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

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 (USFWS) issued a Tier 1 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 USFWS issued a Revised Tier 1 BO in August of 2006 for the entire corridor. The Revised Tier 1 BO 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), and Section 3 (October 21, 2009). INDOT submitted a Tier 2 BA on November 1, 2010 for Section 4 of the Project. Consultation on the entire corridor was reinitiated in 2011, for the reasons discussed below. USFWS has prepared this Amendment to the August 2006 Revised Tier 1 BO.

New Information/Need for Reinitiation

During hibernacula surveys this past winter (2010-2011), the disease White Nose Syndrome (WNS) was found within several Indiana caves, including some of those that serve as Indiana bat hibernacula. This is the first time the disease has been documented in Indiana. Currently, no Indiana bats in Indiana have been confirmed with WNS. Several species, including little brown bats (*Myotis lucifugus*), have been found with fungal growth on the muzzle and other parts of the body; mortality attributed to WNS has been documented in little brown bats (*Myotis lucifugus*), tri-colored bats (*Pipistrellus subflavus*), and northern long-eared bats (*Myotis septentrionalis*) at one hibernacula this season in Indiana (R. Geboy, FWS, pers. comm.). The most recent distribution of suspected and confirmed locations for the disease is shown below in Figure 1.

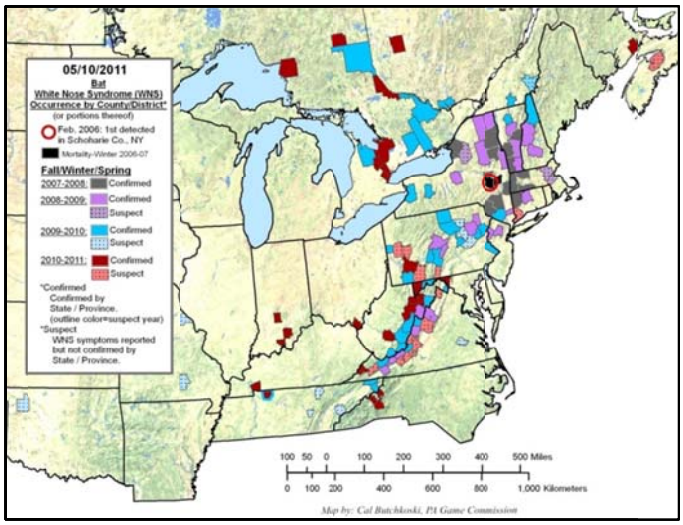

Figure 1.White Nose Syndrome Occurrence by County/District, Updated 05/10/2011.

In addition to new disease information, pre-construction mist netting was conducted this past summer (August 2010) as required by Conservation Measure D.5 in the Tier 1 Revised BO.

During the survey, a male Indiana bat was captured in I-69 Section 4 at Site 14 and a radio-transmitter was secured to it following U.S. Fish and Wildlife Service (USFWS) protocol. (A male Indiana bat was found at this same site in 2004 although was not radio-tagged). This male was tracked for seven days, during which time investigators tracked it to three different live shagbark hickory roosts (adjacent to but out of the Section 4 right-of-way) and one dead sugar maple snag within the right-of-way. During five nights of exit-count surveys the number of bats seen leaving the dead snag was: 34, 34, 32, 27, and 30. According to the criteria established in the Tier 1 RPBO, a maternity colony is determined to exist if there is evidence of reproduction in an area including the capture of a reproductive female or juvenile, or high emergence counts at an identified roost tree. Other factors considered in determining whether this colony was a new Indiana bat maternity colony included the proximity to other known colonies, availability of potential roost trees, and genetic analysis. The closest known maternity colonies are over 2.5 miles from this new colony's primary roost tree. The Plummer Creek colony is approximately 2.6 miles west and the Indian Creek colony is approximately 4.6 miles northeast.

Over 60% of the Action Area in Section 4 is forested, and according to forest transect survey data, is estimated to contain approximately two snags per acre. Considering the location of the roost, the number of bats using it, and the rural, forested nature of this part of the project area, it is not surprising this area supports more than the three maternity colonies originally discovered. An attempt to determine the sex of the bats roosting in the newly identified primary roost tree by DNA analysis of guano collected at the site was unsuccessful; however, it is improbable that a colony of that size (based on exit counts) was comprised of only male bats. Based on the discovery of this primary roost tree, the FWS has determined that four maternity colonies are present within Section 4: Doan's Creek, Plummer Creek, Little Clifty Branch (new), and Indian Creek. This brings the total number of known Indiana bat maternity colonies to 14 project-wide and will result in a slight increase in the estimated number of bats impacted by the project.

Finally, some minor forest impacts within 5 miles of Ray's Cave have recently been identified. Ray's Cave is designated as Critical Habitat for the Indiana bat under the Endangered Species Act. At the time Ray's Cave was designated as Critical Habitat (September 24, 1976), the federal rule did not identify constituent elements associated with the conservation value of this particular cave, nor did it for any of the other caves or mines that were designated at that time. Therefore, in the Tier 1 RPBO, the Bloomington, Indiana Field Office (BFO) identified the physical and biological features that make Ray's Cave essential to the conservation of Indiana bats. We believe the important conservation features include the cave's physical structure, configuration, and all openings that create and regulate suitable microclimates for hibernating bats within, its associated karst hydrology and cave stream recharge area/watershed, and the amount and condition of surrounding forested habitat (specifically all forest extending 5 miles from the cave's entrances) that is used by the bats during the pre-hibernation swarming period each fall. To avoid confusion with the use of the term "Action Area", this 5-mile area surrounding Ray's Cave is now referred to as its Winter Use Area (WUA) instead of Winter Action Area (WAA), as was previously used.

During the Tier 1 analysis it was determined that no direct impacts to Ray's Cave itself or any of its important conservation features (as identified by our office) would occur based on the then preferred alternative. At that time, a more northern connector road was the preferred alternative, and was located just outside of the Ray's Cave WUA. This led, in part, to a "not likely to adversely affect" determination for the Ray's Cave Critical Habitat. Since that time, a southern connector road has been identified as the preferred alternative. This new alignment will have approximately 26 acres of right-of-way that falls within the 5-mile radius of swarming habitat surrounding Ray's Cave, and will result in approximately 16.2 acres of direct tree cover loss (11.8 acres of upland forest loss). The nearest forest impact will occur approximately 4.5 miles from the cave's main entrance. The Ray's Cave WUA contains 32,607 acres of tree cover. Therefore, a loss of 16.2 acres of tree cover represents about 0.05% of the existing available habitat. The selection of the southern connector option does not change the other factors considered in the Tier 1 evaluation including the amount of indirect or induced impacts anticipated within the Ray's Cave WUA and the overall potential for increased vandalism of the cave. In order to account for some minor Tier 2 alignment adjustments, a 10% overage allowance for forested acreage impacts was established in the Tier 1 consultation. Because there were originally no impacts to the important conservation features of the Ray's Cave WUA, the 10% allowance for the Ray's Cave WUA has been exceeded and the new impacts are being evaluated during this reinitiation process.

Status of the Species

Rangewide Update

Since the completion of the Tier 1 RPBO in 2006, new species information and population data are available. Although this type of information continues to be updated via the Tier 2 consultation process for each project section, following is a brief summary of the most recent information available and the current status of the species.

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

Since the April 2007 release of the Draft Recovery Plan (and the 2006 Tier 1 RPBO), the USFWS BFO has collated the population data gathered during the 2007 and 2009 biennial winter hibernacula surveys throughout the range. Based on these surveys, it was determined that the Indiana bat's 2009 range-wide population stands at approximately 414,031 bats, which is a decrease over the 2007 range-wide population estimate of 469,489 bats (USFWS, unpublished

data, 2011; see Figure 2). It is important to note that Indiana's population estimate was recently revised for 2009 based upon newly obtained photo-analysis results at five of the major hibernacula in the state. This new analysis method added approximately 25,000 bats to the original 2009 estimate. Prior to 2007-2009, the range-wide, biennial population estimates had been increasing since at least 2001, indicating that the species' long-term decline had been, at least temporarily, arrested and likely reversed (USFWS, unpublished data, 2010). The observed range-wide decline in 2009 is partly attributable to the recently described disease dubbed White-Nose Syndrome (see discussion below), especially for decreased population estimates in the Northeast; however, some unexplained population declines have also occurred at some key hibernacula in Indiana and Kentucky as well. Just over half of the 2009 range-wide population hibernated in caves within the bat's namesake state of Indiana. The species' range-wide, regional, state, and hibernacula-specific population trends are being closely monitored by the BFO.

Given the 2009 range-wide Indiana bat population estimate of approximately 414,031, we assume that there are approximately 2,588 to 3,450 maternity colonies throughout the species' entire range [assuming a 50:50 sex ratio (Humphrey et al. 1977) and an average maternity colony size of 60 to 80 adult females (Whitaker and Brack 2002)]. At present, the Service has location records for approximately 269 maternity colonies (USFWS 2007), which, based on the assumptions above, represents 8 to 11% of the assumed number of maternity colonies in existence.

Recovery Efforts

Since the Indiana bat's initial listing, the recovery program has largely been focused on protection of important hibernacula (USFWS 1983). The proposed recovery program outlined in the draft Recovery Plan (USFWS 2007) has four broad components: 1) range-wide population monitoring at the hibernacula with improvements in survey techniques; 2) conservation and

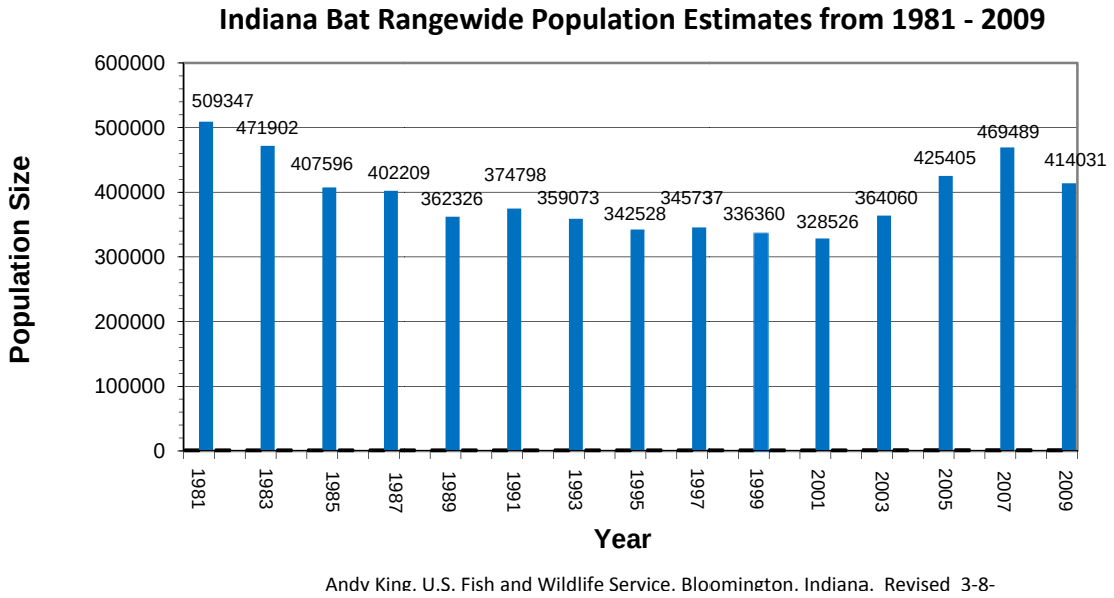

Figure 2. Indiana Bat Rangewide Population Estimates, Revised 2011.

management of habitat (hibernacula, swarming, and summer); 3) further research into the requirements of and threats to the species; and 4) public education and outreach. This recovery program continues to have a primary focus on protection of hibernacula but also increases the focus on summer habitat and proposes the use of Recovery Units to establish and focus recovery efforts.

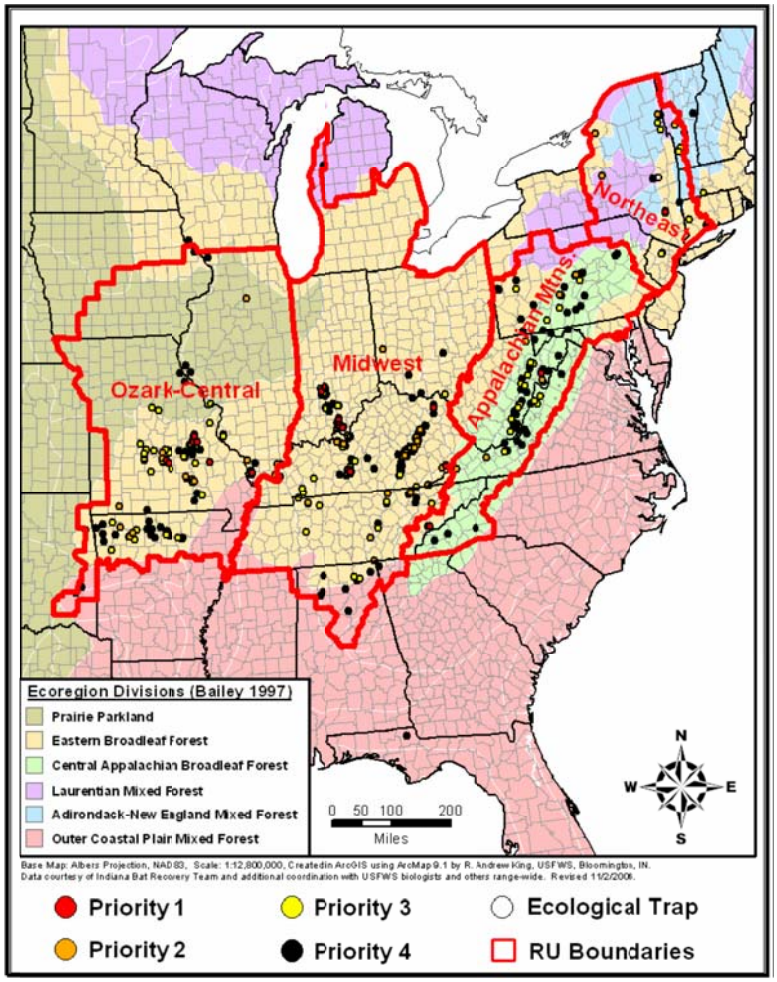

Figure 3. Proposed Indiana bat Recovery Units (Service 2007).

Recovery Units

The Service's proposed delineation of Recovery Units (RUs) relied on a combination of preliminary evidence of population discreteness and genetic differentiation, differences in population trends, and broad-level differences in macro-habitats and land use (USFWS 2007). The Indiana Bat Draft Recovery Plan proposes four RUs for the species: Ozark-Central, Midwest, Appalachian Mountains, and Northeast (USFWS 2007) (Figure3). The proposed project lies entirely within the Midwest RU. The 2009 Indiana bat population estimate for the Midwest Recovery Unit stands at 284,016. Although this is a decrease from 2007 (320,300),

over the last 10 years the Midwest Recovery Unit has seen an overall increase in the Indiana bat population.

Indiana Bat Status in Indiana

Historic hibernating population levels in Indiana were comprehensive enough to estimate on a statewide level for the first time in 1981, resulting in an estimate of 151,676 hibernating bats (USFWS, unpublished data, 2010). Since that time, the statewide estimate fell to a low of 104,680 bats in 1985 and then rose steadily until the 2007 survey when it reached 238,009 bats. In 2009, the state-wide population was estimated to be approximately 215,277 bats, which is a decrease based on 2007. In 2009, Indiana's 37 hibernacula harbored approximately 52% of the range-wide population of Indiana bats and approximately 76% of the Midwest Recovery Unit population. The State's (and the world's) two most populous Indiana bat hibernacula are Ray's Cave (n=59,250 bats in 2009) and Wyandotte Cave (n=52,610 bats in 2009), which are located approximately 5 miles and 70 miles from the I-69 project corridor, respectively. The status of Indiana bats in Indiana greatly influences the status of the species within the Midwest RU and rangewide.

New Threats: WNS and Wind Turbines

Recently a new threat has emerged with serious implications for the well-being of North American bats, including the Indiana bat. White-Nose Syndrome was first documented in a photograph taken in a New York cave in February 2006. Since that time, over 160 sites in 17 states (New York, Massachusetts, Vermont, New Hampshire, Connecticut, Virginia, West Virginia, Pennsylvania, New Jersey, Maryland, Missouri, Oklahoma, Tennessee, North Carolina, Indiana, Ohio, and Kentucky) and three Canadian provinces (Ontario, Quebec, and New Brunswick) have been documented with WNS, including over 50 known Indiana bat hibernacula. In some affected hibernacula in New York and New England, 90 to 100 percent of the bats have died. Some scientists estimate that WNS has killed more than a million hibernating bats (BCI 2010). The Northeast Recovery Unit population of Indiana bats has suffered an approximate 60% decline (loss of at least 32,292 bats, primarily in New York) between 2007 and 2010 (USFWS unpublished data 2011) much of which is attributed to WNS.

WNS has been characterized as a condition primarily affecting hibernating bats. Affected bats usually exhibit a white fungus on their muzzles and often on their wings and ears as well (Blehert *et. al.* 2009). Some affected bats may display abnormal behavior including flying during the day and in cold weather (before insects are available for foraging) and roosting towards a cave's entrance where temperatures are much colder and less stable. Many of the affected bats appear to have little-to-no remaining fat reserves which are necessary to survive until spring emergence. Recently the fungus associated with WNS has been identified as a previously undescribed species of the genus *Geomyces* (named *G. destructans*; G.d.) (Gargas *et. al*., 2009). The fungus thrives in the cold and humid conditions of bat hibernacula. It is unclear at this point if the fungus is causing the bat deaths directly, or if it is secondary to the cause of death. All of the possible modes of transmission are not currently known, although biologists suspect it is primarily spread by bat-to-bat contact. In addition, people may unknowingly contribute to the spread of WNS by visiting affected caves and subsequently transporting fungal spores to unaffected caves via their clothing and gear. Interestingly, G.d. has been documented

growing on hibernating bats in several European countries, but the fungus does not appear to be causing widespread mortality there (Puechmaille *et al.* 2010). Within the U.S., WNS has been confirmed in the Indiana bat, little brown bat, small-footed bat, northern long-eared bat, southeastern bat, tricolored bat and big brown bat. The *G. destructans* fungus has also been detected on two additional bat species: gray bats and cave myotis.

Despite all of the unanswered questions about WNS, there are now four years of population monitoring data which provide valuable insights into the effects of WNS. Considering WNS has been affecting hibernating bat populations for the longest in New York (since February 2006), data from that State may provide the best indication of the effects of this disease on bats, including Indiana bats. By 2009, all known Indiana bat hibernacula in New York, except for a recently-discovered site (P3 or P4) in Orange County (Bull Mine), had been documented with WNS. However, the apparent effects of WNS on Indiana bats varied between affected hibernacula. Some Indiana bat hibernating populations have declined by 92 to 100% (Hicks *et al*. 2008), while counts of Indiana bats at other WNS-affected New York hibernacula (*e.g.*, Jamesville and Barton Hill Mine) have remained somewhat steady (USFWS unpublished data, 2011).

Biologists with New York State Department of Environmental Conservation conducted photographic surveys of all New York Indiana bat hibernacula in March 2008, to compare with the 2006-2007 counts. There were some notable differences in the population trends between affected sites. For example, Indiana bat numbers and roosting locations appeared normal at both Barton Hill and Williams Hotel in 2008 (Service unpublished data). However, at Glen Park Cave, the "K-cluster" of Indiana bats appeared to be where expected at the end of March 2008, but preliminary analyses indicate that there were approximately 600-800 fewer individuals that season compared to the 2006-2007 count of 1,932 Indiana bats (a decrease of 30-40%). Preliminary 2008-2009 winter counts were back up to 1,719 Indiana bats, although in 2010, survey results indicate the colony was down to only 509 bats, an approximate 74% decrease from 2007. Recent numbers for this colony in 2011 were approximately 430.

Another significant decline (100%) was observed at Hailes Cave, where Indiana bats had been documented during every survey since 1981. In 2004-2005, 685 Indiana bats were observed at the site, but no Indiana bats (living or dead) were found at Hailes Cave during surveys in 2007, 2008, or 2009 (Hicks and Newman 2007, A. Hicks, NYSDEC, pers. comm.). Hailes Cave has been classified as an ecological trap hibernaculum in the Indiana Bat Draft Recovery Plan (USFWS 2007) due to the history of occasional flooding and freezing events at this site; however, the total and persistent loss of all Indiana bats at this site is unprecedented.

The 2007-2008 counts at the Williams Preserve and Williams Lake hibernacula were down by 92-99% when compared to 2006-2007 mid-winter surveys. In 2006-2007, there were approximately 13,014 and 1,003 Indiana bats in the Williams Preserve and Williams Lake hibernacula, respectively. In April 2008, counts were closer to 124 and 80 Indiana bats, respectively (Hicks *et al*. 2008). Count data collected during the February 2009 survey found 341 and 32 Indiana bats at the Williams Preserve and Williams Lake hibernacula, respectively. In 2010, preliminary counts at Williams Preserve found 190 bats and 26 bats at Williams Lake, for overall declines of approximately 97% to 98% since 2006-2007. Williams Hotel, which is in the same complex of hibernacula, had declined by only 29% (24,307 to 17,255) from 2007 to

2009; however, preliminary survey data in 2010 found only 8,152 bats hibernating at the site, a decline of almost 64% from 2007 (USFWS unpublished data). One deviation from the post-WNS population trend data from New York is the Barton Hill Mine site. The population at this WNS-affected site has remained stable, and actually slightly increased from 9,393 bats in 2007 to 10,678 bats in 2010, despite being positive for G.d. (USFWS unpublished data, 2011).

Up until recently, WNS has primarily been documented within the Northeast and Appalachian Mountain Recovery Units (RUs) (Figure 2). However, in the winter of 2009-2010, *G. destructans* was detected on bats in Missouri, which is in the Ozark-Central RU, and WNS was confirmed in three caves in central Tennessee, which falls within the Midwest RU. In addition, one site has recently been confirmed with WNS in both Ohio and Kentucky, and at least three sites, including three separate species, have been confirmed with WNS in Indiana (USFWS 2011). The Midwest RU covers the states of Indiana, Kentucky, Ohio and portions of Alabama, Georgia, Michigan and Tennessee (Figure 2). To date, WNS has not been found in Alabama or Michigan. There are many factors regarding WNS that remain unknown including if there are species' and/or regional differences in susceptibility and mortality rates, how long symptoms may take to manifest, and the long-term population effects. Meanwhile, the Service, States and multiple researchers are continuing to learn more about the disease and options for minimizing its spread and impacts. To date, no WNS-related mortality has been documented in the Ozark RU and no mortality to Indiana bats has been found in the Midwest RU; however, based on the pattern seen in the northeast and Appalachians, we believe the disease will continue to spread throughout these regions within the next several winters, with some level of mortality likely to occur. For more information on WNS see http://www.fws.gov/WhiteNoseSyndrome/.

Lastly, there is growing concern that Indiana bats (and other bat species) may be threatened by the recent surge in construction and operation of wind turbines across the species' range. Until the fall of 2009, no known mortality of an Indiana bat had been associated with the operation of a wind turbine/farm. The first documented wind-turbine mortality event occurred during the fall migration period in 2009 at a wind farm in Benton County, Indiana. The Service is now working with wind farm operators to avoid and minimize incidental take of bats and assess the magnitude of the threat. There are no known wind farms within the I-69 project area. For more information see http://www.fws.gov/midwest/News/release.cfm?rid=177.

Action Area

The proposed project involves the construction, operation, and maintenance of an Interstate highway, I-69, from Indianapolis to Evansville, through southwestern Indiana. The "Action Area" is defined by regulation as all areas to be affected directly or indirectly by the Federal action and not merely the immediate area involved in the action (50 CFR § 402.02). The action area is not limited to the "footprint" of the action nor is it limited by the Federal agency's authority. Rather, it is a biological determination of the reach of the proposed action on listed species. For Tier 1, the FHWA, INDOT, and the Service's BFO agreed to break the Action Area down into two seasonally based "sub-" action areas for the purpose of analyzing impacts to the Indiana bat. These areas include a summer impact area, referred to as the Summer Action Area, and a winter impact area, referred to as the Winter Action Area. The Tier 1 RPBO (pg. 32) specifically defines these areas and is hereby incorporated by reference. These two impact areas combined comprise the project's Action Area.

Environmental Baseline

Status of the Species in the Action Area

Maternity Colonies

As discussed above, a new maternity colony was discovered during pre-construction surveys in Section 4 in 2010. A male Indiana bat was captured and radio-tagged in early August, and was found to be roosting with 27 to 34 other bats on at least five separate days. The bats were roosting in a dead sugar maple over 2.5 miles from any previously identified maternity colony. Since the Tier 1 RPBO was completed, additional limited bat surveys have been conducted in several of the project sections. One year of both pre- and post-construction surveys has been conducted in Section 1, and one year of pre-construction surveys has been conducted in Sections 2, 3, and the southern portion of 4. In 2009, three reproductive adult female Indiana bats were captured in Section 1, and in 2010, one adult male was found. Also in 2010, five adult females were found in Section 2, one adult female in Section 3, and one male in Section 4. Some additional roost trees have been identified, including a new primary roost in Section 4 and a secondary roost in Section 2. A few of the roost trees initially identified are no longer standing, including two secondary roosts within the Veale Creek maternity area. One tree in the Plummer Creek colony area and one in the Doan's Creek area were recently described as being deteriorated (although they were still standing). Finally, the newly identified primary roost in the Little Clifty Branch maternity colony area was found on the ground in late November of this year. It is unclear how the tree was felled, but no bats were thought to be present at that time of year. The above discoveries bring the total number of maternity colonies within the Summer Action Area to 14.

Hibernacula Populations and Adult Males

During the Tier 1 evaluation, the most recent population estimates were derived from the 2005 winter hibernacula surveys. Currently, the most up-to-date population information is from the 2009 surveys. In 2005, the estimated number of Indiana bats in all the hibernacula within the Action Area was 74,042. In 2009, the estimate was 97,688 bats. Table 1 lists the updated population for each hibernaculum within the I-69 Action Area based on 2009 data where available. In order to estimate the density of male bats within the Action Area during the summer months, we assumed half of the bats using the hibernacula within the Action Area were male and that half of those male bats would remain close to their hibernacula during the summer; the other half of the male bats would disperse, presumably to other areas within the Action Area (See footnote in Table B4 in Appendix A).

Table 1: Updated Indiana bat Populations within Hibernacula in Action Area	
Hibernacula	**2009 Indiana bat Population**
Ray's Cave	59,250 (-18,437 from 2007))
Coon Cave	18,640 (+4,541 from 2007)
Grotto Cave	19,197 (+6,390 from 2007)
Ashcraft Cave	0 (-3 from 2005)
King Blair/Brinegar	218 (0 from 2007)
Sexton Spring Cave	61 (-29 from 2007)
Saltpeter	48 (-35 from 2007)
Leonard Springs	188 (+106 from 2007)
Buckner Cave	10 (-39 from 2007)
Sullivan	9* (-16 from 2005)
Storm Pit	48 (+20 from 2005)
Reeves Cave	17** (-17 from 2003)
Salamander Cave	0** (0 from 2003)
Ozzy's Hole	1 (only surveyed in 2006)
Primitive Baptist Spring Cave	1**
*Last survey completed in 2007	
** Last survey completed in 2005	
Note: An independent study of Salamander Cave in March 2010 showed approximately 40 Indiana bats.	

Ongoing Stressors in the Action Area

A detailed discussion of ongoing stressors affecting the Indiana bat within the Action Area is found in the Tier 1 RPBO on pages 75 and 79. The discussion is broken down by Summer and Winter Action Areas and is hereby incorporated by reference. In addition to the previously discussed stressors, the disease WNS has now been found within two of the Priority 1A hibernacula within the Action Area (R. Geboy, USFWS, pers. comm.). Mortality of Indiana bats due to WNS has not been documented within the Action Area, although mortality of other species has been found.

Effects of the Action

Although the project activities and footprint are essentially unchanged (with the exception of the south connector road), based on the new number of colonies and revised hibernacula and male bat density estimates, we have determined that a larger number of Indiana bats may now be exposed to those impacts and therefore the project may result in an increase in the projected number of Indiana bats affected through the year 2030 (see Table B4 in Appendix A). More importantly, the recent discovery of WNS in Indiana warrants an additional analysis regarding the degree (based on the potential for significant population declines in the Midwest RU) the current activities may affect the species' ability to persist and recover at the local level (primarily the maternity colony level), in the Midwest Recovery Unit, and rangewide.

Survival and Recovery of Maternity Colony Units

Based on our assumptions as described in the Tier 1 RPBO, each maternity colony is comprised of 80 adult females and their single offspring. This results in a maximum of 160 bats per colony by mid-June after the young are born and become volant (i.e., capable of flight) around mid-July. Therefore, given the documented presence of 14 maternity colonies in the Action Area (which includes the new Little Clifty Branch colony) and an approximate total of 160 females and their pups per colony, we can assume that there are a combined total of approximately 2,240 (14 x 160 = 2,240) adult females (n=1,120) and juveniles (n=1,120) within or adjacent to the Action Area during the summer active period and that varying proportions of the bats in these colonies are likely to be exposed to direct and/or indirect effects from I-69.

Estimates of the number of bats exposed and adversely affected (i.e. disturbed, injured, or killed, henceforth referred to as take) during the summer maternity season as a result of the various project stressors are shown in Appendix A, Table B4. These numbers have been recently updated to reflect the newly identified maternity colony. The impact this anticipated take will have in light of the presence of WNS is discussed below.

As previously mentioned, until just recently, the Indiana bat population numbers in Indiana over the past 20 years indicate an increasing trend, particularly for the larger, Priority 1A hibernacula within the project area. This hibernating population appears to be an important source population for maternity colonies in the central portion of the state, including portions of the Action Area (USFWS unpublished data, 2011). From 1997 to 2009, the Indiana bat hibernating population at the three Priority 1A sites in the project area increased from 58,587 to 97,087 bats. A population increase of this magnitude cannot be from increased survivorship or reproduction rates alone; immigration from other hibernacula must have also occurred. Bats that migrate to high-quality summer habitat close to their hibernacula are exposed to less migration stress and mortality risk than long-distance migrants would be exposed to, and this probably contributes to higher survival and reproductive rates. In addition, because Indiana is at the core of the Indiana bat's range, it is logical to assume that factors necessary for the survival and success of the species, both in summer and winter, are optimal here, compared to other recovery units.

The impact WNS may have on the ability of the Indiana bat to persist and recover is presently unknown. We currently do not have estimates of adult survivorship, juvenile survivorship, or fecundity for Indiana bat populations affected by WNS. Based on a small amount of New York survey data from 2007 to 2010, Indiana bat hibernating populations in New York appear to have declined by 61% overall with affected individual hibernacula having population growth rates ranging from –99% to 14% during this time period. To determine the effects of the proposed project on the Indiana bats in the Action Area in light of WNS, we used a reasonable worst-case scenario of a 60% decline in the estimated maternity colony populations in the Action Area over the next three years. Using our previous assumption that a maternity colony consists of on average 80 adult females and their single offspring, a 60% decline would reduce the maternity colony to 32 adult females by the end of three years. Based on the range of known sizes of maternity colonies, a colony of 32 adult individuals would still be considered a viable colony. Direct and indirect project-related maternity colony impacts, as currently estimated, are roughly 1 bat per colony/per year, estimated through the year 2030. Although final survey results in Indiana are not yet in for 2011, preliminary information suggests that there have not been any significant population shifts or declines in the numbers of Indiana bats at hibernacula visited this

year and no evidence of WNS in the largest hibernacula within the Action Area. In fact, Coon and Grotto Caves both show an increase in their Indiana bat populations from 2009 to 2011 (A. King, USFWS, pers. comm.).

Most project impacts to the maternity colonies will be as a result of direct loss of roosting and/or foraging habitat, and impacts from construction noise and/or vibrations. These impacts will be temporary in nature and occur at different times over a period of years. Almost all direct impacts related to tree clearing and its associated construction noise in Sections 1-3 have already occurred. These impacts (namely forest loss) will most likely be realized by the maternity colonies in these sections this upcoming maternity season, presumably before any significant impacts from WNS occur in Indiana. (Pre- and post-construction monitoring is being conducted in all sections to help evaluate the on-going status of the maternity colonies in the Action Area.) Similarly, we anticipate many of the project impacts in Sections 1,2,3 and 4 to occur prior to the full onset of WNS (if the spread and the effects of the disease follow the pattern observed in the Northeast) and that these affected colonies will likely recover from most project related habitat impacts prior to any substantial WNS-related population reductions. Thus, the effects of most project impacts will be occurring to individuals and maternity colonies not yet affected by WNS. No mortality due to direct impacts during the construction period (first 1-3 years of the project) is anticipated (due to seasonal tree clearing restrictions) and therefore direct mortality of individual adult females (which are considered the most sensitive individuals) from highway construction activities is not anticipated. Some decrease in reproductive fitness could occur as a result of habitat loss. In the spring, pregnant females could abort their pups or experience a delay in fetal development if they are forced to search for new roosting and/or foraging habitat during this critical time when fat reserves are low and they are stressed from pregnancy and migration. Delayed parturition could result in decreased survivorship for the pups, with less time to build up fat reserves prior to hibernation.

If WNS effects manifest earlier than anticipated, we believe the effect of the project impacts could be greater. However, we anticipate that with declining numbers of bats, the number of bats exposed to the project impacts will be fewer as well, and hence, so too will the number of Indiana bats taken (See Appendix A, Table B4). In addition, with declining numbers of bats in an area, the colonies' foraging and roosting requirements would be less as well and we would anticipate that the loss of habitat would not cause the level of effects previously identified.

The proposed action includes numerous conservation measures, including forest habitat mitigation. The habitat mitigation efforts include 3:1 forest restoration/preservation with permanent protection, focused within each of the maternity colony areas. These properties will provide and maintain ample resources for the local Indiana bat populations throughout the project corridor. At least 2 known roost trees have been acquired as part of the mitigation efforts. In addition, over 450 acres of acquired bat habitat in Section 2 will be incorporated into the Patoka National Wildlife Refuge for permanent protection and management. Over the long term, mitigation efforts as part of this project will improve habitat conditions and protect Indiana bat summer habitat in perpetuity. Currently, nearly 2,200 acres within the Action Area have been permanently protected including 800 acres that will be reforested. Just over 1,500 acres fall within the various maternity colony areas and another 170 acres of habitat has been protected adjacent to these maternity areas. Three property owners have recently signed documents indicating their intent to sell or place conservation easements on their properties for an additional

700 acres of forest mitigation, including 79 acres of reforestation. A total of approximately 5,000 acres of restored and/or existing forested habitat is anticipated to be permanently preserved within Sections 1-4. Furthermore, almost all of the mitigation (proposed and acquired) in Section 4 (which contains most of the hibernacula) occurs within the swarming habitat of one or more of the 15 hibernacula in the area. Protection of Indiana bat hibernacula and associated habitat is discussed below. Early estimates for Indiana bat forest mitigation requirements for the final two sections of the project (5 and 6) indicate another 1,700 acres will eventually be permanently protected including a significant amount of restoration (over 500 acres). We anticipate that these mitigation efforts, over time, will offset the impact due to loss of foraging and roosting habitat for the Indiana bats exposed to the project. That is, we do not anticipate that any maternity colony's habitat will be reduced or degraded such that its survival or long-term reproductive success is hindered. Furthermore, the permanent protection of existing forested habitat within the Action Area will ensure that suitable habitat will remain in the Action Area in perpetuity and be protected from future development.

Some mortality may occur due to induced development where no seasonal tree-clearing restrictions would apply. Although any take of Indiana bats by any person or entity is prohibited, we expect indirect take via habitat loss occurs without the property owners or our knowledge. We do not expect much indirect development to occur in each section until a substantial amount of highway construction is underway and/or completed; to date, less than 2 miles of roadway has actually been constructed. The bulk of construction activities for Sections 1-4 will occur during the next couple of years. Indirect take will occur over a period of years and is not anticipated to eliminate or displace any colonies.

Roadkill may also result in direct death of maternity colony members; as with take from induced development, the full effect of the take is not anticipated to occur until the entire interstate is constructed and fully operational (*i.e.* free flowing traffic on all six sections). Until such time we expect only localized increases in traffic. In addition, some direct mortality from roadkill may be compensatory rather than additive as the number of roadkills currently occurring on local roads will decrease as traffic shifts to completed segments of the new I-69 roadway.

Although Indiana bats generally avoid crossing over open areas (Brack 1983; Menzel *et. al.* 2001), they have been documented flying over busy interstate highways such as I-70 near the Indianapolis Airport (USFWS 2002) and U.S. Route 22 near the Canoe Creek Church in Pennsylvania (Butchkoski 2003). In both of these circumstances, however, the road lies between known roosting and foraging areas for members of the colonies (Butchkoski 2003; D. Sparks, ESI, Inc., pers. comm. 2005). While it has been shown that Indiana bats will cross over busy highways when they divide foraging from roosting areas, it should also be noted that through a radio telemetry study by Indiana State University, Sparks (pers. comm.) observed that individuals of the Indianapolis Airport colony avoided flying over I-70 where a bridge provided a 35-ft high corridor beneath the road. The results of this particular study indicate that bats may avoid flying over highways when an alternative corridor is present. Recent research published by Zurcher *et. al*. 2010 indicates that bats may actually avoid traffic. In this study, bats were more than twice as likely to reverse their flight course crossing a road when vehicles were present. They found that when automobiles were present, 60% of bats exhibited avoidance behavior and reversed course at an average of 10 m from the 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. The roadkill estimates used for this project represent what we believe to be a reasonable worst-case scenario and could be reevaluated during subsequent Tier 2 consultations if more detailed information becomes available.

As with the other estimated forms of take, roadkill estimates were based on a percentage of each entire maternity colony being affected. If the number of colony members is decreased as a result of WNS, then the amount of bats exposed to roadkill, and therefore killed, would decrease as well. For example, 5% of each colony of 160 bats (8 bats total or 1 bat every other year) was estimated to be taken over a period of 17 years once the road was fully operational. If each colony is reduced by 60%, then 5% of 64 bats (3 bats total or 1 bat every 5 years) would be anticipated to be killed, reducing the total take from 104 to 42 bats over the 17 year period.

We believe the current estimates for roadkill, while reasonable, are very conservative (*i.e*. represent a worst-case scenario). Over the long-term, based on the recent research, availability and location of habitat, location of maternity colonies, and proposed bridge heights over larger streams, we do not believe the sporadic take of a few individuals every couple of years due to roadkill will hinder the long-term survival and reproductive fitness of any of the maternity colonies.

As indicated in the Tier 1 RPBO, none of the estimated take, direct or indirect, was expected to cause the loss or permanent displacement of any maternity colony. This assumption is still valid even if individual colonies decline to 64 bats (32 adult females) per colony. Because most take is in the form of temporary reductions in reproductive fitness and not direct death of maternity colony members, we do not anticipate the effects of the action to reduce the long-term survival or reproductive potential of the maternity colonies exposed to the project.

Adult Males (summer impacts)

Estimates of male bat density within the Action Area have been slightly adjusted since the 2006 Tier 1 RPBO. We estimate that half of the 97,688 bats (2009 estimate) using the hibernacula within the Action Area are males (48,844) and half of those would remain near their hibernacula during the summer reproductive season (24,422). The expanded WAA (portion of the Action Area where bats swarm and hibernate in fall and winter) consists of approximately 146,725 acres of tree cover which results in a density of male bats in the area of 0.17 bats/acre (24,422 bats/146,725 ac. = 0.17 bats/ac). For the portion of the Action Area that extends north and south of the hibernacula area, we assume the density of adult males is 0.085 adult males per acre of forested habitat (half of the density near their hibernacula). Using these density estimates and the number of acres impacted by the project (excluding the maternity colony areas), we estimated the number of bats exposed and impacted by the project and its various stressors (see Table B4). Because the number of male bats exposed to the project impacts during the summer has slightly increased, the original take estimates were proportionally increased resulting in a very small rise in estimated take of males during the summer. The take originally associated with utility relocations, however, has been recently reduced since those actions will be closely coordinated and will be permitted under the I69 project Incidental Take Permit and will comply with the associated Terms and Conditions.

If and/or when population declines associated with WNS are realized, male Indiana bat numbers would be equally as affected as females. As previously discussed, if the number of males using the Action Area is decreased, the estimated take would also decrease. With the exception of loss due to roadkill, direct loss of males during the summer months due to habitat loss (direct and indirect), noise, and disturbance of summer roosting in ungated hibernacula, is expected to be minimal; only 15 male bats throughout the life of the project. The number of road-killed male bats during the summer is also low, with 31male bats anticipated to be killed over a 17-year period once the highway is fully operational. With a portion of the take already occurring, and some occurring in small increments over a long period of time in the future, these impacts to male bats during the summer, even in light of WNS, will have no measureable impact on the Indiana bat populations to which these individuals belong.

Indiana Bats within the Wintering Portion of the Action Area (WAA) during the Spring, Fall and Winter

No direct adverse impacts are anticipated to any of the 15 Indiana bat hibernacula in the Action Area, although a small amount of take (24 bats through the year 2030) is anticipated due to loss of fall roosting and swarming habitat surrounding several of the hibernacula. The only hibernaculum that appears to have hydrological connectivity (*e.g.*, groundwater connections) with the proposed I-69 corridor is Ashcraft Cave. This cave is not currently, nor has it been in the past, an important hibernaculum for Indiana bats (*i.e*., it is a Priority 4 hibernaculum). Ashcraft Cave is prone to flooding and contained no hibernating Indiana bats when it was last surveyed in January 2005 (Brack et al. 2005). The bulk of anticipated take of bats during the fall, winter, and spring will likely be due to unauthorized, human disturbances of hibernating bats in vulnerable or unprotected hibernacula and roadkill of foraging bats (would primarily occur during the annual swarming period in late summer and fall). Ongoing monitoring at several of the major hibernacula in the area suggests that the number of unauthorized visits has decreased over the past several years (S. Johnson, IDNR, pers. comm.). This monitoring will provide baseline information regarding unauthorized visits once the highway is fully operational.

Take associated with roadkill and human disturbance is based on a percentage of exposed bats (estimated in 2006 to be 0.25% and 1%, respectively). Based on the latest population estimates for each of the hibernaculum within the Action Area, the number of Indiana bats taken by the various stressors during the fall swarming and spring staging periods and the winter hibernation months has increased (n = 883 bats) due to an overall increase in the local population using those hibernacula (an increase from 74,042 bats in 2005 to 97,688in 2009). Although the number of bats likely to be exposed and hence potentially taken has slightly increased, the percent of the overall population potentially affected over a 17-year period has actually decreased, from 1.2% to 0.9% (a large increase in bats at one of the protected caves did not result in any additional take and recent protection added to Coon Cave will actually reduce the previously estimated take). Take associated with unauthorized visits is not anticipated to occur until a significant amount of the highway is constructed and operational, facilitating access to the general area.

Under a reasonable worst-case scenario (*i.e*. all hibernacula-related take occurring in a single year), the anticipated levels of take primarily based on roadkill and unauthorized disturbance/vandalism are not likely to significantly impact the RU. If and/or when WNS begins to negatively affect the local hibernating populations, we would also see a decline in the number of bats exposed to human disturbance and roadkill. All of the Priority 1A caves in the Action

Area are over 4.5 miles from the proposed I-69 roadway. Theoretically, if fewer bats are using the hibernacula and surrounding swarming habitat, we would expect the remaining bats to stay closer to the hibernacula during the swarming period and therefore their exposure and subsequent risk of take via roadkill on I-69 would likely be reduced. If the Action Area winter population is reduced by 60% due to WNS (*i.e.* the population decreased to 39,075), we estimate mortality due to roadkill would be approximately 6 bats per year once the highway is operational. We believe the winter population could withstand this loss and remain viable. In addition, cave closures and heightened awareness by the caving community of spreading the disease could result in decreases of local cave visits and minimization of take attributed to human disturbance.

To date, mitigation efforts have resulted in the permanent protection (including some reforestation) of over 600 acres within the winter portion of the Action Area (*i.e.* area surrounding all of the hibernacula; defined as WAA in the Tier 1 RPBO) and another 107 acres just outside this area, including one property with a small Indiana bat hibernaculum (Clifty Cave); eventually, between 2,878 and 3,583 acres of habitat will be acquired for mitigation purposes within and near one of the core hibernacula areas in the Midwest RU. Most importantly, a Notice of Intent to sell a permanent conservation easement for two Priority 1A Indiana bat hibernacula has been signed. This easement will permanently protect Coon and Grotto Caves and nearly 300 acres of surrounding swarming habitat. Over 37,000 Indiana bats hibernated in these two caves in 2009. Permanent protection and management of these two caves will significantly reduce the take associated with unauthorized disturbance and vandalism at Coon Cave. The 2006 Tier 1 RPBO estimated the take of over 180 bats at Coon Cave through the year 2030 due to human disturbance; this will now be eliminated. Conservation easements on two other small Indiana bat hibernacula are also expected to be purchased in the near future. In addition, a conservation easement on a large cave in the Action Area not currently used by Indiana bats has been purchased with the intent to restore the caves airflow and surrounding forest in hopes it may eventually be suitable for Indiana bats. Should WNS drastically reduce the local Indiana bat population, the large amount of acquired mitigation property (including important hibernacula) will ensure that ample hibernating, roosting, swarming, and foraging habitat for Indiana bats remains in the Midwest Recovery Unit in perpetuity and reduce the potential for future habitat-related impacts to the local population. Management and protection of these important hibernacula will be critical for the protection, survival, and recovery of the species.

Little Clifty Branch Colony Analysis

In order to determine the amount of take anticipated for the newly discovered Little Clifty Branch colony, the likelihood of take for each stressor was analyzed for the new colony, as was done in the Tier 1 consultation for the other 13 colonies. The stressors likely to cause the most take at this maternity colony include loss of roosting and foraging habitat and roadkill. Although the primary roost tree for this colony was recently uprooted, we anticipate that when the colony returns this summer, they will choose another primary roost in the vicinity of their old one.

Loss of a primary roost tree or several surrounding secondary roosts could have adverse impacts at the colony level. Pregnant females would be required to search for new roosting habitat in the spring and this effort could place additional stress on the females at a critical time when fat reserves are low and they are already stressed from pregnancy and migration. This could cause

the females to abort their pregnancy or delay fetal development; the latter could lead to less time for the newborn pups to build up fat reserves for winter hibernation, potentially reducing their survivorship. Furthermore, females may be forced to use roosts less effective in meeting thermoregulatory needs, or roost singularly or in small groups, which again may not meet their thermoregulatory needs and reduce their reproductive success. While some impacts are reasonably likely to occur as a result of the loss of a primary roost tree, given the inherent ability of the Indiana bat to adapt to the ephemeral nature of roost trees and the availability of suitable roosting and foraging habitat in the surrounding landscape, it is probable that the colony will be able to reestablish a new primary roost and additional alternate roosts within a fairly short period of time; loss of a primary roost tree is not expected to be a limiting factor for the success of this colony, particularly considering the amount and quality of surrounding forested habitat. Similar short-term impacts associated with locating new foraging habitat would also be expected once clearing activities begin.

Other impacts to the new colony include collision with fast-moving vehicles once the road is in operation. As previously discussed, although bats may cross roads while commuting between roosting and foraging habitat, several studies have indicated that they will do so primarily if roads divide foraging and roosting habitat. It should also be noted that studies at the Indianapolis Airport have indicated that bats may avoid flying over highways when an alternative corridor is present. In addition, more recent research at the Indianapolis Airport has revealed that bats will avoid traffic by reversing their flight course when vehicles are present on the roadway.

While there is some evidence that Indiana bats will fly across roads during the summer, it is unclear if the proposed road will present a physical barrier to the movements of Indiana bats. The Service anticipates that individual home ranges of Indiana bats that occur in the maternity colony area will be impacted differently depending upon the spatial extent to which the project will impact each bat's roosting, foraging, and commuting areas. The home ranges for some Indiana bats may be partially or even entirely divided by the project. These bats may modify their home ranges to avoid crossing the roadway or they may choose to cross the road (or cross under the road if bridging is sufficient) to access roosting or foraging areas. Bats that do cross the road will be subject to the risk of being struck by vehicles traveling on the roadway; bat mortalities from vehicle collisions, including at least one Indiana bat, have been documented at the Canoe Creek site in Pennsylvania (Butchkoski 2002). Based on the limited information we have regarding the Little Clifty Branch maternity colony, we conservatively assume up to 5% of the colony (8 bats) over a 17 year period could be impacted by fast-moving vehicles along the interstate once the highway is fully operational (*i.e*. all six sections are constructed and have free-flowing traffic). Some take may be offset as traffic (and some unknown amount of currently occurring take) on local roads (*e.g.* SR 45) is eventually diverted to the new interstate.

Other stressors evaluated for the new colony include construction noise/vibrations, and indirect loss of habitat due to utility relocation, home relocations, induced development, etc. The number of animals per colony exposed and affected by all of these various stressors is estimated based on a variety of variables including: the location of the right-of-way within the maternity colony area, amount and location of tree cover before and after construction, location of known roost trees, connectivity of remaining habitat, anticipated indirect and cumulative impacts, etc. Many of these factors are specifically discussed within the Tier 1 Biological Assessment (BA) Addendum, Tier 1 RPBO and the subsequent Tier 2 BAs. The Tier 2 BA and BO for Section 4

will address this colony in more detail. Please refer to Table B4 in Appendix A for additional information regarding the amount of take anticipated for this colony (note that these estimates are through the year 2030). Based on the impacts discussed above (as well as the proposed mitigation efforts) and the amount and location of existing foraging and roosting habitat, we do not anticipate the effects of the action to reduce the long-term survival or reproductive potential of this maternity colony.

Ray's Cave Critical Habitat

The revised preferred alignment for the County Line Interchange connector road will consist of approximately 26 acres of right-of-way that falls within the Indiana bat swarming habitat surrounding Ray's Cave (an important conservation feature of the critical habitat) and will result in approximately 16.2 acres of direct tree cover loss. The 5-mile radius of swarming habitat contiguous with Ray's Cave contains 32,607 acres of tree cover therefore a loss of 16.2 acres represents about 0.05% of the existing available habitat. The selection of the southern connector option does not increase the other stressors considered in the Tier 1 evaluation including the amount of induced impacts anticipated within the area surrounding Ray's Cave and the overall potential for increased vandalism of the cave. The slight impact to the swarming habitat surrounding Ray's Cave will not significantly reduce the quality or quantity of the habitat and this area will likely still support the number and overall fitness of Indiana bats occupying this site as they prepare for hibernation in the fall and when they emerge from hibernation and prepare to migrate in the spring. These impacts will not affect Ray's Cave itself, or measurably adversely affect any of the important conservation features of Ray's Cave.

Conclusion

(Our non-jeopardy conclusion regarding impacts to the bald eagle still stands as stated in the original December 3, 2003 Tier 1 BO.)

After reviewing the current status of the Indiana bat, updated information regarding WNS and the environmental baseline for the action area, and new information regarding the preferred alignment of the road connecting the County Line Interchange to SR 45/54/445 in Greene County, the USFWS has concluded that appreciable reductions in the likelihood of survival and recovery of Indiana bats due to the construction, operation, and maintenance of I-69 from Evansville to Indianapolis, Indiana are unlikely to occur, and hence, FHWA has ensured that their proposed action is not likely to jeopardize the continued existence of the Indiana bat or destroy or adversely modify its designated critical habitat.

Our basis for this conclusion follows:

- An increase in the number of swarming habitat acres affected (16.2 acres of tree cover out of 32,607 acres) surrounding Ray's Cave will not reduce the value of the habitat and this area will continue to support the survival and fitness of Indiana bats as they prepare for hibernation in the fall and when they emerge from hibernation and prepare to migrate in the spring. Any impacts from this loss are considered immeasurable, and thus, will not reduce the likelihood of conserving the Indiana bat in the Midwest RU.

- 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.
- In general, areas with less than 5% forest cover are not capable of sustaining an Indiana bat maternity colony. Currently, forest coverage (*i.e.* tree cover) in the maternity colonies ranges from 10.5% to 70% (estimates for tree cover loss at the colony with 10.5% cover is only 1 acre total); see Table B2 for tree cover estimates per colony. The construction of I-69 will directly reduce the total amount of forest habitat/tree cover available around each of the 14 colonies and in some cases will cause small additional amounts to be indirectly lost by induced development. When combined, the percentages of existing tree cover that will be directly and/or indirectly impacted at each maternity colony is very small. Ten of the 14 colonies will lose less than 1% of their tree cover, and the other four will lose 1.4%, 1.7%, 2.1% and 2.6%;therefore the total amount of forest loss is insignificant for each colony. We do not anticipate any long-term reductions in maternity colony reproductive success or survival as a result of this loss.
- We do not believe that any of the 14 maternity colonies will be permanently displaced by the interstate; that is, sufficient quality and quantity of habitat will remain throughout the life of the project. In addition, the proposed 3:1 mitigation commitment for upland forest losses will largely be focused on improving forest habitats within these affected maternity colony areas, and thus, any adverse habitat impacts to these colonies will be temporary.
- We estimated the maximum overall amount of I-69 related incidental take of Indiana bats **during the summer** will be no more than 304 bats (253 females/juveniles and 51 males) spread over a 17-year long period. On an annual basis, this equates to about 18 bats being taken per year throughout the entire project corridor. Table B4 in Appendix A breaks down the anticipated take by colony. This total take equates to less than 1% of the Indiana bat population that occupies these areas each summer.
- The proposed action will only directly or indirectly take a relatively small number of bats **during fall, winter and spring** (estimated total = 883 bats over a 17-year long period or about 52 bats/year; see Table B5) and will only have minimal, short-term effects on these bats' respective maternity colonies and hibernating populations. The estimated amount of yearly take represents only 0.05% of the *annual* winter population within the Action Area. Loss of these individuals will have no measurable effects on the viability of other maternity colonies in the region or the species' range or to hibernating populations to which these individuals belong. Again, the proposed action in combination with relatively small amounts of cumulative impacts/take is not reasonably expected, directly or indirectly, to cause an appreciable reduction in the reproduction, numbers or distribution of the Indiana bat as a species.
- In the event that a 60% population decline over a period of several years does occur within the Midwest RU due to WNS, the estimated take of 883 bats over a 17-year period **during the fall, winter, and spring** would reduce the WNS-impacted RU population by another 0.8%. We believe this small additional impact is not measurable and therefore will not result in any appreciable reduction in the survival or recovery potential for the species within the Midwest RU. Furthermore, this does not take into consideration that the amount of estimated take would also be proportionally reduced in a WNS-affected

population (i.e. take would be closer to 353 individuals over a 17-year period) since the number of bats exposed to the various stressors would also decrease.

- In the same vein, if the maternity colonies in the action areas were to see a 60% reduction in their number of members, we would expect most take to also be proportionally reduced.
- The combined estimated amount of I-69-related take during the summer maternity season and swarming, hibernation, and spring staging period, including estimated take from cumulative effects (non-federal actions apart from I-69; see Tier 1 RPBO for details and Tables B4 and B5 for cumulative take estimates) equals 2,159 bats over a 17-year period (127 bats/year). Again, we believe this level of yearly take is insignificant because it equates to 0.04% of the annual Midwest Recovery Unit population (based on 2009 data) and 0.03% of the annual range-wide population estimate of *M. sodalis* (again, based on 2009 population data). Much of the take (*i.e.* harm, harassment, wounding and killing) will be short-term/temporary in nature and the population should be able to absorb this amount of loss.
- If WNS reduces the Midwest RU population by 60% over the next several years, the estimated take (project-related and cumulative; n=2,159) would equal approximately 1.9% of the impacted Midwest RU population.
- Mitigation and conservation efforts associated with the project will include over 2,200 acres of reforestation (including permanent protection) and permanent protection of an additional 4,000-plus forested acres, managed for the Indiana bat and other wildlife species. Reforestation efforts will more than offset the anticipated direct forest loss and the additional acreage of forest preservation will ensure suitable bat habitat remains in the area in perpetuity.
- Documents confirming the intent to have a permanent conservation easement placed on the third and fourth largest hibernacula in the state (Coon and Grotto Caves) have been signed; protection of these hibernacula will be very important for the long term protection and recovery of the species. Specifically, permanent protection at Coon Cave will eliminate the estimated take due to vandalism and human disturbance. Furthermore, permanent protection of both caves and their surrounding forests will provide long-lasting protection for essential fall swarming habitat for the 37,000 Indiana bats that use these caves and eliminate future possibilities for this property to be developed.

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)].

Since the Tier 1 Consultation (and Tier 1 RPBO dated August 24, 2006), there have been additional refinements to the alignment for Sections 1, 2, 3, and 4, more accurate habitat impact calculations, as well as updated Indiana bat population estimates. Those numbers have been updated in this amended Incidental Take Statement(ITS) to the Tier 1 RPBO; however, the maximum take permitted for this project (using habitat acreage as a surrogate for the Indiana bat) has not changed. The entire ITS is presented below although most of the information is unchanged from the 2006 Tier 1 RPBO ITS.

INDIANA BAT

AMOUNT OR EXTENT OF TAKE

The Service believes it is reasonably certain to anticipate that incidental take of Indiana bats will occur as a direct or indirect result of the Proposed Action in the following forms:

- death/kill and/or injury/wound from direct felling of occupied trees (during indirect/induced development),

- death/kill and/or injury/wound from direct collision with vehicles traveling on I-69 once it is operational (*i.e.*, roadkill),
- death/kill/wound/harassment of hibernating Indiana bats in unprotected Indiana bat hibernacula as an indirect result of project-induced population growth and increased vehicular accessibility to hibernacula areas,
- harassment of roosting bats 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, and
- harm through loss of roosting habitat such as primary and/or alternate roost trees, and loss of foraging habitat.

Based on our knowledge of the ecology of Indiana bats, and the distribution of Indiana bats within the Action Area of I-69, we assume that the habitat that will be lost will adversely affect the roosting and foraging habitat of Indiana bats.

Based on our analysis of the environmental baseline and effects of the proposed action, the Service anticipates that 14 Indiana bat maternity colonies occupy the Action Area and therefore may be impacted as a result of the proposed activities. The effect of the loss of foraging habitat is expected to result in the harm of some bats (*e.g.*, as the result of exposure to predation or overwinter mortality of bats that failed to store adequate fat reserves). Loss of roosting habitat and degradation of remaining habitat may also result in harm of individual bats. While some adverse effects are not expected to directly result in the death of bats, they may exacerbate the effects of other ongoing stressors on the bats. Collectively, the effects of the action are expected to result in behavioral or physiological effects which impair reproduction and recruitment, or other essential behavioral patterns. We anticipate take/death of individuals, decreased fitness of individuals, reduced reproductive potential, and reduced overwinter survival of an estimated maximum of 304 Indiana bats within the Action Area during the summer and 883 Indiana bats during the fall, winter, and spring as detailed in Tables B4 and B5 in Appendix A, respectively. The effects on the 14 known maternity colonies may be lost reproductive capacity and potentially a short-term decline in their colony sizes. No significant, long-term adverse effects to affected maternity colonies are anticipated.

Construction of I-69 along the proposed 3C alignment and its associated actions is expected to result in the permanent loss of just over 2,000 acres of suitable summer foraging and roosting habitat for Indiana bats, a decrease of approximately 130 acres from the 2006 Tier 1 RPBO estimate. Degradation of remaining habitat is also likely to occur from increased fragmentation and increased disturbance.

It is unlikely that direct mortality of small-sized bats from roadkill will be detected, that is, we do not expect that most dead or moribund bats are likely to be found. The same is true for take associated with habitat modification/loss and disturbance; detecting or finding dead individuals is unlikely. Therefore, the anticipated levels of take primarily are being expressed below as the permanent, direct loss of currently suitable summer roosting and foraging habitat and fall swarming and staging habitat in the Action Area for Indiana bats that will result from project implementation as estimated in the Tier 1 BA Addendum and subsequent Tier 2 BAs for Sections 1, 2, and 3. Human vandalism and disturbance at the various hibernacula will be

tracked via routine surveys and existing data loggers at most sites. Finally, the FHWA will record and track any known Indiana bat roadkills to ensure that the anticipated amount of incidental take is not exceeded.

Summer Action Area:

Permanent direct loss of up to 2,014 acres of forest habitat and 20 acres of non-forested wetlands is anticipated. Approximate direct loss of Tier 2 Forest within each project section is summarized in Table 1 below. New estimates were based on refinements detailed in Tier 2 Biological Assessments for Sections 1, 2, 3, and 4; data from Table 3 of the Tier 1 BA Addendum was used for Sections 5 and 6.

Table 1. Tier 1BA Addendum Estimated Direct Loss of Forest within the I-69 Summer Action Area and Revised Estimates for Forest Loss based on Tier 2 numbers.

Project Section	Tier 1 BA Addendum Estimated Direct Loss of Tier 2 Forest (acres)	Revised Tier 2 Estimated Direct Forest Loss (acres) including utility-related forest impacts
1	55	30
2	280	237
3	112	71
4	1,132	1107
5	303	303*
6	266	266*
Total	**2,148**	**2,014**
***From Tier 2 Representative Alignments as described in the Tier 1 BA Addendum.**		

Winter Action Area (overlaps with Summer Action Area):

Permanent direct loss of up to 1,234 acres of forest habitat surrounding the 15 known hibernacula (and expanded in areas where induced growth is likely) is anticipated (from the Tier 2 Section 4 BA). Approximate direct loss of Tier 2 Forest within a 5-mile radius of each hibernaculum is summarized in Table 2 below. The sum of the individual acreages is greater than 1,234 acres because of a high degree of overlap among the impacted acres surrounding the hibernacula.

Hibernaculum Name	Updated Direct Loss of Tier 2 Forest (acres)
Ozzy's Hole Cave:	605.37
Primitive Baptist Spring Cave:	528.58
Sexton Springs Cave:	468.98
Reeves Cave:	406.69
Ashcraft Cave :	458.18
Saltpeter Cave:	312.10
Leonard Springs Cave:	343.71
Buckner's Cave:	290.41
King Blair Cave System:	259.10
Grotto Cave:	97.24
Coon's Cave:	98.18
Salamander Cave:	84.69
Sullivan Cave:	54.74
Storm's Pit Cave:	0
Ray's Cave:	11.80

Table 2. Updated Estimated Direct Loss of Tier 2 Forest within a 5-mile radius of each Hibernaculum within the I-69 Winter Action Area.

Roadkill:

The Service anticipates that all bats that are struck by vehicles likely will be killed. The Service assumes that the annual number of deaths by vehicle collisions is not likely to exceed 22 Indiana bats per calendar year through the year 2030. The anticipated 5% mortality rate is not expected to commence until the highway is completely constructed and fully operational; some smaller percentage of bats may be impacted as significant portions are completed. It is likely that the anticipated amount of roadkill will be somewhat off-set when local traffic begins to divert to the interstate, therefore lowering roadkill along existing highways and roads. Based on the best

available scientific data, the actual number of Indiana bats that may be struck and killed from vehicles traveling on I-69 between Evansville and Indianapolis cannot be precisely quantified and dead bats will be difficult to locate once I-69 is operational. If more specific information becomes available, then this issue will be reexamined during the Tier 2 project-section consultations and prudent adjustments will be made at that time.

EFFECT OF THE TAKE

In the accompanying amendment to the Tier 1 RPBO, the Service determined that the aggregate level of anticipated take is not likely to result in jeopardy to Indiana bats or destruction or adverse modification of designated Critical Habitat (*i.e.*, Ray's Cave).

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to further minimize take of Indiana bats:

1. In the Tier 1 BA Addendum (also listed in the Tier 1 RPBO, pg. 16), 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 Indiana 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 Indiana 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 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 Tier 1RPBO or the recent amendment to the Tier 1 RPBO.

The Service believes that the measures above are necessary, appropriate, and reasonable for minimizing take of Indiana 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 Tier 1 BA Addendum and Appendix B of the Tier 1 BA or alternative measures that are of equal or greater benefit to Indiana bats as developed in consultation with the Service during Tier 2 consultations.

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 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 Indiana 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 Indiana bat sites are located in the project area, addresses any other concerns regarding Indiana 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. To ensure that the impacts of take associated with future Tier 2 project-section specific action are appropriately minimized and that the exemption of incidental take is appropriately documented, the U.S. Fish and Wildlife Service has or will prepare an individual Tier 2 BO for each of the six Tier 2 Sections for which we conclude will be likely to adversely affect the Indiana bat (*Myotis sodalis*) and/or bald eagle (*Haliaeetus leucocephalus*). The Tier 2 BO for a Section will be a stand-alone document that "tiers" back to the Tier 1 Revised Programmatic BO (as amended), rather than being physically appended to it as previously described.

   While conducting each of the Section-specific "second tier" consultations, the Service has or will ensure that each action proposed under I-69's programmatic-level design standards (1) are consistent with the previously evaluated standards and conservation

commitments (2) will have the effects anticipated during the landscape/programmatic-level analysis, that is, that there is nothing unusual about the proposed Section-specific project that will result in unanticipated impacts, and (3) that the environmental baseline will be appropriately updated.

As previously proposed, the Service has or will review the information provided by FHWA and INDOT within each of the Tier 2 Biological Assessments (BAs) for each I-69 Section. We will (1) confirm the species that may be affected, (2) assess how the action may affect the species, including ensuring that the level of effect is commensurate with the effects contemplated in the Tier 1 programmatic-level BO, and (3) verify the current tally of the cumulative total of incidental take that has occurred to date is below the levels anticipated in the 2006 programmatic incidental take statement (ITS) as amended (2011). During this review, if it is determined that an individual Section of I-69 is not likely to adversely affect listed species, the Service has or will complete its documentation with a standard concurrence letter stating that the Service concurs that the proposed project Section is not likely to adversely affect listed species or designated critical habitat. The concurrence letter will refer to the Tier 1 Revised Programmatic BO (*i.e*., it "tiers" to it), and specify that the Tier 2 BA is consistent with the analysis underlying the Tier 1 Revised Programmatic BO (as amended). However, if information presented in a Tier 2 BA establishes that the proposed Section-specific actions are likely to adversely affect listed species or designated critical habitat, then the Service will complete a Tier 2 BO along with a Section-specific ITS. No incidental take shall be exempted until after a Tier 2 BA has been reviewed and has been found to be consistent with Tier 1 in a Section-specific concurrence letter, or until a Section-specific Tier 2 BO and ITS have been completed by the Service.

Because acreages of lost Indiana bat habitat are being used as a surrogate to monitor levels of incidental take within the entire Action Area 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. The Tier 2 Biological Assessments must include: 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 Indiana 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 Action Area 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. To reduce redundancy, Tier 2 BAs should summarize or simply reference sections of the Tier 1 BA and BA Addendum that would otherwise be repetitive.

Each Tier 2 BA must quantify how the individual Tier 2 project section's direct impact acres contribute to the estimated project section-specific and hibernacula-specific acres (see Tables 1 and 2 above) as well as to the project-wide forest acres (2,014 ac.) and non-forested wetland acres (20 ac.) as specified in the AMOUNT OR EXTENT OF TAKE section above. The Tier 2 BAs 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 project-section specific ESA Section 7 reviews must include a determination of whether or not the proposed project is consistent with the Tier 1 Programmatic Biological Opinion and Incidental Take Statement (as amended) and request a Section-specific concurrence letter or initiation of Formal Consultation resulting in a Section-specific Tier 2 BO and ITS. 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.

5. 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 an Indiana bat is identified, BFO will contact the appropriate Service Law Enforcement office as required.

   The FHWA will keep track of all known Indiana bats killed from vehicle collisions to ensure that the anticipated amount of incidental take, <u>22 killed per calendar year,</u> is not exceeded.

<u>ATTENTION</u>: If at any point in time during this project, the exempted project-wide or section-specific, or hibernacula-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 Indiana bats will be limited to a maximum of 2,014 acres of forest habitat and 20 acres of non-forested wetlands within the Summer Action Area (the portion of the Action Area used by the Indiana bat in the summer) and including 1,234 acres of forest habitat that also falls within the Winter Action Area (portion of the Action Area used by the Indiana bat during the fall, winter, and spring). 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 1-September 30 in the SAA or April 1-November 15 within the WAA any given year) such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The FHWA must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

BALD EAGLE

(This section has not been revised since the original 2003 Biological Opinion except for a brief discussion of the tiered consultation approach.)

AMOUNT OR EXTENT OF TAKE

The Service anticipates that incidental take of bald eagles will occur in the form of death or injury resulting from collisions with vehicles once I-69 is operational. Based on the best available scientific data, the actual number of eagles that may be struck and killed/injured from vehicles traveling on I-69 between Evansville and Indianapolis cannot be precisely quantified. The Service anticipates that collisions with eagles would most likely occur during the winter when food is more scarce and eagles are more apt to scavenge on carrion from roadkilled animals. Once I-69 is operational, we anticipate that all eagles that are struck by vehicles will be killed or injured and that the number of deaths and/or injuries would not exceed 3 bald eagles during any five-year period. Because bald eagles are large birds and would be widely recognized by most motorists and maintenance workers, we anticipate most roadkilled or injured eagles would eventually be reported to the Service, and therefore, the actual level of incidental take could be fairly accurately monitored over time.

The amount of forested habitat that will be permanently cleared for construction of bridges at the two major river crossings (E. Fork of White River and Patoka River, where bald eagles are most likely to occur) was not quantified in the Tier1 BA. However, from our review of aerial photos and maps of the project area, we anticipate that the total combined amount of forest that will be lost at these two river crossing will be equal to or less than 50 acres and that an ample amount of habitat will remain available to bald eagles in these areas. Furthermore, the potential for incidental take from loss of future eagle habitat will be minimized by the proposed forest and wetland mitigation efforts. Therefore, we believe that if forest loss at these sites is equal to or less than 50 acres, then the impact will be insignificant in size and not likely to adversely affect nesting or wintering eagles.

EFFECT OF THE TAKE

In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to bald eagles. No critical habitat has been designated for bald eagles, so none would be impacted.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures are necessary and appropriate to further minimize take of bald eagles:

1. In the Tier1 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 bald eagles. 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 workers and INDOT maintenance staff need to be made aware of potential issues concerning bald eagles and construction and maintenance of I-69.

4. The FHWA needs to ensure that the impacts of take associated with future Tier 2 project-section specific actions are appropriately minimized and that the exemption of incidental take is appropriately documented and anticipated levels of incidental take will not be exceeded or that any new forms of take may occur that were not anticipated in Tier 1.

The Service believes that the measures above are necessary, appropriate, and reasonable for minimizing take of bald eagles.

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 "Tier 1 Forest and Wetland Mitigation and Enhancement Plan" and "Conservation Measures for Impacts to Threatened and Endangered Species" sections and Appendix B of the Tier 1 BA or alternative measures that are of equal or greater benefit to bald eagles as developed in consultation with the Service during Tier 2.

2. The 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 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 bald eagles within the Bald Eagle Action Area.

3. All I-69 engineering supervisors, equipment operators, and construction workers and INDOT (and/or concessionaire) maintenance staff will attend a mandatory environmental awareness training that discloses where known bald eagle nests are located in the project area, addresses any other concerns regarding bald eagles, and presents a protocol for reporting any eagle nests, and any live, sick, injured, or dead eagles observed or found within or near the construction limits or right-of-way during construction, operation, and maintenance of I-69. Project personnel will also be instructed about the terms and conditions of the ITS and the restrictions imposed by them before construction and operation begins.

4. To ensure that the impacts of take associated with future Tier 2 project-section specific action are appropriately minimized and that the exemption of incidental take is appropriately documented, the U.S. Fish and Wildlife Service has or will prepare an individual Tier 2 BO for each of the six Tier 2 Sections for which we conclude will be likely to adversely affect the Indiana bat (*Myotis sodalis*) and/or bald eagle (*Haliaeetus leucocephalus*). The Tier 2 BO for a Section will be a stand-alone document that "tiers" back to the Tier 1 Revised Programmatic BO (as amended), rather than being physically appended to it as previously described.

   While conducting each of the Section-specific "second tier" consultations, the Service will ensure that each action proposed under I-69's programmatic-level design standards (1) are consistent with the previously evaluated standards and conservation commitments (2) will have the effects anticipated during the landscape/programmatic-level analysis, that is, that there is nothing unusual about the proposed Section-specific project that will result in unanticipated impacts, and (3) that the environmental baseline will be appropriately updated.

   As previously proposed, the Service will review the information provided by FHWA and INDOT within each of the forthcoming Tier 2 Biological Assessments (BAs) for each I-69 Section. We will (1) confirm the species that may be affected, (2) assess how the action may affect the species, including ensuring that the level of effect is commensurate with the effects contemplated in the recently amended Tier 1 programmatic-level BO (2011), and (3) verify the current tally of the cumulative total of incidental take that has occurred to date is below the levels anticipated in the amended 2006 programmatic incidental take statement (ITS). During this review, if it is determined that an individual Section of I-69 is not likely to adversely affect listed species, the Service will complete its documentation with a standard concurrence letter stating that the Service concurs that the proposed project Section is not likely to adversely affect listed species or designated critical habitat. The concurrence letter will refer to the amended Tier 1 Revised Programmatic BO (*i.e.*, it "tiers" to it), and specify that the Tier 2 BA is consistent with the analysis underlying the Tier 1 Revised Programmatic BO (as amended in 2011). However, if, information presented in a Tier 2 BA establishes that the proposed Section-

specific actions are likely to adversely affect listed species or designated critical habitat, then the Service will complete a Tier 2 BO along with a Section-specific ITS. No incidental take shall be exempted until after a Tier 2 BA has been reviewed and has been found to be consistent with the Tier 1in a Section-specific concurrence letter, or until a Section-specific Tier 2 BO and ITS have been completed by the Service.

Because acreages of lost bald eagle habitat are being used to ensure that habitat loss in eagle use areas (Patoka River and E. Fork White River crossings) does not reach the scale where take will occur, the FHWA will provide the Service's Bloomington Field Office with a detailed description of each project sections contribution to habitat loss by preparing Tier 2 Biological Assessments for each project section. The Tier 2 Biological Assessments must include: maps of the preferred final alignment and all associated development; methods and results of Tier 2 bald eagle surveys (i.e., current IDNR data should be sufficient), exact locations of all known and newly discovered eagle nests, night roosts, and other important areas; the total acreages and relative quality of forest (i.e., as compared to the maturity of forests and estimated suitability for nesting, perching, roosting in the immediate area) and wetland habitats that will be permanently cleared/filled. Tier 2 BAs must also describe any additional direct or indirect affects that were not considered during the programmatic consultation. To reduce redundancy, Tier 2 BAs should summarize or simply reference sections of the Tier 1 BA that would otherwise be repetitive.

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.

5. Any dead bald or golden eagles found within the construction limits, right-of-way, rest stops, or mitigation areas of I-69, should be reported to BFO [(812) 334-4261] as soon as possible and subsequently transported (frozen or on ice) to BFO.

   Any sick or injured bald or golden eagle located within the construction limits, right-of-way, rest stops, or mitigation areas of I-69 should immediately be reported to BFO (and an Indiana Conservation Officer or the State Police if outside of normal business hours or on weekends). If possible, attempts should be made to remove an injured eagle from harm's way, until a trained person arrives to safely capture and transport the bird. Sick and injured eagles will be transported to a veterinarian or a rehabilitation center that has a valid Federal permit to treat and rehabilitate eagles.

   BFO will contact the appropriate Service Law Enforcement office to report that a sick, injured, or dead eagle has been found.

   The FHWA will keep track of all known bald eagles killed or injured from vehicle collisions to ensure that the anticipated amount of incidental take, <u>3 killed/injured bald eagles during any five-year period,</u> is not exceeded.

   The Service will not refer the incidental take of any migratory bird or bald eagle for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 U.S.C. §§ 703-

712), or the Bald and Golden Eagle Protection Act of 1940, as amended (16 U.S.C. §§ 668-668d), if such take is in compliance with the terms and conditions specified herein.

In conclusion, the Service anticipates that the number of deaths and/or injuries from vehicle collisions would not exceed 3 bald eagles during any five-year period. If this level of take or less occurs, we expect that the effects to Indiana breeding and wintering bald eagle populations will be negligible. We anticipate that if 50 or less acres of forested habitat that will be permanently cleared for construction of bridges at the two major river crossings, East Fork of the White River and the Patoka River, where bald eagles are most likely to occur, then the impact will be insignificant in size and not likely to adversely affect nesting or wintering bald eagles. Impacts to eagle habitat will also be minimized by the proposed conservation measures and forest and wetland mitigation efforts. 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 such incidental take represents new information requiring reinitiation of consultation and review of the reasonable and prudent measures provided. The FHWA must immediately provide an explanation of the causes of the taking and review with the Service the need for possible modification of the reasonable and prudent measures.

CONSERVATION RECOMMENDATIONS

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

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

<u>INDIANA BAT</u>

1. Working with the Service, develop national guidelines for addressing Indiana bat issues associated with FHWA projects within the range of the Indiana bat.

2. Expand on scientific research and educational outreach efforts on Indiana bats in coordination with the Service's BFO.

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

4. Provide funding to staff a full-time Indiana bat Conservation Coordinator position within the BFO, which has the Service's national lead for this wide-ranging species.

5. Provide funding for research to address WNS in bats.

BALD EAGLE

1. Working with the Service, develop guidelines for addressing Bald Eagle issues associated with FHWA projects in the Midwest.

2. Provide funding to implement a bald eagle post-delisting monitoring plan in Indiana or throughout the Midwest.

3. Expand on educational and outreach efforts on bald eagles in Indiana.

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

REINITIATION NOTICE

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

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Appendix A

Table B1. Project deconstruction, anticipated direct and indirect environmental consequences, and likely responses of exposed bats.

Project Element	Associated Direct and Indirect Environmental Consequences	Likely Responses of Exposed Bats/Colonies/Pops.	Is Take Reasonably Certain to Occur?
CONSTRUCTION			
Site Preparation: clearing, blasting, cutting, filling	Permanent direct loss of suitable roosting and foraging habitat in SAA (summer habitat	0,4,5,6,7,9,10,11,12	yes
grading, and surfacing for interstate, interchanges	Permanent direct loss of suitable roosting and foraging habitat in WAA (swarming habitat	0,4,5,6,7,8,12	yes
connector roads, frontage roads, and rest areas.	Variable loss/reduction of forested connectivity/travel corridors	0,4,5,6,7,9	yes
	Introduction of novel day/night-time construction noise,light, and dust (e.g., heavy equip. and blasting	0,1,3,4,5,6,7,9,10,11,12	yes
	Direct degradation of surface water quality (e.g., increased siltation/turbidity) in stream	0,6,7	no
	Direct loss and/or degradation of 20 acres of existing non-forested wetlands	0,5,6,7,	no
	Direct impacts or degradation of non-hibernacula, karst features and ground water resource	0,6	no
	Potential forest loss from borrow areas, rock quarries, and sand/gravel pits used for road material	0-7,9,10,11,12	yes
Demolition of existing bridges in SAA	Potential loss of roost sites beneath bridges	0,1,3,4,6	no
Construction of bat-friendly bridges in SAA	Potential net gain in day/night roost sites for bats	0,6,8,13,14	no
Revegetation of disturbed areas	Long-term protection against erosion, some insect production	0,6	no
Relocation of homes & businesses/Demo. of old	Addtnl. habitat loss/degradation and disturbances of bats during construction of new and demo. of old	0-7,9,10,11,12	yes
Relocation of utilities crossing over/under I-69	Additional habitat loss/degradation and disturbances of bats (e.g., powerlines	0,4,5,6,7,9,10,11,12	yes
OPERATION			
Vehicles driving on Interstate	Increased high-speed traffic through bat population centers leading to increased risk of roadkil	0,2,11,12	yes
(toll or non-toll)	Increased litter and noise/air/soil/light pollution from vehicles using I-69	0,6	no
	New and/or increased risk of accidental spills of hazardous materials occuring in action are	0,2,7,9,15	no
Stormwater diversion and retention	Degraded water quality from road runoff	0,15	no
Induced development	Degraded water quality from induced development (e.g., faulty septic systems, more NPDS dischargers	0,5,6,7,9,	no
	Habitat loss/fragmentation/degradation near hibernacula/mat.colonies from induced developmen	0-7,9,10,11,12	yes
	Induced human population growth increases risk of human visitation and vandalism at hibernacul	0,1,2,3,4,6,7,12,15	yes
High-mast lighting at interchanges and urban area	Increased light pollution	0,5,6	no
I-69 Community Planning Grant Progam	I-69 induced growth is managed under local land-use plans designed to be protective of environmen	0-15	no
MAINTENANCE			
Annual winter applications of sal	Degradation of surface and ground water and potential reduction in aquatic insect abundance/diversity	0,5,6,7,9,	no
Annual summer mowing and herbicide us	Periodic noise, reduced vegetation and minimal reduction in insect abundanc	0,1	no
Periodic resurfacing	Increased noise, night-time lighting, and dust	0,6	no
CONSERVATION MEASURES			
Purchase/protect existing forest in SAA	Permant protection of some important forest lands benefiting local maternity colonie	0,8,13,14	no
Plant and permanently protect new forest in SAA	Insures no net loss of forest habitat from direct impacts of I-69 (no mitigation of indirect impacts	0,8,13,14	no
Purchase/protect swarming habitat in WAA	Permant protection of some important forest lands benefiting local swarming/hibernating population	0,8,14	no
Plant and permanently protect new forest in WAA	Insures no net loss of forest habitat from direct impacts of I-69 (no mitigation of indirect impacts	0,8,14	no
Purchase/protection of hibernacula in WAA	Permant protection of important caves used by local hibernating population	0,8,14	no
Install gates and signs at hibernacula in WAA	Reduces risk of unauthorized visitation/disturbance/vandalism of hibernacula and hibernating bat	0,8,14	no
Conduct additional bat research and monitoring	Knowledge gained will improve current management of hibernacula and maternity habita	0,8,13,14	no
Protective fencing put beneath bridge/roost site	Reduced incidence of vandalism and human disturbanc	0,8,13,14	no
Wetland mitigation and Wetland MOU	Insures no net loss of wetlands from direct impacts from I-69 (no mitigation of indirect impacts	0,8,13,14	no
Karst studies and implementation of Karst MOU	Insures protection of sensitive karst resources	0,8,13,14	no
Creation of educational materials and displays	Increased protection of Indiana bats stemming from impoved public awareness/educatio	0,8,13,14	no
GIS data made available to public and agencies	Greater awareness/protection of sensitive resources identified during I-69 planning	0,8,13,14	no

Key

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/partuition, 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 rat
14. long-term ↑ in colony/hibernaculum size/fitness level
15. long-term↓ in colony/hibernaculum size/fitness leve

n/a not applicabl

Table B2. Updated Impacts to Tree Cover in the Summer and Winter Action Areas (bold font indicates higher levels of concern; shading indicates updated information).

Area Name	Existing Amount of Tree Cover[1] (acres)	Current % of Tree Cover	Updated (Sec. 1-4) Direct Loss of Tree Cover (acres)	Net change since Tier 1	Indirect Loss of Tree Cover (acres)	Sum of I-69 related Losses to Tree Cover (acres)	% of Tree Cover after I-69	Net Loss in Existing Tree Cover caused by I-69	Estimated Cumulative Loss of Tree Cover (acres)	Total Loss of Tree Cover from I-69 and Cumulative Impacts by 2030 (acres)	Total % Tree Cover Left after I-69 and Cumulative Impacts by 2030[2]	Net Decrease in % Tree Cover by 2030
Source:	Tier 1 BA Addendum Table 7 and Tier 2 BAs if applicable					calculated	calculated	calculated	BAA T- 7/Tier 2 BA	calculated	calculated	calculated
Pigeon Creek	1,944	**15.5%**	10	-19	1	11	15.4%	0.1%	279	290	**13.2%**	**2.3%**
Patoka River	3,982	31.7%	20	1	0	20	31.5%	0.2%	24	44	31.3%	0.4%
Flat Creek[7]	5,426	43.2%	76	-16	0	76	42.6%	0.6%	6	82	42.5%	0.7%
East Fork	3,116	**24.8%**	42	-8	0	42	24.5%	0.3%	5	47	24.4%	0.4%
Veale Creek	2,437	**19.4%**	20	0	2	22	19.2%	0.2%	6	28	**19.2%**	0.2%
West Fork (Elnora)	1,319	**10.5%**	0	-3	1	1	10.5%	0.0%	25	26	**10.3%**	0.2%
Doans Creek	8,099	64.5%	84	-11	3	87	63.8%	0.7%	3	90	63.7%	0.7%
Plummer Creek	8,550	68.0%	**207**	**14**	1	208	66.4%	**1.7%**	5	213	66.3%	1.7%
Little Clifty Branch[8]	8,825	70.2%	252		8	260	68.2%	2.1%	16	276	68.0%	2.2%
Indian Creek	7,549	60.1%	**315**	**-44**	9	324	57.5%	**2.6%**	26	350	57.3%	2.8%
W. Fork (Bryant Creek)	4,710	37.5%	107		0	107	36.6%	0.9%	4	111	36.6%	0.9%
W. Fork (Clear Creek)	5,375	42.8%	99		0	99	42.0%	0.8%	26	125	41.8%	1.0%
W. Fork (Crooked Creek)	3,722	**29.6%**	**170**		0	170	28.3%	**1.4%**	44	214	**27.9%**	**1.7%**
W. Fork (Pleasant Run)	2,276	**18.1%**	29		4	33	17.8%	0.3%	83	116	**17.2%**	0.9%
Totals[6]:	67,330		1,402	-86	29	1,431			552	1,983		
Averages:	4,809.3	38.3%	102.2		2.1	104.3	37.4%	0.8%	39.4	143.7	37.1%	1.2%
Expanded Remaining Summer Action Area[4] (excluding WAA overlap)	102,963	29.5%	777		58	835	29.3%	0.2%	798	1,633	29.1%	0.5%
Expanded Winter Action Area[5]	146,725	60.4%	1,234		70	1,304	59.9%	0.5%	920	2,224	59.5%	0.9%

1. 12,566 acres in a 2.5-mile radius circle.
2. proposed forest mitigation acreages or other potential gains in forest have not been included here.
3. This relative ranking is largely based on current and predicted levels of forest habitat, connectivity of existing habitat, and proximity to rapidly developing areas.
4. A total of 348,439 acres comprise the Expanded Remaining SAA (minus the WAA overlap and maternity colony areas);

   Numbers in this row are derived from Tier 1 and Tier 2 Forest Data (i.e., not "Tree Cover"). Sections 1,5,and 6 do not have "Expanded" remaining SAA forest acreage calculated, so Tier 1 info was used.
5. A total of 242,723 acres comprise the collective Expanded Winter Action Area; acreages for the Expanded WAA are in Tree Cover.
6. Overlap areas for four maternity colonies have been subtracted from the direct forest impact totals; there may be very minimal double-counting in the cumulative impacts total due to these overlap areas.
7. The interchange in the Flat Creek maternity area is no longer proposed, so indirect impacts have been reduced in Tier 2.
8. Little Clifty Branch is a new maternity colony; the habitat impacts in the area of this colony were already accounted for in Tier 1, but are now addressed at the maternity colony level instead of part of the Remaining Summer Action Area.

Table B3. Summary of impacts to Indiana bat maternity colonies (n=14) along I-69. (Updated February 2011)

Colony Name	Percent of the MA* that is currently tree covered/ forested	Percent of existing tree cover that is "core forest"	Size of the biggest, connected forest patch within the MA (acres)	In general, how well connected are all the existing forest patches in the MA?	In general, how well connected are the existing patches of Core Forest in the MA?	What is the FWS's overall perceived adequacy of this colony's current habitat?	How much tree cover will be lost to direct/ indirect/ cumulative impacts? (acres)	Will I-69 run through the center of a known or likely roosting area within the MA?	Will any of the identified roosts (n=36) be directly destroyed by I-69?	Is it likely that a primary roost tree(s) will be directly lost?	Is it likely that a primary roost tree(s) will be indirectly lost?	Is a proposed interchange within the MA? If so, is it near the center of the MA?	Once I-69 is operational, are most forested areas in the MA likely to remain for another 50 years?	Is this colony likely to persist into the reasonably foreseeable future once I-69 and forest mitigation are done?	If displaced by I-69 &/or other development, is additional maternity habitat available nearby?
Pigeon Creek	15%	7%	1,139	POOR	FAIR	FAIR	10 / 1 / 279	NO	NO	NO	NO	YES/NO	UNCERTAIN	YES	YES
Patoka River	32%	17%	3,855	GOOD	GOOD	GOOD	20 / 0 / 24	NO	NO	NO	NO	NO	YES	YES	YES
Flat Creek	43%	34%	5,385	GOOD	GOOD	GOOD	76 / 0 / 6	NO	NO	UNK.	NO	NO	YES	YES	YES
East Fork	25%	7%	1,748	FAIR	POOR	FAIR	42 / 0 / 5	NO	NO	UNK.	NO	NO	YES	YES	YES
Veale Creek	19%	6%	1,423	FAIR	FAIR	FAIR	20 / 2 / 6	VERY CLOSE	NO	NO	NO	YES/NO	YES	YES	YES
West Fork (Elnora)	10%	2%	303	GOOD	FAIR	FAIR	0 / 1 / 25	NO	NO	NO	NO	YES/NO	YES	YES	YES
Doans Creek	64%	33%	8,088	GOOD	GOOD	GOOD	84 / 3 / 3	NO	NO	NO	NO	NO	YES	YES	YES
Little Clifty Branch**	70%	26%	8,824	GOOD	GOOD	GOOD	252 / 8 / 16	YES	UNCERTAIN	YES	NO	YES/YES	YES	YES	YES
Plummer Creek	68%	34%	8,542	GOOD	GOOD	GOOD	207 / 1 / 5	NO	NO	NO	NO	NO	YES	YES	YES
Indian Creek	60%	22%	7,540	GOOD	GOOD	GOOD	315 / 9 / 26	CLOSE	NO	UNK.	NO	YES/NO	YES	YES	YES
W. Fork (Bryant Creek)	37%	18%	4,091	GOOD	GOOD	GOOD	107 / 0 / 4	NO	NO	NO	NO	YES/NO	YES	YES	YES
W. Fork (Clear Creek)	43%	18%	4,944	GOOD	GOOD	GOOD	99 / 0 / 26	YES	NO	UNK.	NO	YES/NO	YES	YES	YES
W. Fork (Crooked Creek)	30%	9%	3,046	GOOD	POOR	FAIR	170 / 0 / 44	NO	NO	NO	NO	NO	YES	YES	YES
W. Fork (Pleasant Run)	18%	2%	1,533	FAIR	POOR	FAIR	29 / 4 / 83	NO	NO	NO	NO	YES/NO	UNCERTAIN	YES	YES

* MA = maternity area

** New maternity colony found in 2010

Table B4. Updated Estimated levels of Incidental Take by stressor for Indiana bats during the Summer (2011).

Relevant Stressors to Bats in SAA (estimated through year 2030)	Estimated Amount or Area under Stress	FEMALE AND JUVENILE BATS IN MATERNITY COLONY AREAS (160 bats/colony/year)																														MALES						
		Pigeon Creek		Patoka River		Flat Creek		East Fork		Veale Creek		W. Fork (Elnora)		Doans Creek		Plummer Creek		Little Clifty Branch[4]		Indian Creek		W. Fork (Bryant Creek)		W. Fork (Clear Creek)		W. Fork (Crooked Creek)		W. Fork (Pleasant Run)		Take Subtotal	In WAA in summer		In remaining SAA		Take Subtotal	Total Take	Likely Form(s) of Take[3]
		E[1]	T[2]	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T		E	T	E	T			
I-69 Direct Impacts/Loss of Roosting Habitat (seasonal cutting restrictions observed so no direct killing anticipated)	1992 ac.	80	2	60	2	80	4	120	2	80	2	0	0	40	2	60	4	160	6	160	10	40	2	160	2	160	10	80	2	50	210	0	66	0	0	50	h
I-69 Direct Impact/Loss of Foraging Habitat/Connectivity	1992 ac.	80	2	60	2	80	1	120	2	60	2	0	0	40	0	60	1	160	2	160	4	40	0	160	1	160	2	80	0	19	210	3	66	1	4	23	h
Construction Noise/Vibrations causing bats to stress and flee roosts, ↑ risk of predation (while bats are present in adjacent areas)	-	80	1	60	1	160	2	120	2	160	3	0	0	40	1	60	1	160	2	160	2	40	0	160	1	160	2	80	1	19	210	3	66	1	4	23	H
Disturbance & Habitat Loss associated w/ Demolition and Relocation of 390 Homes & 76 Businesses (no timing restrictions)	unk.																													40					5	45	H,w,k,h
Habitat loss from I-69 related Utility Relocations (seasonal restrictions will be in place so no direct mortality expected)[5]	Approx. 30 ac. total for Sec. 1-4	0	0	80	0	80	0	80	0	80	0	0	0	80	1	80	1	80	1	80	1	80	1	80	1	80	1	80	1	8	15	0	20	0	0	8	H,w,h
Additional High-speed traffic / Roadkill (total roadkill/maternity colony from 2013 through 2030)	5% risk over 17 years	160	8	160	8	160	8	160	8	160	8	0	0	160	8	160	8	160	8	160	8	160	8	160	8	160	8	160	8	104	420	21	132	10	31	135	k
I-69 Indirect/Induced Loss of Roosting and Foraging Habitat (no restrictions/bats present)	29 ac. in MAs	40	1	20	0	80	1	0	0	80	1	0	0	60	1	80	1	80	3	80	3	0	0	0	0	0	0	80	2	13	24	1	11	1	2	15	H,w,k,h
Increased levels of Disturbance/Vandalism of Roosting Bats in ungated Hibernacula during the summer	unk.																													0	500	5	0	0	5	5	H, w, k
TOTAL of Direct and Indirect from I-69			14		13		16		14		16		0		13		16		22		28		11		13		23		14	**253**		33		13	**51**	**304**	
TOTAL Cumulative Effects[6] (all sources through 2030)	552 ac in MAs	160	0	160	0	160	0	120	0	160	0	160	0	60	0	160	0	160	2	160	2	160	0	160	2	160	4	160	8	**18**	130	2	58	2	4	**22**	H,w,k,h
TOTALS Direct and Indirect + Cumulative			14		13		16		14		16		0		13		16		24		30		11		15		27		22	**271**		35		15	**55**	**326**	

[1] E = estimated annual # of exposed bats (for colonies the maximum number exposed = 160/year; for adult males densities were used to estimate potential exposure…with 0.17 males/impacted acre in the WAA and 0.085 males/acre in the SAA; density of males exposed was adjusted using 2009 population estimates, although these numbers are expected to fluctuate some from year to year.)

[2] T = maximum estimated number of exposed bats that may be taken from 2008-2030.

[3] H = harrass, w = wound, k = kill, and h = harm, which includes significant habitat modification or degradation resulting in death, or injury by significantly impairing behavioral patterns such as breeding, feeding, or sheltering.

[4] Gray shading = New maternity colony identified in 2010

[5] Utility locations have been confirmed for Sections 1 and 3 and will not occur within the maternity colony areas for those Sections; in Section 2, approx. 4 ac. of utility impacts in scattered woodlots within Patoka, Flat Creek, and EF White River colonies will occur.

Table B5. Updated Estimated levels of Incidental Take by stressor for Indiana bats during spring, fall, and winter.

Project Phase	Relevant Stressors to Bats in WAA (estimated through year 2030)	Estimated Amount or Area of Stressor	HIBERNACULA* in WAA																										Likely Form(s) of Take[3]
			Buckner		Coon**		Grotto**		King Blair		Leonard Springs		Saltpeter		Sexton Springs		Sullivan		Reeves		Primitive Baptist		Storm's Pit		Ray's		Total Take of Bats[†]	
			E[1]	T[2]	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T	E	T		
	I-69 Direct Impacts/Loss of Roosting Habitat (seasonal cutting restrictions observed so no direct killing anticipated)	1234 ac.	10	0	18,640	10	19,197	10	218	0	188	2	48	1	61	1	9	0	17	0	1	0	48	0	59,250	0	24	h
	I-69 Direct Impact/Loss of Foraging Habitat/Connectivity	1234 ac.	10	0	18,640	0	19,197	0	218	0	188		48		61		9		17	0	1	0	48	0	59,250	0	0	h
	Construction Noise/Vibrations causing bats to stress and flee roosts, ↑ risk of predation (while bats are present in adjacent areas)	1234 ac.	10	0	18,640	0	19,197	0	218	0	188		48		61		9		17	0	1	0	48	0	59,250	0	0	H
	Disturbance & Habitat Loss from Demo. & Relocation of 390 Homes & 76 Businesses	unk.																									15	H,w,k,h
	Habitat loss from I-69 related Utility Relocations (no restrictions/bats present)	unk.	10	0	18,640	0	19,197	0	218	0	188	0	48	0	61	0	9	0	17	0	1	0	48	0	59,250	0	0	H,w,k,h
	Additional High-speed traffic / Roadkill (total from 2013 through 2030)	.25% risk over 17 years	10	0	18,640	47	19,197	48	218	1	188	0	48	0	61	0	9	0	17	0	1	0	48	0	59,250	148	244	k
	I-69 Indirect/Induced Loss of Roosting and Foraging Habitat (no restrictions/bats present)	70 ac.	10	0	18,640	0	19,197	0	218	0	188		48		61		9		17	0	1	0	48	0	59,250	1	1	H,w,k,h
	Increased risk levels of Winter Disturbance/Vandalism of Hibernating Bats in vulnerable Hibernacula[4]	1% increase in risk	10	0	18,640	0**	19,197	0**	218	2	188	2	48	0	61	1	9	0	17	0	1	0	48	0	59,250	593	599	H, w, k
	TOTAL of Direct and Indirect from I-69			0		57		58		3		4		2		2		0		0		0		1		742	**883**	
	Cumulative Effects of Winter Disturbance/Vandalism of Hibernating Bats in vulnerable Hibernacula	1% over the span of 20+ years	10	1	18,640	0	19,197	0	218	2	188	1	48	1	61	1	9	0	17	0	1	0	48	0	59,250	593	599	H, w, k
	Cumulative Effects of ongoing Roadkill (total roadkill/hibernating pop. from 2013 through 2030)	.25% risk over 17 years	10	0	18,640	47	19,197	48	218	1	188	0	48	0	61	0	9	0	17	0	1	0	48	0	59,250	148	244	H, w, k
	Cumulative Effects of Forest Habitat Loss/Degradation, surrounding Hibernacula associated (through 2030)	920 ac.	10	1	18,640	10	19,197	19	218	16	188	26	48	7	61	10	9	0	17	5	1	1	48	2	59,250	11	108	H,w,k,h
	TOTAL of Cumulative			2		57		67		19		27		8		11		0		5		1		2		752	**950**	
	TOTALS Direct and Indirect + Cumulative			2		113		125		22		31		10		13		0		5		1		3		1,493	**1,833**	

* Ashcraft and Salamander caves were not included as they did not contain winter populations in 2009. Similarly, Ozzy's Hole Cave was not included as it was not analyzed in the BA Addendum since it was recently found and only contained 1 Indiana bat.

** Based on a signed letter of intent to place a permanent conservation easement on property, these caves are no longer considered vulnerable to human disturbance

† We are assuming that half of the take would involve adult males and half adult females (i.e., 50:50 sex ratio and no sexual bias in probability of occurrence).

1 E = estimated annual # of exposed bats (used revised winter 2009 population numbers for each hibernaculum based on 2011 photoanalysis)

2 T = maximum estimated number of exposed bats that may be taken from 2008-2030.

3 H = harrass, w = wound, k = kill, and h = harm, which includes significant habitat modification or degradation resulting in death, or injury by significantly impairing behavioral patterns such as breeding, feeding, or sheltering.

4 Assumes worst-case scenario that cave owners will not allow their vulnerable caves to be gated.