Biological Opinion and Incidental Take Statement for the Indiana bat (*Myotis sodalis*) for the Jewett Interchange Rail Improvement Project in Harrison County, Ohio

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INTRODUCTION

This document transmits the United States (U.S.) Fish and Wildlife Service's (Service) Biological Opinion (BO) (ESI 2015) based on our review of the U.S. Army Corps of Engineers' (Corps) proposed authorization of the discharge of dredged and/or fill material into waters of the U.S. associated with the construction of Jewett Joint Ventures, LLC's Jewett Interchange Rail Improvement (Jewett Junction) project under the Nationwide Permit (NWP) Program described in the February 21, 2012, Federal Register, Reissuance of NWPs (77 FR 10184) , and the effects of the proposed project on the Indiana bat (*Myotis sodalis*) in accordance with section 7(a)(2) of the Endangered Species Act (ESA) of 1973, as amended (16 U.S.C. 1531 *et seq.*). The Corps' application number for the project is #LRH-2013-985-TUS. The Corps' request for formal consultation was received on January 15, 2016.

This BO is based on information provided in the Biological Assessment (BA). A complete administrative record of this consultation is on file at the Service's Columbus Ohio Field Office (COFO). CONSULTATION HISTORY

The Corps determined that the Jewett Junction project is likely to adversely affect the Indiana bat, and submitted a request for initiation of formal consultation to the Service on January 15, 2016. The Service concurred with the Corps' determination, and agreed that the initiation package was complete in accordance with 50 CFR §402.14, and that the timeframe for formal consultation had begun effective January 15, 2016.

Date	**Event**
December 15, 2015	COFO receives December 14, 2015 letter from the Gandee Heydinger Group (GHG) requesting technical assistance for the Jewett Junction project. This package included the BA for the project.
January 8, 2016	After reviewing the project, COFO informs GHG that given the anticipated level of forest clearing formal consultation would be recommended.
January 15, 2016	Corps submits letter requesting initiation of formal consultation. Formal consultation initiated January 15, 2016.
January 25, 2016	Corps sends an email to COFO indicating that they intend on using the northern long-eared bat 4(d) rule, finalized on January 14, 2016, to cover take of that species.
April 14, 2016	COFO sends draft BO to Corps for review.
April 26, 2016	Corps sends comments on draft BO to COFO
May 2, 2016	COFO issues final BO to Corps concluding formal consultation.

BIOLOGICAL OPINION

DESCRIPTION OF THE PROPOSED ACTION

The federal action evaluated in this BO is the authorization of the of the discharge of dredged and/or fill material into waters of the U.S. associated with the construction of the Jewett Interchange Rail Improvement project under the Corps' NWP Program pursuant to Section 404 of the Clean Water Act . The project will expand rail service, through improved rail connectivity, for oil and gas developments in eastern Ohio.

The Corps is responsible for authorizing the discharge dredged or fill material into waters of the U.S., including wetlands, under Section 404 of the Clean Water Act (33 USC § 1344: 33 CFR 320-332). Jewett Joint Venture, LLC has submitted a Pre-Construction Notification requesting authorization for the discharge of dredged and/or fill material into waters of the U.S. under the NWP 14 – Linear Transportation Projects, to comply with Sections 401 and 404 of the Clean Water Act.

The Corps permit area for the proposed project is limited to the area of direct impacts, as a result of the discharge of dredge and/or fill material into waters of the U.S. and the immediate adjacent uplands directly affected by authorizing the regulated activity associated with each single and complete project. For the Jewett Junction project, the jurisdiction of the Corps' authorization includes 1.78 acres of wetlands and 289 linear feet of streams. The Corps has stated that their statutory authority is limited to the permit area of the NWP actions.

The Service is issuing this BO pursuant to section 7 of the ESA. Direct and indirect effects of the federal action (NWP verification) and the interrelated or interdependent activities area analyzed to ensure they are not likely to jeopardize the continued existence of federally listed or proposed endangered or threatened species. Indirect effects of the federal action include, "…effects that are caused by or result from the action, are later in time but are reasonably certain to occur…" Interdependent actions have no independent utility apart from the proposed action, and interrelated actions are part of a larger action and depend on the larger action for their justification (50 CFR §402.02). Authorization of the proposed Jewitt Junction project under the NWP 14 will result in the construction, operation, and maintenance of the Jewett Junction project. Therefore, the focus of this BO is the effects of the Jewett Junction project, including all construction, operation, and maintenance activities associated therewith, regardless of the Corps' regulatory jurisdiction or land ownership.

The proposed project is located in Archer and Rumbley Townships in Harrison County approximately 4.2 miles north of Cadiz, Ohio and 15 miles west of Steubenville, Ohio. Smaller towns located closer to the project include Jewett, Scio, and Hopedale.

Jewett Joint Venture, LLC is proposing to develop an 18,500-foot expansion of railway running just south of State Route 151. This project will be constructed adjacent to an existing railway, and will impact approximately 89 acres. The expansion will allow trains to stage, load, and pass where these activities are not currently possible. Of this area, approximately 64.55 acres are deciduous forest which will be cleared as part of this project.

Construction

Construction for this project will involve the clearing, leveling, and grading of approximately 89 acres. Based upon data from the National Land Cover Database (NLCD), the majority of the project area is comprised of deciduous forest (~70%). The remainder of the site is comprised of developed open space (~19%), pasture (~7.5%), and grass/herbaceous (~2%). The project area will be converted to rail yard, roads, and railway.

Operation and Maintenance

Once the project is complete, Jewett Junction will be fully operational and will not require any major ground disturbance work. Potential impacts that may occur during the maintenance and operation of the railway include storm water runoff, snow and ice removal, and mowing along the periphery of the area.

CONSERVATION MEASURES

Conservation measures are those actions taken to benefit or promote the recovery of the species. These actions taken by the federal agency or the applicant that serve to minimize or compensate for project effects on the species under review and are included as an integral portion of the proposed action.

Proposed bat conservation measures were included within the BA. The Service recognizes that, individually and/or cumulatively, these bat conservation measures contribute to the avoidance and minimization of adverse effects that may result from the proposed action. Their conservation measures are included below and by reference. Jewett Joint Venture, LLC has agreed in the BA to implement the following conservation measures as part of this project in order to avoid and/or minimize the effects of the proposed action on the Indiana bat.

1. To the extent possible the project will make use of existing railroad infrastructure and make use of existing open space including reclaimed coal mine, existing railroad, and existing roadway.

2. Tree clearing will occur while the bats are not active (1 October – 31 March), thus direct effects are not anticipated. Indiana bats are not expected to be present on site during this period of time, since they will be in hibernation. If bats are observed exiting any trees during the timbering process, tree clearing will be immediately ceased.

3. Dampening construction areas to control dust in order to minimize impacts to bats or roost/foraging habitat.

4. Trees within avoided wetlands will not be cleared.

5. Reduce the use of lights at night by using of motion sensors, or down-shielding lighting.

6. During the bats active period (1 April – 30 September) vehicle speeds will be limited to 15 miles per hour for the lifetime of the project in order to avoid striking bats.

7. Herbicides and pesticides use will be minimized, with no use of aerial application.

8. Any future tree removal, limb trimming, or pruning will only occur between 1 October – 31 March.

ACTION AREA

In 50 CFR §402.02 "action area" is defined as, "all areas to be affected directly or indirectly by the federal action and not merely the immediate area involved in the action." The action area is not limited to the footprint of the action and should consider the effects to the environment resulting from the action. Within a set action area, all activities that can cause measurable or detectable changes in land, air, and water or to other measurable factors that may elicit a response in the species or critical habitat are considered. The action area is not defined by the range of the species that would be impacted; rather it is defined by the impacts to the environment that would elicit a response in the species (Service and NMFS 1998). Therefore, the action area includes the Jewett Junction project footprint, and maintenance of the rail yard either directly, indirectly, or through interrelated or interdependent actions.

The proposed Jewett Junction project will include clearing and grading of approximately 89 acres (64.55 acres of forest). It includes all areas that will be physically impacted, as well as areas that may be impacted by noise, or downstream movement of sediments and chemicals.

Of all the project activities, clearing and construction dust are expected to have the most far reaching changes to the natural environment. Based upon the size and type of project, the increase in dust during clearing and construction could encompass an area up to 100 meters.

As described above, the authorization of the discharge of dredged and/or fill material into waters of the U.S. under a Corps NWP 14 verification will result in the construction, operation, and maintenance of the Jewett Junction project. The construction, maintenance, and operation of the Jewett Junction project will result in indirect effects throughout the facility. Therefore, the action area for this consultation is the entire 245.5 acres (Figure 1). The 100 meter buffer distance is used to incorporate all potential effects of the project to Indiana bats.

Figure 1. Action area.

STATUS OF THE SPECIES

Indiana Bat

Refer to the Indiana bat (*Myotis sodalis*) Draft Recovery Plan: First Revision (USFWS 2007) for the best available information on Indiana bat life history and biology, threats, distribution and overall status. The following is a summary from that plan.

Life History and Biology

The Indiana bat is a temperate, insectivorous, migratory bat that hibernates colonially in caves and mines in the winter. In spring, reproductive females migrate and form maternity colonies where they bear and raise their young in wooded areas. Males and nonreproductive females typically do not roost in colonies and may stay close to their hibernaculum or migrate to summer habitat. Summer roosts are typically behind exfoliating bark of large, often dead, trees. Both

males and females return to hibernacula in late summer or early fall to mate and enter hibernation.

Summer habitat and ecology

Suitable summer habitat for Indiana bats consists of a wide variety of forested/wooded habitats where they roost, forage, and travel and may also include some adjacent and interspersed non-forested habitats such as emergent wetlands and adjacent edges of agricultural fields, old fields and pastures. This includes forests and woodlots containing potential roosts (i.e., live trees and/or snags ≥5 inches dbh (12.7 centimeter) that have exfoliating bark, cracks, crevices, and/or hollows), as well as linear features such as fencerows, riparian forests, and other wooded corridors. These wooded areas may be dense or loose aggregates of trees with variable amounts of canopy closure. Individual trees may be considered suitable habitat when they exhibit the characteristics of a potential roost tree and are located within 1,000 feet (305 meters) of other forested/wooded habitat.

In summer, female Indiana bats form maternity colonies where they bear and raise their pups. Members of the same maternity colony exhibit strong site fidelity to summer roosting and foraging areas and will return to the same summer range annually. Maternity colony size averages between 50 to 80 adult females (Whitaker and Brack 2002).

Maternity colony habitats include riparian, bottomland, and floodplain forests, wooded wetlands, and upland forest communities. Maternity roost sites are most often under the exfoliating bark of dead trees, although live trees, especially shagbark hickory, are also used if they have flaking bark under which the bats can roost. Maternity colonies typically use 10 to 20 trees each year, but only one to three of these are primary roosts used by the majority of bats for some or all of the summer (Callahan 1993, Callahan *et al.* 1997). Roost trees can vary considerably in size, but primary roosts are usually large diameter snags (dead trees). Although male Indiana bats may roost in trees less than 12.7 cm (5 in) dbh, suitable roosting habitat is defined as forest patches with trees of 12.7 cm (5 in) dbh or larger (USFWS 2015a). Although roost trees are often in mature mostly closed-canopy forests, maternity roost trees, especially in Ohio, are typically in open areas exposed to solar radiation (i.e., sunlight on the roost area for at least part of the day). These trees may be in canopy gaps in the forest, in a fence line, or along a wooded edge. Roost trees, although ephemeral in nature, may be occupied by a colony for a number of years until they are no longer suitable.

Indiana bats eat a variety of flying insects found along rivers or lakes and in uplands. Indiana bats typically forage within 2.5 miles from roost trees. When the locations of roost trees are unknown, the home range for a maternity colony is considered to be all suitable habitat within 5 miles from capture points (USFWS 2011a).

Female Indiana bats give birth to one young each year (Mumford and Calvert 1960, Humphrey *et al.* 1977, Thomson 1982). Most births occur in mid to late June and lactation continues into July for 3 to 5 weeks (Kurta and Rice 2002). Young bats can fly at about four weeks of age after which maternity colonies begin disbanding. A few bats from maternity colonies may commence fall migration in August, although at many sites some bats remain in their maternity colony area

through September and even into October (Humphrey *et al.* 1977, Kurta *et al.* 1993). Members of a maternity colony do not necessarily hibernate in the same hibernacula (Kurta and Murray 2002).

Migration

Indiana bats can migrate hundreds of kilometers from their hibernacula (USFWS 2007). In the Midwest Recovery Unit (RU), the maximum documented migratory distance is 574.5 km (357 mi) (Winhold and Kurta 2006). Migration is an energetically demanding behavior for the Indiana bat, particularly in the spring when their fat reserves and food supplies are low and females are pregnant.

Winter habitat and ecology

Indiana bats tend to hibernate in the same cave or mine at which they swarm (LaVal et al. 1976), although swarming has been observed at hibernacula other than those in which the bats hibernated (Cope and Humphrey 1977; MacGregor 2005, pers. comm.) and at caves that do not serve as hibernacula for the species (Brack 2006, pers. comm.). It is generally accepted that Indiana bats, especially females, are philopatric; that is, they return annually to the same hibernacula (LaVal and LaVal 1980). However, exceptions have been noted (Hall 1962, Myers 1964). Some Indiana bats apparently also move from traditional hibernacula to occupy manmade hibernacula, primarily mines, as these become available.

Most Indiana bats enter hibernation by the end of November (mid-October in northern areas) (Kurta et al. 1997), although populations of hibernating bats may increase throughout fall and into early January at some hibernacula (Clawson et al. 1980). Indiana bats usually hibernate in large, dense clusters ranging from 300 bats per square foot (LaVal and LaVal 1980) to 484 bats per square foot (Clawson et al. 1980, Hicks and Novak 2002), although cluster densities as high as 500 bats per square foot have been recorded (Stihler 2005). While the Indiana bat characteristically forms large clusters, small clusters and single bats also occur (Hall 1962, Hicks and Novak 2002).

Indiana bats often winter in the same hibernaculum with other species of bats and are occasionally observed clustered with or adjacent to other species, including gray bats (*Myotis grisescens*), Virginia big-eared bats (*Corynorhinus townsendii virginianus*), little brown bats (*Myotis lucifugus*), and Northern long-eared bats (*Myotis septentrionalis*) (Myers 1964, LaVal and LaVal 1980).

Spring staging and fall swarming habitat and ecology

Upon arrival at hibernacula, Indiana bats mate and build up fat reserves by foraging, usually in close proximity to the cave. This period of activity prior to hibernation is called swarming, which is a critical part of the life cycle when Indiana bats converge at hibernacula, mate, and forage until sufficient fat reserves have been deposited to sustain them through the winter (Hall 1962). Swarming behavior typically involves large numbers of bats flying in and out of cave entrances throughout the night, while most of the bats continue to roost in trees during the day.

Indiana bats arrive at their hibernacula in preparation for mating and hibernation as early as late July; usually adult males or non-reproductive females make up most of the early arrivals (Brack 1983). The number of Indiana bats active at hibernacula increases through August and peaks in September and early October (Cope and Humphrey 1977, Hawkins and Brack 2004, Hawkins *et al.* 2005). Swarming continues for several weeks and mating may occur on cave ceilings or near the cave entrance during the latter part of the period. After fall migration, females typically do not remain active outside the hibernaculum as long as males. Males may continue swarming through October in what is believed to be an attempt to breed with late arriving females.

Limited mating activity occurs throughout the winter and in spring before the bats leave hibernation (Hall 1962). Young female bats can mate in their first autumn and have offspring the following year (although how many actually do so is variable), whereas males may not mature until the second year.

Shortly after emerging from hibernation in the spring, females become pregnant via delayed fertilization from the sperm that has been stored in their reproductive tracts through the winter. Most reproductive females leave immediately for summer habitat although some may linger for a few days near the hibernaculum. Members of a maternity colony do not necessarily hibernate in the same hibernacula (Kurta and Murray 2002). Males and non-reproductive females may stay near hibernacula or travel to summer habitat.

Threats

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

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

(Cryan et al. 2010). Infected bats exhibit premature arousals, aberrant behavior, and premature loss of critical fat reserves which is thought to lead to starvation prior to spring emergence (Frick et al. 2010). It has been determined that *P. destructans* is the primary cause of death (Lorch et al. 2011).

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

First documented in a New York cave in 2006, WNS has since spread to 26 states and five Canadian provinces, including over 50 known Indiana bat hibernacula. Affected hibernacula typically exhibit significant mortality (USFWS 2013). WNS has resulted in significant population declines in the Northeast and Appalachian RUs. Between 2007 and 2011, the Northeast RU lost 70 % of its Indiana bat population (USFWS 2013). WNS is spreading rapidly throughout the rest of the Indiana bat's range. WNS continues to be found at an increasing number of sites throughout the Midwest RU. In March 2011, the first case of WNS was confirmed in Ohio, in an abandoned mine in Lawrence County. Currently, 16 counties in Ohio have been confirmed as WNS positive (ODNR 2014). Declines in Indiana bat populations are apparent. As the disease spreads, further declines in populations are expected. The Service, with the help of States, researchers, and others, is continuing to research this evolving threat. Methods are being evaluated to stop the spread of WNS and to minimize mortality where it currently exists.

Another emerging risk to bat species is the recent increase in the number of wind turbines being constructed and operated. To date, seven Indiana bat fatalities have been documented at wind energy facilities (USFWS 2014a). While it is assumed that other Indiana bat mortalities have occurred at wind facilities, these fatalities represent the only documented take at wind facilities to date.

Status of the Indiana Bat in Ohio

The entire State of Ohio is considered to be within the core maternity range of the Indiana bat. However, the total population of Indiana bats within Ohio during the summer is unknown. The Service assumes that the Indiana bat may be present anywhere within Ohio during the summer where suitable habitat exists. The Service recognizes that there is no way to know the actual number of Indiana bats that occur in Ohio during the summer. What is known is that the total estimated population of Indiana bats disperses over a large area during the spring.

Indiana bats and their maternity colonies have been documented throughout the state. Indiana bats are known to hibernate in southern Ohio and south of Ohio in Kentucky and Tennessee as well as to the southwest in southern Indiana, and to the east in Pennsylvania. Researchers have documented that Indiana bats migrate over long distances (up to 300 miles) between summer and winter habitats (Murray and Kurta 2002). The summer and winter habitats for others may be in

close proximity. However, when comparing the Indiana bat's known wintering sites to the documented summer sites, it is apparent that there is a general trend of dispersal of Indiana bats from their hibernacula throughout the eastern U.S. This suggests that many Indiana bats are moving in a somewhat northerly direction during spring emergence. Thus, it is a reasonable assumption that a number of Indiana bats migrate into Ohio following hibernation where they remain for the summer.

Ohio has two confirmed Indiana bat hibernacula. Since 2011 when WNS was first detected in the state, winter monitoring of these hibernacula has documented a decline of approximately 50% of Ohio's winter Indiana bat population (USFS 2014, ESI 2014). It is not known whether this documented winter decline represents a 50% loss of Indiana bat due to WNS-caused mortality or if Indiana bats are shifting to alternative hibernacula locations due to the presence of WNS. It is possible that the winter decline may be due to a combination of both factors.

Critical Habitat

Critical habitat was designated for the species on September 24, 1976 (41 FR 41914). Eleven caves and two mines in six states were listed as critical habitat. None of these critical habitat units occur within Ohio.

Conservation Needs of the Species

In order to recover the Indiana bat the following factors are thought to be necessary to ensure genetic representation, redundancy (populations distributed across the landscape) and resiliency (sufficiently large populations). To do this, the following must be addressed:

1. Maintaining the current winter and summer range of the Indiana bat. The key steps of conserving and managing Indiana bats across the species range include establishing Indiana bat RUs, and maintaining self-sustaining Indiana bat populations in each RU.

2. Conserving and managing winter colonies and hibernacula. The key steps in conserving and managing winter colonies and hibernacula include: maintaining both large and small hibernating populations; maintaining or providing appropriate physical structure, airflow, and microclimate of the hibernacula; maintaining forest habitat surrounding hibernacula; avoiding disturbance of hibernating bats which can lead to excessive arousal and premature depletion of fat reserves; and minimizing disturbance of bats during the swarming period that can lead to disruptions in mating and foraging activity.

3. Conserving and managing maternity colonies. The key steps in conserving and managing maternity colonies include: locating maternity colonies in each RU via spring emergence radio tracking or summer surveys; ensuring a sufficient number of self-sustaining maternity colonies persist in order to support the regional population (i.e., RU population) by managing and controlling threats acting singly and cumulatively upon the fitness of maternity colonies; and, maintaining the ecological processes that ensure the continued availability of roosting, foraging, and commuting habitat needed to support maternity colonies.

4. Conserving migrating Indiana bats. The key steps in conserving and managing migrating Indiana bats include: understanding Indiana bat migration, including migratory routes, behaviors and differences between fall and spring migration; maintaining safe and suitable migration pathways across the species range; conserving and managing important stopover habitat, if such habitat is deemed necessary; identifying limiting factors and managing threats during migration, including minimizing/managing fatalities due to wind energy.

5. Managing the effects of WNS. There is currently no effective treatment for WNS. The key steps of managing the impacts of WNS may include: avoiding/minimizing the transmission of *P. destructans;* implementing measures to control *P. destructans* should effective, non-harmful measures become available; and restoring and protecting populations affected by WNS, with emphasis on populations that are seemingly more resilient to the disease.

ENVIRONMENTAL BASELINE

The Environmental Baseline analyzes the effects of past and ongoing human and natural factors leading to the current status of the species, their habitat, and the ecosystem within the action area. In order to assess the potential for the Indiana bat to occur within the action area, the Service must formulate reasonable assumptions. These assumptions must be made in order to analyze the potential effects of the action. It is important to note that the Service has been mandated by Congress to provide the benefit-of-the-doubt to federally listed species (H.R. Conf. Report No. 697, 96th Cong., 2d Session, 1979). That is to say, the Service must err on the conservative side (the side of the species) when making reasoned assumptions.

Status of the Indiana Bat in the Action Area

Summer Habitat

The entire State of Ohio is considered to be within the core maternity range of the Indiana bat. Therefore, the Service assumes that the Indiana bat may be present anywhere within Ohio during the summer where suitable habitat exists. While numerous presence/absence surveys have been conducted for Indiana bats within Harrison County, none have occurred within the action area. Since no surveys have been conducted within the action area the Service will err on the side of the species and assume that Indiana bats do occur within the action area. This would include the entire 64.55 acres of forest planned to be cleared within the action area.

Indiana bats present during summer in the action area may include reproductively active females, non-reproductively active males and females, and juveniles. It is difficult to quantify the actual number of Indiana bats that may be present because Indiana bats are not uniformly distributed on the landscape during the summer. For example, Indiana bat density would be greater in areas where maternity colonies are present. The action area has not been surveyed for bats, although previous Indiana bat surveys in Harrison County have failed to detect Indiana bats. It is also important to note that areas that have been surveyed in Harrison County may not necessarily represent the highest quality bat habitat available in the County. Thirty-four mist net surveys have been conducted within 2.5 miles of the action area; none documented Indiana bats.

Therefore it is likely that if Indiana bats do occur within the action area that it is only a small population.

Woodland habitat will be removed during the period 1 October to 31 March, and therefore a direct take by killing or injury of individuals will be avoided.

Fall, Winter, and Spring Habitat

As mentioned within the Biological Assessment there are no winter hibernacula within the action area, therefore there will be no direct impact on swarming or wintering habitat.

Conservation Needs in the action area

The conservation needs of the Indiana bat in the action area are similar to their needs rangewide. The action area provides habitat for summering and migrating bats. Therefore, within the action area the conservation needs include providing suitable habitat conditions for Indiana bat roosting, foraging, and traveling.

Habitat Conditions in the action area

The 245.54 acre action area is predominately comprised of deciduous forest (70%), developed area (23%), pasture (5%), with the remaining 2% made up of open water or grasslands. While no site-specific data on tree species, age, or heights are available, based upon aerial photography the majority of the forest within the action area appears to be mature, which could represent suitable habitat for Indiana bats.

EFFECTS OF THE ACTION

This BO evaluates the anticipated effects of the Jewett Junction project on the Indiana bat. This project will require the removal of 89 acres, of which 64.55 are forested, of potential Indiana bat habitat. Potential effects to the Indiana bat include indirect effects such as the removal of the habitat during the bat's inactive period. Due to the clearing being limited to the inactive period for Indiana bats, no direct impacts are anticipated associated with this project.

Our analysis of effects for the Indiana bat entails: (1) evaluating individual Indiana bat exposure to action-related stressors and response to that exposure; (2) integrating those individual effects (exposure risk and subsequent response) to discern the consequences to the populations to which those individuals belong; and (3) determining the consequences of any population-level effects to the species rangewide. If, at any point, we demonstrate that the effects are unlikely, we conclude that the agency has insured that their action is not likely to jeopardize the continued existence of the species and our analysis is completed.

Indirect Effects

Summer Habitat

Loss of 64.55 acres of suitable roosting and foraging habitat likely used by Indiana bats during the summer will be lost. When Indiana bats return to their summer home-ranges, they may have to travel to find alternate roosting and foraging habitat. However, much of the surrounding area looks to be suitable habitat for Indiana bats. Thus, the Service anticipates that individuals of the colony will successfully locate new alternate roosts shortly after returning to their summering home-range.

Indiana Bats – Roost Trees

Loss of roost trees can have substantial implications for reproductive females. As explained previously in Status of Species section, female and young Indiana bats depend on specific roost trees for their reproductive success and survival. If their primary maternity roost tree (MRT) or several secondary roost trees are removed, the exposed individuals will need to search for new roosting sites. This can lead to increased energy expenditure, torpor, and possibly loss of young if the expenditure is sufficiently severe and prolonged. Individual males can also be impacted by loss of an undetected roost tree if cut while occupying the tree.

We do not anticipate direct impacts due to loss of occupied Indiana bat primary MRTs due to the seasonal clearing restrictions. Indiana bat primary MRTs are readily identifiable due to their large size, typically ≥16 inches dbh, and structure, which contains large areas of peeling or exfoliating bark with significant solar exposure.

Fall, Winter, and Spring Habitat

Since no caves or mines within known populations of wintering bats are known to occur within 5-miles of this project no indirect effects are anticipated from this project.

Indiana bat – foraging

The forested habitat within the project footprint and within the action area provides suitable foraging habitat for Indiana bats. This species forages within and around the canopy of upland forests and occasionally forage over forest clearings, water, and along roads. The preferred foraging habitat for Indiana bats is more typically associated with riparian areas (Brack and Whitaker 2001, LaVal *et al.* 1977).

The loss of foraging habitat when bats are present could directly affect the Indiana bat by disrupting bat foraging patterns within the action area. During tree clearing, some individual bats may avoid crossing the project footprint. Bats in this scenario would be subject to take in the form of harassment as they are displaced from their home range. Due to the availability of suitable foraging opportunities in the surrounding landscape, it is likely that these bats will have little difficulty in establishing new home ranges. Bats that remain loyal to certain foraging areas may continue to cross through newly cleared areas in the project footprint and would likely have an increased risk of mortality from predation although this risk is not detectable or measurable.

Effects from Noise and Disturbance

Noise and vibration and general human disturbance are stressors that may disrupt normal feeding, sheltering, and breeding activities of the Indiana bat. Bats may be exposed to noise, vibrations, and disturbance from tree clearing, equipment operation, and blasting in and near their roosting and foraging areas.

There is limited literature available regarding impacts from noise (outside of road/traffic) on bats. Gardner et al. (1991) had evidence that an Indiana bat, continued to roost and forage in an area with active timber harvest. Callahan (1993) noted that the likely cause of the bats in his study area abandoning a primary roost tree was disturbance from a bulldozer clearing brush adjacent to the tree. Therefore, novel noises would be expected to result in some changes to bat behaviors.

Increased noise created by construction equipment within the project area could disturb bats day roosting in nearby forests during spring, summer, and fall. This potential disturbance would be localized and short-term for the project. The novelty of these noises and their relative volume levels will likely dictate the range of responses from individuals or colonies of bats. At low noise levels (or farther distances), bats initially may be startled and have increased respiration/heart rates, but they would likely habituate to the low background noise levels. At closer range and louder noise levels (particularly if accompanied by physical vibrations from heavy machinery and crashing of falling trees), many bats would probably be startled to the point of fleeing from their day-time roosts and in a few cases may experience increased predation risk. Because the noise levels in construction areas will continue for more than a single day, the bats roosting within or close to these areas are likely to shift their focal roosting areas farther away or may temporarily abandon these roosting areas completely. Gardner et al. (1991) suggested that noise and exhaust emissions from machinery could possibly disturb colonies of roosting bats, but such disturbances would have to be severe to cause roost abandonment. Callahan (1993) noted that the likely cause of the bats in his study area abandoning a primary roost tree was disturbance from a bulldozer clearing brush adjacent to the tree.

Effects from Lighting

Lighting may be used during project construction during dawn and dusk later in the year when daylight hours become limited. Bat behavior may be affected by lights when traveling between roosting and foraging areas. Foraging in lighted areas may increase risk of predation (leading to death) or it may deter bats from flying in those areas. Bats that significantly alter their foraging patterns may increase their energy expenditures resulting in reduced reproductive rates. This depends on the context (e.g., duration, location, extent, type) of the lighting.

While there is limited information regarding potential neutral, positive, or negative impacts to Indiana bats from increased light levels, slow-flying bats such as *Rhinolophus, Myotis, and Plecotus* species have echolocation and wing-morphology adapted for cluttered environments (Norberg and Rayner 1987), and emerge from roosts relatively late when light levels are low, probably to avoid predation by diurnal birds of prey (Jones and Rydell 1994). Therefore, we

would generally expect that Indiana bats would avoid lit areas. In Indiana, Indiana bats avoided foraging in urban areas and Sparks et al. (2005) suggested that it may have been in part due to high light levels.

Lighting would be an additional disturbance occurring at the same time as construction noise and vibrations. The ongoing construction disturbances will likely have already resulted in bats shifting their roosting and foraging usage of the action area. Therefore, lighting effects on bats are anticipated to be insignificant and discountable.

Effects from Stream and Wetland Impacts

Earthwork and general construction activities may result in short-term adverse impacts to the water quality in the action area. Construction of the Jewett Junction project will result in the filling of 1.78 acres of wetlands and 289 linear feet of streams. Sediment, herbicides, and other contaminants could affect water quality through erosion, vegetation management, and accidental spills during any phase of the project from construction to operation. These impacts will primarily be localized (i.e., limited to the construction limit footprint), but may extend for some distance downstream, depending on intensity of disturbance and field conditions at the time of construction.

Insects associated with these aquatic habitats make up a portion of the diet of the Indiana bat. A change in water quality can affect the species base of these prey species. Decreases in water quality through contamination and the temporary disturbance of wetlands and stream habitats while bats are present may reduce the availability of aquatic insects and may reduce the availability or quality of suitable drinking sources. However, all wetland and stream impacts along the linear portion of the project will be temporary as wetlands and streams within the linear portion of the project will be restored to original grade.

The developer will follow federal wetland permitting, stormwater management, and water quality standards. Implementation of the standard best management practices (e.g., minimization of wetland fill, implementation of erosion control measures) through wetlands and streams is expected to provide for continued clean water and aquatic foraging habitat for bats.

Even if there are minor water quality changes that cause a temporary, localized reduction in prey base and drinking resources for the bats, we presume that the surrounding landscape will continue to provide an abundant prey base of both terrestrial and aquatic insects during project construction, operation, and maintenance. Additionally, 95 feet of stream impacts will occur on-site. Therefore, any potential direct and indirect effects to the bats from a reduction in water quality are anticipated to be insignificant.

Direct Effects

Summer Habitat

Due to the timing of tree clearing no direct effects are anticipated from this project.

Fall, Winter, and Spring Habitat

Since no caves or mines within known populations of wintering bats are known to occur within 5-miles of this project no direct effects are anticipated from this project.

Cumulative Effects

Cumulative effects include the effects of future state, tribal, local or private actions that are reasonably certain to occur in the action area considered in this biological opinion. Future federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA. This section analyzes the added impact from cumulative effects.

The Service is unaware of any tribal, state, local, or private actions presently occurring or that are reasonably certain to occur in the future, which would destroy, modify or curtail the Indiana bat summer habitat within the action area. Therefore, we do not anticipate significant cumulative effects from the proposed action, combined with other reasonably foreseeable non-federal actions.

Summary of Effects

Impacts to Individuals

Indirect effects from the action may result from habitat modification and primarily involve changes to roosting and foraging suitability. Given the nature of the project in relation to the overall forested character of the action area, this project will not substantially alter the overall availability or suitability of Indiana bat roosting or foraging habitat. No direct effects are anticipated from this project.

Impacts to Populations

As we have concluded that individual bats are likely to experience harm, or harass, we need to assess the aggregated consequences of the anticipated reductions in fitness (i.e., reproductive success and survival), of the exposed individuals on the populations (maternity colonies) to which these individuals belong. We recognize the potential for a small amount of impact due to anticipated reduction in fitness due to tree clearing, but we believe the Indiana bat colonies affected should be able to sustain the worst-case losses discussed above.

Impacts to the Species

Reductions in the maternity colonies' population fitness are unlikely to occur. Thus, no component of the proposed action is expected to reduce the reproduction, numbers, or distribution of the Indiana bat rangewide. While we recognize that the status of the species is uncertain due to WNS, given the environmental baseline, and the intensity, frequency, and duration of the project impacts, we find that the proposed project is unlikely to have population-level impacts, and thus, is also unlikely to decrease the overall reproduction, numbers, or

distribution of the Indiana bat. Therefore, we do not anticipate a reduction in the likelihood of both survival and recovery of these species as a whole.

CONCLUSION

After reviewing the current status of this species, the environmental baseline for the action area, the effects of the proposed action, and the cumulative effects, it is our biological opinion that the action, as proposed, is not likely to jeopardize the continued existence of the Indiana bat. No critical habitat for the Indiana bat occurs in the action area; therefore, none will be affected.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to section 4(d) of the ESA prohibit the take of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or 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 (50 CFR § 17.3). Harass is defined by the Service as an intentional or negligent act or omission which creates the likelihood of injury to wildlife by annoying it to such an extent as to significantly disrupt normal behavioral patterns which include, but are not limited to, breeding, feeding, or sheltering (50 CFR § 17.3). Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of section 7(b)(4) and section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

AMOUNT OR EXTENT OF TAKE

Incidental take of Indiana bat present in the action area could occur due to tree clearing and noise disturbance during clearing and construction. The Service anticipates incidental take of the Indiana bat will be difficult to detect for the following reasons: (1) the individuals are small and occupy summer habitats where they are difficult to find; (2) Both species form widely dispersed maternity colonies under loose bark or in the cavities of trees, and males and non-reproductive females may roost individually which makes finding the species or occupied habitats difficult; (3) finding dead or injured specimens during or following project implementation is unlikely; (4) the extent and density of the species within its summer habitat in the action area is unknown; and (5) in many cases incidental take will be non-lethal and undetectable.

The Service anticipates that no more than 64.55 acres of habitat occupied by one (1) Indiana bat maternity colony, and/or individual male and non-reproductive Indiana bats will be disturbed and 89 acres of habitat cleared as a result of Jewett Junction project. Of the habitat to be cleared, Indiana bat is assumed to be present on 64.55 acres.

We anticipate that some male, female, and juvenile Indiana bats may be impacted due to clearing for the Jewett Junction Project. This impact will be in the form of habitat loss, since the clearing will not occur during the active period for Indiana bats (April 1 to September 30). This is likely to occur if an occupied roost tree is felled during the summer roosting/foraging.

The potential roosting and foraging habitat affected can be used as a surrogate to monitor the level of take. Therefore, the Corps must reinitiate consultation with the Service if more than 64.55 acres of forested habitat are removed during the project.

EFFECT OF THE TAKE

Overall, the Service anticipates that this project may harm or harass of one (1) Indiana bat maternity colony, and/or individual male and non-reproductive Indiana bats, and is not likely to cause population-level effects. In the accompanying biological opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to Indiana bat. No critical habitat for the Indiana bat occurs in the action area, so none would be impacted.

REASONABLE AND PRUDENT MEASURES

The Service believes the following reasonable and prudent measures (RPMs) are necessary and appropriate to minimize the impacts of incidental take of Indiana bats during the construction of the Jewett Junction project.

1. The Corps will ensure the permittee will monitor take to verify that the authorized level of take has not been exceeded within their permit areas during construction of the project. Beaver Excavating (the developer) must comply with this RPM in the action area (Figure 1, pg. 7)

2. Implementation of all conservation measures proposed by Beaver Excavating in the BA.

TERMS AND CONDITIONS

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

1. Beaver Excavating will monitor tree clearing limits to ensure no more than 64.55 acres of trees are cleared for the project.

2. The Corps will include implementation of the conservation measures, as detailed in the BA, as a special condition of the NWP authorization. In addition to NWP special conditions, Beaver Excavating is responsible for complying with all proposed conservation measures within the action area.

The RPMs, with their implementing terms and conditions, are designed to minimize the impact of incidental take that might otherwise result from the proposed action. The Service believes that the action will result in the following:

1. Disturbance of 89 acres of habitat occupied by Indiana bats; and

2. Removal of 64.55 acres of habitat occupied by Indiana bats

CONSERVATION RECOMMENDATIONS

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

The Service has identified the following actions that, if undertaken by the Corps or Beaver Excavating, would further the conservation of the Indiana bats.

1. Beaver Excavating should seek opportunities to provide replacement trees to properties in areas cleared for temporary construction activities.

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

REINITIATION NOTICE

This concludes formal consultation for the Corps' actions outlined in your request dated January 15, 2016. As provided in 50 CFR § 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over an action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded (more than 64.55 acres of forested habitat is removed; (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 action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat is designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such a take must cease pending reinitiation.

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