Conference Opinion for the Northern Long-eared Bat (*Myotis septentrionalis*)

Amendment 3 to the Tier 1 Revised Programmatic Biological Opinion (dated August 24, 2006, previously amended July 24, 2013 and May 25, 2011) for the I-69, Evansville to Indianapolis, Indiana highway.

April 1, 2015

This document has been prepared for the I-69 Evansville to Indianapolis Project. The Federal Highway Administration (FHWA) has used a tiered environmental review process for this project. The U.S. Fish and Wildlife Service (Service) issued a Tier 1 Biological Opinion (BO) in December of 2003, and shortly afterward FHWA issued the Tier 1 Final Environmental Impact Statement (FEIS). FHWA issued a Tier 1 Record of Decision (ROD) on March 24, 2004, and then initiated Tier 2 EISs for each of the six sections of the approved corridor (known as I-69 Sections 1 through 6).

The Service issued a revised Tier 1 Programmatic BO (RPBO) in August of 2006 for the entire corridor. The revised Tier 1 RPBO requires a separate BO for each of the six sections of the project. Tier 2 BOs have been issued for Section 1 (August 29, 2007), Section 2 (February 17, 2010), Section 3 (October 21, 2009), Section 4 (July 6, 2011), and Section 5 (July 25, 2013). Consultation on the entire corridor was reinitiated in 2011 in order to update baseline information (including new maternity colony data and white nose syndrome information), as well as the impact analysis for Ray's Cave, which is designated Critical Habitat for the Indiana bat. Consultation on the entire corridor was also reinitiated in 2013 to address additional forest and wetland impacts, as well as new Indiana bat maternity colony information. For a complete summary of the project's consultation history, please refer to Table 2 of the 2014 Tier 1 Biological Assessment Addendum for the Northern Long-Eared Bat (NLEB BA).

Presently, a conference on the entire corridor has been initiated due to the presence of the northern long-eared bat (*Myotis septentrionalis*), which is proposed to be listed in April, 2015, as endangered under the Endangered species Act (ESA) of 1973 (as amended). The Service has prepared this Conference Opinion (CO) and is amending it (as Amendment 3) to the 2006 Tier 1 RPBO.

New Information/Need for Formal Conference

On October 2, 2013, the U.S. Fish and Wildlife Service (FWS) proposed the northern long-eared bat (*Myotis septentrionalis*) (NLEB) for listing as endangered under the ESA. A proposed species is any species where a proposed listing rule under section 4 of the ESA has been published in the Federal Register. For species that have been proposed for listing, the FWS has determined that there is enough information to warrant listing them as either threatened or endangered. The NLEB was proposed for federal listing under the ESA on October 2, 2013 and the final listing decision was expected within one year from that date. Recently, the FWS

published a Federal Register notice announcing a 6-month extension of the deadline for making a final determination on listing the northern long-eared bat (*Myotis septentrionalis*) as endangered. With the extension, the Service will make a final decision no later than April 2, 2015.

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

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

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

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

FWS if the action is likely to adversely affect the NLEB. This approach has the potential to result in significant delays and costs to applicants.

Formal conferences follow the same procedures as formal consultation and end with the issuance of a conference opinion. The conference opinion follows the same format and content of a biological opinion; however, the incidental take statement provided with the conference opinion for the NLEB does not take effect until the FWS and action agency adopt the conference opinion as a biological opinion on the proposed action, once the NLEB is listed. Based on the timing of the conference and the effective listing date of May 4, 2015, the Service has concluded that this conference opinion shall be immediately adopted as a biological opinion upon the effective listing date of May 4, 2015.

CONFERENCE OPINION

PROPOSED ACTION

The Federal Highway Administration (FHWA) and the Indiana Department of Transportation (INDOT) are constructing the I-69 Interstate from Evansville to Indianapolis, Indiana. It is a comprehensive National Environmental Policy Act (NEPA) study that was and will be carried forward in two tiers. Tier 1 of the study involved extensive environmental, transportation, and economic studies, and cost analysis. The Tier 1 Environmental Impact Statement (EIS) provided a basis for the FHWA to grant approval for a specific *corridor*. In most cases, the *corridor* is approximately 2,000 feet wide, but has been narrowed or widened in some instances to avoid or provide flexibility to avoid environmentally sensitive areas. A working alignment within the *corridor*, ranging from approximately 270 – 470 feet wide, was developed to estimate potential impacts for the Tier 1 study. The Tier 1 study was completed on March 24, 2004 with the issuance of the Tier 1 Record of Decision (ROD) signed by FHWA. Alternative 3C was the Selected Alternative for this project. Alternative 3C is near SR 57 from Evansville to Washington, crossing the Patoka River National Wildlife Refuge acquisition boundary. The alternative continues to the east of Washington north to Elnora, then turns east overland toward Bloomington. From Bloomington north, the alternative is located on existing SR 37 to connect to I-465 at Indianapolis.

The proposed action consists of construction, operation, and maintenance of an interstate highway, approximately 142 miles long, connecting Evansville and Indianapolis, Indiana. Approximately 35% of the proposed route is primarily within the footprint of an existing 4-lane highway, SR 37; however, the remaining 65% or approximately 90 miles of interstate is being constructed on entirely new right-of-way. The proposed action also involves constructing multiple interchanges (the actual number may change in Tier 2), as well as new local access roads, and improvements to existing roads. The project is part of a larger, national proposal to connect the three North American trading partners of Canada, the United States, and Mexico by an interstate highway in the states of Michigan, Indiana, Kentucky, Tennessee, Mississippi,

Arkansas, Louisiana, and Texas. The purpose of the I-69 Evansville to Indianapolis Project is to provide an improved transportation link between Evansville and Indianapolis that: 1) strengthens the transportation network in southwestern Indiana, 2) supports economic development in southwestern Indiana, and 3) completes the portion of the National I-69 project between Evansville and Indianapolis.

At this time, Tier 2 NEPA documents and BAs (with corresponding BOs from the Service) have been completed for Sections 1-5, and construction of the roadway is completed for Sections 1-3 or the first 67 miles. Clearing of trees is completed for Section 4 and the lower third of Section 5. Construction of the highway in Section 4 is expected to be completed in 2015.

In addition to the construction, maintenance, and operation of the highway, the proposed action also includes implementation of the Tier 1 Forest and Wetland Mitigation and Enhancement Plan, as well as specific conservation measures developed jointly by the FHWA, INDOT, and the Service. For complete details of the action, please refer to FWHA's and INDOT's BA developed for the northern long-eared bat, the Service's 2006 Tier 1 RPBO and the various amendments and Tier 2 opinions. Conservation measures incorporating the northern long-eared bat can be found in Appendix A of this opinion.

ACTION AREAS

The Action Area for a project is defined by regulation as all areas to be affected directly or indirectly by the Federal Action and not merely the immediate area involved in the action. This analysis is not limited to the "footprint" of the action nor is it limited by the Federal agency's authority. Rather, it is a biological determination of the reach of the proposed action on listed species. Two seasonal Action Areas have been defined for the proposed endangered northern long-eared bat: (1) the Summer Action Area (SAA) and (2) the Winter Action Area (WAA). Figure 1 shows both the SAA and WAA.

Summer Action Area

The SAA is based on a 1.5 mile buffer on either side of the proposed centerline, along the entire length of the proposed project. Additionally, the SAA has been expanded to include all areas where indirect development is forecasted contiguous with the SAA based on the induced growth expectations in TAZs (Traffic Analysis Zones).

Winter Action Area

The WAA is based on a 5-mile radius buffer around each of the caves where northern long-eared bat presence has been established through either I-69 specific cave studies or Service presence data. The 5-mile radius areas for each of 55 caves were combined together to form an overall WAA. Additionally, the WAA has been expanded to include all areas where indirect

development is forecasted contiguous with the WAA based on the induced growth expectations in TAZs (Traffic Analysis Zones).

Analytical Framework for Jeopardy Determinations

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

STATUS OF THE SPECIES/CRITICAL HABITAT

Northern Long-eared Bat (*Myotis septentrionalis*)

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

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

A medium sized bat species, the northern long-eared bat adult body weight averages five to eight grams (0.2 to 0.3 ounces), with females tending to be slightly larger than males (Caceres and Pybus 1997). Average body length ranges from 77 to 95 mm (3.0 to 3.7 in), tail length between

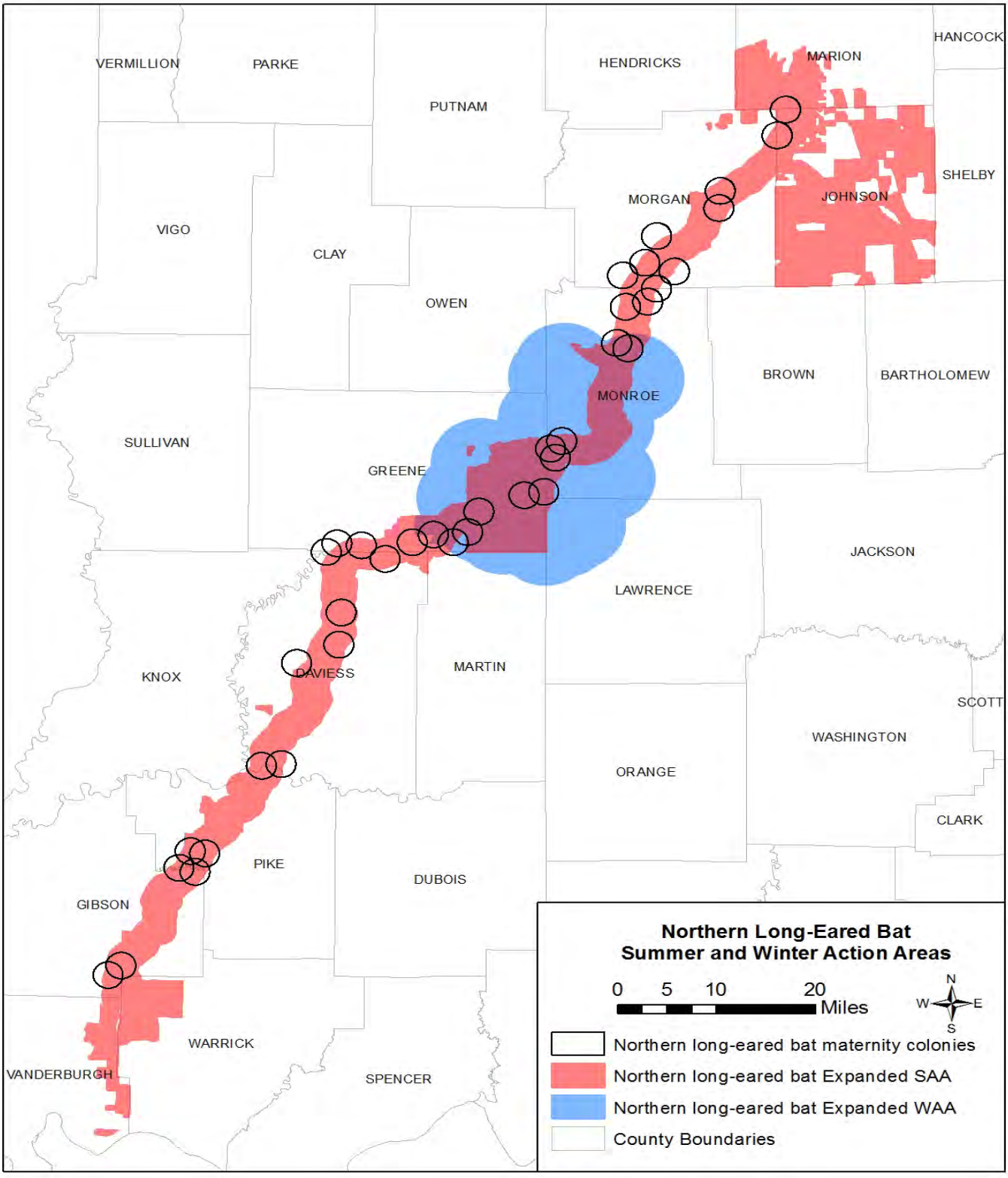

Figure 1. Northern Long-eared Bat Summer and Winter Action Areas.

35 and 42 mm (1.3 to 1.6 in), forearm length between 34 and 38 mm (1.3 to 1.5 in), and wingspread between 228 and 258 mm (8.9 to 10.2 in) (Caceres and Barclay 2000; Barbour and Davis 1969). Pelage (fur) colors include medium to dark brown on its back, dark brown, but not black, ears and wing membranes, and tawny to pale-brown fur on the ventral side (Nagorsen and Brigham 1993; Whitaker and Mumford 2009). As indicated by its common name, the northern long-eared bat is distinguished from other *Myotis* species by its long ears (average 17 mm (0.7 in); Whitaker and Mumford 2009) that, when laid forward, extend beyond the nose but less than five mm (0.2 in) beyond the muzzle (Caceres and Barclay 2000). The tragus (projection of skin in front of the external ear) is long (average 9 mm (0.4 in); Whitaker and Mumford 2009), pointed, and symmetrical (Nagorsen and Brigham 1993; Whitaker and Mumford 2009).

Status and Distribution

The northern long-eared bat ranges across much of the eastern and north-central United States, and all Canadian provinces west to the southern Yukon Territory and eastern British Columbia (Nagorsen and Brigham 1993; Caceres and Pybus 1997; Environment Yukon, 2011).

In the United States, the species' range reaches from Maine west to Montana, south to eastern Kansas, eastern Oklahoma, Arkansas, and east to the Florida panhandle (Whitaker and Hamilton 1998; Caceres and Barclay 2000; Amelon and Burhans 2006). The species' range includes the following 38 States: Alabama, Arkansas, Connecticut, Delaware, the District of Columbia, Florida, Georgia, Illinois, Indiana, Iowa, Kansas, Kentucky, Louisiana, Maine, Maryland, Massachusetts, Michigan, Minnesota, Mississippi, Missouri, Montana, Nebraska, New Hampshire, New Jersey, New York, North Carolina, North Dakota, Ohio, Oklahoma, Pennsylvania, Rhode Island, South Carolina, South Dakota, Tennessee, Vermont, Virginia, West Virginia, Wisconsin, and Wyoming. Historically, the species has been most frequently observed in the northeastern United States and in Canadian Provinces, Quebec and Ontario, with sightings increasing during swarming and hibernation (Caceres and Barclay 2000). However, throughout the majority of the species' range it is patchily distributed, and historically was less common in the southern and western portions of the range than in the northern portion of the range (Amelon and Burhans 2006).

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

The U.S. portion of the northern long-eared bat's range can be described in four parts: the eastern population, the southern population, the western population, and the Midwestern population. Historically, the northern long-eared bat was most abundant in the eastern portion of its range (Caceres and Barclay 2000, p. 2). Northern long-eared bats have been consistently caught during summer mist-net surveys and detected during acoustic surveys in eastern populations (Caceres and Barclay 2000, p. 2). The northern long-eared bat is generally less common in the western portion of its range (Amelon and Burhans 2006, p. 71) and is considered common in only small

portions (*e.g.*, Black Hills of South Dakota) and uncommon or rare in the western extremes of the range (*e.g.*, Wyoming, Kansas, Nebraska). In the southern portion of its range it is considered less common than in the northern portion (Amelon and Burhans 2006, p. 71). It is more common in states such as Kentucky and Tennessee, and more rare in the southern extremes of the range (*e.g.*, Alabama, Georgia, South Carolina). Finally, in the Midwest portion of its range, the northern long-eared bat is commonly encountered in summer mist-net surveys throughout the majority of the Midwest and is considered fairly common throughout much of the region.

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

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

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

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

Reasons for Listing

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

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

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

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

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

Life history

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

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

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

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

speculated structural complexity of habitat or available roosting resources are more important factors than the actual tree species.

Many studies document the selection of live trees and snags by northern long-eared bats, with a range of 10 to 53 percent selection of live roosts (Sasse and Perkins 1996; Foster and Kurta 1999; Lacki and Schwierjohann 2001; Menzel *et al*. 2002; Carter and Feldhamer 2005; Perry and Thill 2007; Timpone *et al*. 2010). Foster and Kurta (1999) found 53 percent of roosts in Michigan were in living trees, whereas in New Hampshire, 34 percent of roosts were in snags (Sasse and Pekins 1996). The use of live trees versus snags may reflect the availability of such structures in study areas (Perry and Thill 2007) and the flexibility in roost selection when there is a sympatric bat species present (*e.g*., Indiana bat) (Timpone *et al*. 2010). In tree roosts, the northern long-eared bat is typically found beneath loose bark or within cavities and have been found to use both exfoliating bark and crevices to a similar degree for summer roosting habitat (Foster and Kurta 1999; Lacki and Schwierjohann 2001; Menzel *et al*. 2002; Owen *et al*. 2002; Perry and Thill 2007; Timpone *et al*. 2010).

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

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

Biology

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

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

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

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

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

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

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

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

Reproduction - Breeding occurs from late July in northern regions to early October in southern regions and commences when males begin to swarm hibernacula and initiate copulation activity (Whitaker and Hamilton 1998; Whitaker and Mumford 2009; Caceres and Barclay 2000; Amelon and Burhans 2006). Copulation occasionally occurs again in the spring (Racey 1982).

Hibernating females store sperm until spring, exhibiting a delayed fertilization strategy (Racey 1979; Caceres and Pybus 1997). Ovulation takes place at the time of emergence from the hibernaculum, followed by fertilization of a single egg, resulting in a single embryo (Cope and Humphrey 1972; Caceres and Pybus 1997; Caceres and Barclay 2000); gestation is approximately 60 days (Kurta 1994). Males are reproductively inactive until late July, with testes descending in most males during August and September (Caire *et al*. 1979; Amelon and Burhans 2006).

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

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

Foraging behavior and home range - The northern long-eared bat has a diverse diet including moths, flies, leafhoppers, caddisflies, and beetles (Nagorsen and Brigham 1993; Brack and

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

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

Recovery and Management

The most important recovery action for the northern long-eared bat is to stop or slow the spread of white-nose syndrome (WNS). WNS is a disease responsible for unprecedented mortality in hibernating bats in the northeast, and continues to spread throughout the range of the northern long-eared bat. Although conservation efforts have been undertaken to help reduce the spread of

the disease through human-aided transmission, these efforts have only been in place for a few years and it is too early to determine how effective they are in decreasing the rate of spread.

Previous Incidental Take Authorizations

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

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

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

In certain cases, the U.S. Forest Service has agreed to limit or restrict burning in the central hardwoods from mid- to late April through summer to avoid periods when bats are active in forests (Dickinson *et al*. 2010).

ENVIRONMENTAL BASELINE

This section is an analysis of the past effects of State, tribal, local and private actions already affecting the species within the Action Areas and the present effects within the Action Areas that will occur contemporaneously with the consultation in progress. It includes a description of the known status of northern long-eared bats and their habitats within or near the I-69 Action Areas.

The natural environments traversed by the project are summarized within the Tier 1 RPBO (pgs. 59-67), along with the I-69, Evansville to Indianapolis, Indiana Tier 1 FEIS and are hereby incorporated by reference.

Northern Long-eared bats in the Action Area

From 2004 through to 2014, various seasonal field investigations have been conducted to determine bat use of summer habitat resources throughout the I-69 corridor. From 2004 to the present, data from the surveys have included all species of bats; however, because the northern long-eared bat was not listed as endangered during this time period, only capture data is available (i.e., radio-telemetry resulting in the identification of northern long-eared bat roost sites was not conducted). Below is a summary of the data that FHWA and INDOT, along with their consultants, have collected over the past decade.

Bridge and Culvert Surveys

In 2004 and 2005, approximately 259 bridges and culverts were inspected for bats in spring and summer. Eight of these structures were found to support bats. Table 1 shows the results for bats found under bridges in the SAA. Little Buck Creek #1 and #3 are located in the upper part of Section 6; Beanblossom Creek and Griffey Creek are located north of Bloomington in Section 5; and the Unknown Creek and Indian Creek are located in the upper middle part of Section 4. Sections 1, 2 and 3 did not have any bridges with bats, except for the large SR 57 Bridge at Newberry over the West Fork White River in Section 3. Formal studies were completed on this bridge from 2006 to 2011.

Table 1. Bats found under eight existing bridges in the I-69 study area from 2004-11.

	Bridge over Creek		MYSO	MYGR	MYSE	MYLU	EPFU	PESU	Unk	Total
Sec 6	Little Buck Creek #1	2004					20			20
	Little Buck Creek #3						8			8
Sec 5	Beanblossom Creek	2004			2	2		6	3	13
	Griffey Creek							1		1
Sec 4	Unknown Creek	2004					2			2
	Indian Creek				2					2
	Jackson Creek								1	1
Sec 3	West Fork White River	2004	3			5		14		22
		2005	9			485	7			501
		2006-2011	878	2		6887	774	29		8,570
	Total		**890**	**2**	**4**	**7379**	**811**	**50**	**4**	**9,140**

Shaded species are federally listed or proposed listed species.

This bridge had, by far, the most bat use of any bridge in the study area. One-hundred twenty-one visits to this bridge from 2004 to 2011 yielded approximately 9,093 bats from 5 species. They were 7,377 little brown (MYLU), 890 Indiana (MYSO), 781 big brown (EPFU), 43 tri-colored (PESU) and 2 gray bats (MYGR). The Indiana bat and gray bat are federally listed species. This bridge did not show any northern long-eared bats (MYSE) even though they are very common in the area.

Of the 259 bridges and culverts investigated for bats in 2004 and 2005, only 2 bridges supported northern long-eared bats. There were 2 northern long-eared bats under the SR 37 bridge over Beanblossom Creek (Section 5) and 2 found under the Breeden Road bridge over Indian Creek (Section 4).

Mist Netting

Table 2 shows a summary of the bat surveys for I-69 in terms of Relative Abundance, Frequency of Occurrence and Captures per Net Night that include all species, including the northern long-eared bat. Collectively, 4,119 bats from 9 species were captured from 2004 to 2014 (9 years of survey). These included red bat (n=1,072, 26%), big brown bat (n= 834, 20%), little brown bat (n=703, 17%), tri-colored bat (n=630, 15%), evening bat (n=364, 9%), northern long-eared bat (n=339, 8%), Indiana bat (n=112 , 3%), hoary bat (n=31, 1%), and silver-haired bat (n=16, <1%) bats. Eighteen bats are unknowns since they escaped from the net before identification.

Table 2. Relative Abundance, Frequency of Occurrence and Captures Per Net Night.

Species	Relative Abundance										
Year Sections	2004 1-2-3-4-5-6	2005 1-2-3-4-5-6	2008 1	2009 1	2010 1-2-3-4	2011 1-2-3-4	2012 1-2-3-4-5	2013 1-2-3-4	2014 1-2-3-4-5	Total	% of Total
Lasiurus borealis	327	74	27	6	125	85	235	81	112	1072	26%
Eptesicus fuscus	266	49	12	2	80	69	194	54	108	834	20%
Myotis lucifugus	259	44			138	121	121	19	1	703	17%
Perimyotis subflavus	219	49	32	10	64	91	108	43	14	630	15%
Myotis septentrionalis	145	47	1		29	34	75	6	2	339	8%
Nycticeius humeralis	105	28	10	7	51	40	40	32	51	364	9%
Myotis sodalis	49	7	3	1	7	8	21	6	10	112	3%
Lasiurus cinereus	7	2			1	1	9	3	8	31	< 1%
Lasionycteris noctivagans					1		7	1	7	16	< 1%
Unknown	1	2				1	5	6	3	18	< 1%
Total	1378	302	85	26	496	450	815	251	315	4119	100%
Diversity ($D=1/\Sigma P_i^2$)	5.80	5.98	3.60	3.56	5.06	5.37	5.23	4.91	3.62		

Table 2. Relative Abundance, Frequency of Occurrence and Captures Per Net Night.										
Survey Data	**Frequency of Occurrence**									
	2004	**2005**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**Total**
# of Sites Sampled	149	44	5	4	27	23	57	33	41	383
# of Sites with *Myotis sodalis*	31	6	2	1	6	6	9	5	8	45
# of Sites with M*yotis septentrionalis*	62	22	1	0	10	15	27	4	2	102
# of Sites with *Myotis sodalis* and *Myotis septentrionalis*	18	4	0	0	2	3	4	0	0	39
% of *Myotis sodalis* Sites with *Myotis septentrionalis*	58%	67%	0%	0%	33%	50%	44%	0%	0%	87%
% of *Myotis septentrionalis* Sites with *Myotis sodalis*	29%	18%	0%	0%	20%	20%	15%	0%	0%	38%
Species	**Captures Per Net Night**									
	2004	**2005**	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**Mean ± 1 SD***
Lasiurus borealis	0.55	0.60	1.04	0.33	1.14	0.87	0.88	0.60	0.58	0.73 ± 0.25
Eptesicus fuscus	0.45	0.40	0.46	0.11	0.73	0.70	0.72	0.40	0.56	0.50 ± 0.19
Myotis lucifugus	0.43	0.36	0.00	0.00	1.25	1.23	0.45	0.14	0.01	0.43 ± 0.47
Perimyotis subflavus	0.37	0.40	1.23	0.56	0.58	0.93	0.40	0.32	0.07	0.54 ± 0.33
Myotis septentrionalis	0.24	0.38	0.04	0.00	0.26	0.35	0.28	0.04	0.01	0.18 ± 0.15
Nycticeius humeralis	0.18	0.23	0.38	0.39	0.46	0.41	0.15	0.24	0.26	0.30 ± 0.11
Myotis sodalis	0.08	0.06	0.12	0.06	0.06	0.08	0.08	0.04	0.05	0.07 ± 0.02
Lasiurus cinereus	0.01	0.02	0.00	0.00	0.01	0.01	0.03	0.02	0.04	0.02 ± 0.01
Lasionycteris noctivagans	0.00	0.00	0.00	0.00	0.01	0.00	0.02	0.04	0.04	0.01 ± 0.01
Unknown	0.00	0.02	0.00	0.00	0.00	0.01	0.02	0.04	0.02	0.01
Total Net Nights	597	123	26	18	110	98	268	134	194	**1,374**
Yearly captures per net night	2.31	2.46	3.27	1.44	4.51	4.59	3.04	1.87	1.62	2.79 ± 1.10

*SD refers to Standard Deviation

Species diversity was relatively consistent for 2004, 2005, 2010, 2011, 2012, and 2013 (Range = 5 to 6), with the exception of 2008, 2009 and 2014 (each about 3.6). During 2008 and 2009, only Section 1 was sampled, and no little brown and only one northern long-eared bat were captured. Lack of preferred habitat in Section 1 for these two species may account for differences.

From 1,548 net nights of effort, 163 female and 169 male northern long-eared bats (seven of unknown gender) were captured. Of the 189 sites sampled, 69 showed northern long-eared bats (36%). Northern long-eared bats were captured at 87% of the sites where Indiana bats were captured. By comparison, Indiana bats were captured at 38% of the sites where northern long-eared bats were captured. This difference in percentages is attributable to three times more northern long-eared bats than Indiana bats (339 to 112) over the nine year data period, and the more general geographic distribution of the northern long-eared bat.

However, it is not uncommon to have these two species both present at individual survey sites since they share similar habitat and habits. Refer to the similar summer habitat for these two species reported in Appendix A of the Service's "Northern Long-Eared Bat Interim Conference and Planning Guidance" (Regions 2, 3, 4, 5 and 6) dated January 6, 2014.

Captures per net night showed variability throughout each species and between years. Comparing 2004 (which had the greatest number of survey sites and net nights) with 2012- 2014 (which is after White Nose Syndrome was reported in Indiana on February 1, 2011), it would appear that population trends of the red bat, big brown bat, tri-colored bat and evening bat are reasonably constant. However, populations trends for the little brown bat, northern long-eared bat and Indiana bat (the myotid species) are questionable.

Radio-telemetry and Roost Tree Identification

Radio-telemetry studies for the northern long-eared bat were not conducted in the past because it was not a listed species during prior studies. In 2014, INDOT and FHWA monitored eight mist netting sites in Section 5 in areas where clearing and construction had not yet occurred; telemetry was proposed for any northern long-eared bats caught in this portion of the project area. Only 2 male northern long-eared bats were captured in Section 5. Protocol did not warrant placing a radio-transmitter on these 2 males because the protocol directs that males captured the first night at a site would not be fitted with a radio-transmitter so as to save the transmitters for females. If no females are captured on the first night for a site, then males captured on the second night could be transmitted provided a female was not captured earlier that same night. No female northern long-eared bats were identified in the mist netting survey in Section 5. For this reason, no roost data is available.

During 2014 surveys of Sections 1, 2, 3 and 4, no northern long-eared bats were captured.

FHWA/INDOT capture data for 337 northern long-eared bats from 2004-2013 and two northern long-eared bats in Section 5 for 2014 are provided in Table 11 of the NLEB BA. FHWA and INDOT will not need to complete any radio-telemetry studies in Sections 1-3 (since it has been constructed), nor in Section 4 (since it has had tree clearing completed). FHWA and INDOT are required to complete future radio-telemetry studies and emergence counts in Sections 5 and 6 on the northern long-eared bat (along with the Indiana bat) following the Service's established methodology.

Maternity Colonies

Maternity colonies were identified by the Service's Bloomington Field Office (BFO) using the best information available (primarily FHWA and INDOT summer mist net survey data for the I-69 project). The maternity colony analysis considered: (a) Capture sites for the northern long-eared bat from 2004 to present, especially for reproductive females and juveniles; (b) Habitat evaluations that follow preferred habitat documented by for the northern long-eared bats, (c) Other data from nearby studies, and (d) Maps (e.g., aerials, GIS, Service generated, and others).

A maternity colony typically consists of reproductively active female northern long-eared bats and their young (i.e., typically 1 pup/adult female/year). A maternity colony was determined to exist if there was evidence of reproduction in an area during the summer reproductive season (the capture of a reproductive female or juvenile). Since no telemetry studies have been done for the northern long-eared bat in the Action Area, no roost trees have been identified. Each maternity colony's roosting and foraging area was assumed to fall within a circle with a 1.5-mile radius centered on mist net sites of northern long-eared bat captures. These colonies were developed independently of any Indiana bat maternity colonies. There are 38 northern long-eared bat maternity colonies identified along I-69 by the Service. Section 1 has 2 maternity colonies; Section 2 has 6 maternity colonies; Section 3 has 8 maternity colonies; Section 4 has 9 maternity colonies; Section 5 has 9 maternity colonies; and Section 6 has 4 maternity colonies:

Section 1- Pigeon Creek South, Pigeon Creek North
Section 2 - Robinson South, Patoka South Fork, Robinson North, Flat Creek, East Fork White River, Aikman Creek
Section 3 – Thousand Acre Wood, North Fork Prairie Creek, Smother Creek, White River - Weaver Ditch, White River - Fourmile Creek, First Creek West, First Creek East, Doan's Creek West
Section 4 - Bogard Creek, Doan's Creek East, Black Ankle Creek, Plummer Creek, Mitchell Branch, Little Indian Creek Monroe, Indian Creek South, Indian Creek West, Indian Creek North
Section 5 - Beanblossom East, Beanblossom West, Indian Creek Morgan, Bryant Creek South, Little Indian Monroe, Bryant Creek North, Jordan Creek, Little Indian Creek Morgan, Lambs Creek
Section 6 – Clear Creek East Fork, White River, White River – Goose Creek, Pleasant Run

Detailed information for each maternity colony, including the number of northern long-eared bats captured, number of over-lapping Indiana bat colonies, amount of secured mitigation sites located within or near the colonies, amount of forest and wetland habitat per colony, etc. can be found in the NLEB BA and its appendices and is hereby incorporated by reference.

Because the northern long-eared bat is not yet a listed species, no radio-telemetry studies for this species have been conducted to date by FHWA or INDOT for the I-69 project. Future surveys in Section 5 and Section 6 will include telemetry for northern long-eared bats as part of the bat survey and monitoring practices, however, even with that effort, it would be practically impossible to determine the number of colony members for each of the individual maternity colonies. Based on this, and 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). To be conservative towards the bats, we are assuming that 100% of adult females will successfully bear a live pup and that 100% of the pups will survive to volancy, which is probably higher than reality, but gives the benefit-of-the doubt to the species. The actual reproductive rate of adult females in each maternity colony is unknown as is the current mortality rate of adults and juveniles.

Given the estimated presence of 38 maternity colonies in the SAA and an approximate total of 100 females and their pups per colony, then we can assume that there are a combined total of approximately 3,800 (38 x 100 = 3,800) adult females (n=1,900) and juveniles (n=1,900) within or adjacent to the defined SAA and that variable proportions of the bats in these colonies are likely to be exposed to direct and/or indirect effects from I-69. In this situation, since all of the direct habitat impacts in Sections 1-4 (and the southern portion of Section 5) have already occurred, we estimate that only 13 northern long-eared colonies would incur direct habitat loss as a result of the project.

Adult Males

From 1,548 net nights of effort (2004-2014), 169 male northern long-eared bats were captured in the action area.

Fall/Winter/Spring Cave Surveys

In 2004, INDOT and FHWA developed a database of 330 caves along with 41 new caves and 2 railroad tunnels located within 5 miles of the I-69 corridor. This list was developed with the help of the Indiana Cave Survey, Indiana Karst Conservancy, Indiana Geological Survey, Service and expert bat biologists familiar with the bat biology in southwestern Indiana. These caves were reviewed by the Service, biologists and bat/cave professionals for potential bat survey locations in the I-69 project area.

Two hundred and fifty (250) caves were selected for further field investigation based on their potential as bat hibernacula. Criteria used were: (1) a chimney air flow effect; (2) multiple cave openings; (3) a large volume that stores cool air; (4) constant winter air temperatures from 3° to 6° C; (5) previous records of bats in the database; and (6) the size and diversity needed as a hibernacula.

Based on field reviews of these 250 caves, INDOT and FHWA contracted to have 76 caves surveyed for Indiana bats in the fall, winter and spring of 2004-05 and 2005-06 (Figure 2). The surveys included either harp trapping the entrance of the cave in the fall or spring, and/or completing a winter census (*i.e.*, an internal count of bats in the cave), and included species identification. Of the 76 caves, eleven did not show any bats of any species from the two winter

censuses or any of the fall/spring harp trapping. Of the 65 caves where bats were noted/captured, northern long-eared bats were found in 50 (75%). Two-hundred and seventy-eight of a total 1,030 northern long-eared bats were from Popcorn Spring Cave. Table 3 provides northern long-eared bat harp trapping capture data and winter cave survey data.

In the winter of 2004-05 and 2005-06, a collective census (internal survey) of 73 caves was conducted to determine the species and number of bats utilizing these resources as hibernacula. A total of 3,117 bats representing five species were documented from this effort; northern long-eared bats were observed in eight caves during the winter surveys.

In addition, northern long-eared bats were harp trapped at 49 cave entrances. In the fall of 2004 and 2005 and the spring of 2005, the entrances to 74 caves in Greene, Monroe and Lawrence counties were harp trapped to assess bat usage. Two of the total 76 caves (Green Eye II Pit and Storm's Pit) were not surveyed via harp trap. Fifty-nine caves were harp-trap surveyed in the fall of 2004 resulting in 1,800 bats; 9 caves were surveyed in the spring of 2005 resulting in 330 bats; and 16 caves were surveyed in the fall of 2005 resulting in 468 bats for a total of 2,598 bats.

Species found were the northern long-eared bat (n=1,015), little brown bat (n=955), tri-colored bat (n=607), Indiana bat (n=21) and big brown bat (n=5). Table 3 provides harp trap capture data for the northern long-eared bats at entrances. Northern long-eared bats were captured at 49 caves. Of the 5 species harp trapped at the entrance to the caves, the northern long-eared bat showed the greatest number. All efforts will be made to protect the water quality and integrity of these caves using the Karst MOU dated October 13, 1993.

Data from Local Mines

INDOT and FHWA investigated the use of mines within 5 miles of the I-69 project for Indiana bats and northern long-eared bats. They coordinated with the IDNR Division of Reclamation to obtain GIS data on mines that have had bat gates installed based on their bat occupancy data.

From the GIS data provided, they were able to identify four locations (some locations have more than one mine entrance) that occur within 5 miles of the I-69 right-of-way, all of which were in Pike County.

The data included records of northern long-eared bats at two of the mines, one associated with the Patoka River watershed and one associated with the East Fork White River. The East Fork White River also had records for the Indiana bat. The period of record for this data is 1996 to 1998, and included data from May, June, August, September and early October. There were no other data available. The individuals from the Patoka River mine were all male northern long-eared bats. Both males and females were captured during the September sampling at the East Fork White River site in 1998.

The IDNR Division of Reclamation indicated that their survey efforts no longer include attempts to determine species. Their surveys now focus on a bat presence/absence to determine if gates are warranted. Appendix A of the NLEB BA includes IDNR's data received from the Agency Coordination

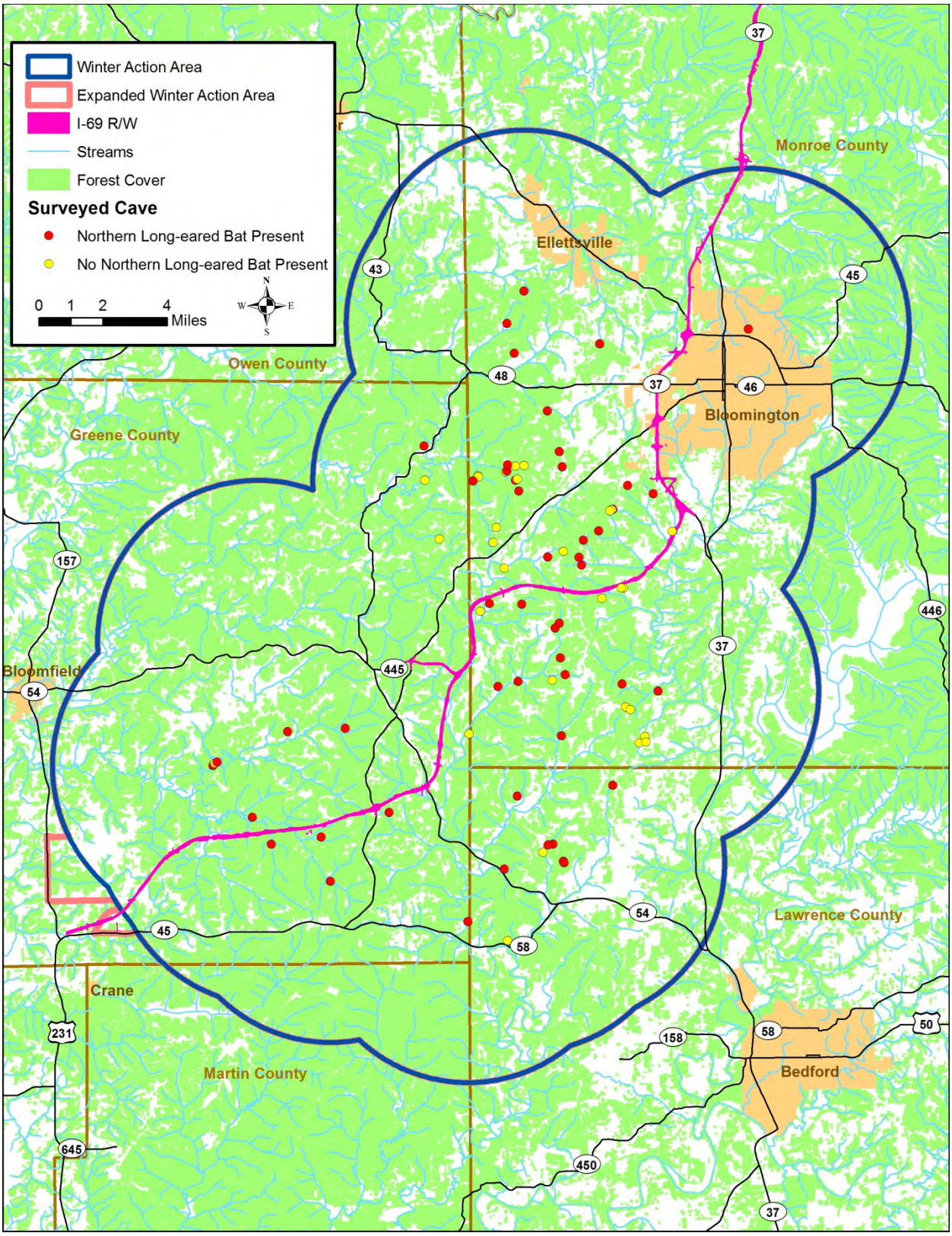

Figure 2. Winter Action Area and Northern Long-eared bat Hibernacula.

Table 3. Summary of Cave Data for the Northern Long-eared Bat						
Cave	**2004 Fall Harptrap**	**2005 Winter Census**	**2005 Spring Harptrap**	**2005 Fall Harptrap**	**2006 Winter Census**	**Cave Totals**
Batey Cave	0	0	0	21	0	21
Briar Sink Cave	3	0	0			3
Blair Springs-Brinegar Cave	13	0				13
Blair Springs-Triple J	78	0				78
Bullfrog Spring Cave	1	0				1
Carmichael Cave	10	0				10
Clifty Creek 1 Cave	1	0				1
Conard Cave				1	0	1
Dead Fox Cave				3	0	3
DuBois' Den Cave	3	0				3
Eller Cave	4	0				4
Galyan Pit Cave				8	0	8
Goad Spring Cave	45	0				45
Gonar Tuna Cave	27	0				27
Goode's Cave	4	0				4
Hollingsworth Cave				9	0	9
Holmes Cave				4	0	4
Hugen Tober Blow Hole	23	0				23
Isom Cave 1	1	0				1
Koontz Pit Cave				4	0	4
Linden Pit	3	0				3
Linthicum Spring Cave	3	0				3
Matlock Cave	8	0				8
May Cave	0	0	3			3
Mayfield Cave				2	1	3
Methane Pit	2	0				2
New Cave 5	0	0	1			1
New Cave 9	55	0				55
New Cave 40				49	0	49
Ozzys Hole Cave				61	0	61
Popcorn Spring Cave	88	1	189			278
Primitive Baptist Spring Cave	3	0				3
Queen Blair Cave	8	1				9
Quimby and Stephen Quarry Cave	1	1				2
Quintet Cave	4	0				4

Table 3. Summary of Cave Data for the Northern Long-eared Bat						
Cave	**2004 Fall Harptrap**	**2005 Winter Census**	**2005 Spring Harptrap**	**2005 Fall Harptrap**	**2006 Winter Census**	**Cave Totals**
Rail Tunnel Cave	0	0				0
Ranard School Cave				17	0	17
Reeves Cave	2					2
Rock East Cave	14		8			22
Rock Springs Cave	45	0				45
Rush To It Cave	41	1		36	0	78
Shirley Springs Cave	5	0				5
Small Dull Cave	4	8				12
Spring Swallow Cave	9	0				9
Storm's Pit		1				1
Sullivan Hill Pit	11	0				11
Thompson North Cave				25	0	25
Thompson South Cave				16	0	16
Truitt Cave	1	1				2
Weaver Cave	35					35
Windy Rock Cave	3	0				3
Total	558	14	201	256	1	1030

Shading indicates no sampling occurred.

The bulk of these data consists of males using these features in summer. It is not atypical for males to use caves or mines in summer. Finding males and non-reproductive females at the mine in the East Fork White River watershed in September is also expected. From the Federal Register, Volume 78, No. 191 under the Summer Section (page 61054), "males and non-reproductive females' summer roost sites may also include cooler locations, including caves and mines" (Barbour and Davis, 1969, p. 77; Amelon and Burhans 2006, p. 72).

Baseline for the SAA, WAA and Maternity Colonies

The direct habitat loss analysis will evaluate the remaining SAA (SAA minus the colony areas), the WAA, and the 13 maternity colonies that are located in the northern portion of the project where tree clearing has not yet occurred. Indirect and cumulative impacts will be evaluated for all 38 maternity colonies, as well as the entire remaining SAA and WAA. According to the NLEB BA, the entire remaining SAA is comprised of 436,284 acres of which 119,219 acres or 27% is forested. The WAA being considered consists of 333,185 total acres of which 207,543 or 62% is forested. Finally, total forest cover within each maternity colony (which contains 4,524 acres) ranged from 313 acres (7% of the colony area) for the Smothers Creek colony in Section 3

to 4,005 acres (89% of the total area) for the Little Indian Monroe colony in Section 4. The current or baseline acreages and conditions of each maternity colony, hibernacula foraging area, and project section is detailed in Tables 17-24 of the NLEB BA and is incorporated by reference. Additional information can also be found in Appendix E and F of the NLEB BA.

Ongoing Stressors in the Action Areas

As was the case for the Indiana bat, the Service believes the following State, local, and private actions are currently occurring within the action areas and are likely to be adversely affecting some percentage of northern long-eared bats to variable degrees, and are likely to continue into the reasonably foreseeable future.

- Loss and degradation of roosting and foraging habitat – variable amounts of private and public, commercial and residential developments are converting, fragmenting, or otherwise degrading forest habitat available for roosting and foraging, especially near larger urban centers and along primary and heavily traveled secondary roadways and their main intersections. Most of the forest within the SAA is privately owned by numerous individuals and entities and some unknown proportion of this habitat may be managed in a manner that degrades the quality or completely eliminates the habitat.
- Commercial and private timber harvesting – Because some private timbering likely occurs on private lands within the SAA while bats are roosting in trees between 1 April and 30 September (15 November in the WAA), some unknown number are exposed to this stressor and may be directly killed, harmed, or displaced as trees are felled in the summer.
- Cutting of Snags - While most primary and many alternate roost trees are dead snags that are ephemeral/short-lived, some small proportion are likely to be cut down before they would naturally fall in order to provide firewood, to improve aesthetics, or to reduce the risk of a dead tree from falling and hurting someone/thing (i.e., hazard tree).
- Degraded water quality – Point and non-point source pollution and contaminants from agricultural, commercial, and residential areas are likely present in waterways within the Action Areas and may reduce aquatic insect biomass that form a portion of the northern long-eared bat prey base and/or have direct or other indirect adverse effects on the bats themselves (e.g., females may have reduced reproduction in heavily contaminated areas). In addition, in areas of karst topography, faulty septic systems can introduce untreated sewage into underground streams and subsequently affect hibernacula.
- Repeated human disturbance of hibernating bats – primarily caused by local and regional organized recreational cavers, spelunkers, and vandals. Most of the 55 hibernacula in the WAA are privately owned caves. Only a few of the caves are currently gated or fenced to prevent unauthorized human visitation.

White Nose Syndrome

No other threat is as severe and immediate for the NLEB as the disease, white-nose syndrome (WNS). 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, WNS has spread rapidly in bat populations from the Northeast to the Midwest and the Southeast. Population numbers of NLEB have declined by 99 percent in the Northeast, which along with Canada, has been considered the core of the species' range. The degree of mortality attributed to WNS in the Midwest is currently undetermined. Although there is uncertainty about how WNS will spread through the remaining portions of the species' range, it is expected to spread throughout the United States. In general, the FWS believes that WNS has reduced the redundancy and resiliency of the species.

According to information from the Indiana Department of Natural Resources, Division of Fish and Wildlife (IDNR, DFW), WNS was first detected in Indiana in January 2011 during routine winter hibernacula surveys conducted by DFW bat biologists. By the end of that first winter, the disease had been found in six caves in Crawford, Monroe and Washington counties. During the next winter, bats exhibiting sign of WNS infection were observed in or reported from 20 additional caves that included six new counties (Greene, Harrison, Jefferson, Lawrence, Martin and Orange). Disease surveillance during the 2012-13 winter resulted in WNS detection from nine more caves that included only one new county (Jennings). Following the 2013-14 winter surveillance, signs of WNS were detected in two additional caves that included one new county (Vermillion). WNS is confirmed or suspected in 37 of 46 caves that have been surveyed in 11 Indiana counties. WNS is widely distributed throughout much of the karst region in south-central Indiana and locally established within most of the state's major concentrations of important bat hibernacula.

Indiana DNR biologists conduct population counts of hibernating bats every other winter. This biennial schedule minimizes disturbance yet still provides important information needed to monitor the status and health of winter bat populations. Since the initial detection of WNS in Indiana in 2011, biologists have obtained estimates of bat populations from 15 caves that have been infected with WNS for at least three winters. In these sites, the total population of all species combined has dropped from about 127,000 bats in the first winter to about 100,000 by the third winter, a decline of approximately 21%. The impact of the disease, however, appears to differ by species. During the same period, biologists tallied the following numbers for Indiana's most common winter bat species:

- little brown bats: 80% decline (from 8,760 in 1st WNS winter to 1,710 in 3rd WNS winter)
- eastern pipistrelles: 45% decline (from 1,040 in 1st WNS winter to 570 in 3rdWNS winter)
- Indiana bats: 16% decline (from 117,600 in 1st WNS winter to 98,400 in 3rd WNS winter)
- big brown bats: 4% increase (from 103 in 1st WNS winter to 107 in 3rd WNS winter)

Counts scheduled for the upcoming 2014-15 winter will provide the first opportunity to evaluate the impact of WNS on bat populations in Indiana's most significant hibernacula, most of which will have been infected for five winters (Indiana DNR website: http://www.in.gov/dnr/fishwild/5404.htm, accessed 9/2/2014).

Unfortunately, due to the northern long-eared bats preference for hibernating in cracks and crevices, hibernacula population estimates are not available for this species.

EFFECTS OF THE ACTION

As previously stated, the proposed action includes construction, operation, and maintenance of an Interstate highway, approximately 142 miles long, connecting Evansville and Indianapolis, Indiana. Approximately 35% of the proposed route is mostly within the footprint of an existing 4-lane highway, SR 37; however, the remaining 65% or approximately 90 miles of interstate has or will be constructed on entirely new right-of-way. The proposed action also involves constructing multiple interchanges (the actual number may change in Tier 2), as well as new local access roads, and improvements to existing roads.

At this time, construction of the roadway has been completed for Sections 1-3 or the first 67 miles. Clearing of trees is completed for Section 4 and the lower third of Section 5 (approximately from Beanblossom Creek south). Construction of the highway in Section 4 is expected to be completed in 2015 and work on Section 6 has not yet begun.

Since construction of the roadway is completed in Sections 1-3 and tree clearing has been completed in Section 4, INDOT and FHWA are not required to complete direct habitat impact analysis for Sections 1-4, but do need to complete indirect and cumulative impacts analysis in Sections 1-4. For Sections 5 and 6, the Service requested direct, indirect and cumulative impact analyses. Because tree clearing has been completed for most of the lower third of Section 5 (up to Beanblossom Creek) and the WAA extends about 1.7 miles further north, the Service requires only direct impact analysis for those locations within the WAA where tree clearing has not been completed.

Impact analysis in this document will be similar, but not exactly the same, as in the Tier 1 BA Addendum of March 2006. The 2006 analysis considered 13 Indiana bat maternity colonies, the remaining SAA that included 2.5 miles on both sides from the centerline for the roadway excluding the maternity colonies, and a circle 5 miles in radius around each of the 16 hibernacula (constituting the Indiana bat WAA) to complete the impact analysis. Analysis for the northern long-eared bat included 38 maternity colonies and the remaining SAA (1.5 miles on both sides from the edge of the right-of-way for the roadway for Sections 1-5, and 1.5 miles on both sides from the centerline of the representative alignment in Section 6). The WAA is defined as a circle 5 miles in radius around each of 55 hibernacula for impact analysis. Both the WAA and the SAA were expanded in areas were indirect development was forecasted to be contiguous with these areas. This information is based on the induced growth expectations within the Traffic Analysis Zones (TAZs).

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

- proximity of the action to known species locations,
- distribution of the disturbances and impacts (in this case a linear corridor),

- timing of the effects in relation to sensitive periods in the species' lifecycle,
- nature of the effects – how the effects of the action may be manifested in elements of a species' lifecycle, population size or variability, or distribution, and how individual animals may be affected,
- duration of effects - short-term, long-term, permanent,
- disturbance frequency - number of events per unit of time, and
- disturbance severity - how long would it take a population to recover?

As was done for the Indiana bat in the original 2003 Tier 1 Biological Opinion, we have deconstructed the I-69 project into its various components and outlined the anticipated direct and indirect impacts and their effects on northern long-eared bats.

Using the same approach as was done for the I-69 project for Indiana bats, we looked at each project activity that may directly or indirectly affect the NLEB and outlined the likely responses of the bats and their local populations to each of these potential stressors. Our primary focus was placed on the 38 maternity colonies in the SAA and the 55 hibernacula in the WAA. We determined which of the project-related stressors was likely to result in take of NLEBs and conducted a detailed incidental take analysis for bats in both the SAA and WAA. The results of our effects and incidental take analyses are summarized in a series of four tables (Tables B1-B4) presented in Appendix B. Due to lack of population data for the 55 hibernacula, detailed take analysis during the hibernation period was not possible for the northern long-eared bat as has been done for the Indiana bat. Please review each of these tables for further information. Only key findings of these effects analyses are discussed in greater detail below.

Stressors

The primary, project-related stressors that we determined NLEBs were likely to be directly or indirectly exposed to that were also likely to cause some level of incidental "take" include:

- I-69 direct impacts/loss of roosting habitat (seasonal cutting restrictions observed so no direct killing anticipated),
- I-69 direct impact/loss of foraging habitat,
- 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 northern long-eared bats are present),
- Construction noise/vibrations causing bats to stress and flee roosts, with increased risk of predation (while bats are present in adjacent areas),
- Disturbance and habitat loss associated with demolition and relocation of homes and businesses (no timing restrictions),
- Habitat loss from I-69 related utility relocations (seasonal cutting restrictions

observed so no direct killing anticipated),

- Additional high-speed traffic and increased speed in action area leading to roadkill,
- I-69 indirect/induced loss of roosting and foraging habitat (no restrictions/bats present)
- Increased levels of disturbance/vandalism of bats in vulnerable hibernacula

Other potential project-related stressors that bats may be exposed to, but are not anticipated to cause incidental take because of their insignificant or discountable effects are listed in Table B1 in Appendix B.

Responses of Exposed Bats to Stressors

With an understanding of how, when, and where NLEBs will be exposed to the proposed action, we then determined whether and in what manner these individuals are likely to respond after being exposed to the proposed action's effects on the environment or directly on the bats themselves. Our analysis followed the same approach as was used in evaluating project impacts on the Indiana bat which entailed identifying the range of possible responses NLEBs could exhibit as a result of being exposed to the project-related stressors (see Table B1 in Appendix B). To ensure a thorough analysis of effects, the range of probable responses, not just the most deleterious, for each exposure pathway were identified. As is true in humans, bats typically demonstrate some degree of individual variability as seen by their range of responses to various stimuli. Therefore, accurately predicting how a generic, individual NLEB may or may not respond to a stressor is an inherently difficult task with little scientific literature available for guidance. Nevertheless, following the same process we used previously for Indiana bats and general biological principles and logic, we identified the following range of responses of individuals and their local populations during or after exposure to project-related stressors:

0. no response
1. startled: increased respiration/heart rate
2. **death/injury of adults and/or offspring**
3. **flees from roost during daylight / ↑predation risk**
4. abandons roost site(s)
5. abandons foraging areas
6. shifts focal roosting and/or foraging areas
7. **↑ energy expenditures / ↓ fitness (short-term)**
8. ↓ energy expenditures / ↑ fitness (long-term)
9. **aborted pregnancy/repro. Failure**
10. **↑torpor, delayed development/parturition, and/or delayed sexual maturation of offspring**
11. **short-term ↓ colony reproductive rate (3-4 seasons)**
12. **short-term ↓ in colony/hibernaculum size (3-4 seasons)**
13. long-term ↑ colony reproductive rate

14. long-term ↑ in colony/hibernaculum size/fitness level
15. **long-term ↓ in colony/hibernaculum size/fitness level**

Response numbers 2, 3, 7, 9, and 10 are in bold because we anticipated that these negative responses are likely to rise to the level of take (as defined in the ESA) of one or more exposed NLEB in the action area. Similarly, responses 11, 12, and 15 are the negative responses to local populations that would result from take of individual bats.

Please see Table B1 in Appendix B, which identifies the specific behavioral and physiological responses of individuals and the demographic responses of local maternity colonies/hibernating populations that we anticipate will occur for each of the project-related activities.

Analysis of Stressors Causing Take of Individual Bats

Loss of Roosting and Foraging Habitat – Tree clearing is only planned to occur in Section 5 and Section 6 at this time. All other sections have already been cleared. In addition, it is likely that the clearing in Section 5 will be finished this winter (2014-2015) prior to the northern long-eared bat being listed. If this happens, then take of the species as a result of loss of roosting and foraging habitat will only be likely for Section 6 of the project. Because potential roost trees within the I-69 footprint will be cleared while bats are absent (between 30 September and 30 March in the SAA and 16 November and 30 March in the WAA), we do not anticipate any direct mortality from the felling of these trees. However, a few individual females from each of the maternity colonies may be taken once they return to their traditional roosting areas the following season and find that their primary or alternate roost tree is gone. Given the locations of the colony areas and the fact that Sections 5 and 6 will consist of upgrading an existing four lane highway, we feel it is unlikely that any primary maternity roost trees will be directly felled during the construction phase of I-69 (Table B3, Appendix B). It is possible that some number of occupied alternate roost trees typically containing far less than 30 bats may be felled and lead to the death or injury of some proportion (but not all) of the bats as a result of I-69 induced growth and/or the relocation of those people displaced by the interstate. We would expect this to be very minimal.

Because maternity colonies and individual male NLEBs commonly shift their use among multiple roost trees it is possible that some unoccupied roost trees will be felled as well. In this case no direct adverse effects or take will occur, but some indirect adverse effects could still stress some bats to the point where take is reasonably certain to occur. For example, it is possible that a few alternate roosts trees being used by one or more of the maternity colonies in Sections 5 and 6 are located within or near some of the proposed interchange areas and as a result a proportion of their alternate roosts (assuming primaries will remain standing) may be felled. Loss of multiple alternate roost trees would cause displaced individuals to expend increased levels of energy while seeking out replacement roost trees. If this increased expenditure occurred during a sensitive period of a bat's reproductive cycle (e.g., pregnancy) it is assumed that spontaneous abortion or other stress-related reproductive delays or losses would be a likely response in some individuals, particularly those that may have already been under other environmental stresses or perhaps stressed by other project-related stressors (e.g., increased noise levels). It has been hypothesized that these stresses and delays in reproduction could also cause

lower fat reserves and ultimately lead to lower winter survival rates (the Service 2002). For example, females that do give live birth may have pups with lower birth weights or their pups may have delayed development *(i.e.*, late into the summer). This could in turn affect the overwinter survival of the young-of-the-year bats if they enter fall migration and winter hibernation periods with inadequate fat reserves.

Because the footprint of this transportation project is primarily linear in shape, occurs partially along an existing four lane highway, and because most of the tree-clearing has already occurred, losses to any one patch or areas of important habitat (e.g., maternity colony area or hibernacula swarming areas) are automatically minimized. For most maternity colonies and hibernacula areas it appears that I-69 will not directly nor indirectly eliminate a significant amount of the existing forest cover, nor will it create any additional permanent barriers to movement among forest patches (see Table B2 in Appendix B).

Private Landowner Clearing in Maternity Colony Areas - One effect of the action that was not contemplated during the original consultation for the Indiana bat 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, this cutting often occurs during the summer maternity period.

In an effort to avoid and minimize this issue, INDOT and FHWA, in coordination with the FWS, have developed a new conservation measure which is now included in the official proposed action for the I-69 project:

> **Avoid and minimize impacts from private landowner harvests within the right of way -** The goal of the measure is to avoid and minimize impacts from private landowner harvests by working with property owners within the right of way who plan to harvest their property. FHWA and INDOT propose to develop an voluntary agreement with the interested landowners, such as a "right of entry" agreement or other type of covenant, to pay the landowner to limit the time of year in which they harvest their property; this time period would be limited to the late fall and winter when Indiana bats are not present in the forested areas.

Fortunately, these potential impacts are less likely to occur in Sections 5 and 6 because much of the proposed alignment falls within existing INDOT right-of-way.

Noise, Tree Felling, and Predation Risk – Most noise generated from project-related construction activities will likely occur during daylight hours when NLEBs are roosting in trees. Unfamiliar noises from the operation of chainsaws, bulldozers, skidders, trucks, etc. could occur in relatively close proximity to occupied primary and alternate roost trees during the summer reproductive season. The novelty of these noises and their relative volume levels will likely dictate the range of responses from individuals or colonies of bats. At low noise levels (or farther distances), bats initially may be startled and have increased respiration/heart rates, but they would likely habituate to the low background noise levels. At closer range and louder noise

levels (particularly if accompanied by physical vibrations from heavy machinery) many bats would probably be startled to the point of fleeing from their day-time roosts and in a few cases may experience increased predation risk. Because the noise levels in construction areas will likely continue for more than a single day the bats roosting within or close to these areas are likely to shift their focal roosting areas further away or may temporarily abandon these roosting areas completely. Callahan (1993) noted that the likely cause of the bats in his study area abandoning a primary roost tree was disturbance from a bulldozer clearing brush adjacent to the tree. Female Indiana bats in Illinois used roosts at least 1640 ft (500 m) from paved roadways (Garner and Gardener 1992). Very low bat usage close to interstates has also been noted by other bat biologists (Whitaker, Jr. per. comm.). Conversely, some Indiana bats did use roosts near the I-70/Indianapolis Airport area, including a primary maternity roost 1,970 ft (0.6 km) south of I-70. This primary maternity roost was not abandoned despite constant noise from the Interstate and airport runways, however; their proximity to the Interstate could also have been due to lack of more suitable roosting areas and furthermore the noise levels from the airport were not novel to the bats, so they had apparently habituated to them (USFWS 2002).

In areas that may experience induced growth or private landowner cutting, we assume that some bats that would be startled by the noise and vibrations coming from a chainsaw would successfully exit their roost trees prior to the tree being felled. Bats that remained in a roost tree and survived the initial felling would likely try to crawl and fly away from the immediate area, but being unaccustomed to flying during the daytime and likely injured or disoriented from the fall, would likely have a relatively high risk of predation from diurnal predators. Bats that successfully flee the disturbance uninjured would not be expected to return to that area and would likely shift their focal roosting (and perhaps foraging) area at least temporarily. We assume that any surviving young that were still nursing and non-volant (i.e. too young to fly) would soon die if their lactating mothers were directly or indirectly killed by a felled roost tree during the middle of the maternity season.

Highway Noise

Highways are linear noise sources in which the tire/pavement contact, engine and exhaust generate sound at various pressures and frequencies. 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 (Tier 2 Section 5 DEIS).

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. The latter may be a factor of available surrounding habitat and habituation over time to the noise. The completion of I-69 will produce new noise levels with the upgrade of the principal arterial road (SR 37), increased traffic on newly opened Sections 1-3, and new traffic on soon-to-be operational Section 4. Since this project involves more of an increase in traffic as opposed to novel traffic noise, we anticipate noise impacts to be minimal.

Roadkill - Roadkill may also result in direct death of maternity colony members (and is likely currently occurring to some extent); the full effect of the take is not anticipated to occur until the entire 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 five of the six sections are already operational to varying extents, we do not expect roadkill deaths to escalate significantly in these areas. Some rise could occur due to overall increased traffic volume and faster moving vehicles, particularly once Section 4 is constructed.

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

Therefore, although it is logical to assume that some roadkill may occur, the amount of roadkill attributable to 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, we estimated roadkill for each colony by starting with the assumption that some proportion of bats in a colony (100/colony) would be exposed to I-69 traffic and had a 5% risk of being hit and killed over the course of a 16 year period (this assumes a fully operational, completed interstate and is a similar method as used for the Indiana bat Section 7 consultation for this project). 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 (*i.e.*, Tier 2 consultation for Section 6). The preferred alternative runs along the outer edge of numerous maternity colonies and likely does not separate large portions of roosting and foraging habitat in these instances, therefore further reducing the likelihood that roadkill is a significant form of take of NLEBs in many colony areas.

We anticipate that bat-auto collisions (*i.e.*, roadkill) on the proposed interstate would be the single largest cause of take to NLEBs within the Summer Action Area (n=55 bats over 16 years) and likely the second leading cause of take in the Winter Action Area (however winter population numbers are not available) (see Table B4 in Appendix B). Because we expect that

the total amount of take will be evenly spread over a projected 16-year period of time, we anticipate that the annual amount of take for any given maternity colony or hibernating population will be insignificant. For example, we have conservatively estimated that portions of each colony of 100 bats, depending on how much of the alignment passes through a given colony, have a 5% chance of take as a result of roadkill over the course of 16 years. This has resulted in an estimated take of no more than 7 bats total every 2 years for all of the 25 colonies through which the roadway traverses, combined. This amount of roadkill is insignificant at the regional or species level.

Increased Risk of Disturbance/Vandalism of Bats in Vulnerable Hibernacula - Because I-69 is anticipated to induce indirect development and thereby increase the human population within the WAA and will provide improved, convenient accessibility to people that live outside the WAA (*e.g.*, via the proposed Greene/Monroe county line interchange), we believe it is reasonable to assume that a small proportion of these "new" people will want to explore the caves in the area and will thereby increase the inherent risk of disturbing hibernating NLEBs within caves that are currently unprotected (*i.e.*, ungated and/or unfenced). In a reasonable worst-case scenario an unauthorized visitor(s) or vandal(s) would enter a hibernaculum and directly or indirectly kill/take (*e.g.*, direct, physical contact with bats is not required for arousal to occur and essential fat reserves to be depleted and subsequently leading to starvation) NLEBs. While this scenario could still occur with or without I-69, we believe that it is more likely to happen with **t**he proposed interstate and interchanges in place (*i.e.*, overall improved accessibility). However, the Service believes it is extremely unlikely (*i.e.*, discountable) that I-69 would cause an increased risk of someone physically altering or vandalizing unprotected caves to the degree that they would no longer remain suitable habitat. Typically, the worst physical alterations to the caves themselves are likely to be an increased prevalence of spray-painted graffiti and trash.

Specific estimates of take as a result of increased risk of disturbance are difficult to make at this time due to a lack of information concerning local cave populations of the NLEB. Fifty-five caves were shown to have some sort of fall/winter/spring NLEB activity based on harp trapping and limited internal cave surveys in the WAA.

Short-term Water Quality Impacts - Water quality affects the bats in the Action Areas in terms of their aquatic insect prey and drinking water sources. In general, the streams in the Action Areas exhibit a wide variety of aquatic habitat types and associated species. The project area has many ephemeral, intermittent and perennial streams with narrow riparian areas that will be crossed by I-69. There is some potential for sediment to move down the ephemeral channels into intermittent and perennial streams after rainfall events. Removal of vegetation during or after grading activities could potentially cause short-term adverse effects on the hydrologic characteristics and water quality in a watershed. A reduction in vegetative cover could potentially increase water yield and stream discharge; changes in vegetation cover could alter normal nutrient cycles in both terrestrial and aquatic systems, and use of temporary access/construction roads and trails during the construction phase could cause soil erosion leading to sedimentation. Potential effects from removal of vegetation and soil disturbance would be temporary. Proposed soil erosion and sediment control measures such as riparian vegetative buffer strips, equipment limitation zones, contouring for drainage control, outsloping

roads, and providing waterbars, mulching, and seeding would be implemented and greatly reduce water quality degradation. Finally, some small potential exists for accidental fuel/oil spills or spills of other hazardous materials from chainsaws and heavy equipment during the pre-grading forest clearing phase and related roadwork, which could degrade the quality of both surface and ground water, but given the degree of project oversight, we believe the odds of a large spill occurring and entering a waterway are discountable. Although water quality could also be adversely affected during a major spill or accident once I-69 is operational, the probability of this is not known.

Risks to Bat Populations in the Action Area

Maternity Colonies – Based upon mist netting efforts during the summers of 2004 and 2005 and monitoring mist netting in 2008-2014 (9 years total effort), it was determined that there are 38 northern long-eared bat maternity colonies and their associated foraging areas within the I-69 SAA. 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 in an area during the summer reproductive season (the capture of a reproductive female or juvenile). Each maternity colony foraging area is a circle with a 1.5-mile radius. The 1.5-mile distance was determined in consultation with the Service. A 1.5-mile distance was also used to determine the width of the SAA by buffering the right-of-way for Sections 1 through 5 and the Representative Alignment for Section 6. Maternity colony foraging area circles were centered on mist net sites of northern long-eared bat capture or centroids from multiple mist net capture locations where such locations were in generally close proximity to each other. The 38 maternity colonies for the northern long-eared bat are shown on Exhibit 3 of the NLEB BA. These maternity colonies were developed by the Service (BFO) using the best data available which included capture data (especially reproductive females and juveniles); following habitat descriptions in scientific publications; and use of existing maps (*e.g.*, USGS, NWI, Soil Survey, aerials, etc.).

The 38 northern long-eared bat maternity colonies have been named after an associated river, stream or notable landscape feature. Because of their position in the landscape, several of the colonies overlap each other. Table 4 lists the 38 colonies by Section and indicates the percentage of area overlap with adjacent colonies.

Table 4 Colony Area Overlap Percentages for I-69 Northern Long-Eared Bat Colonies

Section	Colony	% Overlap	Overlap Colonies
Section 1	Pigeon Creek South	33%	Pigeon Creek North
	Pigeon Creek North	33%	Pigeon Creek South
Section 2	Patoka South Fork	46%	Robinson South, Robinson North, Flat Creek
	Robinson South	43%	Robinson North, Patoka South Fork, Flat Creek
	Robinson North	56%	Robinson South, Patoka South Fork, Flat Creek
	Flat Creek	48%	Robinson North, Patoka South Fork
	East Fork White River	22%	Aikman Creek

	Aikman Creek	22%	East Fork White River
Section 3	Thousand Acre Woods	0%	N/A
	North Fork Prairie Creek	0%	N/A
	Smothers Creek	0%	N/A
	White River - Weaver Ditch	41%	White River - Fourmile Creek
	White River - Fourmile Creek	50%	White River - Weaver Ditch, First Creek West
	First Creek West	10%	White River - Fourmile Creek, First Creek East
	First Creek East	2%	First Creek West
	Doans Creek West	13%	Bogard Creek
Section 4	Bogard Creek	30%	Doans Creek West, Doans Creek East
	Doans Creek East	43%	Bogard Creek, Black Ankle Creek
	Black Ankle Creek	32%	Doans Creek East, Plummer Creek
	Plummer Creek	6%	Black Ankle Creek
	Mitchell Branch	21%	Little Indian Creek Monroe
	Little Indian Creek Monroe	21%	Mitchell Branch
	Indian Creek South	55%	Indian Creek West, Indian Creek North
	Indian Creek West	75%	Indian Creek South, Indian Creek North
	Indian Creek North	44%	Indian Creek West, Indian Creek South
Section 5	Beanblossom East	47%	Beanblossom West
	Beanblossom West	47%	Beanblossom East
	Indian Creek Morgan	13%	Bryant Creek South
	Bryant Creek South	44%	Indian Creek Morgan, Little Indian Monroe
	Little Indian Monroe	36%	Jordan Creek, Bryant Creek
	Bryant Creek North	5%	Little Indian Creek Morgan
	Jordan Creek	4%	Little Indian Monroe
	Little Indian Creek Morgan	5%	Bryant Creek North
	Lambs Creek	0%	N/A
Section 6	Clear Creek East Fork	24%	White River
	White River	24%	Clear Creek East Fork
	White River - Goose Creek	0%	N/A
	Pleasant Run	0%	N/A

For the purposes of this study and using existing published data, the Service considers all maternity colonies of the northern long-eared bat to be comprised of 50 reproductively active adult females and 50 pups. This would result in a maximum of 100 bats per colony once the young are volant. This assumption is based on documented maternity colony sizes throughout the northern long-eared bat's range. Unfortunately, no roost trees were identified and thus no emergence counts to assist in developing the maternity population estimate.

We estimated that during the first 16 years of the I-69 project that a maximum combined total of 90 adult female and juvenile Indiana bats may be taken directly or indirectly by project-related activities (see Table B4 in Appendix B). For perspective, even if all of this take were to occur within a single reproductive season (again this is not anticipated), it would only cause a relatively small decline in the estimated annual local breeding population (90/3800 bats = 2.3% loss) within the Summer Action Area. We anticipate that take of these individuals would likely be spread among many of the 38 maternity colonies, not just a few. Under no likely scenarios, is the estimated amount of loss/take of reproductive individuals likely to cause an appreciable long-term change in viability of an individual maternity colony let alone to the species' regional or range-wide status. At **worst**, only short-term (2 or 3 maternity seasons) reproductive loss and reduction in numbers at a few local maternity colonies is anticipated as a result of the proposed action. In none of the maternity areas is the amount of proposed tree clearing or anticipated induced development believed to be extensive enough to cause a maternity colony to be permanently displaced from its traditional summer range. If however, our suppositions are wrong and these maternity colonies are displaced, there is currently additional suitable habitat available in adjacent areas that they could relocate to with minimal effort (personal observations based upon aerial photo interpretations).

Please refer to Tables B2 – B4 for a comparison of anticipated impacts among the 38 maternity colonies. As indicated in Table B3, **despite the direct and indirect impacts from I-69 and other cumulative impacts, the Service believes that all 38 of the maternity colonies should still be able to persist in their current maternity areas, especially if proposed mitigation efforts are successful.**

In summary, the following effects are anticipated for the 38 maternity colonies within the SAA:

- Habitat loss will be minimal for all colonies: total forest impacts (including direct, indirect, and cumulative) ranged from less than 1 acre for Thousand Acre Woods, North Fork Prairie Creek, Smothers Creek, White River – Weaver Ditch, White River – Fourmile Creek, First Creek East and Bryant Creek North maternity colonies; 1-10 acres for 14 of 38 maternity colonies; 11-20 acres for 9 of 38 maternity colonies; 21-41 acres for 3 of 38 maternity colonies; and 50, 55, 58, 66 and 71 acres for White River, Beanblossom East, Indian Creek Morgan, Clear Creek East Fork and Bryant Creek South. Collectively, the total forest cover impact for the composite maternity colony area of 148,790 acres is estimated at 448 acres or 0.3% - the majority related to cumulative impacts. So, the total amount of forest loss is relatively insignificant for each colony. It is also unlikely that any maternity area would experience a significant long-term decrease in quality of roosting or foraging habitat as a direct result of I-69, particularly since most of the roadway is either already operational or consists of upgrading existing SR 37, a four-lane state highway.
- We anticipate that bat-auto collisions (*i.e.*, roadkill) on the proposed interstate would be the single largest cause of take to NLEBs within the Summer Action Area (n=55 bats over 16 years).
- Seasonal tree-cutting restrictions will ensure no direct impacts/take occurs from this activity during the maternity colony season.

- Primary roost trees are not likely to be destroyed in any of the maternity colonies since the tree-clearing has already happened for Sections 1-4 and Sections 5 and 6 are along existing SR 37 (Appendix B, Table B3); primary roosts trees were not located for any of the NLEB colonies since no telemetry has been done yet for the species in the action area.
- All maternity colonies have additional habitat that is available nearby if some bats should become displaced.
- Forest mitigation within each maternity area will insure suitable roosting and foraging habitat persists in these areas in perpetuity.

Although there may be some short-term impacts to individuals, these impacts are not likely to affect a colony's long-term reproduction and survival. Thus, all NLEB maternity colonies are likely to persist within the SAA following the I-69 project.

Local Populations of Males– Because adult males (and presumably many non-reproductive females) do not participate in the rearing of offspring, they typically lead solitary lives or in some cases gather in small bachelor colonies during the summer. Because these individuals are not burdened with a dependent young they presumably would be more apt to flee from their roost trees than reproductive females would be when faced with a disturbance. Therefore, it is very unlikely that the felling of an occupied roost tree would ever have more than a few adult males in it at any one time and even more unlikely for take of more than one male to occur per event. 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. The potential loss of a relatively small number of male bats will have no measureable or significant impact on the non-breeding NLEB population in the Action Areas or beyond.

Hibernating/Swarming Populations – No direct adverse impacts are anticipated to any of the 55 physical cave structures in the WAA that are thought to serve as NLEB hibernacula. Two caves have known hydrological connections to the Preferred Alternative. They are Goode's Cave and May Cave. Goode's Cave has one known hydrological connection to I-69. Drainage downslope from I-69 in a surface tributary drains through swallet 4-0037 which was dye traced to Goode's Cave. There is potential for accidental spills or releases from the I-69 roadway to affect water in a part of the Goode's Cave stream. The spring at the lower end of Goode's Cave is being monitored with water quality samples during construction. Four NLEBs were harp trapped during the fall of 2004 in Goode's Cave; a winter survey of the cave did not find any NLEBs. The May Cave recharge area was determined with dye tracings as a part of the Section 5 Tier 2 Karst Studies and a portion of the recharge area is located inside the existing SR37 right-of-way over the cave stream. Surface water in this area drains downward toward May Cave and if this water has impaired quality then there is potential for impacts to the cave. There is no known data indicating the thickness of roof rock over the top of May Cave below SR 37. There is potential for structural impacts related to seismic accelerations or extreme changes in groundwater conditions, but no concerns have been documented. May Cave was found to have three NLEBs in the spring of 2005 and none were recorded during the 2004 fall harp trapping nor the 2004-05 winter survey.

Although there does not appear to be a hydrological connection to the right-of-way, Rush To It Cave is in close proximity to the roadway (approximately 1,400 ft). Forty-one NLEBs were harp trapped here in the fall of 2004 and 36 in the spring of 2005. One NLEB was found during the winter cave survey in 2004-05. In addition, Spring Swallow Cave lies down gradient from the roadway; although no known hydrological connections to I-69 exist for these two caves, there is a potential for some to exist.

Popcorn Spring Cave has the most documented use by NLEBs in the action area. Two hundred seventy-eight NLEBs were recorded using the cave during the Fall/Winter/Spring time period. This cave is over 2.5 miles away from the alignment and no direct impacts are anticipated; indirect and cumulative forested habitat impacts are expected to be less than 1%.

These caves will be recognized by FHWA and INDOT as northern long-eared bat hibernacula and receive karst protective measures, as appropriate. Much effort has been taken to protect groundwater resources and cave systems in Sections 4 and 5. FHWA and INDOT have been working with IDNR, IDEM, and the Service in following the Karst MOU dated October 1993 in Section 4 and will continue such coordination and efforts to protect groundwater resources and cave systems in Section 5. Clearing of trees has been completed in these areas of Sections 4 and 5.

Habitat Impacts to WAAs

The direct impact analysis focuses on how the direct transformation of land from its current state to an Interstate and its associated interchanges, frontage roads, access roads, grade separations, and other road improvements impact the foraging areas for each of the proposed hibernacula. Each hibernaculum foraging area is approximately 50,265 acres (79 square miles) in size. Hibernacula foraging areas overlap each other and collectively form the WAA. Impacts for each hibernaculum foraging area cannot be added together to determine a total. Collectively, the total WAA area is 333,185 acres or approximately 521 square miles and also includes a small area at the south end of the hibernacula circles that includes TAZs taken into consideration for the indirect and cumulative analysis.

Direct forest cover impacts within the cave foraging area circles resulting from any remaining interstate construction (Sections 5 and 6) ranged from 0 or less than 1 acre for 46 of 55 hibernacula foraging areas to 17 acres and 38 acres for Mayfield Cave and Matlock Cave, respectively. The remaining 7 caves had 2-3 acres of impact each. Forest cover impacts were 1% or less of the forest cover within the hibernacula foraging areas. Forest core impacts ranged from 0 or <1 acre for 53 of the 55 hibernacula to 3 acres and 4 acres for the Mayfield Cave foraging area and the Matlock Cave foraging area, respectively. Impacts to forest cover and core forest are very small because construction in Section 5 is partially completed and primarily along existing SR 37. The remaining impacts are to the forest edge. Table 24 of the NLEB BA has detailed data for each hibernacula, as well as Appendix F of the NLEB BA.

The bulk of anticipated take to bats residing in the WAA is likely to be caused by unauthorized, human disturbances of hibernating bats in vulnerable hibernacula and roadkill of foraging bats (would primarily occur during the annual swarming period in late summer and fall). It is not

possible at this time to determine the number of bats that may be exposed to these types of incidental take. Although there is information indicating which caves have records of NLEB use, we do not have population data for any of the potential hibernacula. While it is possible that an increase in human vandalism/disturbance and roadkill may occur (in comparison to what is already occurring in the area due to existing SR 37), the anticipated levels of take for these two threats are not likely to significantly impact the regional populations and are not expected to jeopardize the species.

The "Winter Action Area Hibernacula Analysis" chapter and Appendix F of the NLEB BA should be consulted for more detailed information regarding anticipated impacts for each hibernaculum and the WAA as a whole. Specific take numbers were not developed for the various NLEB hibernacula (as was done for the Indiana bat) due to a lack of population data.

The impact WNS may have on the ability of the NLEB to persist and recover is presently unknown. We currently do not have estimates of adult survivorship, juvenile survivorship, or fecundity for NLEB populations affected by WNS. The impact the project will have in light of WNS is also unknown at this time; however, based on what we currently know, WNS is the primary threat to the NLEB and even if all habitat-related stressors were eliminated or minimized, the detrimental impacts of WNS would still occur.

Indirect/Induced Impacts

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

Induced Growth

For the induced growth portion of the indirect (and cumulative) impacts analysis, the Regional Economic Models, Inc. (REMI) model was used during the Tier 1 NEPA process to calculate the projected population and employment changes in each of five economic zones within the I-69 study area for the year 2030. Growth for each region was allocated into Traffic Analysis Zones (TAZs). Changes in land use were calculated for both the No Build and the Build conditions. Population changes (*i.e.*, number of new households) were converted to acreages by multiplying the number of households by a factor of 0.21 to 0.26 acres per household depending upon the region. The acres per household factors were determined by weighting the percentage of single-family dwelling units (3 units per acre) and multi-family dwelling units (7 units per acre) based on differing regional statistics. Employment changes were converted to acreages by multiplying the number of new employees by a factor of 0.05 to 0.065 acres per employee depending upon the region. These factors were developed for each region based on various housing and commercial/industrial development factors. The cumulative impacts are those forecasted to occur without the proposed I-69 construction (No-Build). The indirect impacts are those that would occur solely as a result of the I-69 construction (Build).

A total of 90 acres of induced development impact is predicted to occur within all of the **maternity colony areas** (24 acres are estimated to be forested). Total indirect development for the entire **Remaining SAA** was estimated at 709 acres, of which 123 are forested. The expert land use panel identified TAZs (traffic analysis zones) along the project corridor and near the various proposed interchanges as the probable locations of that induced development (see page 188 and Appendix E of the NLEB BA for more discussion and detailed information about individual maternity colonies and their associated TAZs).

Forest cover impacts resulting from indirect development that fall within the **WAA** were estimated at 99 acres or <1% of the total forest cover available in the area. Forest cover impacts ranged from 0 acres for Carmichael Cave to 46 acres for Mayfield Cave. All forest cover impacts resulting from indirect impacts were 0 or <1% of the total forest cover available to the individual foraging areas. These impacts overlap those in the maternity colony areas and the Remaining SAA and should not be double counted.

The Service gives deference to the "expert land use panel" on the issue of where induced development is most likely to occur. Thus, we anticipate a very small amount of incidental take of NLEBs as a result of induced development in forested areas. The amount of induced/indirect development predicted to occur within each maternity colony area and the remaining SAA is presented in Table 17 and Table 23 of the NLEB BA, respectively, and is considered insignificant and discountable, as is the indirect development predicted in the WAA (see Table 25 of the NLEB BA).

Effects on Habitat Quality

In addition to direct habitat loss, proposed actions may result in a decrease in the quality of remaining habitat within the action areas. 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); decreased foraging habitat over piped or relocated streams; impacts to karst habitat as a result of changes to infiltration and surface water runoff patterns, including introducing contaminants to karst resources; and impacts to water quality as a result of construction activities, road salts, motor oil, and various hazardous materials leaked during traffic accidents. Over time, it is expected that fragmentation of habitat in the Summer and Winter Action Areas will increase as new indirect development occurs. However, as the mitigation plantings mature into suitable NLEB habitat this may be partially compensated.

Noise/Lighting

Increased human disturbance in the project area may affect the quality of summer bat habitat, but these effects are expected to be relatively minor. However, human disturbance within an unprotected NLEB hibernaculum could be severe. Some NLEBs in the action areas that have not previously been exposed to artificial lighting, high noise levels and highway traffic may avoid habitat near I-69, but this will probably only be a relatively minor adverse effect of the project, as a four-lane highway is already operational in 5 of the 6 sections.

Water Quality

During construction, water quality may be temporarily adversely affected in streams (*e.g.*, increased siltation) where NLEBs may drink and presumably obtain a small portion of their insect prey. Water quality impacts that may result from the proposed project include the relocation of stream channels, increased sedimentation as the result of construction activities, and increased runoff (and associated pollutants) from newly constructed roadways. All wooded stream channels that must be relocated will be planted with hardwood seedlings (legal drains may be an exception), which are expected to stabilize the banks; eventually trees are expected to provide shade to the riparian corridor, a source of woody debris to provide in-stream habitat, and NLEB foraging cover. Until these newly relocated channels become established, they will not provide good foraging habitat for bats. Consultation with the FHWA and INDOT will be ongoing to insure that relocated stream channels produce viable aquatic systems. Aquatic communities will be monitored post-construction and remedial actions will be required if established criteria are not met. Erosion control plans will be implemented during all construction activities. Because the bulk of the bats' prey base is made up of terrestrially based insects (Feldhammer et al. 2009; Brack and Whitaker 2001), short and/or long-term adverse effects to local water quality are not likely to rise to a level where incidental take of NLEBs is reasonably certain to occur.

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 (including karst), and to design bridges with no or minimal in-span drains and to direct bridge runoff away from streams and rivers.

Karst

Karst habitat is a non-renewable resource that is biologically important because it provides habitat for a number of rare, threatened, and endangered species that depend on caves to different degrees. Many species of bats, including the NLEB, use caves in karst areas within the WAA of I-69. Some anticipated karst impacts may include: sediment-laden run-off to sinking streams, cave recharge areas, or sinkholes; filling in sinkholes or reopening buried sinks; collapse and exposure of karst conduits; and blocked spring outlets and recharge pathways. Drainage patterns could be altered either increasing or decreasing typical flow patterns.

FHWA and INDOT have been working with IDNR, IDEM, and the Service in following the Karst MOU dated October 1993 and will continue such coordination and efforts to protect groundwater resources and cave systems. Karst features in the project are solely in Sections 4 and 5. Impacts to specific karst features have been and will continue to be addressed via consideration of alternative drainage and other appropriate mitigation features during final design. Such treatment measures include peat and sand filters, gravel filters, vegetated buffers, and lined spill or run-off containment structures.

Effects of Avoidance, Minimization and Mitigation Measures

Forest Mitigation

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 2006 Tier 1 BA Addendum) and the recently revised **Conservation Measures** (page 9 of the NLEB BA), which has been updated to include the NLEB. This information is incorporated by reference.

During the Tier 1 and Tier 2 consultations for the Indiana bat, the FHWA and INDOT committed to mitigate for the permanent and unavoidable loss of forests (3:1 ratio) and wetlands (ratios vary) within the action areas by purchasing existing habitat, and/or creating, restoring, and enhancing habitat. Due to similarities in the two species, we believe these mitigation properties will also benefit the NLEB and help to mitigate and minimize project impacts on this species.

Based on estimates of total project impacts, the mitigation acreage could total up to approximately 6,400 acres. The actual mitigation acreage will be determined based on impact acres and the committed ratios which could provide higher or lower mitigation acres than the amounts estimated in the NLEB BA. To date, 50 mitigation properties in Sections 1-4 (totaling over 5,500 acres) have been purchased. Another 25 properties in Section 5 are currently being pursued. Some mitigation areas will be planted with a mixture of native hardwood seedlings and all sites will be protected in perpetuity. The goal of the plantings will be to enhance Indiana bat and NLEB habitat in the long term by providing forested habitat, improving connectivity among blocks of existing habitat, and creating larger blocks of forested bat habitat. The specific sites proposed for plantings will also be located to improve the connectivity of forested habitat within the range of maternity colonies that would be adversely affected by I-69. Improved connectivity of habitat between roosting and foraging areas is expected to improve habitat conditions for both NLEBs and Indiana bats. Permanently protected plantings along stream corridors will also benefit water quality in the long term, as the plantings will provide a vegetated buffer that will reduce runoff, and associated sedimentation, from adjoining roadways, commercial/industrial developments, and agricultural areas. In the long term, mitigation plantings will provide a diverse woodland that is well stocked with species of trees that are known to provide NLEB and Indiana bat roosting habitat. Plantings will be monitored to insure that at least 80% of the initial planting survives; if survival is below 80% five years after planting, then remedial measures will be taken. There will be no manipulation of vegetation (e.g., mowing, timber harvest, timber stand improvement, firewood collecting) in these mitigation areas without consultation with the Service's BFO. In addition, four Indiana bat hibernacula have been purchased and protected, three of which are known to be used by NLEBs in the winter. A fourth cave known to have NLEB use in the winter has also been purchased. A deed restriction or conservation easement will be recorded for the properties and will provide permanent protection. Details of specific mitigation projects are described in the NLEB BA starting on page 48.

An extensive monitoring and research program is also proposed by the FHWA and INDOT. Therefore, the NLEB colonies discovered in the action area will be studied and monitored the

summer prior to and at least 5 summers post-construction, beginning with the first summer following the start of construction (radio-tracking for the NLEB will apply to the colonies in Section 5 and Section 6 since tree clearing activities and construction have already occurred in Sections 1-4). The details of the proposed monitoring plan will be developed in consultation with the Service. The environmental benefits of these sites will be significant and will continue to increase as the sites mature.

The FHWA and INDOT will also work with the Service's BFO to design an educational poster and interpretive displays about the NLEB.

Wetland Mitigation

Mitigation plans to offset unavoidable wetland impacts will comply with INDOT's MOU (1991) as noted during Tier 1. The overall I-69 project proposes wetland replacement at a ratio of 3:1 or 4:1 depending on quality for forested wetland impacts. A ratio of 2:1 or 3:1 for Scrub/Shrub wetland impacts and emergent wetland impacts will be replaced, depending upon their quality. Impacts to open water are proposed to be mitigated at a ratio of 1:1 and may be mitigated using borrow pits.

Landowner Coordination

In an effort to avoid and minimize impacts to Indiana bats, and now NLEBs, and their habitat as a result of private landowner clearing within and adjacent to the I-69 right of way, INDOT and FHWA, in coordination with the FWS, have 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 November 15-March 31 timeframe within the WAA and 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 NLEBs and Indiana bats are not present in the action area. These offers will be made on a case by case basis in coordination with the Service's Bloomington, Indiana Field Office.

Impacts Summary

In summary, the following effects on NLEBs in the action areas are anticipated:

- Direct habitat modification/loss will occur, but will be minimal with a direct forest cover loss within the maternity colony areas totaling 211 acres. Per colony, these impacts range from 0 acres (28 maternity colonies in Sections 1 through 4 and 3 maternity colonies in Section 5) to as high as 64 acres for the Bryant Creek South colony in Section 5. Forest cover loss ranged from 0 % to 1.6% of the forest cover within the maternity colony foraging areas. 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 Sections 5 and 6 consist of upgrading of an existing four-lane facility.

- Direct forest loss within the Remaining SAA (the area outside of the maternity colony areas) is estimated to be 275 acres, or 0.2% of the available forest.
- 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, as well as utilities that are coordinated with them.
- 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 estimated maternity colonies. Given the capture location of the bats and the location of the I-69 alignment, 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 Sections 5 and 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 the roadway is fully operational is anticipated on I-69 and other local roadways when traffic volume and speed increases. We anticipate no more than approximately 7 bats total every 2 years for all of the 25 colonies through which the roadway traverses, combined. Some road-kill may be offset as traffic on local roads decreases and shifts to the new interstate. Since Sections 1-3 are already in operation, and 5 and 6 consist of upgrading an existing four-lane state highway, impacts of this project to NLEBs from vehicular collision are anticipated to be less than typical new terrain roadways and these estimates are likely conservative.
- The maternity colonies and individual adult males have access to ample 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 5 and 6 interchanges (e.g. Liberty Church 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 and hibernacula areas will ensure that over 5,500 acres of suitable roosting and foraging habitat persists in perpetuity, in addition to the permanent protection of several hibernacula known to support NLEBs during the non-maternity season.
- Long term reproduction and viability are not expected to be impacted by the project and all maternity colonies and hibernacula are likely to persist in the area.

Although there may be some short-term impacts to individuals within the colonies, these impacts are not likely to affect the colonies' long-term reproduction and viability. Thus, the maternity colonies are likely to persist within the action area into the reasonably foreseeable future following construction, operation, and maintenance of the I-69 project. Furthermore, with successful implementation and maturation of the proposed mitigation projects, permanent protection of several hibernacula, 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 in Appendix B deconstructs the Proposed Action and summarizes the anticipated direct and indirect environmental consequences and likely responses of exposed NLEBs.

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).

Reasonably foreseeable non-federal activities that are anticipated to occur within both the Summer and Winter Action Areas for the NLEB are planned development for residential subdivisions and commercial properties, legal drain maintenance, and timber harvest.

Regional Growth and Development

As previously mentioned, the Regional Economic Models, Inc. (REMI) model was used during the Tier 1 NEPA process to calculate the projected population and employment changes in each of five economic zones within the I-69 study area for the year 2030. Growth for each region was allocated into Traffic Analysis Zones (TAZs). Expert land use panels reviewed the REMI model results and either concurred with model results, or suggested adjustments based on their expectations of development. These panels consisted of developers, local city and county

planning staff, and economic development personnel. Changes in land use were calculated for both the No Build and the Build conditions. The cumulative impacts are those forecasted to occur without the proposed I-69 construction (No-Build).

Cumulative forest cover impacts due to cumulative development ranged from 0 acres for Thousand Acre Woods, North Fork Prairie Creek, Smothers Creek, and White River – Weaver Ditch maternity colonies; <1-10 acres for 22 of the 38 maternity colonies; 11- 20 acres for 10 of the 38 maternity colonies; and 22 and 27 acres for Flat Creek and Beanblossom East maternity colonies respectively. All forest cover impacts resulting from cumulative impacts were less than or equal to 2% of the total forest cover available within the individual foraging areas. The majority were under 1%.

Forest cover impacts resulting from cumulative development for the entire WAA were estimated at 2,693 acres or 1% of the total forest cover available in the area. Forest cover impacts ranged from 26 acres for Bullfrog Spring Cave to 1,566 acres and 1,581 acres for the Matlock Cave foraging area and the Mayfield Cave foraging area, respectively. All forest cover impacts resulting from cumulative impacts ranged from <1% to 7% of the total forest cover available to the individual foraging areas. These impacts overlap most of the cumulative impacts discussed for the SAA and are not in addition to those described above.

There are numerous planned residential subdivisions in the Action Areas. Based on information from the Tier 1 Revised Programmatic BO for the Indiana bat, in 2006 there were approximately 100 plus planned and currently expanding subdivisions still being built within the Action Areas. The bulk of these developments are located in the northern portion of the Action Area just south of Indianapolis, in non-forested areas along SR 37.

In the Wabash Lowland Region (i.e., Vanderburgh, Warrick, Pike, Gibson and Daviess counties), forests were for the most part comprised of woodlots surrounded by farm fields. In addition, many of these are forested wetlands and/or in flood prone areas. The majority of the few subdivisions recorded were developed upon previously cleared lands, not forestlands.

In the heavily forested counties of Greene, Monroe, and Morgan, subdivisions were for the most part in developed lands with some exceptions. The major exceptions include the proposed Clifty Hills and Blue Ridge Estates in eastern Greene County and the Stonebridge Club along SR 37 in Morgan County. The development of such properties could potentially take many acres of forest. Other smaller planned subdivisions in Greene County are Lawrence Hollow Estates, Deer Lake, and Green Hills Estates South. These three subdivisions would take much less forested acres.

Monroe County and Morgan County have a number of subdivisions planned; however, many of these are near SR 37 in open lands surrounding the city of Bloomington. Examples of planned subdivisions in Monroe County are Farmers Field Acres, Rolling Glen Estates, Harrell Road Subdivision, and Orchard Estates in the vicinity of Hindustan. In Morgan County, a few examples of planned subdivisions are Turkey Knob, Country Club Woods, The Oaks and the Stonebridge Club. Most of the subdivisions located within the Action Areas take marginal acres of forestland.

Most of the planned subdivisions in the northern portion of the Action Area were found in open lands of the Tipton Till Plain within Marion County and Johnson County. Some examples of planned subdivisions in Marion County are Willingshire Community, Bluffs Subdivision, Bayberry Village, Silver Springs Subdivision, Governor's Pointe Subdivision, Ridgehill Trail Subdivision, and Thompson Meadows Subdivision. Examples in Johnson County are Shadowood, Woods at Somerset, Manor at Somerset, Persimmon Woods, and Northridge. Many of these subdivisions were located around existing subdivisions in the area and are part of the Indianapolis metropolitan area.

Legal Drains

In addition to indirect impacts generated by the REMI model, impacts to forest cover from possible legal drain dredging were estimated and added to the model-based cumulative impacts. These impacts could potentially occur regardless of the I-69 construction. Legal drains are those streams legally maintained by the county or maintained through privately funded groups and were identified through coordination with county engineers or representative director of Drainage Boards, Ditches and Levees for the various counties. The cumulative impacts to forest cover associated with the maintenance (*i.e.*, clearing of trees along streams) of legal drains was assessed by determining which legal drains support riparian tree habitat and estimating how much of it would likely be cleared in the next 20 years. Coordination with the county engineers and drainage board directors suggested that generally 1-2% of the legal drains have their forests cleared in 20 years. For this assessment a more liberal estimate of 5% clearing of forest cover along legal drains over the next 20 years was used to determine the legal drain maintenance forest loss component of the cumulative impact. This percentage was applied equally to all forest covered legal drains in each county. FHWA and INDOT concur that this approach is reasonable. Agricultural land impacts from legal drain maintenance were not included because they are temporary and land will likely remain in agricultural use. Legal drain maintenance impacts can be found in Appendix E and listed as part of the Cumulative Impacts in Table 19 of the NLEB BA.

Legal drains occur in the following 15 northern long-eared bat maternity colonies in order from south to north: Pigeon Creek South, Pigeon Creek North, Patoka South Fork, Robinson South, Robinson North, Flat Creek, East Fork White River, Aikman Creek, Thousand Acres Woods, North Fork Prairie Creek, Smothers Creek, White River - Weaver Ditch, White River – Fourmile Creek, Lambs Creek and Pleasant Run. For these colonies, forest cover impacts from potential legal drain maintenance make up the majority of the cumulative impacts to forest cover. Collectively, 49 acres of forest cover loss is estimated due to legal drain maintenance over the next 20 years.

The cumulative forest cover impacts (legal drain forest loss and REMI model cumulative loss) for all of the maternity colony areas are estimated at 213 acres.

Timber harvest

In the Tier 1 FEIS Cumulative Impacts (Chapter 5.26), it was found that the long-term pattern in Indiana forest loss, which began at least in 1800, began to level off in 1950. Appendix G of the Tier 1 FEIS shows that based on USDA data, forested acreages in southwestern Indiana have

increased or remained relatively constant from 1950 (1,904,000 acres) to 1998 (2,026,500). The 38 maternity colonies are located primarily in Gibson, Pike, Daviess, Greene, Monroe, Morgan, and Johnson counties. From 1950 to 2013, forest acreage within the I-69 counties (Gibson, Pike, Daviess, Greene, Monroe, Morgan and Johnson) gradually increased from 461,000 acres to 550,896 acres (see Table 18 of the NLEB BA). Changing land management practices are contributing to this trend of increased forestation as some cropland and pasture are allowed to revert to forest and existing narrow wooded strips are allowed to expand. The increase in forested areas due to these changing practices has been greater than the losses from the conversion of forests to agriculture, urban/suburban expansion, and other uses in the past 50 years.

The following Indiana forest trends were highlighted within the North Central Research Station's 2005 report, "Indiana Forests: 1999-2003, Part A". A more recent report by the United States Forest Service entitled "Indiana's Forests 2008" confirms the trends listed below are still valid at the time of publishing (2011). Trends that we believe may be of a net benefit to NLEBs 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 forested land across the state.

Timbering appears to be limited and sporadic in the Action Areas. Observations throughout many years indicate that cutting is for the most part selective and that much of the timber in the area is second growth indicating past activities. Classified forests are common and many in the Action Areas and allow for the management of timber, especially selective cutting.

VI. CONCLUSION

Our non-jeopardy conclusions regarding impacts to the eastern fanshell mussel (*Cyprogenia stegaria*) and the Indiana bat (*Myotis sodalis*) still stand as stated in the original December 3, 2003 BO and the amended 2006 Revised Programmatic BO, respectively. In addition, all previous Tier 2 Biological Opinions for these species remain valid.

After reviewing the current status of the NLEB, the environmental baseline for the action areas, the aggregate effects of the proposed construction, operation, and maintenance of the interstate and associated development, and the cumulative effects, **it is the Service's conference opinion that the I-69 interstate project, from Evansville to Indianapolis, as proposed, is not likely to jeopardize the continued existence of the northern long-eared bat (M*yotis septentrionalis*). No Critical Habitat has been designated for this species.**

Our basis for this conclusion follows:

- Because construction of I-69 in Sections 1-3 is completed, Section 4 (and part of 5) is already cleared, and Sections 5 and 6 consist primarily of upgrading an existing four-lane facility, we believe impacts to the existing colonies should be minimal. Much of the tree-clearing work in Sections 5 and 6 will be performed within existing right of way and any colonies in this area have co-existed with the current roadway.
- 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 of clearing, should avoid and minimize impacts to 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 NLEBs may be taken during the summer maternity season as a result of road-kill (no more than approximately 7 bats total every 2 years for all of the 25 colonies through which the roadway traverses, combined). Some small amount of males during the summer may be taken, as well as some bats in the WAA during the fall, winter and spring. We anticipate these numbers to be insignificant.
- Based on an abundance of surrounding forested habitat, we do not anticipate that any of the 38 maternity colonies will be permanently displaced by direct or indirect effects associated with the construction, operation, and maintenance of the I-69 project.

- The currently proposed 5,528 acres of forest mitigation (including landlocked parcels) and nearly 240 acres of wetland mitigation has been strategically located to improve upon the existing high-quality habitat within and near the various NLEB and Indiana bat maternity colony areas and hibernacula; 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 of the commitment to restore and permanently protect thousands of acres of forest and wetland habitat, the maternity colonies within the project action area 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 NLEBs nor the species within its entire range due to the proposed project.
- A permanent conservation easement has recently been placed on the third and fourth largest Indiana bat hibernacula in the state (Coon and Grotto Caves), which is also known to be used by the NLEB; protection of these hibernacula and several others will be very important for the long term protection and recovery of myotids. Specifically, permanent protection of local hibernaculum will reduce the estimated take due to vandalism and human disturbance. Furthermore, permanent protection of the caves and their surrounding forests will provide long-lasting protection for essential fall swarming habitat for bats that use these caves and eliminate future possibilities for these properties to be developed.

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 northern long-eared bat by reducing the reproduction, numbers, or distribution of the northern long-eared bat (50 CFR 402)." For the proposed action to "reduce appreciably" the NLEBs survival and recovery, the proposed action would have to impede or stop the process by which the NLEB's ecosystems are restored and/or threats to the NLEB 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 NLEB bat because:

> We believe that the proposed roadway construction, operations, and maintenance, while potentially resulting in the incidental take of some individuals, are not a significant threat to the species in the Midwest population, nor the 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 northern long-eared bat.

This concludes the conference for the northern long-eared bat on the I-69 Evansville to Indianapolis, Indiana Interstate project. Based on the timing of the completion of this conference opinion and the effective listing date of May 4, 2015, this conference opinion will automatically be adopted as a biological opinion upon the listing date and no further section 7 consultation will be necessary. The incidental take statement provided in this conference opinion will become

effective once the species is listed and the conference opinion is adopted as the biological opinion issued through formal consultation.

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

INCIDENTAL TAKE STATEMENT

Section 9 of the Act and Federal regulation pursuant to section 4(d) of the Act prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or to attempt to engage in any such conduct. Harm is further defined by 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)].

The prohibitions against taking the species found in Section 9 of the Act do not apply until the species is listed. However, the Service advises the FHWA to consider implementing the following reasonable and prudent measures. If this conference opinion is adopted as a biological opinion following a listing or designation, these measures, with their implementing terms and conditions, will be non-discretionary.

AMOUNT OR EXTENT OF TAKE

The Service believes it is likely that incidental take of northern long-eared bats in the I-69 action area 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 the action area, primarily in Sections 5 and 6 where tree clearing activities are still ongoing,
- Harass/wound/kill/harm from disturbance and habitat loss associated w/demolition and subsequent relocation of homes and businesses in the action area,
- 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.*, road-kill) 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 (most likely to occur in Section 4 where new terrain construction is underway, as well as Sections 5 and 6).

Based on our analysis, the Service believes 38 northern long-eared bat 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 road-kill. Although very difficult to predict, we estimated the maximum amount of I-69 related incidental take for all 38 maternity colonies combined from all sources within the Action Area to be no more than 90 individuals (55 from road-kill, 20 from noise/vibration during construction, and an additional 15 adult females/juveniles as a result of habitat loss/modification and/or disturbance) during the next 16 years of construction and operation (approximately 2014-2030). Additionally, we expect a small, unknown number of male bats to be taken during the summer months, primarily as a result of road-kill. 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 also possible that some small amount of take could occur during the fall, winter, and spring time period as a result of roadkill, habitat loss (this amount is very low), disturbance during hibernation (construction noise and vibrations), and increased human visitation to area caves. The number of northern long-eared bats using the various hibernacula is not known at this time, but we expect the number of bats affected to be insignificant and discountable.

It is unlikely that direct mortality of small-sized bats from road-kill 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, because it is not practical to quantify take of northern long-eared bats at the individual level, 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 direct loss of up to 486 forested acres in the I-69 project action area. 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 re-initiation has been met. The specified level of habitat modification which triggers re-initiation is defined as exceeding the anticipated project-wide 486, section-specific, or hibernacula-specific habitat acreages or annual number of roadkilled bats by more than 10%. Furthermore, the FHWA will keep track of any known northern long-eared bat road-kills to ensure that the anticipated amount of incidental take is not exceeded.

The anticipated level of adverse impacts to northern long-eared bat forested habitat includes impacts planned to take place this winter in Section 5. It is expected that these impacts will occur prior to the species being listed, in which case the actual amount of take will be reduced from the current estimates by the time this conference opinion is adopted as a biological opinion. If the remainder of Section 5 is cleared this winter (172 acres), then the estimated forested habitat loss

for the species once it is listed will be approximately 314 acres (the amount of estimated clearing in the final section, Section 6).

Anticipated direct forest acreage impacts for the remaining I69 construction in Sections 5 and 6:

Section 5 (if not cleared in 2015)	**Section 6**
172 acres	314 acres

Anticipated direct forest impacts to presumed NLEB hibernacula:

Hibernacula	**Acres of forest**
Batey Cave	0
Briar Sink Cave	<1
Blair Springs-Brinegar Cave	<1
Blair Springs-Triple J	2
Buckner Cave	<1
Bullfrog Spring Cave	0
Carmichael Cave	0
Clifty Creek 1 Cave	0
Conard Cave	2
Coon Cave	<1
DuBois' Den Cave	0
Eller Cave	2
Galyan Pit Cave	0
Goad Spring Cave	0
Gonar Tuna Cave	0
Goode's Cave	0
Grotto	<1
Hollingsworth Cave	0
Holmes Cave	<1
Hugen Tober Blow Hole	0
Isom Cave 1	2
Koontz Pit Cave	<1
Leonard Spring Cave	<1
Linden Pit	0
Linthicum Spring Cave	0
Matlock Cave	38
May Cave	3
Mayfield Cave	17
Methane Pit	0
New Cave 5	<1
New Cave 9	0
New Cave 40	0
Ozzys Hole Cave	0
Popcorn Spring Cave	0

Primitive Baptist Spring Cave	0
Queen Blair Cave	<1
Quimby and Stephen Quarry Cave	0
Quintet Cave	0
Ranard School Cave	0
Rays Cave	0
Reeves Cave	<1
Rock East Cave	0
Rock Springs Cave	0
Rush To It Cave	0
Sexton Springs Cave	0
Shirley Springs Cave	3
Small Dull Cave	0
Spring Swallow Cave	0
Sullivan Cave	0
Sullivan Hill Pit	0
Thompson North Cave	0
Thompson South Cave	0
Truitt Cave	3
Weaver Cave	0
Windy Rock Cave	<1

EFFECT OF THE TAKE

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

REASONABLE AND PRUDENT MEASURES

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

1. In the NLEB BA, the FHWA proposed to investigate and/or implement numerous conservation measures and mitigation efforts as part of their proposed action and these measures are hereby incorporated by reference. These measures will benefit a variety of wildlife species, including northern long-eared bats. The Service will take the necessary steps to ensure that the FHWA successfully implements all the conservation measures to the fullest extent practicable.

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.

3. All I-69 construction personnel and INDOT maintenance staff need to be made aware of potential issues concerning northern long-eared bats and construction and maintenance of I-69.

4. The FHWA needs to ensure that the impacts of take associated with future Tier 2 section-specific actions (i.e. Section 6) are appropriately minimized and that the exemption of incidental take is appropriately documented and anticipated levels of incidental take will not be exceeded nor will any new forms of take occur that were not anticipated in the CO.

5. The FHWA will avoid direct take of roosting northern long-eared bats, including as a result of building relocations and demolitions, and bridge work in the action area.

The Service believes that the measures above are necessary, appropriate, and reasonable for minimizing take of northern long-eared bats.

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 terms and conditions, which implement the reasonable and prudent measures. These terms and conditions are non-discretionary.

1. The FHWA must implement all proposed mitigation and conservation measures, as detailed in the revised "Tier 1 Forest and Wetland Mitigation and Enhancement Plan" and "Conservation Measures for Impacts to Threatened and Endangered Species" sections of the 2006 Tier 1 BA Addendum, as updated for the northern long-eared bat (see page 7 of the NLEB BA) or alternative measures that are of equal or greater benefit to northern long-eared bats as developed in consultation with the Service during Tier 2.

2. FHWA will prepare an annual report detailing all conservation measures, mitigation efforts, and monitoring that have been initiated, are ongoing, or completed during the previous calendar year and the current status of those yet to be completed. The report will be submitted to the Service's BFO by 31 January each year (the first report will be due 1/31/16) and reporting will continue for at least 5 years post-construction or until otherwise agreed to with the Service.

   If proposed conservation measures or mitigation goals cannot be realized (e.g., lack of willing-sellers), then FHWA will investigate and propose alternative solutions that can be realized and are of equal or greater benefit to northern long-eared bats within the Summer and Winter Action Areas.

3. All I-69 engineering supervisors, equipment operators, and other construction personnel and INDOT (and/or concessionaire) maintenance staff will attend a mandatory environmental awareness training that discloses where known sensitive northern long-eared bat sites are located in the project area, addresses any other concerns regarding northern long-eared bats, and presents a protocol for reporting the presence of any live,

injured, or dead bats observed or found within or near the construction limits or right-of-way during construction, operation, and maintenance of I-69.

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

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

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

7. To ensure that the impacts of take associated with future Tier 2 section-specific actions are appropriately minimized and that the exemption of incidental take is appropriately documented, the FHWA and the U.S. Fish and Wildlife Service have implemented a tiered consultation approach for I-69. Under this approach, the Tier 1 Revised Programmatic Biological Opinion and Incidental Take Statement (of which the accompanying NLEB Conference Opinion and Incidental Take Statement are an addendum of) will exempt incidental take that results from the implementation of site-specific actions of the proposed action as detailed in the NLEB BA. This exemption of incidental take shall currently apply to the Tier 2 Sections in operation or actively under construction (i.e. Sections 1, 2, 3, 4 and 5) as long as the impacts remain consistent with those presented in the NLEB BA and the Terms and Conditions of this Conference Opinion. This exemption will continue to apply unless there is a change that would require reinitiation (i.e. new information becomes available or a substantial project change occurs that would exceed the habitat impact or incidental take allowance). However, specific impacts within the future Section 6 Tier 2 project must be individually reviewed by the Service to determine if they are consistent with this Incidental Take Statement's reasonable and prudent measures and associated terms and conditions, and to ensure that site-specific impacts and the resulting incidental take are minimized. If effects of the individual Section 6 Tier 2 project are found to be consistent with those analyzed in the Section 7 consultation and this conference, then it will be approved in a Tier 2 Biological Opinion and Incidental Take Statement, along with any additional section-specific reasonable and prudent measures and terms and conditions that are needed to fulfill the requirements of section 7(a)(2). No incidental take for Section 6 shall be exempted until after the Section 6 Tier 2 BA has been reviewed, found

to be complete and consistent with Tier 1 findings, and has been approved in a Section 6 Tier 2 BO by the Service.

Because acreages of lost northern long-eared bat habitat are being used as a surrogate to monitor levels of incidental take within the entire Summer and Winter Action Areas, as well as within each Tier 2 project section and 5-mile radius around each known hibernaculum, the FHWA will provide the Service's Bloomington Field Office with a detailed description of each project section's contribution to habitat loss by preparing a Tier 2 Biological Assessment for each project section (this has already been done for Sections 1, 2, 3, 4 and 5). The Tier 2 Biological Assessments must include (where applicable): maps of the preferred final alignment and all associated development; methods and results of Tier 2 mist net surveys, radio-tracking studies, roost tree emergence counts, and hibernacula surveys; exact locations of all known and newly discovered northern long-eared bat roost trees and hibernacula (hibernacula location maps must identify known hydrologically connected surface streams and sinkholes and their drainage basins and delineate approximate boundaries of potential recharge areas for each hibernaculum within the WAA in relation to I-69's direct and indirect impacts as identified during Tier 2 and previous studies); the total acreages and relative quality of forest (e.g., maturity of forest/estimated dbh of live canopy trees and estimated suitability for roosting/estimated number and dbh of snags) and wetland habitats that will be directly impacted and permanently cleared/filled; and all other anticipated project section-specific impacts. Tier 2 BAs must also describe any additional direct or indirect effects that were not considered during the Tier 1 programmatic-level consultation and conferencing. To reduce redundancy, Tier 2 BAs should summarize or simply reference sections of the Tier 1 BAs that would otherwise be repetitive.

The Tier 2 BA must quantify how the individual Tier 2 Section's direct impact acres contribute to the estimated section-specific and hibernacula-specific acres as well as to the project-wide forest acres (486 acres of forest impact estimated for the NLEB) as specified in the AMOUNT OR EXTENT OF TAKE section above. The Tier 2 BA should also report how much total acreage remains for the overall I-69 project and within each project section in the SAA and hibernacula in the WAA (*i.e.*, provide the running totals and the remaining balances for these exempted levels of take).

FHWA's cover letters requesting section-specific ESA Section 7 reviews must include a determination of whether or not the proposed project is consistent with the Programmatic Biological Opinion and Incidental Take Statement (and accompanying NLEB Conference Opinion and Incidental Take Statement) and request that the proposed Tier 2 BA be appended to the Programmatic Biological Opinion. The cover letter, and one bound hard copy and an electronic copy of the Tier 2 BA should be submitted to the BFO when requesting a project section review.

8. Any dead bats located within the construction limits, right-of-way, rest stops, or mitigation areas of I-69, regardless of species, should be immediately reported to BFO [(812) 334-4261], and subsequently transported (frozen or on ice) to BFO. No attempt should be made to handle any live bat, regardless of its condition; report bats that appear

to be sick or injured to BFO. BFO will make a species determination on any dead or moribund bats. If a northern long-eared bat is identified, BFO will contact the appropriate Service Law Enforcement office as required.

The FHWA will keep track of all known northern long-eared bats killed from vehicle collisions to ensure that the anticipated amount of incidental take, approximately 7 killed every two years (55 total through year 2030), is not exceeded.

ATTENTION: If at any point in time during this project, the exempted project-wide or section-specific habitat acreages or annual number of roadkilled bats quantified in the AMOUNT OR EXTENT OF TAKE section of this ITS are exceeded by more than 10%, then the Service will assume that the exempted level of take for this project may have been exceeded and the FHWA should immediately reinitiate formal consultation.

In conclusion, the Service believes that the permanent loss of currently suitable summer roosting and foraging habitat for northern long-eared bats will be limited to 486 acres of forest within the SAA (SAA) and 38 acres of forest habitat within the Winter Action Area (WAA). These acreages represent approximately a <1% loss of the SAA's forested acreage and a <1% loss of the WAA's forested acreage and will occur over a period of at least several years. The reasonable and prudent measures, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. If, during the course of the action, this level of incidental take is exceeded (or tree clearing occurs during the period April 15-September 15 in the SAA or April 1-November 15 within the WAA any given year) such incidental take represents new information requiring re-initiation 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:

NORTHERN LONG-EARED BAT CONSERVATION RECOMMENDATIONS

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

range of the northern long-eared bat, 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 northern long-eared bats in coordination with the Service's BFO.

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

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

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

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Appendix A

I-69 Conservation Measures

The following conservation measures were jointly developed by the FHWA, INDOT, and the Service during informal consultation as part of the Tier 1 study and were subsequently incorporated into the Tier 1 BA as part of the proposed action. These measures were specifically designed to avoid and minimize impacts of the proposed action on Indiana bats and to further their recovery, **and because of similarities between the species are hereby offered for the northern long-eared bat.** In the original Tier 1 BO (dated December 3, 2003), the Service analyzed the effects of the proposed action based on the assumption that all conservation measures would be implemented or equivalent measures developed in consultation with the Service during Tier 2. The beneficial effects of the following measures were taken into consideration for both jeopardy and incidental take analyses.

Since the development of the Tier 1 BA, FHWA and INDOT have generated additional information for the northern long-eared bat. Therefore, the following conservation measures are provided along with any suggested revisions in this Tier 1 BA Addendum. A status report is provided for reference.

It is important to note that those conservation measures developed for the bald eagle and eastern fanshell mussel in the original Tier 1 BA remain valid although they are not listed below.

Conservation measures below for the northern long-eared bat have been added to those of the Indiana bat measures reported in the Tier 1 BA Addendum dated March 7, 2006. Due to similarities in the two species, FHWA and INDOT consider conservation measures suitable for the Indiana bat to be similarly suitable for the northern long-eared bat.

A. CONTEXT SENSITIVE SOLUTIONS

1. WINTER HABITAT

a. **Alignment Planning** – Efforts will be made to locate Interstate alignments beyond 0.5 mile from known Indiana bat hibernacula.

Status – Completed for Indiana bat. All alternatives are 0.5 mile or more from an existing Indiana bat hibernacula. The road has been built in Sections 1-3.

The Preferred Alternative in Sections 4 and 5 show six northern long-eared bat hibernacula within 0.5 mile. Five of these caves are in Section 4 with May Cave in the lower portion of Section 5 along SR 37. Tree clearing in Sections 1-4 is completed. Tree clearing in Section 5 was completed for most utilities and southern portions of the right-of-way as of April 1, 2014. Tree clearing for the remainder of the right-of-way in Section 5 is proposed from October 15, 2014 to March 31, 2015.

Northern long-eared bat hibernacula within 0.5 miles of the roadway are Hugen Tober Blow Hole, May Cave, New Cave 40, Quimby and Stephen Quarry Cave, Rock Springs Cave and Rush To It Cave. Approximate distances of these caves from existing cleared right-of-way are:

Cave Name	**Distance to Right-of-Way (miles)**
Hugen Tober Blow Hole	0.3

May Cave	0.4
New Cave 40	0.3
Quimby and Stephen Quarry Cave	0.1
Rock Springs Cave	0.5
Rush To It Cave	0.3

The WAA for the northern long-eared bat is within Greene, Monroe, Lawrence and Owen counties. There are 60 known hibernacula for the northern long-eared bat in these four counties. Fifty-five hibernacula are within 5 miles of the Preferred Alternative and thus comprise the WAA. Hibernacula for this species include caves that showed northern long-eared bats hibernating in the cave and/or those that have had northern long-eared bats harp trapped at cave entrances.

Hibernacula for the northern long-eared bat are: Batey Cave (21), Briar Sink Cave (3), Buckner Cave (IDNR winter cave survey), Bullfrog Spring Cave (1), Carmichael Cave (10), Clifty Creek 1 Cave (1), Conard Cave (1), Clyfty Cave (IDNR winter cave survey), Coon Cave (IDNR winter cave survey), Dead Fox Cave (3), Doghill-Donnehue Cave (IDNR winter cave survey), DuBois' Den Cave (3), Eller (4), Galyan Pit Cave (8), Goad Spring Cave (45), Gonar Tuna Cave (27), Goode's Cave (4), Grotto Cave (IDNR winter cave survey), Hollingsworth Cave (9), Holmes Cave (4), Hugen Tober Blow Hole (23), Isom Cave 1 (1), Blair Springs-Brinegar Cave (13), Koontz Pit Cave (4), Leonard Spring Cave (IDNR winter cave survey), Linden Pit (3), Linthicum Spring Cave (3), Matlock Cave (8), May Cave (3), Mayfield Cave (3), Methane Pit (2), New Cave 5 (1), New Cave 9 (55), New Cave 40 (49), Ozzys Hole Cave (61), Patton Cave (IDNR winter cave survey), Popcorn Spring Cave (278), Primitive Baptist Spring Cave (3), Queen Blair Cave (9), Quimby and Stephen Quarry Cave (2), Quintet Cave (4), Ranard School Cave (17), Rays Cave (IDNR winter cave survey), Reeves Cave (2), Rock East Cave (22), Rock Springs Cave (45), Rush To It Cave (78), Sexton Spring Cave (IDNR winter cave survey), Shirley Springs Cave (5), Small Dull Cave (12), Spring Swallow Cave (9), Storm's Pit (1), Sullivan Cave (IDNR winter cave survey), Sullivan Hill Pit (11), Thompson North Cave (25), Thompson South Cave (16), Blair Springs-Triple J Cave (78), Truitt Cave (2), Weaver Cave (35), and Windy Rock Cave (3). Numbers (in parentheses) come from I-69 data and indicate the number of northern long-eared bats harp trapped at their entrance and/or observed in a winter cave survey, while "IDNR winter cave survey" indicate their winter occurrence in caves (USFWS data). A total of 1,030 northern long-eared bats have been recorded from 50 caves reviewed in I-69 surveys. The northern long-eared bat was the most common species harp trapped in this project.

b. **Blasting** – All efforts will be made to avoid blasting between September 15 and April 15 in areas within 0.5 mile of known northern long-eared bat hibernacula. All blasting in the WAA will follow the specifications developed in consultation with the Service and will be conducted in a manner that will not compromise the structural integrity or alter the karst hydrology of nearby caves serving as northern long-eared bat hibernacula. Due to existing construction contracts in place prior to consideration of the northern long-eared bat, this commitment will not be fully implemented prior to the listing of the species. All efforts will be made to blast this in the fall of 2014 and avoid the 2014-15 winter time period

for Rock Springs Cave, New Cave 40, Hugen Tober Cave and Rush-To-It Cave. Blasting is not anticipated for Quimby and Stephen Quarry Cave or May Cave.

Status – Completed for Indiana Bat and Ongoing for the Northern Long-Eared Bat.. All blasting (within all areas) will be done after consulting with the Service, INDOT, and FHWA. Blasting within areas where dimension limestone is quarried will also be completed following special provisions developed in consultation with limestone industry representatives as well as the Indiana Geological Survey (IGS) and other geology experts.

Upon consulting with the Service, the limestone industry representatives concurred that the design plans and INDOT Standard Specifications seem appropriate and that they did not have any further questions or comments regarding the specifications. The Service requested additional coordination if the proposed monitoring reveals that ground movement, vibrations, or other stability measurements are exceeded. As part of the specifications, detailed monitoring requirements are required to ensure blasting techniques do not damage adjacent features. Special provisions were developed with the limestone companies.

c. **Hibernacula Surveys** – A plan for hibernacula surveys (caves and/or mines) will be developed and conducted in consultation with and approved by the Service during Tier 1 studies.

Status – Completed. The plan was completed with the Service and fieldwork has been conducted. To date, 373 cave records were evaluated and 250 caves were visited in the field. Of these, 61 caves met the proper search criteria for habitat and were surveyed for bats in 2004 and 2005. Sixteen caves had fall harp trapping conducted in 2005. These 16 caves also had internal cave surveys completed in December 2005. The northern long-eared bat ranked 1st in number with 1,015 northern long-eared bats harp trapped at cave entrances. Eighteen caves showed northern long-eared bat occupation in the winter based on data from the Service and 2004-05 and 2005-06 winter surveys conducted for the I-69 project.. These caves were Buckner Cave, Clyfty Cave, Coon Cave, Grotto Cave, Blair Springs-Brinegar Cave, Leonard Spring Cave, Sexton Spring Cave, Mayfield Cave, Popcorn Spring Cave, Queen Blair Cave, Quimby and Stephen Quarry Cave, Rays Cave, Reeves Cave, Rush To It Cave, Small Dull Cave, Storm's Pit, Sullivan Cave, and Truitt Cave. The number of northern long-eared bats found in these hibernacula were very low. Specifically, there were 1,015 northern long-eared bats harp trapped and 15 northern long-eared bats observed in cave surveys. The caves that actually showed northern long-eared bats inside were Mayfield Cave (1), Popcorn Spring Cave (1), Queen Blair Cave (1), Quimby and Stephen Quarry Cave (1), Rush To It Cave (1), Small Dull Cave (8), Storm's Pit (1), and Truitt Cave (1).

d. **Karst Hydrology** – To avoid and minimize the potential for flooding, dewatering, and/or microclimate (i.e., temperature and humidity) changes within hibernacula, site-specific efforts will be made to minimize changes in the amount, frequency, and rate of flow of roadway drainage that enters karst systems that are determined to be hydrologically connected to hibernacula.

Status – Completed for Indiana bat and Ongoing for Northern Long-Eared Bat. Ashcraft Cave (Section 4) is the only known hibernaculum that is hydrologically connected with the corridor that had Indiana bats at one time, but not for many years.

For the northern long-eared bats, 2 caves have hydrological connections to the Preferred Alternative. They are Goode's Cave and May Cave. Clearing of trees has been completed in these areas of Section 4 and 5 respectively. Rush To It Cave is in close proximity to the roadway and there is potential for impacts. In addition, Spring Swallow Cave lies down gradient from the roadway, and has no known hydrological connection to I-69, but there is a potential for impact. These caves will be recognized by FHWA and INDOT as northern long-eared bat hibernacula and receive karst protective measures, as appropriate. Much effort has been taken to protect groundwater resources and caves systems in Section 4. FHWA and INDOT have been working with IDNR, IDEM, and the Service in following the Karst MOU dated October 1993 in Section 4 and will continue such coordination and efforts to protect groundwater resources and cave systems into Section 5. Karst features in the project are solely in Sections 4 and 5.

2. AUTUMN/SPRING HABITAT

a. **Tree Removal –** To minimize adverse effects on bat habitat, tree (three or more inches in diameter) cutting will be avoided within five miles of a known hibernaculum. If unavoidable, cutting will only occur between November 16 and March 31.

Status – **To be completed for the northern long-eared bat**. Tree cutting within five miles of known hibernacula will only occur between November 15 and March 31.

3. SUMMER HABITAT

a. **Alignment Planning** – Efforts will be made to locate Interstate alignments so they avoid transecting forested areas and fragmenting core forest where reasonable.

Status – **To be completed**. This effort has been completed for Sections 1 through 5. This effort will continue throughout the final preferred alternative development for Section 6.

b. **Tree Removal** – Tree and snag removal will be avoided or minimized as follows:

1. **Tree Cutting** – To avoid any direct take of Indiana bats and northern long-eared bats, no trees with a diameter of 3 or more inches will be removed between April 15 and September 15. Tree clearing and snag removal will be kept to a minimum and limited to within the construction limits. In the median, outside the clear zone, tree clearing will be kept to a minimum to keep woods in as natural state as reasonable. Forested medians will be managed following the IDNR State Forest Timber Management Plan.

2. **Avoid and minimize impacts from private landowner harvests within the right of way -** The goal of the measure is to avoid and minimize impacts from private landowner harvests by working with property owners within the right of way who plan to harvest their property. FHWA and INDOT propose to develop an voluntary agreement with the interested landowners, such as a "right of entry"

agreement or other type of covenant, to pay the landowner to limit the time of year in which they harvest their property; this time period would be limited to the late fall and winter when Indiana bats are not present in the forested areas.

Status – **To be completed**. All tree cutting activities will only occur within the construction limits. All tree clearing within the proposed construction limits will follow the Service's seasonal cutting restrictions. The construction limits will be identified during final design. Based on the Service's revised guidance dated February 14, 2008, the new tree clearing restriction dates of April 1 through September 30 for the SAA will be used for future sections to be developed. The majority of Section 4 and a portion of Section 5 are within the WAA and will follow the dates for autumn/spring habitat removal (as noted above). Clearing of trees in Section 4 and the lower third of Section 5 have been completed.

Note there have been six instances of accidental tree removal that have occurred to date during the time frames mentioned above. These incidences occurred in August and September of 2011, May and June of 2012, and July and November of 2013. In all instances, INDOT/FHWA had qualified biologists review conditions and coordinate with the Service. It was agreed that there was not likely impacts to bats resulting from the accidental tree removals. The Service has been previously notified of all of these instances.

3. **Mist Netting** – In areas with suitable summer habitat for the northern long-eared bat, mist net surveys will be conducted between May 15 and August 15 at locations determined in consultation with the Service as part of Tier 2 studies. If northern long-eared bats are captured in Section 5, some will be fitted with radio transmitters and tracked to their diurnal roosts for at least 5 days unless otherwise determined by the Service.

Status – **To Be Completed**. One hundred and forty-eight mist netting sites were completed in 2004 and 49 were completed in 2005. This information helped in avoiding sensitive areas that may have impacted this species. However, due to the length of time since the original surveys, the Service has requested that Sections 5 and 6 be mist netted again. As such, mist netting was conducted for Section 5 in the summer of 2012. Mist netting of Section 6 will be scheduled in the future as directed by the Service, FHWA, and INDOT.

c. **Bridges –** Bridges will include the following design features:

1. **Surveys** – The undersides of existing bridges that must be removed for construction of I-69 will be visually surveyed and/or netted to determine their use as night roosts by the northern long-eared bat during the summer.

Status – **Completed**. Two hundred and fifty-nine (259) bridges and culverts within the SAA were inspected for northern long-eared bats. Of the 259 bridge surveys, northern long-eared bats were found underneath two bridges. They were the Beanblossom Bridge on SR 37 north of Bloomington which showed 2 individuals, while the 2nd bridge was the Breeden Road bridge over Indian Creek. It also showed 2 individuals.

A large bridge that showed many bats and was studied for 6-8 years showed over 8,500 bats of 5 species. The northern long-eared bat was never found under this bridge even though they were a very common species in this geographic area. This bridge will not be removed as a result of the I-69 project. However, due to the presence of bats (especially the Indiana bat) near concentrations of human disturbance (e.g. graffiti), INDOT and FHWA have worked with the Service on fencing both ends of this bridge in order to avoid human disturbance to bats. The fencing is identified as a conservation measure for the Tier 1 BA Addendum. Two fences, approximately 30 feet wide and six feet high with an angled top, were installed under the bridge in April 2006 by INDOT Vincennes District. In September 2007, signs were installed at the bridge indicating that coordination with INDOT Vincennes District and the Service will be required for work performed on or within 200 feet of the bridge. Both fences have a gate and a key for the Service to access. As of January 2009, the terms and conditions for this commitment were considered met and INDOT is not proposing any other monitoring of the bridge as part of I-69.

2. **Bat-friendly bridges** – Where feasible and appropriate, interstate and frontage road bridges will be designed to provide suitable night roosts for bats in consultation with the Service.

Status – Due to concerns about attracting bats to the high-speed interstate facility, it is not currently proposed to include any "bat friendly" bridges along I-69. The Service concurs with no "bat friendly" bridges.

3. **Floodplains** – Where reasonable and appropriate, floodplains and oxbows will be bridged to protect environmentally sensitive areas. The Patoka River floodplain will be bridged in its entirety, thus minimizing impacts to many different habitats.

Status – **To be completed**. The majority of the Pigeon Creek (Section 1), Patoka River (Section 2), Flat Creek (Section 2), Prairie Creek (Section 3), First Creek (Section 3), Doan's Creek (Sections 3 and 4), Black Ankle Creek (Section 4), Dry Branch (Section 4), Plummer Creek (Section 4), Indian Creek (Section 4), and an unnamed tributary (UNT) to Clear Creek (aka May Creek) (Section 4) floodplains have been or will be bridged. Although no floodplains within Section 4 will be bridged in their entirety, floodplain encroachments have been minimized where reasonable through design practices such as longer bridges and perpendicular stream crossings. Although it is not anticipated that any floodplains within Section 5 will be bridged in their entirety, floodplain encroachments will be minimized where reasonable by utilizing existing bridge crossings and design practices such as longer bridges and perpendicular stream crossings where new crossings are warranted. Bridging allows for wildlife corridors and the greatest clearance is beneficial for bats to fly under these bridges.

d. **Stream Relocations –** Site-specific plans for stream relocations will be developed in design considering the needs of sensitive species and environmental concerns. Plans will include the planting of woody and herbaceous vegetation to stabilize banks. Such plantings will provide foraging cover for many species. Stream Mitigation and Monitoring plans will be developed for stream relocations, as appropriate.

Status – To be completed. This will be completed during mitigation and permitting. The final design plans continue to be reviewed to assure conformance with the previously secured permits. Specific mitigation sites have been purchased in some sections. Note some of the mitigation regarding stream relocations occurring within maternity colonies is being conducted onsite using natural channel design.

4. ALL HABITATS

a. **Medians and Alignments –** Variable-width medians and independent alignments will be used where appropriate to minimize impacts to sensitive and/or significant habitats. Context sensitive solutions will be used, where possible. This may involve vertical and horizontal shifts in the Interstate.

Status – To be completed. This will occur where appropriate and possible in final design and construction in each section. These were not used for Sections 1 and 3. For Section 2, variable width medians were used in one area outside a maternity colony area. For Section 4, it was determined it was not appropriate to use variable-width medians given design constraints. A typical median width of 60 feet is proposed and no trees will be left in the median. For Sections 5 and 6, a typical median width of 60 feet is proposed. No trees will be left in the median for the majority of Section 5 with the exception of a small stretch (approximately 1.4 miles) of split roadway north of Burma Road and Bryant Creek Road in the Morgan-Monroe State Forest area. This split minimizes impacts to forest habitat, the State Forest, and streams.

Environmentally sensitive areas in Section 2 include the Patoka River National Wildlife Refuge, Flat Creek, Prides Creek, and the East Fork of the White River. Environmentally sensitive areas in Section 4 include Black Ankle Creek/Koleen Bottoms and all Indian Creek crossings. Environmentally sensitive habitats in Section 5 include May Cave and Well Cave recharge areas.

b. **Minimize Interchanges** – Efforts have been made to limit interchanges in karst areas, thereby limiting access and discouraging secondary growth and impacts. In Tier 2, further consideration will be given to limiting the location and number of interchanges in karst areas.

Status – Completed. Only Sections 4 and 5 are located within the Karst Region. Interchanges in Section 4 include SR 45, Greene/Monroe County Line, and SR 37. Interchanges in Section 5 include Fullerton Pike, combined Tapp Road and SR 45/2nd Street, SR 48/3rd Street, SR 46, Walnut Street, Sample Road, and Liberty Church Road. Existing interchanges in Section 5 include SR45/2nd Street, SR 48/3rd Street, SR 46, and Walnut Street. These interchanges have been designed to limit impacts in karst areas. Specific design elements include folded ramps, the use of smaller urban-style interchanges in rural areas, and using existing interchange locations, overpasses and pavement layouts when possible. Liberty Church Road is not in karst terrain.

c. **Memoranda of Understandings (MOUs)** – Construction will adhere to the Wetland MOU (dated January 28, 1991) and Karst MOU (dated October 13, 1993). The Wetland MOU minimizes impacts to the northern long-eared bat by mitigating for wetland losses, and creating bat foraging areas at multiple ratios to those lost to the project. The Karst MOU avoids and minimizes impacts to the

northern long-eared bat by numerous measures which protect sensitive karst features including hibernacula.

Status – To be completed. This will be coordinated prior to or during construction. Procedures established in these MOUs will be adhered to during the planning phase and will be incorporated into the Mitigation and Monitoring Plan for each mitigation site. Coordination with the Karst MOU signatory agencies for Section 4 began in fall 2011 and is ongoing. Coordination with the Karst MOU signatory agencies for Section 5 is anticipated to start prior to construction.

d. **Water Quality** – Water contamination will be avoided/minimized by the following:

1. **Equipment Service** – Equipment servicing and maintenance areas will be designated to areas away from streambeds, sinkholes, or areas draining into sinkholes.

Status – To be completed. Procedural steps 1-4 of the Karst MOU are being addressed in Tier 2. In addition, this item will be incorporated as a special provision in all contracts, as applicable.

2. **Roadside Drainage** - Where appropriate in karst areas, roadside ditches will be constructed that are grass-lined and connected to filter strips and containment basins. The development of these measures will be coordinated with the Karst MOU agencies.

Status – To be completed. In Section 4, roadside ditches may include geo-membrane lining, rock filters or detention basins. No roadside drainage will be directly discharged into a karst feature (dry well). Coordination with the Karst MOU signatory agencies for Section 4 began in fall 2011 and is ongoing. Specific impacts to karst features and treatment of drainage has not yet been determined for Section 5. Impacts to specific karst features in Section 5 will be addressed via consideration of alternative drainage and other appropriate mitigation features during final design. Such treatment measures include peat and sand filters, gravel filters, vegetated buffers, and lined spill or run-off containment structures.

3. **Equipment Maintenance** - Construction equipment will be maintained in proper mechanical condition.

Status – To be completed. This item is contained in the INDOT Standard Specifications and will be implemented during construction.

4. **Spill Prevention/Containment** – The design for the roadway will include appropriate measures for spill prevention/containment.

Status – To be completed. Special measures, including diversions of highway runoff from direct discharge off of bridge decks into streams and containment basins to detain accidental spills, will be incorporated into final design plans for perennial streams within the northern long-eared bat maternity colony areas to address water quality concerns. Within Section 1, this includes Pigeon Creek and its tributaries. Within Section 2, this includes Hurricane Creek, Patoka River, Flat Creek, Mud Creek, East Fork of the White River, Jackson Pond tributary, Veale Creek, and Hurricane Branch of Veale Creek. Within Section 3, this includes Weaver and

Vertrees Ditches. Within Section 4, this includes Black Ankle Creek, Dry Branch, and the three most northern Indian Creek crossings. The remaining perennial streams, Plummer Creek, Mitchell Branch, the southernmost Indian Creek, an UNT to Clear Creek (aka Happy Creek), and an UNT to Clear Creek (aka May Creek) all fall within the WAA. Locations within Section 5 are still to be defined. Measures for spill prevention/containment will be included in the roadway design.

Contractors will be required to provide an acceptable spill response plan which will include telephone numbers for emergency response personnel and copies of agreements with any agencies which are part of the spill response effort. An emergency response telephone number is also required. The Rule 5 Permit will require each contractor have spill containment plans in their contract documents.

5. **Herbicide Use Plan** – The use of herbicides will be minimized in environmentally sensitive areas such as karst areas to protect northern long-eared bats and their prey. Environmentally sensitive areas will be determined in coordination with the INDOT, and as appropriate, the INDOT consultants. Appropriate signage will be posted along the interstate to alert maintenance staff of these areas.

Status – **To be completed**. The use of herbicides will be minimized within environmentally sensitive habitats. In addition, the herbicide use plan will include any drainage area of a karst feature which is used for highway drainage. Appropriate signage will be posted along the interstate to alert maintenance staff of these environmentally sensitive areas. Within Section 2, this includes the Patoka River National Wildlife Refuge, Flat Creek, Prides Creek and the East Fork of the White River. Within Section 4, this includes Black Ankle Creek/Koleen Bottoms and all Indian Creek crossings. Within Section 5, this includes May Cave and Well Cave recharge areas.

6. **Re-vegetation** – Re-vegetation of disturbed areas will occur in accordance with the INDOT standard specifications. Woody vegetation will only be utilized beyond the clear zone. Re-vegetation of disturbed soils in the right-of-way and medians will utilize native grasses and wildflowers, as appropriate, similar to the native seed mixes of other nearby states.

Status – **To be completed**. Re-vegetation of disturbed areas will occur in accordance with INDOT standard specifications. Woody vegetation will only be used a reasonable distance beyond the clear zone to ensure a safe facility. Re-vegetation of disturbed soils within the right-of-way and medians will utilize native grasses and wildflowers as appropriate, such as those cultivated through INDOT's Roadside Heritage program. Within Section 2, locations include the SR 61/56 Intersection, North Pike, South Daviess, and US 50. Within Section 4, locations may include Black Ankle Creek, an UNT to Clear Creek (aka May Creek), and Indian Creek crossings. Other areas may include interchange locations. Locations within Section 5 are still to be defined.

7. **Low Salt Zones** – A low salt and no spray strategy will be developed in karst areas for this project. A signing strategy for these items will

also be developed. The low salt zones will be determined in coordination with the INDOT.

Status – To be completed. For Section 4, the BA states that low salt zones will be defined within any drainage area of a karst feature which is used for highway drainage within the karst region (Taylor Ridge Road north to SR 37—approximately 22.3 miles). For Section 5, the limits for the low salt/no spray zone in Section 5 will be along I-69 continuing from Section 4 to 200 feet north of the existing SR 37/Chambers Pike Intersection. Signs illustrating *Low Salt/No Spray Zone* and *Report All Spills to 1-888-233-7745* were developed and approved by INDOT in 2011. For Section 4, *Low Salt/No Spray Zone* signs will be placed along both sides of the road (each travel direction) within the karst portion of the roadway, approximately three miles apart and at entrance ramps leading to the highway for a total of 24 signs.

Signs showing *Report All Spills to 1-888-233-7745* will be placed following the above recommendations but will be inserted in between the *Low Salt/No Spray Zone* signs for a total of 16 signs. Similar signs and spacing will be used within the karst areas of Section 5.

8. B**ridge Design** – Where feasible and appropriate, bridges will be designed with none or a minimum number of in-span drains. To the extent possible, the water flow will be directed towards the ends of the bridge and to the riprap drainage turnouts.

Status – To be completed. This will be coordinated in the final design of bridges crossing perennial streams located within the maternity colony areas. For a list of these perennial streams, see "Spill Prevention/Containment" (#4 above).

e. **Erosion Control** – Temporary erosion control measures will be used to minimize sediment and debris. Timely re-vegetation after soil disturbance will be implemented and monitored. Re-vegetation will consider site specific needs for water and karst. Erosion control measures will be put in place as a first step in construction and maintained throughout construction.

Status – To be completed. Best Management Practices (BMPs) will be used during construction to minimize impacts of erosion. Erosion control measures will be put in place as a first step in construction and maintained throughout construction. Temporary erosion control devices, such as silt fencing, check dams, sediment basins, inlet protection, sodding, and other appropriate BMPs will be used to minimize sediment and debris in tributaries and karst features within the project area.

Timely re-vegetation will be implemented after soil disturbance and monitored. Any riprap used will be a large diameter to allow space for habitat for aquatic species after placement. Slopes will be designed that resist erosion. If slopes exceed 2:1, they will include stabilization techniques. Soil bioengineering techniques for bank stabilization will be considered where situations allow.

In addition to the above measures, a video has also been prepared to help assure compliance with erosion control measures. This video will be viewed by personnel (i.e. engineering supervisors, equipment operators, construction personnel, INDOT maintenance) prior to construction activities in all Sections. Additional specifications have also been added to Section 4 contracts for erosion control.

f. **Parking and Turning Areas** – Parking and turning areas for heavy equipment will be confined to sites that will minimize soil erosion and tree clearing, and will avoid environmentally sensitive areas, such as karst.

Status – **To be completed**. This will be identified in construction contracts.

B. Restoration / Replacement

1. SUMMER HABITAT

a. **Summer Habitat Creation/Enhancement** – Northern long-eared bat summer habitat will be created and enhanced in the Action Area through wetland and forest mitigation focused on riparian corridors and existing forest blocks to provide habitat connectivity. The following areas and possibly others have been investigated for wetland and forest mitigation to create and enhance summer habitat for the Indiana bat: Pigeon Creek, Patoka River bottoms, East Fork of the White River, Thousand Acre Woods, White River (Elnora), First Creek, American Bottoms, Garrison Chapel Valley, Beanblossom Bottoms, White River (Gosport), White River (Blue Bluff), and Bradford Woods. In selecting sites for Indiana bat summer habitat creation and enhancement, priority was given to sites located within a 2.5 mile radius from a recorded capture site or roost tree. If willing sellers cannot be found within these areas, other areas may be used as second choice areas as long as they are within the Action Area and close enough to benefit these maternity colonies, or are outside the Action Area and still deemed acceptable to the Service. Where appropriate, mitigation sites will be planted with a mixture of native trees largely comprised of species that have been identified as having relatively high value as potential northern long-eared bat roost trees. Tree plantings will be monitored for 5 to 10 years after planting to ensure establishment and protected in perpetuity via conservation easements.

Status – **To be completed**. This will occur during mitigation and permitting. Tree plantings are anticipated to be monitored for 10 years. Additional conceptual detail has been and will be provided in the Tier 2 BA for each section. In addition to the areas mentioned above, Rays Cave (and surrounding areas), Veale Creek, Flat Creek, Indian Creek, Plummer Creek, Doan's Creek, areas adjacent to the White River, Little Clyfty Branch, Crooked Creek, Lambs Creek, Morgan-Monroe State Forest, Beanblossom Nature Preserve, and Maple Grove Road Rural Historic District were investigated for wetland and forest mitigation possibilities in order to enhance summer habitat for the northern long-eared bat. Specific mitigation sites have already been purchased in some sections. Coordination with interested landowners is ongoing. Mitigation sites for the Indiana bat are considered mitigation sites for the northern long-eared bat.

b. **Wetland MOU** – Wetlands will be mitigated at ratios agreed upon in the Wetland MOU (dated January 28, 1991). Wetland replacement ratios are as follows:

1. Farmed 1 to 1.

2. Scrub/shrub and palustrine/lacustrine emergent 2 – 3 to 1 depending upon quality.

3. Bottomland hardwood forest 3 – 4 to 1 depending upon quality.

4. Exceptional, unique, critical (i.e. cypress swamps) 4 and above to 1 depending upon quality.

Status – **To be completed**. This will occur during mitigation and permitting. Additional conceptual detail will be provided in the Tier 2 BA for each section. Specific mitigation sites have already been purchased in some sections.

c. **Forest Mitigation** – The Tier 1 Forest and Wetland Mitigation and Enhancement Plan identifies the general location of potential mitigation sites for upland and bottomland forests. Preference will be given to areas contiguous to large forested tracts that have recorded federal and state listed species. The actual mitigation sites implemented will be determined in Tier 2 in consultation with the Service and other environmental review agencies. Coordination with the environmental review agencies will assure that these forest mitigation sites are strategically situated in biologically attractive ecosystems. Forest impacts will be mitigated at a ratio of 3 to 1. All forest mitigation lands will be protected in perpetuity via conservation easements. The 3:1 forest mitigation may not be located entirely within the Action Area. Forest impacts occurring within each of the northern long-eared maternity colony areas would be mitigated by replacement (i.e. planting of new forest and purchase of existing) at approximately 3:1, preferably in the vicinity of the known roosting habitat.

Status – **To be completed**. This will occur during mitigation and permitting. Additional conceptual detail will be provided in the Tier 2 BA for each section. Coordination with the Service has indicated that of this 3:1 ratio, 2:1 may be preservation, while restoration is at a minimum of no net loss or 1:1. In addition to conservation easements, deed restrictions may also be used to protect mitigated lands. Specific mitigation sites have already been purchased in some sections for the Indiana bat and are anticipated also to be accepted as mitigation sites for the northern long-eared bat.

C. Conservation / Preservation

1. *Winter Habitat*

a. **Hibernacula Purchase** – Opportunities will be investigated to purchase at fair market value from "willing sellers," Indiana bat and northern long-eared bat hibernaculum(a) including associated autumn swarming/spring staging habitat. After purchase and implementation of all management efforts, hibernaculum(a) and all buffered areas will be turned over to an appropriate government conservation and management agency for protection in perpetuity via conservation easements.

Status – **Completed**. Property owners of Indiana bat hibernacula within and outside the WAA were contacted to determine if they are interested in being willing sellers. Conservation

easements have been purchased for Clyfty Cave (Newark property), Coon Cave and Grotto Cave—Priority 1 Caves—(Coon Hollow property), and Salamander Cave (Garrison Chapel property). Note that contrary to expectations described in previous documents, the property owner of Reeves Cave chose not to have I-69 mitigation on his property in 2011 and the property owner of Primitive Baptist Spring Cave (Rock East Road property) chose not to include the cave within the mitigation boundary.

Primitive Baptist Spring Cave is a wet cave adjacent to Indian Creek that had 3 harp trapped northern long-eared bats in 2004 and 1 Indiana bat and in 2005. The owners of Rays Cave (including Beech Tree Entrance), King Blair Cave, Sexton Spring Cave, Saltpeter Cave, Storm's Pit, and Ozzys Hole Cave are not willing sellers. There are three caves that are currently managed by federal/state/local agencies and/or environmental organizations; these include Bucker, Sullivan Cave, and Ashcraft Cave. The property owners of Blair Springs-Brinegar Cave, Leonard Spring Cave and Blair Springs-Triple J Cave were also contacted, but were either not interested in selling/giving easements or did not respond. These caves also are hibernacula for the northern long-eared bat, so the purchase of Coon Cave, Grotto Cave, Salamander Cave and Clyfty Cave benefit the northern long-eared species.

In addition, FHWA and INDOT have improved the opening of Eller Cave for greater air flow and cooler temperatures. It is a suspected northern long-eared bat hibernaculum based on August 2004 harp trap data obtained for the I-69 project. In the purchase of these caves, FHWA and INDOT have also purchased 100's of acres of high quality foraging areas for both the Indiana bat and the northern long-eared bat and protected hundreds of karst-related features from potential development.

b. **Hibernacula Protection** – With landowner permission, investigations will coordinate with the Service on acquiring easements to erect bat-friendly angle-iron gates at cave entrances. These gates prevent unauthorized human access and disturbance of hibernacula, while maintaining free airflow within the hibernacula within the Action Area. Gates will be constructed according to designs from the American Cave Conservation Association. Effects of gates on water flow and flash flooding debris will be carefully evaluated before and after gates are installed. Other structures (e.g., perimeter fencing) or techniques (e.g., alarm systems and signs) may be used.

Status – To be completed. Fencing has been installed at the entrance to Grotto Cave (Coon Hollow property). In 2012, the large rocks were removed from the entrance of Eller Cave (Eller property) to allow for greater airflow and lower temperatures which could create conditions more conducive for northern long-eared bats and Indiana bats. The Service has already installed data loggers for background temperature measurements. Studies from 1982 to present have not observed Indiana bats in Eller Cave, but it is considered a hibernaculum for the northern long-eared bat. Eller Cave is currently being evaluated to determine the need for a gate.

2. AUTUMN/SPRING HABITAT

a. **Autumn/Spring Habitat Purchase** – Any hibernaculum(a) purchased as part of conservation for Indiana bat or northern long-eared bat winter habitat will include associated autumn swarming/spring staging habitat to the maximum

extent practicable. Any purchase will be from a willing seller at fair market value. In addition, some parcels containing important autumn swarming/spring staging habitat may be acquired near key hibernacula regardless of whether the hibernacula themselves are acquired. Any acquired autumn swarming/spring staging habitat would be conveyed to an appropriate government conservation and management agency for protection in perpetuity via conservation easements. The purchase of forestland would be included as part of the 3:1 mitigation.

Status – Completed. Conservation easements have been purchased for Coon Cave and Grotto Cave (Coon Hollow property), Clyfty Cave (Newark property), Eller Cave (Eller property) and Salamander Cave (Garrison Chapel property). Note that contrary to expectations described in previous documents, the property owners of Reeves Cave and Wayne Cave chose not to have I-69 mitigation on their properties in 2011 and the property owner of Primitive Baptist Spring Cave (Rock East Road property) chose not to include the cave within the mitigation boundary.

3. SUMMER HABITAT

a. **Summer Habitat** – Investigations will be coordinated with the Service on purchasing lands at fair market value in the Action Area from "willing sellers" to preserve summer habitat. Any acquired summer habitat area will be turned over to an appropriate government conservation and management agency for protection in perpetuity via conservation easements.

Status – To be completed. This will occur during mitigation and permitting. Additional conceptual detail will be provided in the Tier 2 BA for each section. Specific mitigation sites (containing summer habitat) have already been purchased in some sections.

D. Education / Research

1. Winter Habitat

a. **Monitor Gated Caves** – All caves that have gates erected as mitigation for this project will have their temperature, humidity, bat activity and populations monitored before and for three years after gate installation. Infra-red video monitoring or other techniques deemed acceptable by the Service will be conducted for a minimum of two nights in the appropriate season at each newly installed cave gate to ensure the bats are able to freely ingress and egress. Data acquisition will use a number of data loggers minimizing the need for entry into these caves. All precautionary measures will be taken to minimize potential impacts to hibernating Indiana bats and northern long-eared bats.

Status – To be completed. Eller Cave (Eller property) is currently being evaluated to determine the need for a gate. Coordination with the new property owner regarding use limitations and the ongoing monitoring has been completed; follow-up coordination for a review of the cave is planned in 2014. Currently, no other cave gates are anticipated as part of I-69 mitigation. However, review of Coon Cave and Grotto Cave (Coon Hollow property) will be conducted with Bat Conservation International (BCI) and the Service for input during review of Eller Cave, which is a known hibernacula for the northern long-eared bat.

b. **Cave Warning Signs** – Where deemed appropriate by the Service, the following may be done: signs will be posted that warn the public and discourage cave entry at hibernacula within/near the Action Area. Signs should be placed so that they do not block airflow into the cave and do not draw attention to the entrance and attract violators (USFWS, 1999). Also, light-sensitive data loggers may be placed within the caves to assess the effectiveness of the warning signs at deterring unauthorized entries. Permission from the landowners must be obtained before erecting such signs and installing data loggers.

Status – **To be completed**. This can be completed any time prior to or during construction of the roadway. In cooperation with the property owner (who is not a willing seller), the entrance to Rays Cave is currently being monitored for unauthorized access. A camera and warning signs are installed at the entrance to Coon Cave (Coon Hollow property), fencing with warning signs are installed at the entrance to Grotto Cave (Coon Hollow property), and warning signs are installed at Clyfty Cave (Newark property). As a result of conversations between INDOT and the Service, a warning sign was placed at the entrance to Salamander Cave (Garrison Chapel property) in 2012 by the Service. A warning sign was also placed at the entrance to Eller Cave in 2012.

c. **Biennial Census** – Total funding of $50,000 will be provided to supplement the biennial winter census of hibernacula within/near the proposed Action Areas. Funding will be made available in consultation with the Service.

Status – **To be completed**. A MOU was prepared between INDOT and the Service for the transfer of funds to address this commitment. Per the MOU, these funds will be made available upon submittal of a project plan by the Service.

2. AUTUMN/SPRING HABITAT

a. **Autumn/Spring Habitat Research** – Total funding of $125,000 will be provided 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 Service. Funding will be made available as soon as practical after Notice to Proceed is given to the construction contractor for the applicable Tier 2 Section (or earlier).

Status – **To be completed**. A MOU was prepared between INDOT and the Service for the transfer of funds to address this commitment. Per the MOU, these funds will be made available upon submittal of a project plan by the Service

3. SUMMER HABITAT

a. **Mist Netting** – A work plan for surveying, monitoring, and reporting will be developed and conducted in consultation with and approved by the Service. This mist netting research will be in addition to Tier 2 sampling requirements. Fifty-two mist netting sampling sites are presently under consideration. In earlier discussions, FHWA/INDOT agreed with the Service to complete surveys at 50 mist netting sites; however, 2 additional sites have been added to the list as

recommended by the Service. To limit the number of surveyed sites to 50, possibly 2 sites can be removed in Section 6. Monitoring surveys focused at known maternity colonies 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 in any section, or northern long-eared bats are captured in Section 5 (as well as in Section 6 when construction occurs there), 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.

Status – **To be completed**. Surveys will be conducted pre-construction, during construction and for five years post-construction. Pre-construction surveys will be conducted within the summer bat mist netting season immediately prior to the start of construction activities (including tree clearing) for any given construction contract. Surveys during construction will be conducted each year up to the year that the highway is open to traffic. The first of the five post-construction surveys will begin the summer following completion of the Section when the highway is open to traffic. Sites for this additional sampling include the following:

Section and Sites	**# of Sites**
Section 1 – Sites 3, 3B, 4C and 5	4
Section 2 – Sites 6, 7, 8, 11, 12, 12B, 14, 22, 29, and 30	10
Section 3 – Sites 11, 13, 14, 15, 18, 19, 21, and 23	8
Section 4 – Sites 2, 3, 8, 11, 14A, 18, 21, 23, 24, 27A, and 28	11
Section 5 – Sites 2, 4, 6, 14A, 17, 19, 22 and 24	8
Section 6 – Sites 5, 7, 8, 10, 13, 14, 17, 19, 20, 22 and 23	11
Total	52

Sections 1 through 5 pre and post-construction mist netting sites have been approved by the Service. Pre-construction mist netting was completed in 2008 for Section 1, while construction year mist netting was completed in 2009 through 2012 for four sites in Section 1. In 2012, Site 4 was replaced with Site 4C. Pre-construction mist netting was completed in 2010 for Sections 2 and 3, while construction year mist netting was completed in 2011 and 2012. The 2013 survey for Sections 1, 2, and 3 represents the first year of post-construction monitoring since the highway was open to traffic in 2012. In 2013, Site 22 for Section 3 was replaced with Site 23 due to lack of property owner access permission. Pre-construction mist netting for Section 4 (Sites 2, 3, 8, 11 and 14) was completed in 2010. Due to the location of construction segments scheduled for the fall-winter-spring of 2011 and 2012, the pre-construction survey for Site 18 was conducted in 2011. Similarly, pre-construction for Sites 21, 23, 24, 27A and 28 was completed in 2012. In 2012, Site 14 was replaced with Site 14A due to lack of property owner access permission. The 2013 survey for Section 4 (11 sites) represents a construction year monitoring effort. Mist netting was completed for 24 sites in Section 5 in 2012. The 2012 survey is anticipated to serve as the pre-construction survey in Section 5.

Note that three additional maternity colonies have been found since the original 13 colonies were identified in 2004 and 2005. They are associated with Clyfty Creek (Section 4), Beanblossom Nature Preserve (Section 5), and Lambs Creek (Section 5). No additional maternity colonies were found in 2013. The Beanblossom Nature Preserve colony was discovered by the Service and requested by them to be added to the I-69 colonies.

For the northern long-eared bat, the Service has identified 38 maternity colonies associated with I-69. These are broken down as follows:

Section 1	
	Pigeon Creek South
	Pigeon Creek North
Section 2	
	Patoka South Fork
	Robinson South
	Robinson North
	Flat Creek
	East Fork White River
	Aikman Creek
Section 3	
	Thousand Acre Woods
	North Fork Prairie Creek
	Smothers Creek
	White River – Weaver Ditch
	White River – Fourmile Creek
	First Creek West
	First Creek East
	Doans Creek West
Section 4	
	Bogard Creek
	Doans Creek East
	Black Ankle Creek
	Plummer Creek
	Mitchell Branch
	Little Indian Creek Monroe
	Indian Creek South
	Indian Creek West
	Indian Creek North
Section 5	
	Beanblossom East
	Beanblossom West
	Indian Creek Morgan
	Bryant Creek South
	Little Indian Monroe
	Bryant Creek North
	Jordan Creek
	Little Indian Creek Morgan

Lambs Creek

Sections 6

Clear Creek East Fork
White River
White River – Goose Creek
Pleasant Run

4. *GENERAL*

a. **Educational Materials** – 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 and northern long-eared bat. Funding would be provided after a Notice to Proceed is issued for construction of the first section of the project.

Status – **To be completed**. The name of this conservation measure was changed to "Educational Poster" per request from the Service in 2009. The Service indicated they would like to finalize the posters. A MOU was prepared between INDOT and the Service for the transfer of funds to address this commitment. Per the MOU, these funds will be made available upon submittal of a project plan by the Service.

b. **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 I-69. Information on the life history of the Indiana bat, protecting karst, and protecting water quality will be included in such displays.

Status – No rest areas are being proposed.

c. **Access to Patoka 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.

Status – **Completed**. Interchanges within the vicinity of the Patoka River National Wildlife Refuge include signage directing motorists to the Refuge's office. The nearest interchange to the Patoka River National Wildlife Refuge is at SR 64, west of Oakland City. Another interchange is south of Petersburg, at SR 57. The SR 64 interchange has this directional signage.

d. **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 were made available from a server accessed on the IGS website at IU: http://igs.indiana.edu/arcims/statewide/index.html. In addition, detailed GIS forest data (five meter resolution) has been developed for the 13 maternity colony foraging areas (circles with 2.5 mile radius) and WAA; and as part of this Tier 1 BA Addendum for the northern long-eared bat, 38 maternity colonies (1.5 mile radii) are analyzed for indirect and cumulative in Sections 1-

4, and those in Section 5 and 6 will have direct, indirect and cumulative impact analysis. This data was developed in order to better determine habitat impacts to the Indiana bat and the northern long-eared bat. This is the most accurate and detailed forest data known to exist for those areas. This data could potentially be used by the Service, other government agencies, or students to examine effects on the Indiana bat, northern long-eared bat, other species, or ecosystems over time.

Status – Completed. The website is: http://www.indianamap.org/

Appendix B