.

We believe the Tier 1 estimate for roadkill for the Clear Creek Maternity Colony will not be exceeded and no more than 8 bats will be killed by vehicle collision between 2013 and 2030, or approximately 1 bat every two years, as a result of the upgrade of ■■■■ for the Section 6 refined preferred alignment (see roadkill discussion above).

Based on the location of the alignment throughout the colony area and the locations of the known roosts and capture points, some take in the form of harassment due to construction noise/vibration may be possible. Loud noises during the day may cause increased heart rates/respiratory rates and disturbance from the roost. This could lead to roost abandonment and/or atypical exposure to daytime predation. No noise/vibration impacts are anticipated to occur to nighttime foraging activities. If any bats are roosting in the vicinity of the construction activity, it is likely they are already somewhat acclimated to noise and vibrations from traffic and typical maintenance activities. The construction activities will be short term and no long term affects are anticipated.

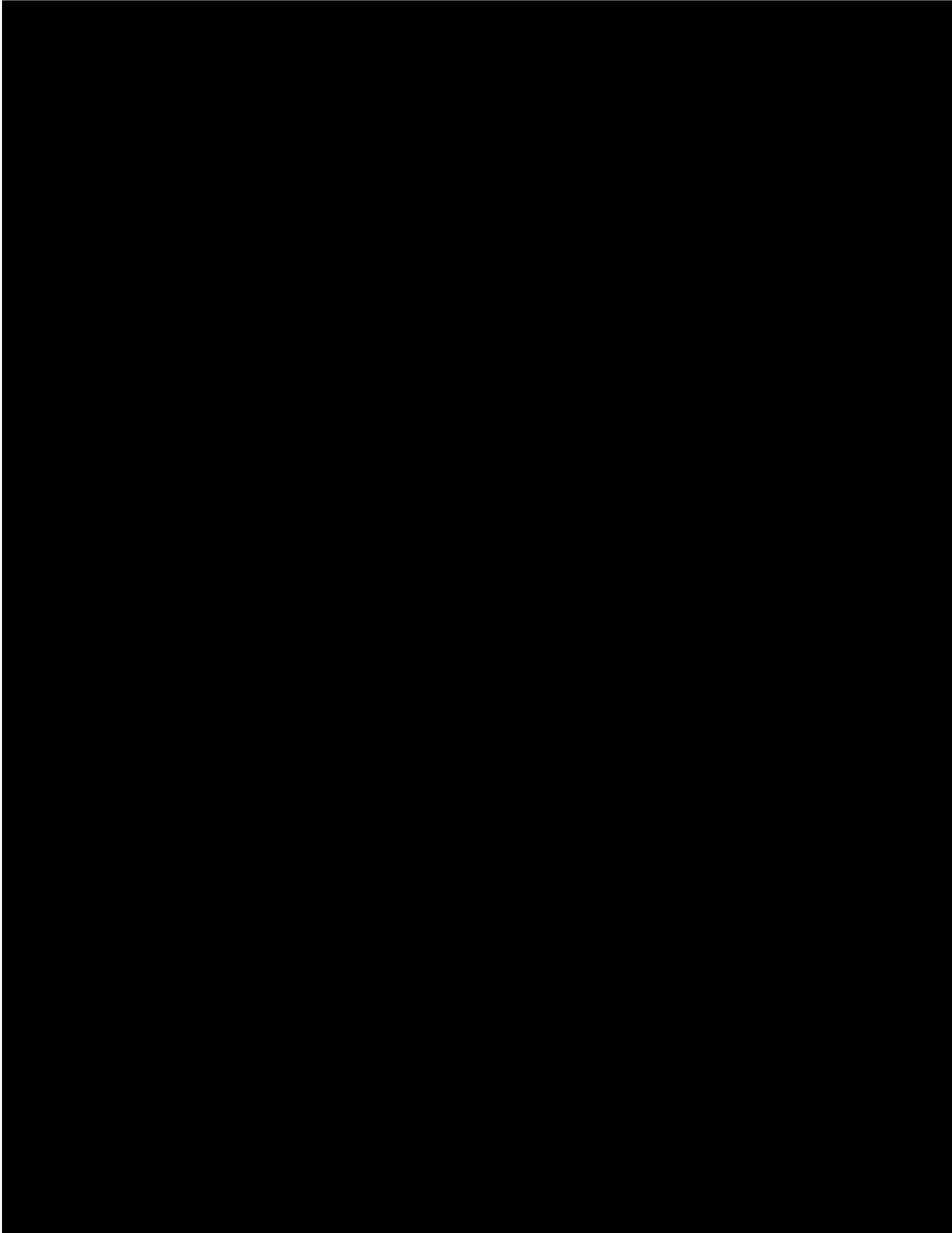


Figure 6. Pleasant Run Creek Maternity Colony Connectivity to the Nearest I-69 Alignment and Mitigation Sites

Adult Male Indiana Bat Summer Impacts

In the Tier 1 RPBO, we estimated that a maximum of 50 adult males may be taken by the year 2030 as a result of the entire I-69 Proposed Action with the majority (60%) occurring as roadkill, particularly for males remaining within the Winter Action Area (WAA) during the summer. Fourteen adult males were estimated to be taken in the entire portion of the I-69 SAA corridor extending outside of the WAA to the north and south. In the 2013 amendment, that number was revised to 46 adult males in total, with 10 males taken in the entire I-69 SAA.

Four male Indiana bats (including 3 juveniles) were captured within the [redacted] of [redacted] in 2004, none in 2005, 2012, 2014, or 2015, and one in [redacted] in 2016. In 2016, one radio-tagged male visited three alternate roost trees in the Lamb’s Creek Maternity Colony area.

The refined preferred alignment will impact potential roosting and foraging habitat and disrupt various travel corridors throughout Section 6. Once this section is operational, fast-moving vehicles may strike bats as they fly across the interstate at night. We are uncertain how or whether male Indiana bats currently travel across or parallel to the proposed interstate alignment. Assuming that some individual bats do and will continue to use this area, we anticipate a small number of male bats could be struck by vehicles and killed; this is the most likely form of incidental take of male Indiana bats in Section 6 during the summer months.

Given the low density of male Indiana bats in the Section 6 action area, and that the project primarily entails upgrading an existing roadway, we anticipate the total number of bats that may be taken as a result of the Proposed Action in the Section 6 SAA to be less than 5 individuals between the years 2013 and 2030, or less than 1 male bat every three and a half years (primarily as a result of roadkill). The potential loss of this very small number of male bats will have no measurable or significant short or long-term impacts on local or regional Indiana bat populations in the SAA, Midwest Recovery Unit or beyond.

Northern Long-eared bats Maternity Colony Impacts

Lambs Creek Maternity Colony

The proposed alignment does not pass through the NLEB Lambs Creek Maternity Colony. As previously mentioned, portions of the Lambs Creek Maternity Colony occur in both the Section 5 and Section 6 SAA. The Lambs Creek Maternity Colony contains 1,946 acres of tree cover. Within the refined preferred alternative, no acres of tree cover will be impacted within the right of way. This is similar to the less than 1 acre as reported in the analysis of the representative alignment in 2014. Figure 4.4-2 of the Tier 2 BA shows the tree cover within the NLEB Lambs Creek Maternity Colony and potential impacts.

The 1,946 acres of tree cover equates to approximately 7,006 available snags at 3.6 snags/acre density; no snags within this colony are anticipated to be affected.

One northern long-eared bat capture site (Site 24 from I-69 Section 5) is located within the NLEB Lambs Creek maternity colony. No roost trees have been identified for the northern long-eared bat in this colony. Connectivity to I-69 from this northern long-eared bat capture site occurs primarily along [REDACTED] the [REDACTED] and [REDACTED] a distance of [REDACTED]. The shortest straight-line distance to I-69 is [REDACTED]. Site 24 is [REDACTED] away from the [REDACTED] mitigation site. Substantial alternative roosting and foraging habitat is located to the west of the I-69 Section 6 refined preferred alternative in this area and we do not anticipate much movement across the proposed new roadway. Figure 7 shows the northern long-eared bat connectivity pertaining to the NLEB Lambs Creek maternity colony.

Impacts as a result of roadkill or construction noise and vibration are likely limited for this colony based on proximity to the proposed alignment.

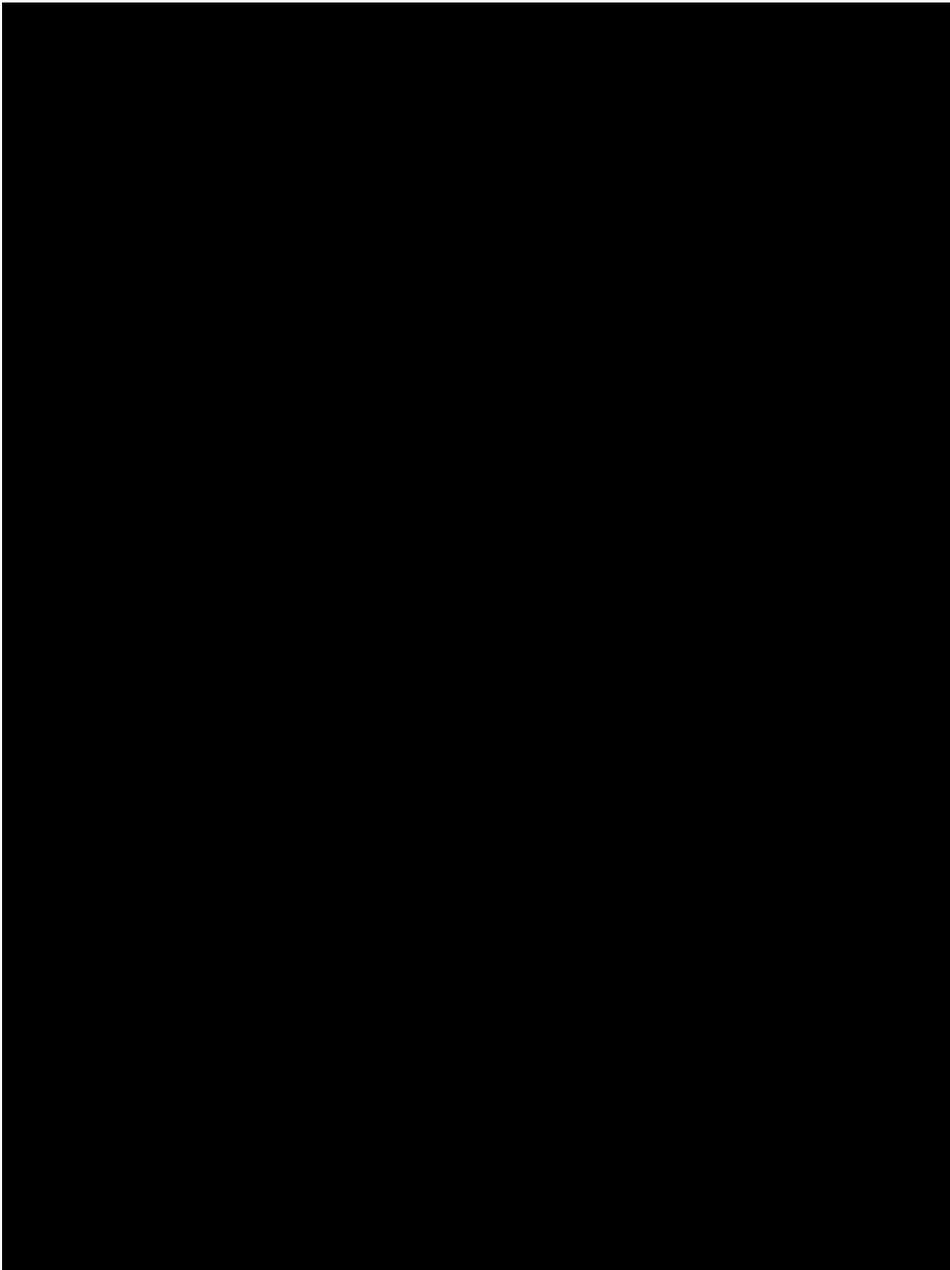


Figure 7. NLEB Lambs Creek Maternity Colony connectivity to I-69 alignment and mitigation sites.

Clear Creek East Fork Maternity Colony

The NLEB Clear Creek East Fork Maternity Colony contains 1,728 acres of tree cover. Within the refined preferred alternative, 29.8 acres of tree cover (24.9 acres of forest) will be impacted within the right of way. This impact has decreased from the 48 acres reported in the analysis of the representative alignment in 2014 due to a reduction in right of way take. Core forest impacts are estimated to be 2.1 acres. This impact is a result of a loss of edge, which in turn redefines the core area as smaller. Figure 4.4-3 in the Tier 2 BA shows the tree cover within the NLEB Clear Creek East Fork Maternity Colony and potential impacts. Less than 8 acres of forest impacts have been estimated for utility and billboard relocations.

According to the calculated snag density in the SAA, there are 6,221 available snags in the Clear Creek East Fork colony area. Based on DEIS forest data, the 24.9 acres of direct forest impacts

will result in impacts to approximately 90 snags within the maternity colony. This is approximately 1.4% of the available snags in the maternity colony area and not expected to have a significant impact on snag availability.

The refined preferred alternative will impact 1.2 acres of forested wetlands, 0.4 acres of emergent wetlands, and 0.7 acres of unconsolidated bottom wetlands in the Clear Creek East Fork maternity colony. Approximately 1.15% of the available forested wetlands, 1.0% of available emergent wetlands, and 0.43% of the available unconsolidated bottom emergent wetlands within the Clear Creek East Fork maternity colony will be impacted by the refined preferred alternative.

The Clear Creek East Fork colony is divided by the highway and contains NLEB records on both sides of the existing road. Two northern long-eared bat capture sites (Sites 6 and 7) are located within the NLEB Clear Creek East Fork maternity colony. No roost trees have been identified for the northern long-eared bat in this colony. Route connectivity to I-69 from the northern long-eared bat capture sites are along [REDACTED] distances from Site 6 ([REDACTED]) and Site 7 ([REDACTED]). The shortest straight-line distance to I-69 are [REDACTED] and [REDACTED] respectively. Site 6 is about [REDACTED] from the [REDACTED] mitigation site, while Site 7 is on the [REDACTED] mitigation property. Substantial alternative roosting and foraging habitat is located upstream and downstream of these two sites.

As was discussed for the Indiana bat colony in this area, barrier effects could increase in areas where the existing four-lane highway is widened or access roads developed. In the vicinity of [REDACTED] where the road crosses the creek, we anticipate that the new crossing will bridge at least the same amount of floodplain as the current roadway. Although we do not have roost tree information for the bats captured in this colony, it is possible that bats currently use [REDACTED] as a flyway and area to move under the roadway. This should remain as an option once the upgrade is complete.

Based on the location of the alignment throughout the colony area and the locations of the known roosts and capture points, some take in the form of harassment due to construction noise/vibration may be possible. Loud noises during the day may cause increased heart rates/respiratory rates and disturbance from the roost. This could lead to roost abandonment and/or atypical exposure to daytime predation. It is likely that bats in the area have somewhat acclimated to some noise associated with traffic and maintenance activities. The construction activities will be short term and no long term effects are anticipated.

Once Section 6 of I-69 is operational, an increased volume of fast-moving vehicles may result in additional bat/vehicle collisions. Assuming that some individual bats from the colony do and will continue to use this area, we estimate a small, additional number of these bats may be struck by vehicles and killed. As stated above, some recent research suggests that bats may attempt to avoid large multi-lane roads, as well as approaching vehicles; however, based on one report of roadkilled Indiana bats at a site in Pennsylvania (Butchkowski 2002), there still exists some potential for bats to be struck by vehicles along highways. We believe the Tier 1 estimate for roadkill for the NLEB Clear Creek Maternity Colony will not be exceeded and no more than 2 bats will be killed by vehicle collision between 2014 and 2030, or approximately 1 bat every eight years, as a result of the upgrade of [REDACTED] for the Section 6 refined preferred alignment (see previous roadkill discussion). We do not anticipate an appreciable long-term change in reproductive success or viability of the colony as a result of roadkill. Furthermore, partial

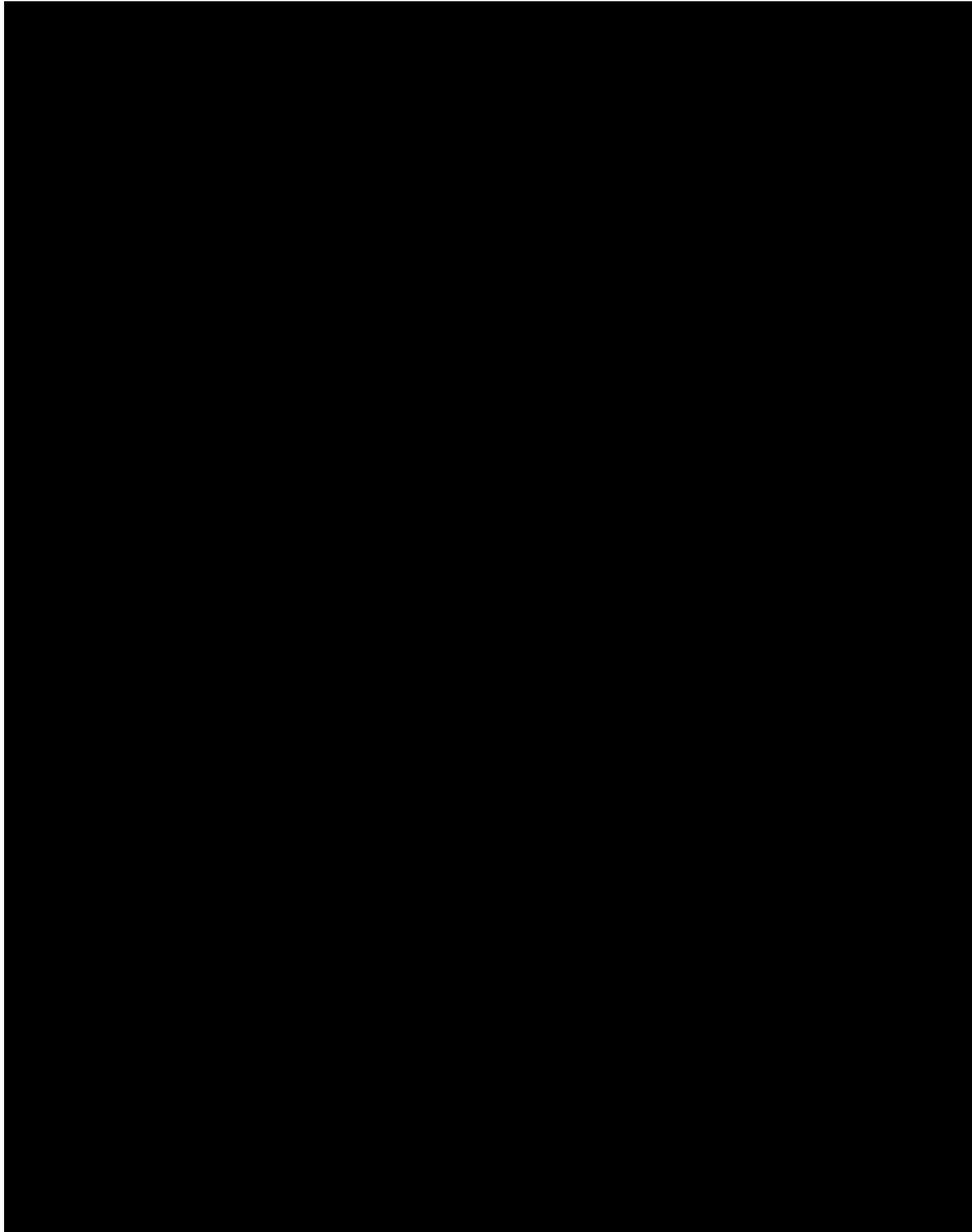


Figure 8. NLEB Clear Creek Maternity Colony area connectivity to I-69 alignment and mitigation sites.

bridging of the floodplain of [REDACTED] [REDACTED] will provide an area for the bats to cross under the roadway therefore reducing the likelihood of roadkilled bats at that location

NLEB White River Maternity Colony

The White River Maternity Colony overlaps with roughly one-third of the Clear Creek Colony. About two-thirds of the colony lies west of existing [REDACTED] [REDACTED]. The [REDACTED] [REDACTED] in this area is at its closest to the roadway. The NLEB White River Maternity Colony contains 894 acres of tree cover. Within the refined preferred alternative, 16.7 acres of tree cover (12.3 acres of forest) will be impacted within the right of way. This impact has decreased from the 40 acres of tree cover reported in the analysis of the representative alignment in 2014 due to a reduction in right of way take. Core forest loss is estimated to be 5.3 acres. This is a result of the loss of edge forest which redefined the core as a smaller area. Figure 4.4-4 of the Tier 2 BA shows tree cover within the

NLEB White River Maternity Colony and potential impacts. Another 2 acres of forest impact may occur as a result of utility relocations.

The analysis for number of snags available and impacted showed 3,218 available snags at 3.6 snags/acre density. Based on DEIS forest data, 12.3 acres of forests will be directly impacted within the maternity colony and result in 44 snags affected within the refined preferred alternative. This is approximately 1.37% of the available snags in the maternity colony circle.

The refined preferred alternative will impact 0.6 acres of emergent wetlands and 0.3 acre of forested wetlands in the White River maternity colony. Approximately 0.58% of the available emergent wetlands and 0.09% of the available forested wetlands within the White River maternity colony will be impacted by the refined preferred alternative.

Two northern long-eared bat capture sites (Sites 10 and 13) are located within the NLEB White River maternity colony. No roost trees have been identified for the northern long-eared bat in this Colony Route connectivity to I-69 from the northern long-eared bat capture sites are along the [REDACTED] and [REDACTED]. Distance from Site 10 is [REDACTED] and from Site 13 is [REDACTED]. In the same order, the shortest straight-line distances to I-69 are [REDACTED] and [REDACTED]. Site 10 is [REDACTED] and Site 13 is [REDACTED] from a large landlocked mitigation property.

Most capture sites were located west of the existing alignment with the exception of one NLEB caught just east of [REDACTED] near the mouth of [REDACTED] as it flows into the [REDACTED]. Substantial alternative roosting and foraging habitat is located upstream and downstream of these two sites along the [REDACTED] and [REDACTED]. Figure 9 shows the northern long-eared bat connectivity pertaining to the NLEB White River maternity colony.

Assuming that some bats currently cross the roadway and will continue to do so, we estimated during the Tier 1 consultation that a small number of bats may be struck by vehicles and killed. We believe the Tier 1 estimate for roadkill will not be exceeded and no more than two bats will be killed by vehicle collision over a 16-year period. We do not anticipate long-term change in reproductive success or viability of the colony as a result of roadkill, especially because a four-lane highway already exists.

Based on the proximity of the colony, White River, and its floodplain to the alignment, some take in the form of harassment due to construction noise/vibration may be possible. Loud noises during the day may cause increased heart rates/respiratory rates and disturbance from the roost. This could lead to roost abandonment and/or atypical exposure to daytime predation. It is likely that bats in the area have to some extent acclimated to noise associated with traffic and typical maintenance activities. The construction activities will be short term and no long term effects are anticipated.

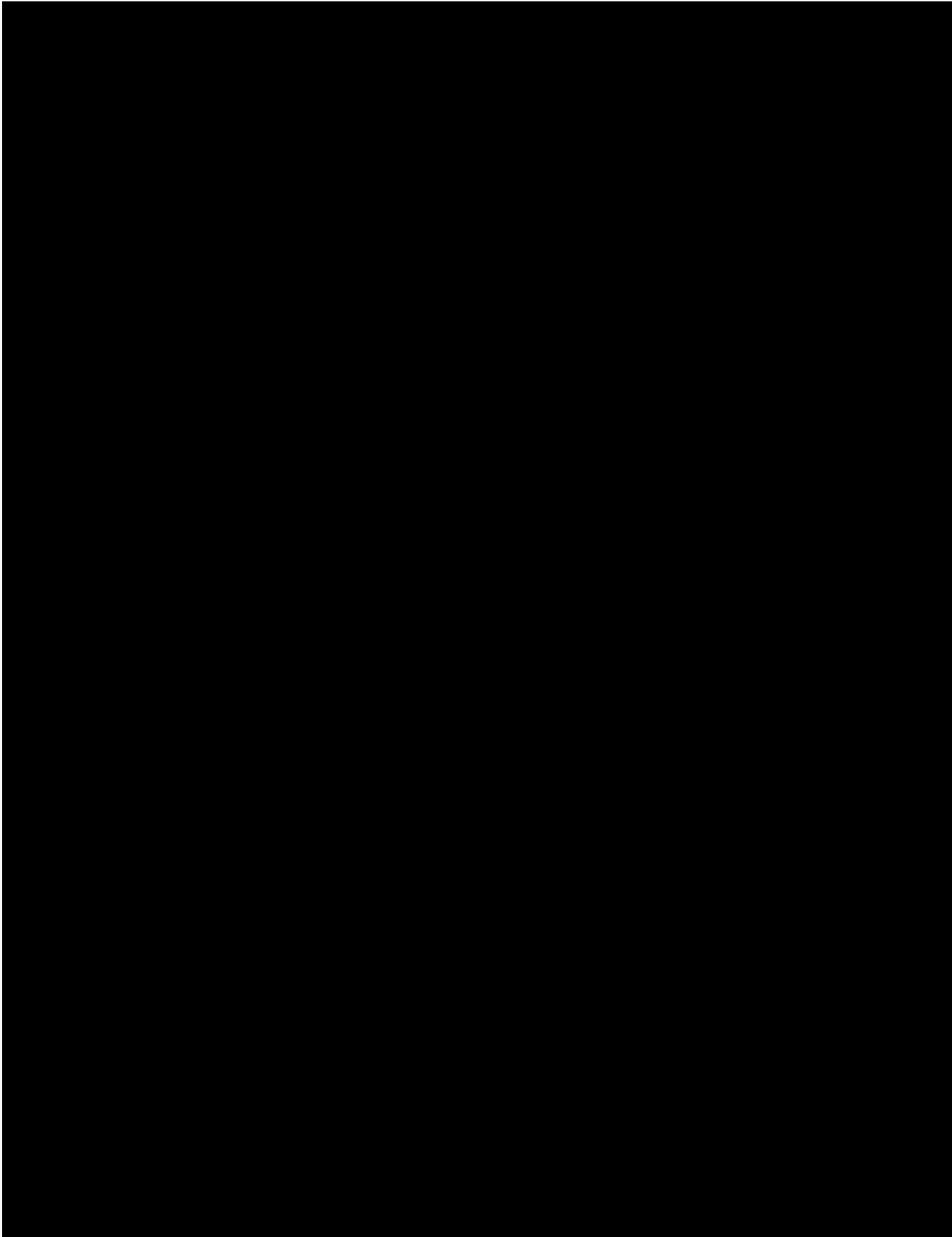


Figure 9. NLEB White River Maternity Colony area connectivity to I-69 alignment and mitigation sites.

NLEB White River-Goose Creek Maternity Colony

The White River-Goose Creek Colony is essentially centered along the White River and its floodplain. About three-fourths of the colony lies west of existing [REDACTED] where the majority of the bat habitat is located. The east side of the roadway consists of agriculture and residences although a couple of NLEBs were captured along a small creek with sparse riparian habitat just east of the roadway in 2004 and 2005.

The NLEB White River-Goose Creek Maternity Colony contains 818 acres of tree cover. Within the refined preferred alternative, 13.8 acres of tree cover (7.1 acres of forest) will be impacted within the right of way as a result of highway construction. This impact has increased from the 9 acres reported in the analysis of the representative alignment in 2014. No core forest

impacts are expected. Figure 4.4-5 from the Tier 2 BA shows the tree cover within the NLEB White River – Goose Creek Maternity Colony and areas of potential impact. Another acre of forest impact may occur as a result of utility relocations.

In the White River -Goose Creek Maternity Colony, 818 acres of tree cover are available which equates to 2,945 available snags. Based on forest data, 7.1 acres of these forests will be impacted within the maternity colony by the refined preferred alternative. This would equate to 26 snags impacted within the refined preferred alternative. This is approximately 0.88% of the available snags in the maternity colony circle.

Three northern long-eared bat capture sites (Sites 19, 20 and 21) are located within the NLEB White River-Goose Creek maternity colony. There is one known roost tree used by the northern long-eared bat in this colony. It is [REDACTED] [REDACTED] from I-69 following riparian corridors, and [REDACTED] [REDACTED] using a straight line distance to I-69. It is across the [REDACTED] [REDACTED] ([REDACTED] [REDACTED] from the [REDACTED] mitigation site.

Route connectivity to I-69 from the northern long-eared bat capture sites (19 and 20) is along [REDACTED] [REDACTED] the [REDACTED] [REDACTED] [REDACTED] [REDACTED] and [REDACTED] [REDACTED]. Route connectivity to I-69 from capture site 21 is via the [REDACTED] [REDACTED] and [REDACTED] [REDACTED]. Distances are [REDACTED] [REDACTED] and [REDACTED] [REDACTED] for sites 19, 20 and 21. The shortest straight-line distances to I-69 are [REDACTED] [REDACTED] and [REDACTED] [REDACTED]. Sites 19 and 20 are [REDACTED] [REDACTED] and [REDACTED] [REDACTED] from the [REDACTED] [REDACTED] mitigation site. Site 21 is [REDACTED] [REDACTED] from the [REDACTED] [REDACTED] mitigation site. Connected to and north of the [REDACTED] [REDACTED] mitigation site is the [REDACTED] [REDACTED] mitigation site. In this area, there is a nature preserve, wellhead protection area, utility and water company property.

Assuming that some bats currently cross the roadway and will continue to do so, we estimated during the Tier 1 consultation that a small number of bats may be struck by vehicles and killed. We believe the Tier 1 estimate for roadkill will not be exceeded and no more than two bats will be killed by vehicle collision over a 16-year period. We do not anticipate long-term change in reproductive success or viability of the colony as a result of roadkill, especially because a four-lane highway already exists.

Based on the location of the alignment throughout the colony area and the locations of the known roosts and capture points, some take in the form of harassment due to construction noise/vibration may be possible. Loud noises during the day may cause increased heart rates/respiratory rates and disturbance from the roost. This could lead to roost abandonment and/or atypical exposure to daytime predation. It is likely that bats in the area have somewhat acclimated to some noise associated with traffic and maintenance activities. The construction activities will be short term and no long term affects are anticipated.

Substantial alternative roosting and foraging habitat is located upstream and downstream of these three sites. Properties are associated with the White River and land is reasonably remote from any development. Figure 10 shows the northern long-eared bat connectivity pertaining to the NLEB White River-Goose Creek Maternity Colony.

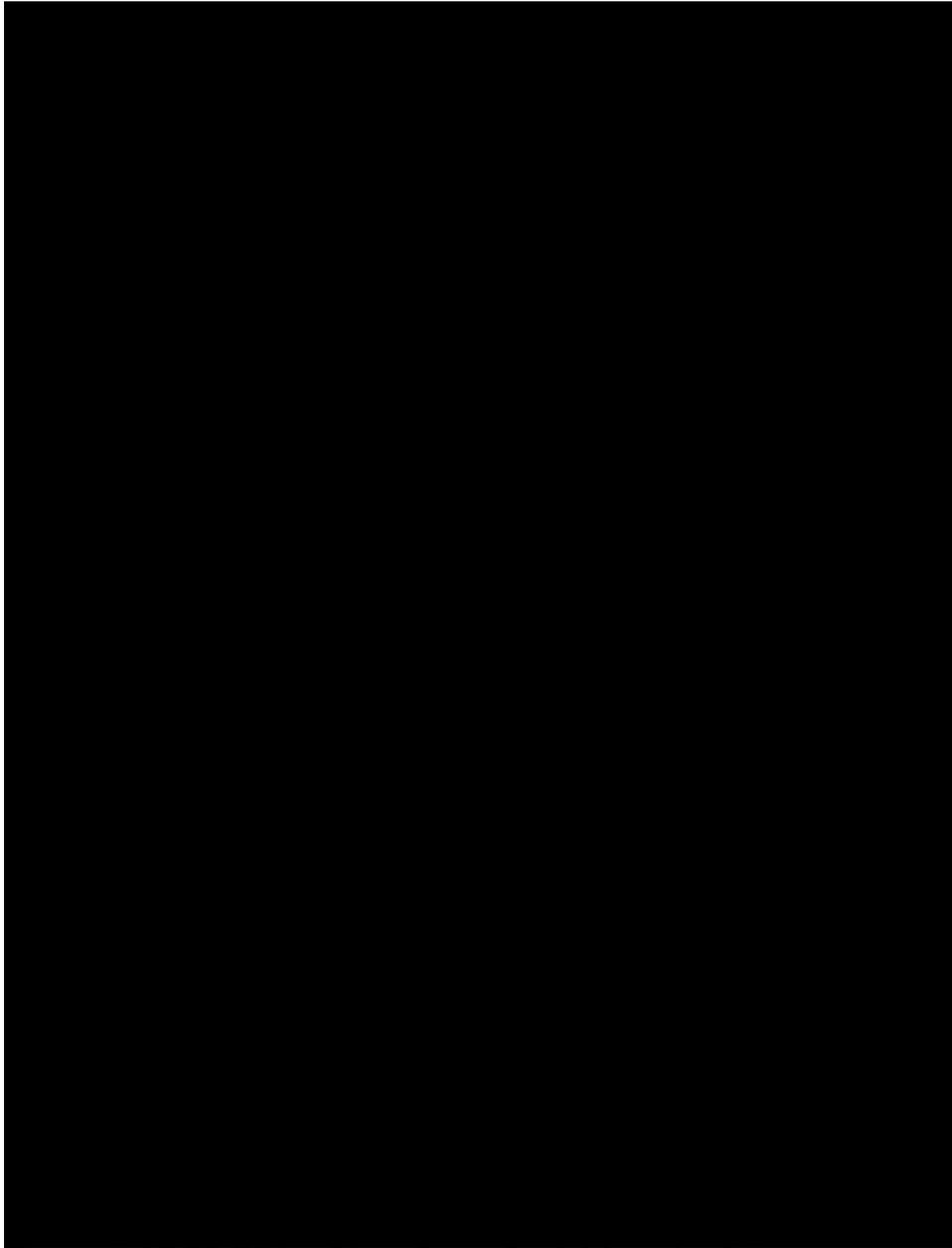


Figure 10. NLEB Whiter River-Goose Creek Maternity Colony area connectivity to I-69 project area and mitigation sites.

NLEB Pleasant Run Maternity Colony

The Pleasant Run Colony is also centered along the [REDACTED] [REDACTED] and its floodplain. The proposed alignment will cross a small portion of the colony on the [REDACTED] edge. All of the capture locations and known roosts lie west of the project area along the [REDACTED] [REDACTED]

The NLEB Pleasant Run Maternity Colony contains 1,030 acres of tree cover. Within the refined preferred alternative, 2.6 acres of tree cover (2.4 acres of forest) are expected to be impacted within the right of way. This impact is a slight increase when compared to the less than 1 acre of tree cover impacts reported in the analysis of the representative alignment in 2014. No core forest impacts are anticipated in this colony area. Figure 4.4-6 of the Tier 2 BA shows the tree cover within the NLEB Pleasant Run Maternity Colony and potential impact areas. Another 1.3 acres of forest impact may occur as a result of utility and billboard relocations.

Two northern long-eared bat capture sites (Sites 23 and 25) are located within the NLEB Pleasant Run maternity colony. There are no roost trees identified for the northern long-eared bat in this colony. Route connectivity to I-69 is along the [REDACTED] [REDACTED] and [REDACTED] [REDACTED] with distances of [REDACTED] [REDACTED] and [REDACTED] [REDACTED] respectively. Shortest straight-line distances to I-69 are [REDACTED] [REDACTED] and [REDACTED] [REDACTED]. Site 23 is about [REDACTED] [REDACTED] from the [REDACTED] mitigation site, while Site 25 is [REDACTED] [REDACTED] for the [REDACTED] mitigation site. Substantial alternative roosting and foraging habitat is located upstream and downstream of these two sites. Figure 11 shows the northern long-eared bat connectivity pertaining to the NLEB Pleasant Run maternity colony.

In Tier 1, the estimate for roadkill for the Pleasant Run Colony was one bat. We believe this estimate will not be exceeded as a result of the upgrade of SR37 for the Section 6 refined preferred alignment.

Some take in the form of harassment due to construction noise/vibration may be possible, although most habitat is located a fair distance from the known habitat areas. Loud noises during the day may cause increased heart rates/respiratory rates and disturbance from the roost. This could lead to roost abandonment and/or atypical exposure to daytime predation. It is likely that bats in the area have to some extent acclimated to noise associated with traffic and typical maintenance activities. The construction activities will be short term and no long term effects are anticipated.

Adult Male NLEB Bats Summer Impacts

We assume a very small number of adult males may be taken as a result of the proposed action; however, we do not have adequate data on the number of males in the area to determine a number of individuals affected. A total of 13 adult male NLEBs have been captured between 2004-2015 within the Section 6 project area. Another three males have been captured during that time period at Site 24 in the Lambs Creek Colony area. The potential loss of a small number of male bats will have no measureable or significant impact on the NLEB population in the action area.

Indirect/Induced Impacts

Induced development

A total of 337 acres of induced development is predicted to occur as a result of I-69 Section 6 development. The expert land use panel identified a total of 56 TAZs (traffic analysis zone) along existing [REDACTED] [REDACTED] in an area [REDACTED] of [REDACTED] and near the various proposed interchanges as the probable locations of that induced development (see Figure 3.5-2 or 4.5-2 and Appendix G of the Tier 2 BA for detailed information about individual TAZs). Unlike the previous new-terrain Sections, Section 6 has existing development along the refined preferred alignment; therefore, it is assumed that some of the induced development will result in higher densities of growth on already developed land. Regarding the potential for I-69 to spur induced development in Section 6, the Section 6 DEIS states:

Review of existing data, mapping, and local coordination indicates that streams and wetlands account for a smaller acreage than the agricultural land or forests in any given induced growth TAZ. An induced growth TAZ is a TAZ with growth

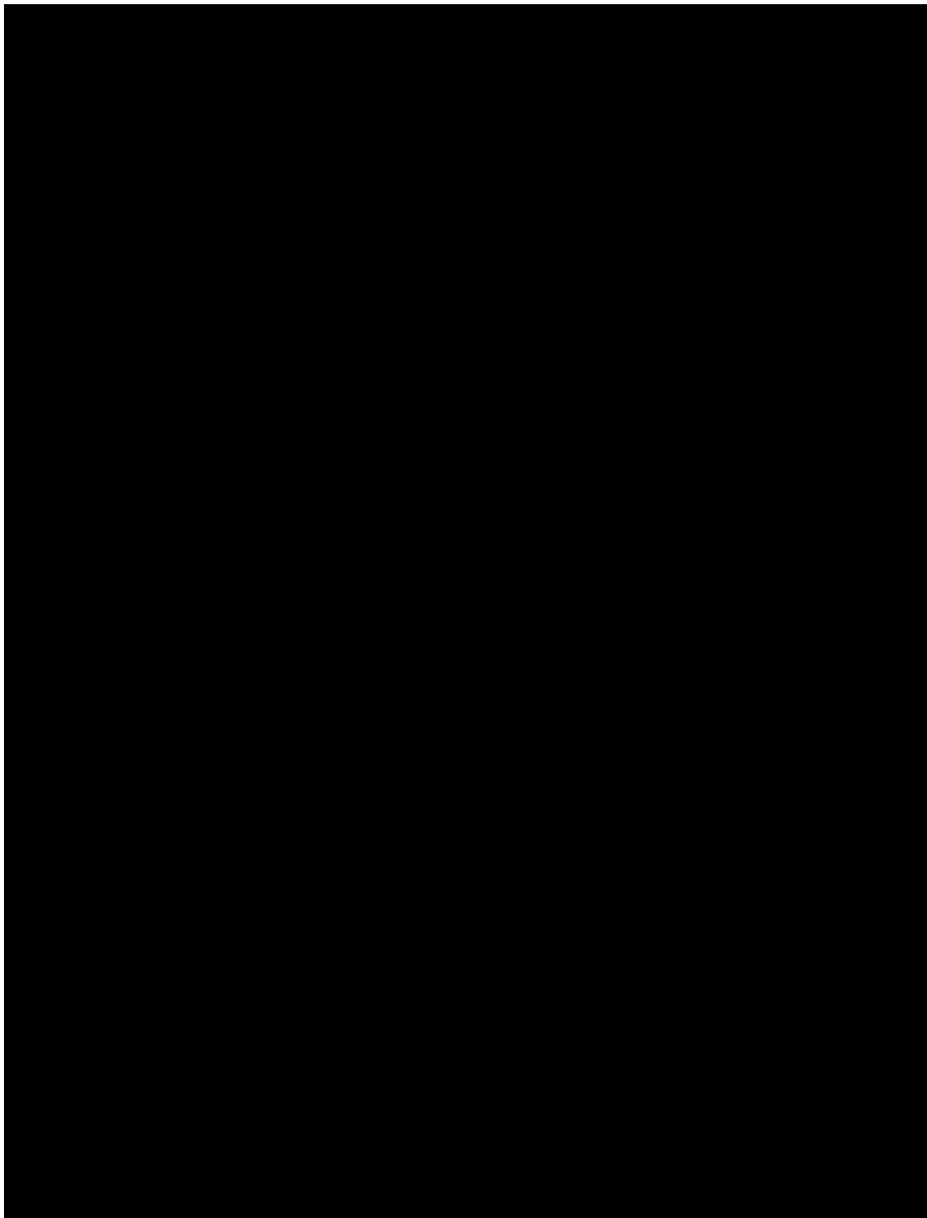


Figure 11. NLEB Pleasant Run Creek Maternity Colony area connectivity to I-69 project area and mitigation sites.

caused by I-69 Section 6 that exceeds the year 2045 no-build growth. Ratios of available agricultural and forest land within TAZs with induced growth were used to estimate induced growth trends in each county in the study area.

Based on the ratio of available agricultural and forest land within TAZs with induced growth, an estimate of 80% of the induced growth occurring on agricultural land and 20% forest land was established based for Hendricks County; a 55% agricultural land and 45% forest land ratio was established for Morgan County; an 85% agricultural land and 15% forest land ratio was established for Johnson County; and a 90% agricultural land and 10% forest land ratio was established for Marion County. These percentages were applied where growth is expected to occur on non-developed land.

The Service gives deference to the “expert land use panel” on the issue of where induced development is most likely to occur in Section 6. Thus, we anticipate a small amount of incidental take of Indiana bats and NLEBS in Section 6 as a result of induced development (63f forested acres) in forested areas. The amount of induced/indirect development predicted to occur within each maternity colony area is described below.

Indiana bat colonies

The Lambs Creek Maternity Colony has been only recently identified, and therefore indirect and cumulative impact analyses specific to the colony were not prepared during the Tier 1 evaluation. Recent analysis indicates minimal growth may occur in the colony area, primarily as a result of construction of the [REDACTED] [REDACTED] [REDACTED] interchange. A total of 0.01 acres of forest are estimated to be indirectly impacted (*i.e.* developed) as a result of the I-69 project in this colony area.

Results of the Tier 1 indirect and cumulative impact analysis for the Clear Creek Maternity Colony area indicated no induced growth was expected. The indirect impact analysis was updated during the Tier 2 process and currently about 7 acres of forest are anticipated to be impacted by induced growth as a result of the I-69 project in this colony area.

At the time of the Tier 1 analysis, the Crooked Creek Maternity Colony area was not expected to have any impacts to forest habitat as a result of induced growth. The updated impact analysis indicates approximately 8 acres of forest impacts are expected to occur with the colony area.

Finally, the Pleasant Run Creek Maternity Colony area was estimated in the Tier 1 analysis to have 4 acres of tree cover impacts as a result of induced growth and development in the area. The most recent information indicates just under two acres of forest will be affected by project related growth.

Please note that 0.61 acres of the indirect forest impact is shared between the Clear Creek and Crooked Creek colonies.

NLEB colonies

For the five NLEB colonies being considered in the opinion, Tier 1 indirect impacts to forest cover were estimated at less than one acre for the Lambs Creek, Clear Creek, White River, and White River-Goose Creek colonies. The Pleasant Run Colony was estimated to have three acres of indirect forest impacts.

The updated impact numbers indicate zero impacts to the Lambs Creek colony, 3.08 acres of forest impact for the Clear Creek East Fork colony, 2.96 acres of forest impact for the White River Colony, 0.66 acres of impact for the White River-Goose Creek Colony, and 1.31 acres of impact for the Pleasant Run Colony. Please note that 1.29 acres of impact is shared between the Clear Creek East Fork colony and the White River colony.

Highway Operational Noise

For interstates such as I-69, steady state A-weighted sound pressure levels of 66 dB or greater are anticipated at distances of 250 feet from the roadway and possibly as far as 350 to 400 feet from the roadway depending on the volume of traffic predicted for the design year, and then

decrease with distance from the roadway to lower levels. The construction of I-69 in Section 6 will produce new noise levels with the upgrade of the principal arterial road (SR 37). The Section 6 Tier 2 DEIS discusses noise studies starting on page 5.10. Detailed noise information is discussed in the Tier 2 BA for Section 6 beginning on page 3-65 for Indiana bats and page 4-46 for NLEBs, and is incorporated for reference. Numerous sites were analyzed for current and future noise levels within the project corridor. The INDOT Highway Traffic Noise Policy developed to analyze human noise impacts, defines “approach or exceed” to mean that future levels are higher than 1 dBA $L_{eq}(h)$ below the appropriate NAC (noise abatement criteria) (for Category B, 1 dBA below the NAC is 66 dBA). “Substantially exceed” means the predicted traffic noise levels exceed existing noise levels by 15 dBA or more. The existing measured L_{eq} noise levels within the project corridor ranged from 31 dBA to 70.1 dBA.

A total of 244 noise receptors were located within the I-69 Section 6 Indiana bat maternity colonies. Of those receptors, 94 are projected to exceed the applicable NAC or substantially exceed the existing noise level for the design year refined preferred alternative. This includes 23 receptor sites in the Lambs Creek Colony, 15 in the Clear Creek Colony, 15 in the Crooked Creek Colony, and 42 in the Pleasant Run Creek Colony.

For the NLEB, there are 102 noise receptor sites located within the maternity colony areas and 47 of these receptors are forecasted to be impacted. Of the 22 receptors in the NLEB Clear Creek Colony, seven exceed the applicable NAC for the design year refined preferred alternative. Of the 14 receptors in the NLEB White River Colony, six exceed the applicable NAC. Of the 33 receptors in the NLEB Goose Creek Colony, 21 exceed the applicable NAC. Of the 33 receptors in the NLEB Pleasant Creek Colony, 13 exceed the applicable NAC.

It is unclear exactly how bats may react once the new highway becomes fully operational. Some studies indicated very low bat usage close to interstates and others indicate that some bats will roost and forage near large roadways, or cross over or under to access habitat. The latter may be a factor of available surrounding habitat and habituation over time to the noise. The construction of I-69 will occur during daylight hours, and cause temporary noise impacts from chainsaws, bulldozers, skidders, trucks, etc. Since this project involves the upgrade of an existing four-lane facility, we anticipate the noise impacts from daily operation and maintenance to be minimal.

Habitat Quality Impacts

In addition to direct and indirect habitat loss, proposed actions may result in a decrease in the quality of remaining habitat within the Action Area. Factors that may lead to a loss in the quality of remaining habitat include: increased habitat fragmentation; increased human disturbance (e.g., more lighting associated with road improvements, increased traffic and associated noise levels); foraging habitat over culverted or relocated streams will be relatively poor until the aquatic community becomes re-established; and decreased water quality in the Action Area (short-term and long-term), as a result of construction activities, road salts, motor oil and other road run-off, and various hazardous materials leaked or spilled during traffic accidents. Over time, it is expected that fragmentation of habitat in some portions of the Action Area will increase as new indirect development occurs particularly near proposed interchanges. However, as the mitigation plantings mature into suitable Indiana bat habitat this will be at least partially off-set.

Lighting- Increased human presence/disturbance in the project area may affect the quality of summer bat habitat, but these effects are expected to be relatively minor. Because the

development of Section 6 entails upgrading an existing four-lane facility, bats in the action area have likely previously been exposed to artificial lighting and may not be as affected as those individuals in previously undisturbed portions of the overall project. At present, roadway lighting is anticipated at interchanges as well as along the mainline in highly developed areas. Lighting at all interchanges will be evaluated, and will be included if warranted for safety reasons. Any lights installed will be approximately 40 feet above the highway and would be non-diffuse. The tallest vehicles expected to be traveling on I-69 would be between 15 - 18 feet tall. This would leave 22 - 25 feet of open space for bats that are drawn to the lights to forage on insects. No incidental take is anticipated from the additional lights and traffic noise levels that will occur with the operation of Section 6 of I-69.

Water Quality- During construction, water quality may be temporarily adversely affected in Section 6 streams (e.g., increased siltation) where Indiana bats and NLEBs drink and presumably obtain a small portion of their insect diet. Due to the addition of numerous new frontage roads, Section 6 streams and legal drains may receive additional roadway runoff containing salts (applied by INDOT maintenance staff) and other vehicular-based contaminants, which may further degrade their current conditions, which in some cases are already of poor quality. Anticipated adverse impacts to water quality will be addressed in erosion control plans that INDOT will be implementing during all construction activities, which will help alleviate short-term sedimentation impacts on aquatic insect communities. Because the bulk of the Indiana bat's and NLEB's prey base is made up of terrestrially based insects (*i.e.*, not aquatic-based, short and/or long-term adverse effects to local water quality are not likely to rise to a level where incidental take of Indiana bats is reasonably certain to occur.

The INDOT has committed to include measures for spill prevention and containment in the roadway design, incorporate herbicide use plans and low salt zones in sensitive areas, and to design bridges with no or minimal in-span drains and to direct bridge runoff away from streams and rivers.

Impacts Summary

In summary, the following effects on Indiana bats and NLEBs in Section 6 are anticipated:

- Direct habitat modification/loss will occur, but will be minimal with a loss of tree cover ranging from approximately 0.09% to 1.6% within the four Indiana bat maternity colony areas and 0% to 1.9% for the NLEB. Therefore, the total amount of forest loss is relatively insignificant. It is also unlikely that these maternity areas would experience a significant long-term decrease in quality of roosting or foraging habitat as a direct result of I-69, based on the amount and quality of remaining forest habitat, the location of the alignment, and the fact that it is an upgrade of an existing four-lane facility.
- Seasonal tree-cutting restrictions will ensure no direct impacts/take occurs from the construction of I-69 during the maternity colony season. INDOT has also extended this restriction to include all borrow areas used by construction contractors.
- Indirect loss of forest or wetland habitat from residential and commercial development is anticipated to be fairly small and minimal impacts are expected, particularly in the maternity colony areas.
- No known primary or alternate roost trees will be impacted within the four known maternity colonies. Given the capture location of the bats, the location of the I-69 alignment, and results of forest transects conducted by BLA, it is unlikely that any

primary maternity roosts are within the proposed alignment that will be cleared for I-69. Thus, no take is anticipated from the loss of a primary roost tree. Loss of unidentified alternate roost trees may occur, but this is limited given the location of the proposed alignment.

- Because construction in Section 6 primarily involves the upgrade of an existing four-lane facility, impacts to existing stream crossings and bat travel corridors are expected to be minimal. In most cases, current stream crossings will be maintained or improved upon (longer spans, redirection of road-runoff, etc.). If any of the existing stream crossings are currently used as corridors for bats, the upgraded structures should continue to provide areas for bats to connect to existing habitat and safely cross under the interstate. Some additional structures may be developed for access roads and interchanges but we expect impacts to bat movement to be minimal from such structures.
- Death/kill from collision with vehicles once roadway is fully operational is anticipated on I-69 and other local roadways when traffic volume and speed increases. One Indiana bat per colony is projected to be taken every two years through 2030 and one bat every eight years during that period for NLEBs. Some roadkill may be offset as traffic on local roads decreases and shifts to the new interstate. Since Section 6 consists of upgrading an existing four-lane state highway, impacts of this project from vehicular collision are anticipated to be less than the other new terrain sections.
- The maternity colonies and individual adult males have access to sufficient additional habitat nearby in the unlikely case that some individual bats should become displaced from their traditional foraging/roosting areas.
- I-69 may induce some amount of residential/commercial development in currently forested areas and may also speed up the rate of development that otherwise would have occurred within the action area at a slower rate, particularly in the immediate vicinity of and within easy commuting distance of Section 6 interchanges (e.g. Henderson Ford Road Interchange).
- Some harassment of bats roosting near construction areas may occur as a result of exposure to novel noises/vibrations/disturbance causing roost-site abandonment and atypical exposure to day-time predators while fleeing and seeking new shelter during the day-time. This will have only short term impacts, if any.
- Proposed forest, wetland, and stream mitigation within and near the maternity areas will ensure that at least 500 acres of suitable roosting and foraging habitat persists in perpetuity.
- Long term reproduction and viability are not expected to be impacted by the project and all maternity colonies in the area.

Although there may be some short-term impacts to individuals within the four colonies, these impacts are not likely to affect the colonies' long-term reproduction and viability. Thus, the maternity colonies are likely to persist within the Action Area into the reasonably foreseeable future following construction, operation, and maintenance of the I-69 project. Furthermore, with successful implementation and maturation of the proposed mitigation projects, and other proposed mitigation and conservation measures, we anticipate that long-term habitat conditions for these colonies will be suitable and sustainable for the long-term survival and recovery of the species.

Table B1 (updated in Appendix A of the recent 2013 amendment to the 2006 Tier 1 RPBO and Appendix B of the 2015 NLEB CO/BO), deconstructs the Proposed Action and summarizes the anticipated direct and indirect environmental consequences and likely responses of exposed Indiana and northern long-eared bats. After reviewing the Section 6 BA and conducting the formal consultation for Section 6, the Service has concluded that applicable information within these tables remains valid for Section 6 of I-69.

Effects of Avoidance, Minimization and Mitigation Measures

The FHWA and INDOT have incorporated measures into the proposed project design to avoid, minimize and mitigate the impacts of the project to the extent practical. Proposed avoidance, minimization and mitigation procedures are discussed in the Revised Tier 1 Forest and Wetland Mitigation and Enhancement Plan (see Appendix D of the Tier 1 BA Addendum). Details of specific mitigation projects in Section 6 are described in the Section 6 Tier 2 BA starting on page 6-1 (see also Appendices I-V), and updated Conservation Measures developed for the project can be found in Appendix D of Amendment 2 (July 24, 2013) and Appendix A of Amendment 3 (2014 NLEB CO/BO) and are hereby incorporated by reference. A summary of the proposed Conservation Measures and their current implementation status is provided in Appendix A of this BO.

Forest Mitigation

Upland forests impacted by the I-69 Evansville-to-Indianapolis project will be mitigated at a 3:1 ratio. This commitment, made in the Tier 1 FEIS and reaffirmed in the Tier 1 ROD, considers upland forests as all those not classified as wetlands. Mitigation may be in the form of planting non-forested areas (with a minimum goal of 1 to 1 replacement or reforestation) and/or protecting existing forests by fee simple purchase, permanent protective easement, or a combination of actions with a maximum goal of 2 to 1 protective measures or preservation. The 3 to 1 ratio will be achieved for the overall I-69 Evansville-to-Indianapolis project; the ratio for an individual Tier 2 section could be higher or lower than 3 to 1.

To minimize and mitigate impacts to bats due to habitat loss in Section 6, existing high quality forested habitat suitable for Indiana bat foraging and roosting, as well as areas suitable for restoration, were identified within the Action Area. Based on the similarities in habitat use by both the Indiana bat and the northern long-eared bat, we believe this process will be applicable for the NLEB as well. In identifying mitigation properties, INDOT and FHWA used the following criteria for Section 6:

- Roost tree(s) and flyways connected to a Roost
- Areas within a Maternity Colony Area
- Part of a larger contiguous block of forest/property
- Preservation of especially older growth forests with snags/shaggy barked trees
- Reforestation and restoration practices (e.g., wetlands and streams)
- Biologically attractive areas with streams, springs, wetlands, forests, and endangered species
- Potential for Human Development

Currently, INDOT has identified 12 property owners as “willing sellers” and one potential landlocked area for potential mitigation; these properties total approximately 1,317 acres. Of

Some amount of reforestation will occur within each of the maternity colony areas, along with preservation of existing forest. For most of the maternity colonies, depending on which mitigation sites are acquired, a net gain of forest could occur; this will greatly benefit those colonies.

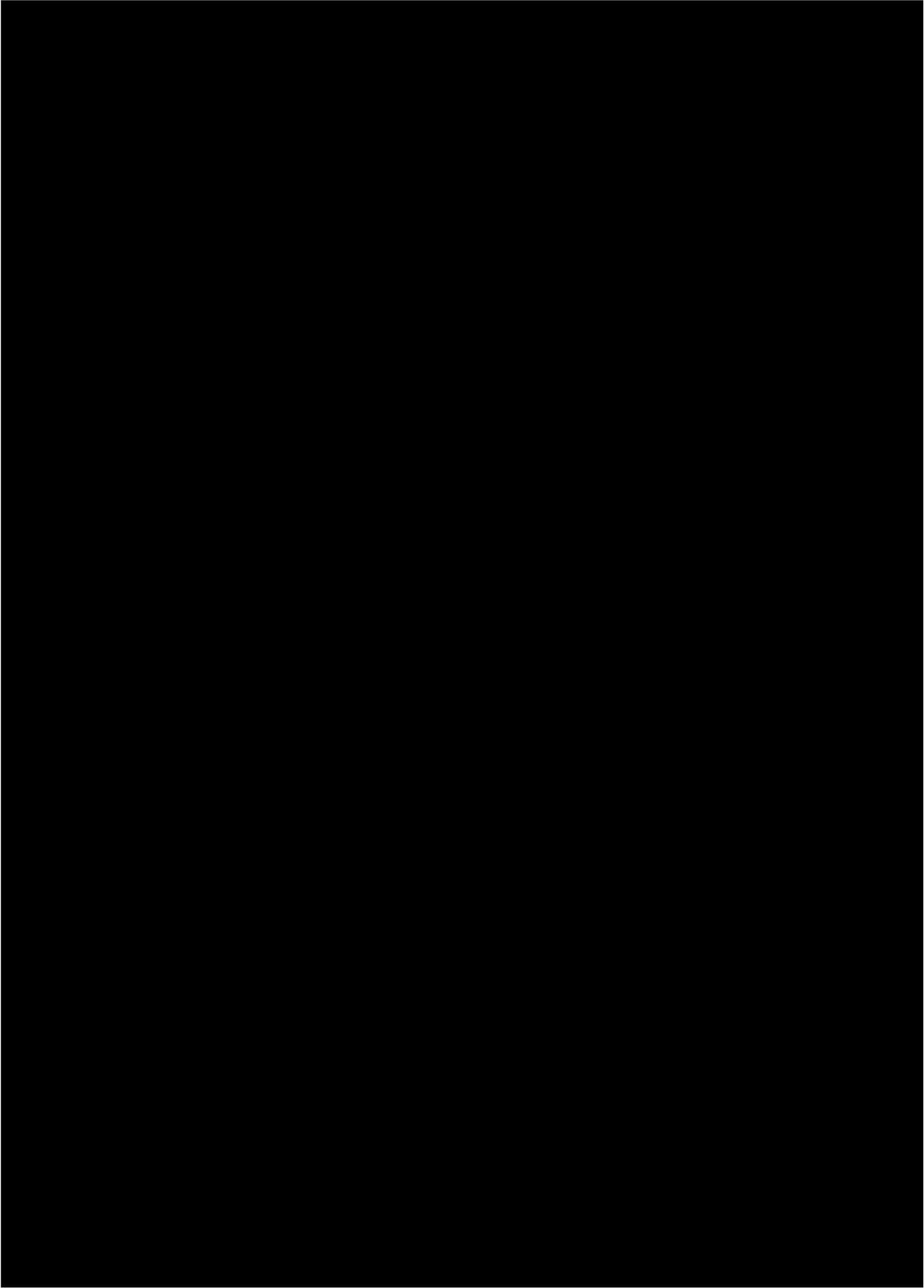
Reforestation and preservation in these areas is especially significant due to the proximity of the City of Indianapolis and predicted growth in the area. With successful implementation of the proposed mitigation projects, we anticipate that short- and long-term habitat conditions for maternity colonies within the Section 6 Action Area, as well as individual bats within the area, will be sufficient and sustainable.

Site descriptions, maps, photographs, conceptual mitigation plans, etc. are included in the site specific appendices of the Section 6 Tier 2 BA, beginning with Appendix I. Figure 11 shows a map of the proposed mitigation sites in Section 6. Table 4 shows an overall summary of the credits anticipated at each mitigation site. Once the restorations mature, the sites will provide larger contiguous blocks of bottomland and upland forests and increased connectivity among other existing blocks of forested habitat and will provide valuable habitat for Indiana bats foraging and roosting in the area.

INDOT will be responsible for monitoring and maintaining the various mitigation areas, where applicable, while they are being established or until a long-term management entity is identified. The environmental benefits of these sites will be significant and will continue to increase as the sites mature. Silvicultural manipulation in these areas will be limited to activities which will enhance the quality of habitat for Indiana bats and NLEBs, as agreed to by the Service's INFO. A deed restriction or conservation easement will be recorded for the properties and will provide permanent protection (e.g., no mowing, timber harvest, timber stand improvement, etc.).

Before any construction of Section 6 in I-69 commences within the maternity colony areas, the FHWA, in consultation with the Service, will develop detailed, site-specific, final mitigation plans. The mitigation plans will include design plans with detailed descriptions for each phase of mitigation including 1) initial construction and establishment, 2) 10-year, post-construction monitoring phase, and 3) long-term management. The Section 6 final mitigation plans will address and/or establish the following: 1) quantifiable criteria and methods for assessing success of all mitigation plantings and functionality of constructed wetlands and streams, 2) approved lists of tree/plant species to be planted (and their relative abundance/percentage), 3) approved lists of herbicides for weed control, 4) proposed construction schedules, 5) annual post-construction monitoring schedules, and 6) a long-term, ongoing management/stewardship strategy.

FHWA will begin construction and/or reforestation within the Section 6 Mitigation Areas either before (the most preferable option) or during the first summer reproductive season (1 April – 30 September) immediately after any I-69 related tree clearing or construction begins in Section 6. This will be applicable to all mitigation properties. Once initiated, all Service-approved construction and tree plantings within the Section 6 Mitigation Areas must be completed within 3 calendar years.



Section 6 Mitigation Sites Anticipated Acres Summary							
Mitigation Site	Forest Preservation (acres)	Reforestation (acres)	Total Forest Mitigation (acres)	Emergent Wetlands (acres)	Forested Wetlands (acres)	Scrub-shrub Wetlands (acres)	Total Wetlands (acres)*
Lambs Creek Indiana Bat and Lambs Creek Northern Long-eared Bat Maternity Colony							
██████████	245.5	0	245.5	0	0	0	0
Clear Creek and Crooked Creek Indiana Bat and Clear Creek East Fork and White River Northern Long-eared Bat Maternity Colonies							
██████████	52.7	44.4	97.1	3.1	0	0	3.1
██████████	2.7	3.2	5.9	0	0	0	0
██████████	69.4	225.2	294.6	0	8.2	0	8.2
Crooked Creek Indiana Bat and White River Northern Long-eared Bat Maternity Colonies and Upper White River Focus Area							
██████████	79.5	39.5	119.0	0	0.3	0	0.3
██████████ ██████████	76.8	88.3	165.1	4.2	24.3	1.9	30.4
██████████	14.8	36.1	50.9	0	0	0	0
Pleasant Run Indiana Bat and White River Northern Long-eared Bat Maternity Colonies							
██████████	34.4	64.5	98.9	2.0	9.7	0.9	12.6
Pleasant Run Indiana Bat and Pleasant Run Northern Long-eared Bat Maternity Colonies							
██████████	46.2	0	46.2	0	0	0	0
██████████	26.3	0	26.3	0	0	0	0

Table 4. Section 6 Mitigation Sites Anticipated Acres Summary

Section 6 Mitigation Sites Anticipated Acres Summary continued.							
Mitigation Site	Forest Preservation (acres)	Reforestation (acres)	Total Forest Mitigation (acres)	Emergent Wetlands (acres)	Forested Wetlands (acres)	Scrub-shrub Wetlands (acres)	Total Wetlands (acres)
Bryant Creek Indiana Bat and Bryant Creek North Northern Long-eared Bat Maternity Colonies							
██████████	19.8	16.7	36.5	0	1.9	0	1.9
██████████	7.9	7.8	15.7	0	0	0	0
Indian Creek Focus Area							
██████████	33.7	7.3	41.0	0.2	0.9	0	1.1
Totals	709.7	533.0	1242.7	9.5	45.3	2.8	57.6

*Does not include open water impacts.

Table 4. Section 6 Mitigation Sites Anticipated Acres Summary

Indiana bat and NLEB monitoring

An extensive bat monitoring and research program has also been committed to by the FHWA and INDOT. Therefore, the various maternity colonies will be studied and monitored the summer prior to construction beginning, during construction, and at least five summers post-construction. Final details of the proposed monitoring plan will be developed in consultation with the Service for each affected project section as construction plans and schedules are finalized. During these monitoring efforts, the FHWA and INDOT will locate and identify property owners of newly discovered roost trees and the Service will work with FHWA, INDOT, and the land owners (private or otherwise) to promote conservation of the Indiana bat and NLEB habitat occurring at each new location.

Education and Outreach

Finally, FHWA, INDOT and Lochmueller Group, have worked with the Service's INFO to design an educational poster that could be made publicly available via the internet; these posters could also be used in interpretive displays about Indiana bats (and possibly NLEBs) in rest stops along I-69, if and when rest stops are constructed. The Draft Indiana bat recovery plan (USFWS 2007) identifies public education and awareness about Indiana bats as a priority activity needed for recovery of the species.

All conservation measures presented in the Tier 1 RPBO dated August 24, 2006 (pgs. 16-23), and the new measure developed during the 2013 Tier 1 Reinitiation, will be carried out as written or as updated in consultation with the Service. The FHWA will provide the Service with a written annual report that summarizes the previous year's monitoring, conservation and mitigation accomplishments, remaining efforts, and any problems encountered within Section 6. This annual report will be provided throughout the 10-year post-construction monitoring period. The annual report for Section 6 will be included with other sections of I-69 as allowed under the 2006 Tier 1 RPBO, Terms and Conditions Number 2 (pp. 103).

In summary, **construction** of Section 6 of I-69 will cause direct loss of an estimated 160 acres [approximately 158 acres of forest and 2 acres of forested wetlands] of suitable Indiana bat and NLEB forested summer habitat (*i.e.*, roosting and foraging habitat and forested travel corridors). The 160 acres does not include an estimated 43 acres of forest loss due to utility relocations and another 7.2 acres as a result of billboard relocations. Forested habitat loss from future indirect development is expected to be approximately 63 acres. Impacts to wetlands comprise approximately 7 acres, including emergent (1.9 ac.), forested (1.7 ac.), scrub-shrub (0.4 ac.), and open water ponds (2.8 ac.). Although short-term reductions in habitat quality may occur, overall long-term habitat restoration and protection efforts are expected to improve habitat conditions for Indiana bats and NLEBs. The Service anticipates the incidental take to be consistent with or less than that which was determined in the recently updated ITS (as detailed in the 2013 and 2015 amendments to the Tier 1 RBPO): No more than 26 Indiana bats from the four maternity colonies in Section 6 (Lamb's Creek – 0; Clear Creek – 5; Crooked Creek – 15; and Pleasant Run Creek – 6) will be taken as a result of all project-related *habitat modifications* (direct and indirect) through 2030 (see Table B4 in 2013 Amendment to Tier 1 RPBO). No more than 32 bats total in the four Indiana bat colonies (or approximately 1 bat/ year/colony) are anticipated to be taken as a result of roadkill from 2013 to 2030 and less than 5 Indiana bat males during that same period (also primarily as a result of roadkill).

For the NLEB, we anticipate no more than 10 NLEBs from the five maternity colonies in Section 6 (Lambs Creek– 0; Clear Creek – 3; White River – 5; White River Goose Creek – 2; and Pleasant Run Creek – 0) will be taken as a result of all project-related *habitat modifications* (direct and indirect) through 2030 (see Table B4 in 2014 Amendment (NLEB CO/BO) to the Tier 1 RPBO). No more than 7 bats total in the five NLEB colonies (or approximately 1 bat/2 years for all colonies combined) are anticipated to be taken as a result of roadkill from 2014 to 2030 and less than 5 Indiana bat males during that same period (also primarily as a result of roadkill).

We anticipate the Action Area for Section 6 will continue to support the existing maternity colonies into the foreseeable future.

V. CUMULATIVE EFFECTS

In the context of the Endangered Species Act, cumulative effects are defined as the effects of future State, tribal, local or private actions that are “reasonably certain” to occur in the action area considered in this biological opinion. Future Federal actions that are unrelated to the proposed action are not considered because they require separate consultation pursuant to Section 7 of the Endangered Species Act (e.g., new surface coal mining permits).

Based on information provided in the June 6, 2017 Tier 2 BA (revised October 20, 2017) for Section 6 of I-69, the currently anticipated sources of cumulative effects are consistent with those contemplated in the August 24, 2006 Tier 1 RPBO and its associated amendments. Limestone and gravel quarrying was not originally discussed in the Tier 1 consultation and is addressed below. No additional adverse effects beyond those discussed in the Tier 1 RPBO (as amended) are anticipated as a result of cumulative effects. Therefore, most of the previous discussion of adverse effects and the incidental take analyses on pages 94-97 and Appendix A of the Tier 1 RPBO and the 2015 Tier 1 RPBO amendment for the NLEB CO/BO remain valid and are hereby incorporated by reference.

Reasonably foreseeable non-federal activities that are anticipated to occur include land conversion activities such as development for residential and commercial growth and timber harvesting. Other types of impacts considered include limestone/gravel quarrying and legal drain maintenance.

No-build Growth/Residential Development

GIS analysis was conducted to determine the approximate amount of no-build growth that is projected to occur in the action areas. This analysis made a conservative estimate of impacts. The percentage of the TAZ within the action areas was calculated and the no-build growth by land use type within that particular action area was determined on a percentage basis. The total acreage of no-build that will occur on lands that have not been previously developed was then multiplied by 20% in Hendricks County, 15% in Johnson County, 10% in Marion County and 40% in Morgan County to get the amount of forest that would be impacted by the no-build growth. Please see Chapter 5.24 in the Section 6 DEIS for an explanation of how these percentages were chosen. These calculations showed that approximately 453 acres of no-build growth would occur in forested areas in the Indiana bat RSAA and 391 acres of the NLEB RSAA. This is approximately 2.8% and 2.5%, respectively, of the available forest in the RSAAs. Furthermore, the calculations showed that approximately 63 acres of no-build growth would

occur in forested areas within the Indiana bat maternity colony areas. Approximately 11 acres of no-build growth is estimated to occur in forested areas in Lambs Creek Maternity Colony (0.2% of available forest), four acres in Clear Creek Maternity Colony (0.1% of available forest), three acres in Crooked Creek Maternity Colony (0.1% of available forest), and 45 acres in Pleasant Run Creek Maternity Colony (2.4% of available forest). This would equate to approximately 0.4% of the available forest within the Indiana bat maternity colony areas.

For the NLEB, the calculations showed that approximately 18 acres of no-build growth would occur in forested areas within the maternity colonies. Approximately 0 acres of no-build growth would occur in forested areas in Lambs Creek Maternity Colony (0.0% of available forest), 1 acre in Clear Creek East Fork Maternity Colony (0.1% of available forest), 0 acres in White River Maternity Colony (0.0% of available forest), 13 acres in White River - Goose Creek Maternity Colony (1.8% of available forest), and four acres in Pleasant Run Maternity Colony (0.4% of available forest). This would equate to approximately 0.3% of the available forest within the NLEB maternity colony areas.

For each species, please refer to the Indirect Impacts section, Cumulative Effects section, and Appendix G of the Tier 2 BA for more information on land-use and development factors in the Section 6 Action Area.

Timber Harvest/Other Land Conversion Trends

We typically cannot accurately quantify how much forest land on private lands will be converted to other habitat types, the extent of future timber harvests on private lands, nor the amount of privately owned habitat that will be developed for other purposes. However, we can look at the trends state-wide and extrapolate assumptions as to how the private lands within the Action Areas will likely be managed in the foreseeable future.

The following Indiana forest trends were highlighted within the North Central Research Station's 2005 report, "Indiana Forests: 1999-2003, Part A". We believe these trends to still be accurate. Trends that we feel may be of a net benefit to Indiana bats have been *italicized* below:

- *There are no major tree die-offs anywhere in the state; natural tree mortality appears evenly across the state.*
- *The ratio of harvested tree volume to tree volume growth indicates sustainable management.*
- *Diverse and abundant forest habitat (snags, coarse woody debris, forest cover and edges) support healthy wildlife populations across the state.*
- *Indiana possesses a diversity of standing dead tree wildlife habitat with an abundance of recently acquired snags to replenish fully decayed snags as Indiana's forests mature.*
- Indiana's oak species continue to grow slower than other hardwood species.
- The average private forest landholding dropped from 22-acres in 1993 to 16-acres in 2003, indicating a continued "parcelization" of Indiana forests.
- Introduced or invasive plant species inhabit a majority of inventories plots.
- The amount of forest edge doubled from 1992 to 2001, indicating smaller forest plots.
- Due to land use history and natural factors, the forest soils of southern Indiana are generally below-average in quality.
- Although Indiana's overall forested land mass is increasing, the rate of increase has slowed over the past decade.

- *Indiana's forests continue to mature in terms of the number and size of trees within forest stands.*
- Increases in total volumes of oak species are less than those for most other hardwood species.
- The advanced ages and inadequate regeneration of Indiana's oak forests may signal a successional shift from an oak/hickory-dominated landscape to one where other hardwood species, such as maples, occupy more forested areas.
- Indiana's hardwood saw-timber resource continues to be at risk due to maturing of hardwood stands, loss of timberland to development and new pests (gypsy moth, emerald ash-borer, sudden oak death, beech-bark disease, and more).
- Ownerships of Indiana forests have changed in the past decade, resulting in more parcelization and fragmentation.

While the data shows there has been loss of continuous forest, resulting in smaller, fragmented stands, there is also an overall increase in quantity and quality/maturation of forested land across the state (Gormanson 2016).

According to the Tier 2 Section 6 BA, observations within the Action Area throughout many years indicate that cutting is for the most part selective harvest, and that clear cutting is limited and sporadic. Some who own property within and adjacent to the right-of-way may be motivated to harvest timber on a portion of their property prior to selling to the State. The likelihood and amount of such activity should be significantly reduced based on INDOT's coordination with landowners and new conservation measure.

Legal Drains

According to the Tier 2 BA, there are several legal drains within Section 6. GIS layers showed five legal drains in Marion County. They are State/Harmon Ditch, Fowler-Haueisen or Thompson Run/Haueisen Ditch, Hare-Marea Ditch, Alcorn Ditch or Little Buck Creek, and Orme Ditch. No legal drains are known to occur in Johnson County, and there is one legal drain in Morgan County (Sartor Ditch). None of these legal drains are within any Indiana bat maternity colony, and as such, there would be no removal of any tree cover related to any known legal drain in any Indiana bat colony in I-69 Section 6. One legal drain, Orme Ditch, touches the edge of the NLEB Pleasant Run Creek colony. It is unlikely that trees would be removed along this ditch and thus no impacts area expected to the colony.

Summary

We anticipate a slight decline in bat habitat in some portions of the Action Area in the future, although we are not aware of specific development plans (beyond those already discussed) in known Indiana bat or NLEB habitat in Section 6 at this time. If INDOT, FHWA or USFWS become aware of specific projects, impacts to will be addressed through the incidental take permit process, if appropriate.

VI. CONCLUSION

After reviewing the section-specific information, including 1) scope of the project, 2) the environmental baseline for the action area, 3) the status of the Indiana bat and NLEB and their known and potential occurrence within the action area, 4) the aggregate effects of the proposed construction, operation, and maintenance of the interstate and associated development, and 5) any cumulative effects, it is the Service's biological opinion that Section 6 of the I-69 Project, by itself or when considered in conjunction with the larger I-69 project from Evansville to Indianapolis, is not likely to jeopardize the continued existence of the Indiana bat or the NLEB.

Our basis for this conclusion follows:

- The scope, impacts and effects associated with the project in Section 6 are consistent with those evaluated in the Tier 1 RPBO and recent amendments to the Tier 1 RPBO (2011, 2013 and 2015).
- Because construction of I-69 consists primarily of upgrading an existing four-lane facility and, impacts to the existing colonies should be minimal. Much of the work performed will be within existing right of way.
- New coordination with landowners along the right of way regarding Indiana bat and NLEB presence and tree clearing restrictions, in conjunction with a new conservation measure to encourage landowners to limit the timing clearing, should avoid and minimize impacts to Indiana bats.
- Because I-69 will have a long narrow/linear footprint, the amount of adverse impacts to any one habitat patch or maternity area along its path is minimal when compared to impacts of a similarly sized area that has a non-linear configuration.
- We anticipate very few Indiana bats or NLEBs may be taken during the summer maternity season as a result of roadkill.
- Based on the amount of surrounding forested habitat, we do not anticipate that any of the maternity colonies will be permanently displaced by direct or indirect effects associated with the construction, operation, and maintenance of Section 6 of the I-69 project.
- The currently proposed forest and wetland mitigation in Section 6 has been strategically located to improve upon the existing high-quality habitat within and near the various maternity colony areas; therefore, we believe adverse impacts to the colonies and any adult males occurring in the immediate area will be further minimized and should not be long lasting. Because at least 500 acres of existing forest habitat will be protected and and/or enhanced, we anticipate the maternity colonies within Section 6 will experience a net gain in habitat as part of the Proposed Action and receive both short and long-term benefits that will continue in perpetuity. In the unlikely event all of the proposed mitigation areas completely fail, the maternity colonies are still likely to persist within the other available habitat within their traditional summer range.
- We do not anticipate any long-term, significant impacts to the local population of Indiana bats and NLEBs, the proposed Indiana bat Midwest Recovery Unit population, nor either species within their range due to the proposed project.

Based on our analysis, we do not believe that the proposed action “would be expected, directly or indirectly, to reduce appreciably the likelihood of both the survival and recovery of the Indiana bat or northern long-eared bat by reducing the reproduction, numbers, or distribution of the

Indiana bat or northern long-eared bat (50 CFR 402)”. For the proposed action to “reduce appreciably” the bats’ survival and recovery, the proposed action would have to impede or stop the process by which the Indiana and northern long-eared bats’ ecosystems are restored and/or threats to the bats are removed so that self-sustaining and self-regulating populations can be supported as persistent members of native biotic communities (USFWS and NMFS 1998, page 4-35). We do not believe the proposed project impedes or stops the survival and recovery process for the Indiana bat or the northern long-eared bat because:

We believe that the proposed roadway construction, operation, and maintenance, while potentially resulting in the incidental take of some individuals, are not a significant threat to the Indiana bat in the proposed Midwest Recovery Unit nor the Indiana bat and northern long-eared bat species’ as a whole and, therefore, do not rise to the level of jeopardy. No component of the proposed action is expected to result in harm, harassment, or mortality at a level that would reduce appreciably the reproduction, numbers, or distribution of the Indiana bat or northern long-eared bat.

SECTION 6 (TIER 2)

INCIDENTAL TAKE STATEMENT

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

The measures described below are non-discretionary, and must be undertaken by the FHWA or their designee (e.g., INDOT) for the exemption in section 7(o)(2) to apply. The FHWA has a continuing duty to regulate the activity covered by this incidental take statement. If the FHWA fails to assume and implement the terms and conditions of the incidental take statement, the protective coverage of section 7(o)(2) may lapse. In order to monitor the impact of incidental take, the FHWA must report the progress of the action and its impact on the species to the Service as specified in the incidental take statement [50 CFR §402.14(i)(3)].

AMOUNT OR EXTENT OF TAKE

The Service believes it is likely that incidental take of Indiana bats in Section 6 of I-69 will occur as a direct or indirect result of the Proposed Action in the following forms:

- Harm through habitat modification/permanent direct loss of roosting habitat/ alternate roost tree(s) and loss of foraging habitat and connectivity/travel corridors among forested patches in Section 6,
- Harass/wound/kill/harm from disturbance and habitat loss associated w/demolition and subsequent relocation of homes and businesses in Section 6,
- Harass/harm from permanent habitat loss from I-69 related utility relocations,
- Death/kill from direct collision with vehicles traveling at high speeds (*i.e.*, roadkill) on I-69 and/or increased traffic volumes on other local roadways,
- Harassment of bats roosting near construction and/or operation of I-69 from noises/vibrations/disturbance levels causing roost-site abandonment and atypical exposure to day-time predators while fleeing and seeking new shelter during the day-time.

Based on our analysis, the Service believes four Indiana bat maternity colonies and five NLEB maternity colonies occur within the Expanded SAA. Adverse effects on the colonies include habitat loss/modification, short term noise/disturbance, and loss of individuals from roadkill. Although very difficult to predict, we estimated the maximum amount of I-69 related incidental take for all four Indiana bat maternity colonies combined from all sources within the Action Area

to be no more than 58 individuals (32 from roadkill and an additional 23 adult females/juveniles as a result of habitat loss/modification and/or disturbance) during the first 17 years of operation (approximately 2013-2030). (Some small, unknown number of bats in Section 6 may be taken as a result of habitat modification, demolition and relocation activities). Additionally, less than 5 male bats are anticipated to be taken during the summer months, primarily as a result of roadkill. In total, on an annual basis, this equates to less than 4 bats (males and females combined) being taken per year.

For NLEBs, we estimated the maximum amount of I-69 related incidental take for the five maternity colonies combined from all sources within the Action Area to be no more than 17 individuals (7 from roadkill and 10 adult females/juveniles as a result of habitat loss/modification and/or disturbance) during the first 16 years of operation (approximately 2014-2030). We do not have much information on males in the area. We expect there may be some small, insignificant loss of males during this period.

No significant, long-term adverse effects are anticipated to accrue to any of the maternity colonies, nor to any local populations of adult males.

It is unlikely that direct mortality of small-sized bats from roadkill will be detected, that is, we do not expect that most dead or moribund bats are likely to be found. The same is true for take associated with habitat modification/loss and disturbance; detecting or finding dead individuals is unlikely. However, as outlined in the Tier 1 RPBO (as amended), we can track the level of anticipated take by monitoring the amount of habitat modification as a surrogate. The Proposed Action will result in the loss of up to 208 forested acres (including forested wetlands and utility and billboard relocations) in Section 6 of I-69. The Service anticipates that reproductive and viability consequences at the maternity colony level are not likely to occur with the proposed amount of habitat modification. If the amount of habitat modification exceeds the specified levels, the trigger for reinitiation has been met. The specified level of habitat modification which triggers reinitiation is defined as exceeding the anticipated 210 acres by more than 10%. Furthermore, the FHWA will keep track of any known bat roadkills to ensure that the anticipated amount of incidental take is not exceeded.

Although the anticipated levels of adverse impacts to Indiana bat summer habitat/forest in Section 6 were modified during the Tier 1 Reinitiation Consultation (increased from 303 acres to 350 acres), the overall project amount is still well below the anticipated total of 2,148 acres of direct forest loss (Table 5). This anticipated level brings the cumulative total of Tier 2 estimated forest habitat loss for the entire I-69 Evansville to Indianapolis project to approximately 1,561 acres (29 acres in Section 1, 186 acres in Section 2, 60 acres in Section 3, and 882 acres in Section 4, 194 acres in Section 5 and 210 acres in Section 6). For a running summary of habitat impacts per Section, see Appendix F of the Tier 2 Section 6 BA.

Loss of Forest Anticipated in the 2006 Tier 1 RPBO/BA	Loss of Forest Anticipated in 2013 Amendment 2 of the Tier 1 RPBO	Loss of Forest Anticipated in the 2015 Amendment 3 of the Tier 1 RPBO (NLEB CO/BO)	Most Recent Anticipated Loss of Tier 2 Forest for Sections 1-6. (Includes as-built info for Sec. 1-4 and best available for Sec. 5 and 6)
2,148 acres	1,973 acres	2,021 acres	1,561 acres

Table 5. Estimated direct loss of Tier 1 and 2 Forest within the I-69 Action Area.

Additionally, we anticipate that the Proposed Action will result in the loss of 2.29 acres of non-forested wetlands (palustrine emergent and scrub-shrub) in Section 6 of I-69 (Table 6). This anticipated level brings the cumulative total of incidental take of Tier 2 estimated non-forested wetlands for the entire I-69 Evansville to Indianapolis project to approximately 18.6 acres. This impact level is below the 20 acres originally anticipated for the entire I-69 Evansville to Indianapolis project in the Tier 1 RPBO and ITS. [Through a recent Tier 1 Reinitiation (July 24, 2013), this amount was revised to 30 acres in anticipation of greater wetland impacts, which ultimately were not realized].

Section	Loss of Non-forested Wetlands Anticipated in Tier 1 RPBO/BA Addendum for Section 6	Loss of Non-forested Wetlands in Tier 2 BA & Tier 2 BO for Section 6
6	6 acres	2.3 acres*

*Does not include open water ponds

Table 6. Estimated direct loss of non-forested wetlands within the I-69 Section 6 Action Area

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that the aggregate level of anticipated take is not likely to result in jeopardy to the Indiana bat or the NLEB.

TIER 2 REASONABLE AND PRUDENT MEASURES

In addition to the Tier 1 Reasonable and Prudent Measures (RPMs) contained within the 24 August 2006 Incidental Take Statement for Tier 1 of the I-69 Evansville to Indianapolis project (and subsequently updated in the May 25, 2011, July 24, 2013, and April 2015 amendments) the Service believes the following Tier 2 RPMs are necessary, appropriate, and reasonable for further minimizing incidental take of Indiana bats and NLEBs in Section 6 of I-69:

1. In the Section 6 Tier 2 BA (page 6-1), the FHWA proposed to implement numerous conservation measures and mitigation efforts as part of their proposed action and these measures are hereby incorporated by reference (including the recently added measure to work with private landowners to avoid tree clearing during the time period Indiana and northern long-eared bats are present). These measures will benefit a variety of wildlife species, including bats. FHWA should take necessary steps to ensure that successful implementation of all conservation measures is achieved to the fullest extent practicable in a timely manner.
2. The implementation status of all the proposed conservation measures, mitigation efforts, and research and any related problems need to be monitored and clearly communicated to the Service on an annual basis.

TIER 2 TERMS AND CONDITIONS

In order to be exempt from the prohibitions of section 9 of the Act, the FHWA (and/or INDOT and their contractors or assigns) must comply with the following Tier 2 Terms and Conditions

(T&Cs), which implement the Tier 2 RPMs above. These Tier 2 T&Cs are non-discretionary and are in addition to the Tier 1 T&Cs.

1. The FHWA, in consultation with the Service, must develop detailed, site-specific final mitigation plans for each secured mitigation site within six (6) months of securing the site or within six (6) months of the issuance of this BO, whichever is later. All mitigation sites must be identified and secured within 3 years of the issuance of this biological opinion, including the development of final mitigation plans. The mitigation plans will not be conceptual, but rather will contain detailed descriptions for each phase of mitigation including 1) initial construction and establishment, 2) 10-year, post-construction monitoring phase, and 3) long-term management. The Section 6 final mitigation plans will address and/or establish the following: quantifiable criteria and methods for assessing success of all mitigation plantings and functionality of constructed wetlands and streams, approved lists of tree/plant species to be planted (and their relative abundance/%), approved lists of herbicides for weed control, proposed construction schedules, annual post-construction monitoring schedules, and a long-term, ongoing management/stewardship strategy.

To ensure timeliness, the FHWA must begin construction and/or reforestation within the Section 6 Mitigation Areas either before (the most preferable option) or during the first summer reproductive season (1 April – 30 September) immediately after any I-69 related tree clearing or construction begins in Section 6 anywhere within each maternity area (see Figure 1). Once initiated, all Service-approved construction and tree plantings within the Section 6 Mitigation Areas must be completed within 3 calendar years.

2. FHWA will provide the Service with a written annual report that summarizes the previous year's monitoring, conservation and mitigation accomplishments, remaining efforts, and any problems encountered within Section 6. This annual report will be completed throughout the 10-year post-construction monitoring period. The annual report for Section 6 may be a stand-alone document or included as part of the annual report required under the Tier 1 Term and Condition Number 2 (amended May 25, 2011, July 24, 2013, and April 2015).

In conclusion, the Service believes that no more than 32 individual Indiana bats and 7 NLEBs will be incidentally taken between the years 2013 and 2030 as the result of roadkill. Direct habitat loss and/or modification will be limited to approximately 208 acres of forest habitat and 2.6 acres of non-forested wetland habitat (excluding open-water ponds) within the Section 6 Expanded Action Area. Such take will be monitored by reporting known bat vehicle collisions and tracking the amount of habitat modification. These acreages represent less than a 1% loss of the Section 6 Expanded Action Area's forested acreage. 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 anticipated levels of incidental take (*i.e.*, habitat modification and/or roadkill) are exceeded by more than 10% (or tree clearing occurs during the period April 1-September 30 in the SAA), then such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The FHWA must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by carrying out conservation programs for the benefit of endangered and threatened species. Conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action/program on listed species or critical habitat, to help implement recovery plans, or to develop information. Conservation recommendations generally do not focus on a specific project, but rather on an agency's overall program.

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

INDIANA BAT CONSERVATION RECOMMENDATIONS

1. Working with the Service, develop national guidelines or best management practices for addressing Indiana bat and NLEB issues associated with FHWA projects within the range of the bats, including measures to avoid and minimize private landowner impacts to the species prior to state and/or federal acquisition.
2. Provide funding to expand on scientific research and educational outreach efforts on Indiana bats and NLEBs in coordination with the Service's INFO.
3. In coordination with the INFO, purchase or otherwise protect additional Indiana bat and NLEB hibernacula and forested swarming habitat in Indiana.
4. Provide funding to staff a full-time Indiana bat Conservation Coordinator position within the INFO, which has the Service's national lead for this wide-ranging species.
5. Provide funding for research to address White Nose Syndrome in bats.

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

REINITIATION NOTICE

This concludes formal programmatic consultation with FHWA on the construction, operation, and maintenance of the Section 6 portion of the I-69 from Evansville to Indianapolis, Indiana and associated development. As provided in 50 CFR §402.16, reinitiation of formal consultation is required where discretionary Federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action (e.g., highway construction and associated development) are subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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APPENDIX A. Tier 1 I-69 Evansville to Indianapolis Conservation Measures for the Indiana Bat (*Myotis sodalis*)

#	Tier 1 Conservation Measures	Status (as of 06/2011)
A. Context Sensitive Solutions		
1	Alignment planning - alignments will be located beyond 0.5 miles from known IBat hibernacula	completed
2	Avoid Blasting within 0.5 miles of IBat hibernacula from 15 September to 15 April	Ongoing
3	Survey potential hibernacula for IBats	completed
4	Avoid and minimize impacts to karst hydrology connected to IBat hibernacula	completed
5	Tree removal - to avoid direct take of IBats, tree cutting within 5 miles of a known hibernaculum will only be allowed from 15 November to 31 March	ongoing
6	Alignment planning - alignments will be located to minimize impacts to forested areas and core forests	ongoing
7a	Tree cutting - to avoid direct take of IBats, no trees >3 inches DBH will be cut down from 1 April to 30 September	ongoing
7b	To locate IBats within the action area, mist net surveys will be conducted as part of Tier 2 studies. If captured, IBats will be radio-tracked to locate roost trees	completed
8a	Bridge surveys will be conducted in action area as part of Tier 2 studies	completed
8b	Bat friendly bridges will be designed where feasible and appropriate	Removed
8c	The Patoka River floodplain will be bridged in its entirety to minimize impacts to riparian habitat	completed
9	Stream relocations - site-specific plans will be developed including stream mitigation and monitoring plans	ongoing
10	Medians and Alignments - variable-width medians and independent alignments will be used to minimize impacts	completed
11	Minimize Interchanges - efforts will be made to minimize interchanges in karst areas	completed
12	INDOT will adhere to the multi-agency Wetland and Karst MOUs	ongoing
13a	Water quality - equipment servicing and maintenance areas will be restricted to designated areas away from streams and sinkholes and their immediate watersheds	ongoing
13b	Water quality - road-side ditches will be constructed with filter strips and containment basins	ongoing
13c	Construction equipment will be maintained in proper mechanical condition	ongoing
13d	Roadways will be designed to contain accidental spills	ongoing
13e	Herbicide use will be minimized in identified environmentally sensitive areas	ongoing
13f	Revegetation - disturbed soil areas will be revegetated with native grasses and wildflowers	ongoing
13g	Low Salt Zones - low salt and no salt spray strategy will be developed in karst areas	ongoing
13h	Bridges will be designed with none or a minimum number of in-span drains and water will be directed toward drainage turnouts at the ends of the bridge	ongoing
14	Erosion control measures will be implemented during construction	ongoing
15	Parking and Turning Areas - for heavy equipment will be outside and away from environmentally sensitive areas.	ongoing
16	Avoid and minimize private landowner clearing - initiating a process to limit clearing to Nov.16-March 31.	ongoing
B. Restoration / Replacement		
1	Summer Habitat Creation/Enhancement - Wetland and forest mitigation will occur within the action area with priority given to sites within 2.5 miles of IBat capture sites or roost trees. Mitigation sites will be planted with a mixture of native trees that is largely comprised of species that have been identified as having relatively high value as potential Indiana bat roost trees. Tree plantings will be monitored for five years after planting to ensure establishment and protected in perpetuity via conservation easements.	ongoing

APPENDIX A. Continued.

#	Tier 1 Conservation Measures	Status
B. Restoration / Replacement (continued)		
2	Wetland MOU will be followed	ongoing
3	Forest Mitigation - Forest impacts occurring within each of the 13 2.5-mile radius maternity colony areas would be mitigated by replacement (<i>i.e.</i> planting of new forest and purchase of existing) at approximately 3:1, preferably in the vicinity of the known roosting habitat.	ongoing
C. Conservation / Preservation		
1	Hibernacula Purchase - one or more will be purchased to conserve IBat winter habitat from willing sellers in the action area	completed
2	Hibernacula Protection - cave gates, fences, or alarm systems will be constructed to prevent unauthorized human entry	completed
3	Autumn/Spring Habitat Purchase - autumn swarming/spring staging habitat will be purchased from willing sellers as part of conservation for IBat habitat to the greatest extent practicable. Some parcels containing important autumn swarming/spring staging habitat may be acquired near key hibernacula regardless of whether the hibernacula are acquired themselves.	completed
4	Summer Habitat Purchase - at fair market value in the Action Area from "willing sellers" to preserve summer habitat. Any acquired summer habitat area would be turned over to an appropriate government conservation and management agency for protection in perpetuity via conservation easements.	ongoing
D. Education / Research / Monitoring		
1	Monitor any caves that had gates installed as an I-69 conservation measure.	completed
2	Install warning signs at caves as appropriate.	completed
3	Provide \$50,000 to supplement the biennial IBat winter surveys at known hibernacula in the action area and elsewhere in Indiana	in process
4	Provide \$125,000 for research on the relationship between quality autumn/spring habitat near hibernacula and hibernacula use within/near the Action Area. This research should include methods attempting to track bats at longer distances such as aerial telemetry or a sufficient ground workforce. A research work plan will be developed in consultation with the USFWS.	in process
5	Conduct additional mist net surveys at 50 sites to monitor status of the 13 known IBat maternity colonies in the action area. Surveys will be completed the summer before construction begins in a given section and will continue each subsequent summer during the construction phase and for at least five summers after construction has been completed. If Indiana bats are captured, radio transmitters will be used in an attempt to locate roost trees, and multiple emergence counts will be made at each located roost tree. These monitoring efforts will be documented and summarized within an annual report prepared for the Service.	ongoing
6	Educational Poster - Total funding of \$25,000 will be provided for the creation of an educational poster or exhibit and/or other educational outreach media to inform the public about the presence and protection of bats, particularly the Indiana bat.	in process
7	Rest Areas - rest areas will be designed with displays to educate the public on the presence and protection of sensitive species and habitats. Attractive displays near picnic areas and buildings will serve to raise public awareness as they utilize the Interstate. Information on the life history of the Indiana bat, protecting karst, and protecting water quality will be included in such displays.	to be completed
8	Access to Patoka River NWR - If reasonable, an interchange will be constructed that would provide access to a potential Visitor's Center at the Patoka River National Wildlife Refuge.	completed
9	GIS Information - GIS maps and databases developed and compiled for use in proposed I-69 planning will be made available to the public. This data provides information that can be used to determine suitable habitats, as well as highlight other environmental concerns in local, county, and regional planning. Digital data and on-line maps are available http://igs.indiana.edu/arcims/statewide/index.html .	completed

