



TABLE OF CONTENTS

3.16 Threatened and Endangered Species	2
3.16.1 Introduction	2
3.16.1.1 Endangered Species Act of 1973	2
3.16.1.2 Bald and Golden Eagle Protection Act of 1962	3
3.16.1.3 Migratory Bird Treaty Act of 1918	3
3.16.1.4 Indiana Nongame and Endangered Species Conservation Act of 1973	3
3.16.1.5 Division of Nature Preserves	3
3.16.2 U. S. Fish and Wildlife Service Consultation and Indiana Department of Natural Resources Coordination	4
3.16.3 Methodology	6
3.16.3.1 Proximity Analysis	7
3.16.3.2 Bat Habitat Assessment Analysis	7
3.16.4 Analysis	8
3.16.4.1 U.S. Fish and Wildlife Service Federally Listed, Candidate and Proposed Listing Species	10
3.16.4.2 Indiana Department of Natural Resources State Listed Species	22
3.16.5 Local Improvements	26
3.16.6 Mitigation	26
3.16.7 Summary	26

FIGURES

Figure 3.16-1: U.S. Fish and Wildlife Service and Indiana Department Of Natural Resources Listed Species per PLSS Section	9
Figure 3.16-2: Bald Eagle Territories and Young Fledged In Indiana – 1993-2010	15

TABLES

Table 3.16-1: Chronology Summary of Endangered Species Act Section 7 Consultation and IDNR Endangered Species Coordination.	5
Table 3.16-2: Alternative Proximity Analysis Summary for Federally Listed Species	10
Table 3.16-3: Indiana Bat Maternity and Hibernacula Forest Habitat Assessment	12
Table 3.16-4: Northern Long-Eared Bat Maternity and Hibernacula Forest Habitat Assessment	13
Table 3.16-5: Documented Bald Eagle Nests Within 1 Mile of Alternative Working Alignments	16
Table 3.16-6: Alternative Proximity Analysis Summary for State Listed Species	22



3.16 THREATENED AND ENDANGERED SPECIES

3.16.1 Introduction

Unique wildlife and plant resources are afforded consideration and protection from adverse impacts resulting from public projects through various federal and state acts and statutes. The assessment of threatened and endangered species is concerned with the preservation and conservation of imperiled species and their sustainability. Federal and state statutes which offer protection to these species include the following. The first three listed are federal acts; the fourth is a State of Indiana law.

- Endangered Species Act of 1973
- Bald and Golden Eagle Protection Act of 1962
- Migratory Bird Treaty Act of 1918
- Indiana Nongame and Endangered Species Conservation Act of 1973

3.16.1.1 Endangered Species Act of 1973

Section 7 of the Endangered Species Act of 1973 (16 U.S.C. § 1531 et seq.) directs all Federal agencies to use their existing authorities to conserve threatened and endangered species and ensure that their actions do not jeopardize the continued existence of listed species or significantly impact or adversely modify critical habitat. The U.S. Fish and Wildlife Service (USFWS) administers the Act and is charged with designating species as endangered or threatened. The following definitions for federal listing status, listing status review, and critical habitat are current as of January 2021.

- **Endangered** – Any species which is in danger of extinction throughout all or a significant portion of its range
- **Threatened** – Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range
- **Candidate** – Species that have sufficient information on biological vulnerability and threats to support a proposal for listing as endangered or threatened, but for which preparation and publication of a proposal is precluded by higher priority listing actions
- **12-Month Proposed Listing and Proposed Critical Habitat Review** – 12-month finding of a petition to list a species. If listing is warranted, proceed with a concurrent proposed listing rule and proposed critical habitat designation, if critical habitat is prudent and determinable
- **Discretionary Proposed Listing and Proposed Critical Habitat Review** – Status review undertaken by discretion of the Service. Results of the review may be to propose listing, make a species a candidate for listing, provide notice of a not warranted candidate assessment or other action as appropriate.
- **Critical Habitat** – Specific habitat areas that contain the physical or biological features essential to conservation of a species



3.16.1.2 Bald and Golden Eagle Protection Act of 1962

Originally enacted as the Bald Eagle Protection Act of 1940, it was later expanded to include the golden eagle in 1962 (16 U.S.C. § 668) and amended several times since. This statute prohibits “take” of bald eagles, their parts, nests, eggs, as well as acts that result in molesting or disturbing the birds, without a permit from the Secretary of the Interior, subject to criminal and civil penalties. The USFWS developed the Nation Bald Eagle Management Guidelines to assist land managers and agencies in assessing potential disturbance to bald eagles from proposed actions and to provide recommendations for avoidance and minimization of such disturbances.

3.16.1.3 Migratory Bird Treaty Act of 1918

The Migratory Bird Treaty Act (U.S.C. 703-712) is a statute which enforces a bird conservation treaty between the United States and Great Britain (acting for Canada). Its provisions were expanded to include later conventions with Mexico, Japan and the Soviet Union (Russia). This statute makes it unlawful to pursue, hunt, take, capture, kill, possess, sell, purchase, barter, import, export, or transport any migratory bird, or any part, nest or egg of any such bird, unless authorized under a permit issued by the Secretary of the Interior. The act provides protection to 1,093 birds in the United States (USFWS 2020), over 400 of which are known to occur in Indiana (IDNR 2020d).

3.16.1.4 Indiana Nongame and Endangered Species Conservation Act of 1973

The Nongame and Endangered Species Conservation Act (IC 14-22-34) charges the Indiana Department of Natural Resources (IDNR) Division of Fish and Wildlife with the responsibility to manage and conserve nongame and endangered species (mammal, bird, amphibian, reptile, fish, mollusk, and crustacean) within Indiana.

3.16.1.5 Division of Nature Preserves

In 1978, the State of Indiana entered into an agreement with The Nature Conservancy, Inc. to develop an Indiana Heritage Program to establish a “systematic classification and identification of Indiana’s natural diversity including ecologically significant areas, communities, features, or species; for the protection of such areas from adverse impacts; and for the development of an overall data management system to coordinate the processes of ecological, cultural, historical, and recreational inventory, systematic data management, analysis and protection.” Today the IDNR Division of Nature Preserves administers this program through the Indiana Natural Heritage Data Center. The Division of Nature Preserves performs an administrative role in monitoring and designating species status within groups (invertebrates and plants) not covered by the Nongame and Endangered Species Conservation Act as either endangered or threatened. While the Division of Nature Preserves does not exercise any regulatory authority over impacts to species included in the Indiana Natural Heritage Data System, these designations are used by other agencies such as the Indiana Department of Environmental Management and IDNR Division of Water in implementation of their respective permitting programs. The following Indiana state listing status definitions are used by the IDNR Division of Fish and Wildlife and IDNR Division of Nature Preserves to assist in directing conservation needs.

- **Endangered Animals and Mussels (Division of Fish and Wildlife)** - Any animal species whose prospects for survival or recruitment within the state are in immediate jeopardy and are in danger of disappearing from the state. This includes all species classified as endangered or threatened by the federal government that occur in Indiana.
- **Special Concern Animals and Mussels (Division of Fish and Wildlife)** - Any animal species requiring monitoring because of known/suspected limited abundance or distribution or because of a recent change in legal status or required habitat.



- **Endangered Insect or Spider (Division of Nature Preserves)** – A species whose prospects for survival or recruitment within Indiana are in immediate jeopardy, and is in danger of disappearing from the state, where: 1) a species may occur in Indiana is classified as endangered by the federal government, 2) is biologically dependent on a threatened or endangered plant species or 3) a species is known from fewer than five sites in Indiana.
- **Threatened Insect or Spider (Division of Nature Preserves)** – A species which is likely to become endangered within the foreseeable future, where: 1) a species may occur in Indiana is classified as threatened by the federal government, 2) is biologically dependent upon a rare or threatened plant species or 3) a species is known from six to 10 sites in Indiana.
- **Rare Insect or Spider (Division of Nature Preserves)** – A species where problems of limited abundance or distribution in Indiana are known or reasonably suspected, where: 1) a species is known to be rare in Michigan, Ohio, Illinois or Kentucky or 2) a species is biologically dependent upon a rare plant species.
- **Endangered Plant (Division of Nature Preserves)** – A species believed to be native to Indiana with five or fewer occurrences in Indiana or that is otherwise currently at the brink of extinction.
- **Threatened Plant (Division of Nature Preserves)** – A species believed to be native to Indiana with six to 20 occurrences in the state, or that is of conservation concern, or that is otherwise likely to become endangered within the foreseeable future.

3.16.2 U. S. Fish and Wildlife Service Consultation and Indiana Department of Natural Resources Coordination

Informal Section 7 consultation with the USFWS was initiated via a July 3, 2019 meeting at the Bloomington Field Office to introduce the project as a tiered EIS, generally discuss limits of the Study Area, and explain the development of preliminary alternatives. This coordination meeting included further discussion of the alternative screening process, general timelines, and potential endangered species concerns. The project team sought to receive input from the agency regarding Section 7 consultation expectations, a biological assessment and biological opinion schedule and to establish the overall anticipated framework for continued Section 7 consultation. Table 3.16.1 provides a chronology of Tier 1 Endangered Species Act Section 7 informal consultation activities with USFWS concerning federally-listed species and coordination with IDNR concerning state-listed species.

In response to the Early Coordination request effort, the USFWS provided a response letter dated September 10, 2019 (**Appendix I**) in which they listed multiple federally-listed endangered and threatened species of potential concern within the Mid-States Corridor 12-county project area. This response identified eight endangered species, one threatened species, the bald eagle and two species currently under proposed listing and proposed critical habitat (PLPCH) review. Subsequently, USFWS provided a response dated March 23, 2020 for their review of the Screening of Alternatives Report. In this letter, it was reiterated the previous list of species of concern was still valid, and four other species were added that are currently under review for listing on the National Listing Workplan. At the request of the Mid-States Corridor Project Team, on June 10, 2021, USFWS was requested to provide a revised list including species of concern under the Endangered Species Act for the project due to the status of some species changing since the previous two responses were received. Additionally, the project scope had also been revised relative to Segment 1 along existing US 231 south of I-64. The resulting collective list of federally-listed, candidate, and review species of potential concern for the Mid-States Corridor project includes:

- Bats
 - Indiana bat (*Myotis sodalis*) – endangered



Date	Event/Action
July 3, 2019	Initial Coordination meeting with U.S. Fish and Wildlife Service at Bloomington Field Office to discuss intended Tiered approach, threatened and endangered species, and Section 7 consultation expectations
July 5, 2019	Notice of Intent for Mid-States Corridor published in Federal Register (84 FR 32251)
July 29, 2019	U.S. Fish and Wildlife Service acknowledges receipt of Notice of Intent for Mid-States Corridor. Response includes notification of nine species that have ranges within the proposed project area.
July 30, 2019	Early Coordination Letter distributed to agencies.
August 20, 2019	Agency Scoping Meeting involving multiple agencies, including U.S. Fish and Wildlife Service and Indiana Department of Natural Resources, to highlight the project. This introductory meeting included an overview of the Tiered NEPA approach, milestones, purpose and need, project area description, preliminary alternatives, general resource impact assessment methodology, preliminary alternative screening process, public meeting schedule, public involvement strategy, and schedule for agency responses.
September 10, 2019	U.S. Fish and Wildlife Service provides response letter to Early Coordination. The Service identified nine federally listed species (Indiana bat, northern long-eared bat, gray bat, least tern, sheepsnose mussel, fat pocketbook mussel, rough pigtoe mussel, eastern fanshell mussel and rabbitsfoot mussel) that have ranges within the proposed project area. The response also indicated that the Service released a 90-day finding on a petition to list the lake sturgeon and is currently undergoing a 12-month review. Additionally, the response noted there are numerous records of the bald eagle within the proposed project area.
December 12, 2019	Meeting with U.S. Fish and Wildlife Service at Bloomington Field Office to discuss the tiered NEPA approach, threatened and endangered species of concern, impact assessment expectations, field survey needs, Section 7 consultation expectations and schedule.
February 2, 2020	Preliminary Alternatives Screening Report made available to all coordinating agencies, including U.S. Fish and Wildlife Service and Indiana Department of Natural Resources.
March 3, 2020	Preliminary Alternative Screening Meeting at Vincennes University Jasper Campus involving multiple agencies, including U.S. Fish and Wildlife Service and Indiana Department of Natural Resources, to review the screening process and results of the preliminary alternatives as grouped into three families: Northwest, North Central and Northeast.
March 4, 2020	Preliminary Alternative Screening Bus Tour involving various agency representatives, including U.S. Fish and Wildlife Service and Indiana Department of Natural Resources. A mobile tour of the project area and preliminary alternatives with scheduled stops at key natural resource feature locations.
March 23, 2020	U.S. Fish and Wildlife Service provides response to Preliminary Alternatives Screening Report. The Service confirmed the listing of federally listed species of concern from September 10, 2019 coordination was still valid. This coordination also included a listing of four additional species known to occur within the project area that are currently included in the National Listing Workplan and could potentially become federally listed species in the near future. Additionally, the Service noted that the lake sturgeon, although not currently on the National Listing Workplan, is undergoing review for a 12-month finding to list or not list the species.
March 27, 2020	Indiana Department of Natural Resources provides response to Preliminary Alternatives Screening Report. Division of Nature Preserves and Division of Fish and Wildlife collectively provided comments on the Preliminary Alternatives Screening Report.
May 6, 2020	Meeting with U.S. Fish and Wildlife Service via conference call to discuss current status of proposed routes and alternatives, summarize preliminary impacts, revisit federally listed species of concern for EIS and BA development, general parameters and expectations of the Tier 1 BA, and continued Section 7 consultation. Delisting of the interior least tern and removal for the species list of concern was acknowledge. Current status of candidate species was reviewed for the purposes of potentially conferencing with USFWS for these species. Probable need to include the monarch butterfly was also discussed.
June 10, 2021	In response to potential changes in the listing status of several species under the Endangered Species Act since coordination with the U.S. Fish and Wildlife Service was initiated, a request for an updated threatened and endangered species list was submitted to the Bloomington Field Office as part of continuing Section 7 consultation. U.S. Fish and Wildlife Service was also requested to provide a general expectation as to which listed were of particular concern for each of the proposed alternative routes.
June 29, 2021	U.S. Fish and Wildlife Service provide a response to the June 20, 2021 request for an updated threatened and endangered species list, which resulted in the removal of two mussel species previously included for consideration, removal of the interior least tern since it had become delisted in the interim and inclusion of the monarch butterfly.

Table 3.16-1: Chronology Summary of Endangered Species Act Section 7 Consultation and IDNR Endangered Species Coordination.



- Northern long-eared bat (*Myotis septentrionalis*) – threatened
- Gray bat (*Myotis grisescens*) – endangered
- Little brown bat (*Myotis lucifugus*) – discretionary PLPHC review
- Tricolored bat (*Perimyotis subflavus*) – 12 month PLPHC review
- Mussels
 - Fanshell mussel (*Cyprogenia stegaria*) – endangered
 - Sheepnose mussel (*Plethobasus cyphus*) - endangered
 - Rough pigtoe mussel (*Pleurobema plenum*) - endangered
 - Fat pocketbook mussel (*Potamilus capax*) endangered
 - Salamander mussel (*Simpsonaias abigua*) – 12 month PLPHC review
- Birds
 - Bald eagle (*Haliaeetus leucocephalus*) – delisted – Bald and Golden Eagle Protection Act
- Fish
 - Lake sturgeon (*Acipenser fulvescens*) – 12 month PLPHC review
 - Northern cavefish (*Amblyopsis spelaea*) – 12 month PLPHC review
- Insect
 - Monarch butterfly (*Danaus plexippus*) - candidate

Similarly, IDNR provided an Early Coordination response dated September 12, 2019. In addition to comments related to the project Purpose and Need, proposed alternatives, transportation needs, safety, and connectivity, the IDNR Division of Nature Preserves also commented on specific unique natural communities in the project area. The IDNR Division of Fish and Wildlife also provided narrative addressing concerns for specific species in various taxonomic groups (i.e., mammals, birds, fish, mussels, amphibians, and reptiles). This correspondence included a comprehensive account of state-listed plants and animals of known occurrence (derived from the Indiana Natural Heritage Data Center). The IDNR also provided a response dated March 27, 2020 to the Screening of Alternatives Report. This response focused on state-listed species that are cave dependent and other species within one-half mile of the preliminary alternatives. Collectively, IDNR identified 88 species designated as either endangered, threatened, special concern, rare or are on a watch list. A complete listing is provided in **3.16.4 Analysis** and in **Appendix I**.

3.16.3 Methodology

Informal Section 7 consultation with the USFWS included coordination meetings with the Bloomington Field Office staff on July 3, 2019 and December 12, 2019. As part of this effort, the discussion addressed whether it was necessary to conduct presence/absence field studies for federally endangered/threatened or candidate species during Tier 1 to support NEPA studies and a Tier 1 Biological Opinion (BO). These discussions focused on bat and mussel surveys. This discussion concluded that based on the size of the project area, wide geographic/physiographic range of alternatives and accelerated Tier 1 schedule, comprehensive field surveys would not be practical during Tier 1 for the EIS, Biological Assessment (BA) and BO. Alternatively, impact assessments for endangered species would be conducted using spatial data available from USFWS, IDNR and review of relevant literature. USFWS identified if the Biological Assessment provided sufficient detailed analysis of potential impacts to listed species, a reasonable Tier 1 “jeopardy determination” could be rendered.



Through a data sharing agreement, USFWS provided GIS data for federally-listed bats (Indiana bat, northern long-eared bat, and gray bat), mussels (fanshell mussel, sheepsnose mussel, rough pigtoe mussel, fat pocketbook mussel and rabbitsfoot mussel), and the interior least tern within the Mid-States Corridor Study Area. Similarly, Indiana Natural Heritage Data Center GIS coverage for state-listed species was obtained through IDNR, Division of Nature Preserves. Collectively, these resources were the principal data used to define the known distribution of each species within the 12-county Study Area and conduct a proximity analysis to determine which species are known to occur within, near, or proximal to each of the alternative working alignments.

3.16.3.1 Proximity Analysis

There are 13 federally endangered/threatened, candidate or proposed listing species and 88 state-listed species identified within the Mid-States Corridor by USFWS and IDNR, respectively. While it is not anticipated any single proposed alternative has the potential to impact all these species, there is potential for multiple species to be affected by any given alternative alignment. To better determine which species are of potential concern for specific alternatives, including local improvements, a GIS proximity analysis was conducted using the aforementioned data received from the federal and state agencies. USFWS data for bats are represented as discrete focal points where each respective species has previously been documented. For the Indiana bat and the northern long-eared bat, the data points represent either capture locations, roost trees or hibernacula, which typically are caves. USFWS data for mussels is depicted as 1-mile-wide linear buffers along reaches of streams where species have been observed. The Indiana Natural Heritage Data Center species records are represented as circular polygons ranging up to one mile in diameter or as linear reaches of streams for listed mussel and fish species. The proximity analysis was designed to identify which species have known occurrence locations that intersect the working alignment for each of the alternatives, and which species have known locations that are within one or two miles of the alternatives. The one and two mile proximity limits were selected to illustrate that a species was locally known from the immediate region, and although not necessarily known from within an alternative alignment, might likely occur within similar habitat impacted by the alternative.

3.16.3.2 Bat Habitat Assessment Analysis

The purpose of the bat habitat assessment analysis is to build on the proximity analysis by using USFWS capture, roost and hibernacula point data for the Indiana bat and northern long-eared bat to construct local bat occupancy range maps for each species. USFWS generally uses a 2.5-mile radius around a known roost tree or roost tree cluster to define the limits of an Indiana bat maternity colony. Similarly, a 1.5-mile radius is used to define a northern long-eared bat colony. For the purposes of this analysis, all known roost trees in the dataset were buffered by 2.5-miles and 1.5-mile, respectively. Often, Indiana bat captures do not result in the discovery of summer roost trees. Furthermore, since northern long-eared bats were only first listed as threatened in 2015, roost data is generally lacking for this species in the USFWS and IDNR data sets. Therefore, each capture point was buffered by five miles and three miles for both species, respectively. The purpose was to generate an expansion of the potential maternity colony limits in the region based on captured data.

The USFWS dataset also includes multiple hibernacula records in caves and mines for the Indiana bat and northern long-eared bat. Indiana bat hibernacula caves have been classified as P1, P2, P3 or P4 based on the extent of usage. Through coordination with USFWS, the P1 and P2 hibernacula were buffered by 10 miles, while the P3 and P4 hibernacula were buffered by five miles. Similarly, northern long-eared bat hibernacula were buffered by five miles for the habitat analysis.

Except for a few capture records, USFWS gray bat records within the Mid-States Corridor Study Area are from acoustic surveys conducted between 2016 and 2018. Because the gray bat has large foraging ranges, the agency suggested using a 10-mile radius to define potential areas of gray bat occupation based on current available data. No known gray bat winter hibernacula or summer caves are within the Mid-State Corridor Study Area.



For the Tier 1 bat habitat assessment, a GIS analysis was conducted to determine the length of each alternative that intersects the presumed maternity colony boundaries for the Indiana bat and the northern long-eared bat. This was also conducted for the respective hibernacula boundaries for each respective species. Because summer habitat for the Indiana bat and the northern long-eared bat are strongly associated with forested habitat, the 2016 National Land Cover Database (NLCD) was used to further assess the varying amounts of forest habitat acreage within each alternative and within the maternity colony and hibernacula boundaries for the Indiana bat and northern long-eared bat.

3.16.4 Analysis

To provide a holistic view of federal and state endangered/threatened species distribution within the Mid-State Corridor Study Area, species occurrence data from USFWS and the IDNR Indiana Natural Heritage Data Center was used to generate a species density map (**Figure 3.16-1**). The color-themed map is based on the number of federal (endangered, threatened, candidate or proposed listing) and state (endangered, threatened, rare, special concern or watch list) species that occur within each of the Public Land Survey System (PLSS) Sections. In general, this represents the number of listed species per square mile throughout the Study Area based on current available information. This depiction represents the number of individual species per PLSS Section and not the number of actual occurrences within the GIS databases. Therefore, multiple records of the Indiana bat from a specific cave or capture location are only counted as a single occurrence within a one-square mile section. Additionally, in the case of several mussel species, linear reaches of the East Fork White River where the species is believed to occur were used instead of the actual focal point where the species was recorded. In doing so, all the PLSS Sections along the East Fork White River are considered to support at least one federally- or state-listed species. PLSS Sections where no listed species has been previously recorded are blank. The graduated shading for all other PLSS Sections range from light yellow with one to three species per PLSS Section to dark brown with 51 to 144 species per PLSS Section.

In general, the East Fork White River, Patoka River and the Crawford Upland karst-based physiographic region east of US 231, supports a slightly greater species occurrence distribution and density per square mile than the more disturbed agricultural-based landscape in the western portion of the Mid-States Corridor Study Area. This is due in large part to the number of cave/karst dependent and obligate species known to occur within these sensitive habitats in Martin, Lawrence, Orange and eastern Dubois counties. Since not every square mile of the Mid-States Corridor Study Area has previously been investigated for federally- and state-listed species, this graphic cannot represent a true spatial depiction of endangered/threatened species distribution/density. However, it does provide a valuable geographic representation of relative expected distribution and density of listed species based on decades of investigation data.

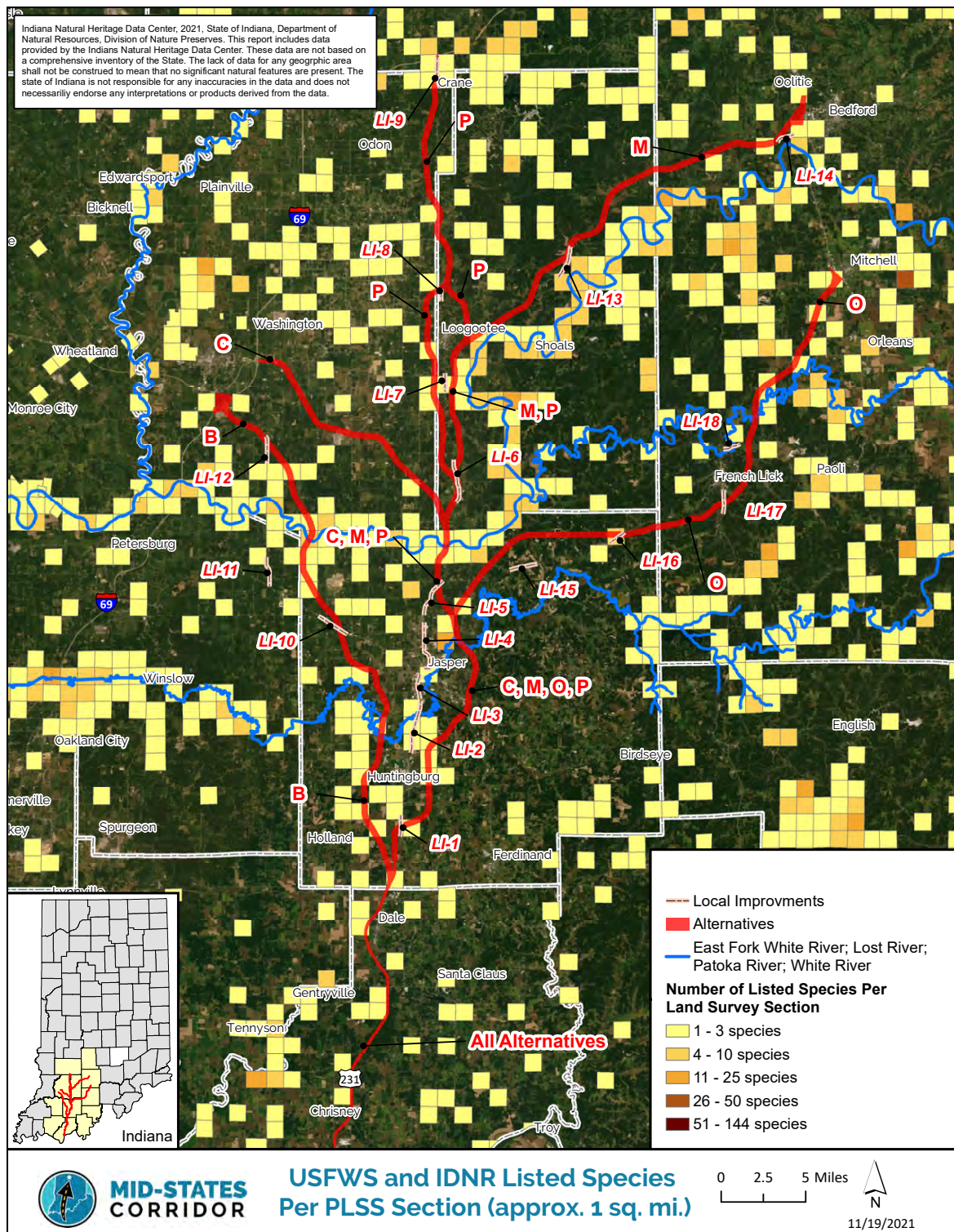


Figure 3.16-1: U.S. Fish and Wildlife Service and Indiana Department Of Natural Resources Listed Species per PLSS Section



The Tier 1 EIS analysis of potential impacts to federally-listed endangered, threatened, candidate and proposed listing species are highlighted in **Section 3.16.4.1**. The analysis of potential impacts to Indiana state-listed species are highlighted in **Section 3.16.4.2**. **Appendix I** includes additional detailed information on the biology, range and Study Area distribution of each species.

3.16.4.1 U.S. Fish and Wildlife Service Federally Listed, Candidate and Proposed Listing Species

Table 3.16-2 includes the summary results of the proximity analysis for federally-listed, candidate, and proposed listing species based on the information obtained. In general, considering the limitations of the datasets used for this analysis, Alternatives M, O and P have a greater number of federally-listed species within relatively close proximity to the working alignments than Alternatives B and C.

Taxon	Species	Common Name	USFWS Status	Alternatives ¹				
				B	C	M	O	P
Mammal	<i>Myotis grisescens</i>	gray bat	Endangered	1 mile	1 mile	1 mile	1 mile	1 mile
	<i>Myotis lucifugus</i>	little brown bat	Discretionary PLPCH				Alignment	1 mile
	<i>Myotis septentrionalis</i>	northern long-eared bat	Threatened	2 mile	2 mile	1 mile	1 mile	1 mile
	<i>Myotis sodalis</i>	Indiana bat	Endangered	1 mile	2 mile	1 mile	2 mile	1 mile
	<i>Perimyotis subflavus</i>	tri-colored bat	12M PLPCH				Alignment	1 mile
Bird	<i>Haliaeetus leucocephalus</i>	bald eagle	Delisted	1 mile	1 mile	1 mile	1 mile	1 mile
Fish	<i>Acipenser fulvescens</i>	lake sturgeon	12M PLPCH			1 mile		1 mile
	<i>Amblyopsis hoosieri</i>	Hoosier cavefish	12M PLPCH				1 mile	
Mussel	<i>Cyprogenia stegaria</i>	eastern fanshell pearlymussel	Endangered	Alignment	Alignment	Alignment	1 mile	Alignment
	<i>Plethobasus cyphus</i>	sheepnose	Endangered			1 mile	1 mile	1 mile
	<i>Pleuroblema plenum</i>	rough pigtoe	Endangered			1 mile	1 mile	1 mile
	<i>Potamilus capax</i>	fat pocketbook	Endangered	Alignment	Alignment	Alignment	1 mile	Alignment
	<i>Simpsonaias ambigua</i>	salamander mussel	12M PLPCH	2 mile		1 mile		1 mile
Insect	<i>Danaus plexippus plexippus</i>	monarch butterfly	Candidate	Specific occurrence data not available for GIS proximity analysis				
Federal endangered				4	4	6	6	6
Federal threatened				1	1	1	1	1
Federal candidate, 12M PLPCH, discretionary PLPCH, and proposed threatened				1	0	2	3	4
Federal species total				6	5	9	10	11

¹ Proximity determinations based on the expressway facility type Variation for Alternatives B, C, M, O and P.

Table 3.16-2: Alternative Proximity Analysis Summary for Federally Listed Species

Indiana bat (*Myotis sodalis*) - Endangered

The Indiana bat is a mid-sized, insectivorous, year-round resident of Indiana. In the summer, the Indiana bat typically roosts under the loose bark or within cavities of dead, large-diameter trees, like shagbark hickory (*Carya ovata*) and eastern cottonwood (*Populus deltoides*) within wetland habitats or upland areas with access to water resources. During the winter, Indiana bats hibernate in caves or underground mines. The majority of hibernacula caves for the Indiana bat are located within the Crawford Upland and Mitchell Karst Plain regions of South-Central Indiana, including Greene, Monroe, Lawrence, Martin and Orange counties in the Mid-States Study Area.

Critical habitat is defined in the Endangered Species Act as a “specific geographic area(s) that is essential for the conservation of a threatened or endangered species and that may require special management and protection.” Critical habitat for the Indiana bat was designated on September 24, 1976 and includes a Priority 1 hibernacula cave in Greene County and a second cave in Crawford County. Priority 1 caves support winter populations in excess of 30,000 bats. The Greene County Priority 1 cave population has been reduced to an estimated 25,693 in 2019 (King 2019). This cave is more than 10 miles from the northern limit of the closest alternative (Alternative P) and would not be impacted by any of the alternatives. There are seven Priority 1 caves in Indiana. All of the known Indiana



bat winter hibernacula caves within the Study Area south of I-69 are Priority 3 and Priority 4 caves. These support smaller populations of the species. Six of these caves are in Lawrence, Martin and Orange counties, the closest of which is approximately 1.0 mile from Alternative O new alignment and nearly 2 miles from Local Improvement 18. None of these caves are closer than 5.5 miles from Alternative M.

Following emergence from winter hibernation, females migrate from late March to early April and congregate in summer maternity colonies that often consist of 100 or more adult reproductive females. Pregnant females typically select several mid-sized to large dead trees with good solar exposure for maternity roosting. Females give birth to a single pup between June and early July, and the pups are able to fly approximately a month later. Females may use multiple primary or alternative trees as maternity roosts within a colony and frequently move between these trees throughout the summer. For the purposes of defining maternity colony limits, the USFWS typically uses a 2.5 mile radius from a major primary roost or the centroid of multiple known roosts.

As a consequence of their limited distribution, specific summer and winter habitat requirements and tendency to congregate in large numbers during winter, Indiana bats are particularly vulnerable to rapid population reductions resulting from habitat change, environmental contaminants and other human disturbances, particularly during hibernation (Brady et al. 1983). Natural disasters such as cave flooding, ceiling collapse, freezing and storm damage are stressors contributing to Indiana bat declines. Other stressors are deforestation, surface mining and pesticide/herbicide poisoning. More recently, the fungus *Pseudogymnoascus destructans* that causes white nose syndrome (WNS) has played a notable role in the decline of the Indiana bat and other *Myotis* species. The ability of the Indiana bat to sustain populations and recover from significant declines is further hampered by their limited reproductive capacity of one young for each female per year.

Population estimates compiled by USFWS indicate that within Indiana the Indiana bat has decreased from 238,068 in 2007 to a low of 180,811 in 2017 (King 2019, USFWS 2017a). However, the 2019 estimate indicated a 2.3 percent increase to 184,848 in 2019. Nonetheless, Indiana remains the state with the greatest overall decrease in Indiana bats since 2007. The Indiana trend is comparable with the range-wide decline in the Indiana bat population from 635,349 in 2007 to 537,297 in 2019, a 15.4 percent decrease over 12 years. The population in the Greene County Priority 1 critical habitat cave has experienced a similar decline from 48,200 in 2001 to 25,983 in 2019 (King 2019).

From **Table 3.16-2**, all the alternatives are within at least two miles of a known Indiana bat roost or capture location. **Table 3.16-3** summarizes the results of the potential Indiana bat maternity and hibernacula area encroachments from the GIS habitat assessment analysis. Because the Indiana bat is dependent upon woodland habitat in the summer, forested area was used as a surrogate to assess relative potential impacts to habitat by each alternative. Based on this parameter, Alternative M has the greatest potential for impacts to Indiana bat habitat, with Alternative O estimated at slightly less. Alternative B would have the least amount of forest loss, with much of this occurring within the Patoka River floodplain. Using known Indiana bat roosts and capture locations to determine potential maternity colony limits, Alternative M is expected to have the greatest potential for encroachment and impact to forested habitats within these zones. The predicted impact to maternity colony forested habitat for Alternative O from the GIS analysis is considerably less than that for Alternative M. This is most likely attributed to a lack of studies completed and available data in relatively close proximity to Alternative O. Alternative O is the only alignment within five miles of a known Indiana bat hibernacula, with an estimated 493 to 516 acres of forested habitat within this buffer zone. In general, since the local improvements for the respective alternatives are along existing highways, impacts to forest habitat suitable for the Indiana bat would be none to minimal. However, Local Improvements 2, 14 and 16 are located in areas where the general landscape setting of large, forested area, adjacent wetlands and riparian stream corridors is considered favorable as Indiana bat habitat.

Draft Environmental Impact Statement



**MID-STATES
CORRIDOR**

Alternatives	Working alignment length and areas within Indiana bat maternity and hibernacula zones				
	Forested area within working alignment (acres)	Length of working alignment within potential maternity colony limits (miles)	Forested area within potential maternity colony limits (acres)	Length of working alignment within hibernacula limits (miles)	Forested area within hibernacula limits (acres)
B	281-314	15.7	206-223	0	0
C	404-540	11.0	62-86	0	0
M	1940-2264	29.5	1418-1603	0	0
O	1569-1740	12.3	380-431	12.2	493-516
P	595-896	21.3-21.9	228-282	0	0

Table 3.16-3: Indiana Bat Maternity and Hibernacula Forest Habitat Assessment

Northern long-eared bat (*Myotis septentrionalis*) - Endangered

Habitat for the northern long-eared bat is similar to that of the Indiana bat in that they use live and dead snag trees with exfoliating bark or crevices as roosts within woodland areas, often associated with bottomland floodplains or in close proximity to water resources. The northern long-eared bat also frequents streams and trails as flyways for movements within its habitat and for foraging. Unlike the Indiana bat, the northern long-eared bat is more tolerant of forest clutter in the understory and not only feeds by catching prey on the fly, but also uses a gleaning technique whereby it plucks insects perched on twigs and foliage (Whitaker et al. 2007).

Critical habitat for the northern long-eared bat was not designated when the species was listed as threatened on May 4, 2015. Accurate range-wide population estimates for the northern long-eared bat are lacking, but it was estimated that there may have been as many as 4,000,000 bats in the Midwest (Illinois, Indiana, Iowa, Ohio, Michigan, and Missouri) (USFWS 2015a). Wintering northern long-eared bats can be elusive and difficult to find in hibernacula caves because of their tendency to insert themselves into cracks and crevices of the bedrock. There were 25 known hibernacula within Indiana with one or more northern long-eared wintering at the time of its listing (USFWS 2015a). Prior to the onset of WNS in Indiana (2010-2011), the northern long-eared bat was the fourth or fifth most captured bat in the state with records from 51 of 92 counties.

Similar to the Indiana bat, northern long-eared bats emerge from winter hibernation from mid-March to early May. Following the spring staging phase, northern long-eared bats migrate to their respective summer maternity colonies. Maternity colony size is typically smaller than that for the Indiana bat, consisting of less than 100 adult reproductive females. Females give birth to single young in early June, and the pups are volant, able to fly, approximately 21 days later (Whitaker et al. 2007). For the purposes of defining maternity colony limits, USFWS typically uses a 1.5-mile radius from a major primary roost or the centroid of multiple known roosts; therefore, the home range of the northern long-eared bat is considered to be smaller than that of the Indiana bat.

From **Table 3.16-2**, all the alternatives are within at least two miles of a known northern long-eared bat roost or capture location. **Table 3.16-4** summarizes the results of the potential northern long-eared bat maternity and hibernacula area encroachments from the GIS habitat assessment analysis. As with the Indiana bat, forested area was used as a surrogate to assess relative potential impacts to the northern long-eared bat habitat by each of the alternatives. Based on this parameter, Alternative M has the greatest potential for impacts to northern long-eared bat habitat, with Alternative O impacts estimated at slightly less. Alternative B would have the least amount of forest loss, with much of this occurring within the Patoka River floodplain. Using known northern long-eared bat roosts and capture locations to determine potential maternity colony limits, Alternative M is expected to have the greatest potential for encroachment and impact to forested habitats within these zones at 841 to 954 acres. Although the predicted impact to maternity colony forested habitat for Alternative O from the GIS analysis at 294 to 327 acres is considerably less than that for Alternative M, this is most likely attributed to a lack of studies completed



and available data in relative close proximity to Alternative O. Alternatives M and O are the only alignments within 2.5 miles of a known northern long-eared bat hibernacula, with an estimated 651 to 712 acres of forested habitat impacted by Alternative M within this buffer zone. As with the Indiana bat, impacts anticipated to northern long-eared bat forest habitat for the local improvements is considered minimal, but not necessarily discountable for locations such as Local Improvements 2, 14 and 16.

Alternatives	Working alignment length and areas within northern long-eared bat maternity and hibernacula zones				
	Forested area within working alignment (acres)	Length of working alignment within potential maternity colony limits (miles)	Forested area within potential maternity colony limits (acres)	Length of working alignment within hibernacula limits (miles)	Forested area within hibernacula limits (acres)
B	281-314	3.4	130-135	0	0
C	404-540	3.5	9-12	0	0
M	1940-2264	14.9	841-954	9.2	651-712
O	1569-1740	5.5	294-327	1.9	1-2
P	595-896	13.1	161-188	0	0

Table 3.16-4: Northern Long-Eared Bat Maternity and Hibernacula Forest Habitat Assessment

Gray bat (*Myotis griscesens*) - Endangered

The gray bat is a year-round occupant for summer maternity and winter hibernacula of caves or cave-like features such as quarry mines (Whitaker et al. 2007). However, the species does not typically spend the summer in the same cave within which it winters. In Indiana, the gray bat is generally considered to only be a summer resident that migrates south to Kentucky for hibernation, although a few bats have been observed in Indiana sites during the winter (Whitaker et al. 2007). Females typically arrive at maternity caves in late March to early April, while males generally are found in different caves or different areas of the same cave away from reproductive females.

Occurrence data from USFWS and the Indiana Natural Heritage Data Center include multiple accounts of the gray bat scattered throughout the Mid-States Corridor Study Area. However, the majority of these represent acoustic detection of gray bats, with only a small number representing captures or direct observations. Records of gray bats in caves within the karst regions of the Mid-States Corridor Study Area are limited to older records (1907, 1958, and 1959) from two Lawrence County caves in the vicinity of Mitchell and Bedford. Additional bat capture records from the late 1990s and early 2000s are limited to Perry and Crawford counties. Gray bats are known to forage over large distances. Many of the more recent, post-2010 records of acoustic detections from within the Mid-States Corridor survey area are attributed to long distance foraging or possibly represent summer movements from nearby caves not previously known to be used by gray bats. There are acoustic detections of gray bats from 2018 in southern Dubois County in close proximity to all of the alternatives. Similarly, there are acoustic detections of gray bats from 2016 and 2017 near Alternative M in Martin County and near Alternative B in Daviess County. While Local Improvements 13, 14, 15, 16, 17 and 18 are associated with Alternatives M and O in the karst region of the Mid-States Corridor Study Area, upgrades to these roadway segments are not anticipated to have an adverse impact to any potential local gray bat populations.

Little brown bat (*Myotis lucifugus*) – Discretionary Proposed Listing and Proposed Critical Habitat Review

Little brown bats have similar winter hibernacula and summer foraging habitats to that of the Indiana bat. They spend the winter in cave or mine hibernacula, and summer throughout the state where the females establish nursery colonies. Unlike the Indiana bat, little brown bat nursery colony preference is typically in buildings such as attics and sides of houses and barns. They do on occasion use expansion joints or crevices in bridges or bark and cavities of trees (Whitaker et al. 2007). In the summer, adult males are solitary, sometimes using caves. Although they may



occur in the same area, they roost separately from reproductive females. Young are born between late May and early July and begin to fly in about three weeks (Whitaker et al. 2007). Foraging habitats vary from forest, open water, water body perimeters, roads through forests and clearings (Kunz and Reichard 2010).

In 2006, the core Northeastern U.S. population for the little brown bat was estimated at 6.5 million (Frick et al. 2010) and it was considered one of the most common bats in Indiana. However, since arrival of WNS in 2010-2011 numbers have drastically declined range-wide and within Indiana. The 2010 status review prepared for the species indicated that in the four years since 2006 it was estimated that at least one million little brown bats in the Northeast died from WNS (Kunz and Reichard 2010). In addition to WNS, habitat loss and fragmentation from timber harvesting, oil, gas, mineral extraction, residential/commercial development and trauma from wind farms pose threats to continued survival and recovery of this species.

Most little brown bat occurrence records from the Indiana Natural Heritage Data Center within the Mid-States Corridor Study Area are in Greene, Monroe and northwest Lawrence counties, or along the I-69 corridor in Daviess County. Winter cave hibernacula and summer cave records for the little brown bat within the Study Area include one location in Dubois County, two in Martin County and two in Lawrence County. The Dubois County cave record is in immediate proximity to Alternative O, while the remaining locations are four or more miles from Alternative O, and even further from the other alternatives.

Tri-colored bat (*Perimyotis subflavus*) - 12 Month Proposed Listing and Proposed Critical Habitat Review

The tri-colored bat is the smallest of the Indiana resident bats (Whitaker et al. 2007). Like other *Myotis* species, the tri-colored bat hibernates in caves, but often chooses smaller side passages removed from other bats. Tricolored bats can be found in many caves and mines and are often the only species in the cave. Typically, their numbers are not large at any one location, and they usually roost solitary. Tricolored bats emerge from hibernation in April and May, later than other *Myotis* species. In the summer, tri-colored bats are associated with woodland habitats in proximity to streams and ponds (Whitaker et al. 1982). Female tri-colored bats typically cluster within dead leaves hanging in trees and frequently move among different roosts, although colonies have also been found in building structures (Whitaker et al. 2007). Females generally give birth to two young each year, which are capable of flight at about three weeks. Longevity can be as much as 15 years. Tricolored bat diet consists of small prey like flies, beetles, wasps and ants (Whitaker et al. 2007).

Like other *Myotis* species, the tri-colored bat has been adversely affected by WNS and continues to experience declining populations. The majority of the tri-colored bat occurrence records from the Indiana Natural Heritage Data Center within the Mid-States Corridor Study Area are in Greene and Monroe counties, with scattered occurrences on Hoosier National Forest properties in Lawrence, Orange, Martin and Dubois counties. Winter cave hibernacula records for the tri-colored bat within the Study Area include numerous sites south of I-69. The closest of these caves is greater than one mile, but less than two miles from Alternative O and greater than four miles from the nearest local improvement.

Bald eagle (*Haliaeetus leucocephalus*) - Delisted

The bald eagle was delisted as endangered from the Endangered Species Act effective August 8, 2007, but is still protected under the Bald and Golden Eagle Protection Act. Bald eagles construct large platform nests of dead twigs and branches within the upper canopy of live and dead trees, most often at the edge of open forests along or very near large bodies of waters such as rivers and reservoirs. Nesting pairs may construct multiple nests in different trees and alternate from year to year. Bald eagles mate for life, reach maturity in four to five years and typically establish nests near where they were raised as young. Nesting usually occurs from October to mid-May in the Southeast, although in the northern portion of the range, this can be as late as August (USFWS 1987).



The Indiana Nongame and Endangered Wildlife Program introduced 73 eaglets at Lake Monroe from 1985 through 1989 as part of the Bald Eagle Reintroduction Program. **Figure 3.16-2** shows the increase in bald eagle territories and fledged young for Indiana as reported by the Indiana Department of Natural Resources from 1993 through 2010 (IDNR 2021). In 2020, over 350 eagle nests were reported for Indiana (IDNR 2021).

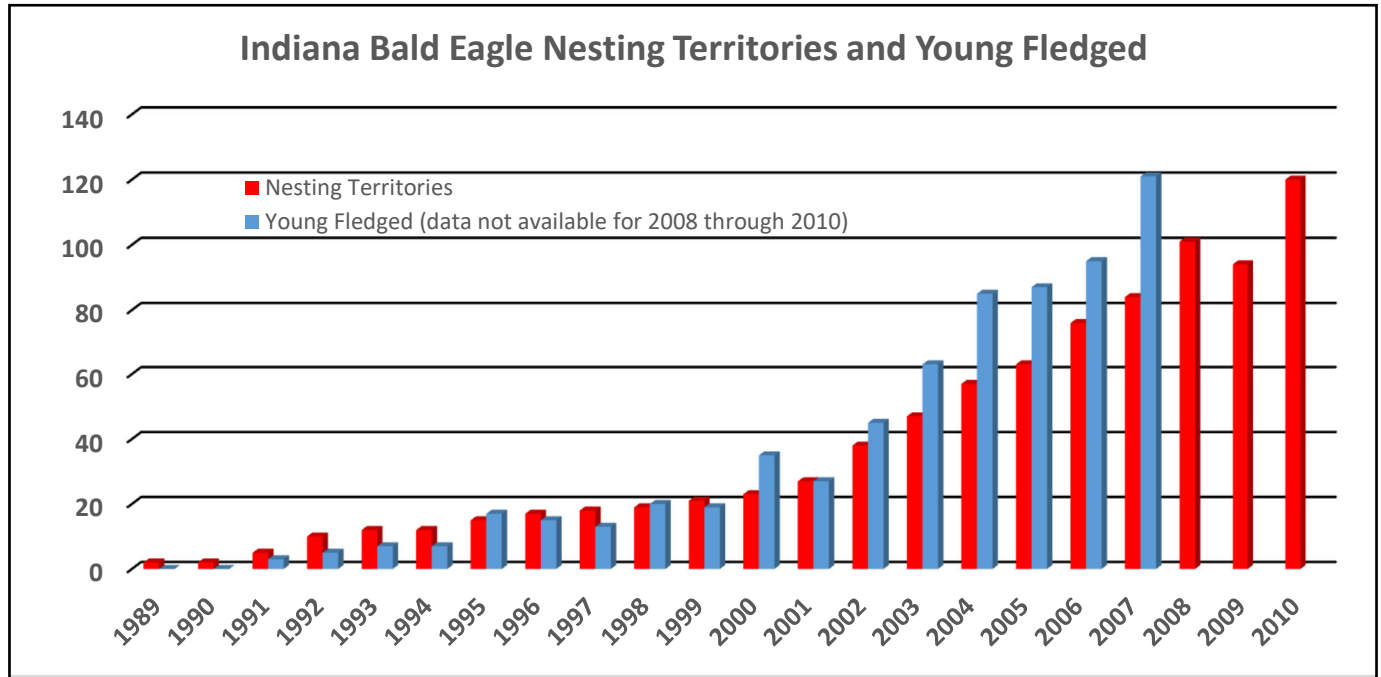


Figure 3.16-2: Bald Eagle Territories and Young Fledged In Indiana – 1993-2010

The Indiana Natural Heritage Data Center information includes records of 101 bald eagle nests for the 12-county Mid-States Corridor Study Area from 1993 through 2020. The majority of these nests are associated with the White River, East Fork White River, Patoka River, Lost River and large reservoirs such as Patoka Lake, Lake Monroe, West Boggs Lake and Lake Greenwood. Bald eagle nests are used year after year but are still ephemeral as eagles may abandon a nest or it may be destroyed in a storm. Nonetheless, there are 48 nests in the dataset observed within the past five years.

The National Bald Eagle Management Guidelines (USFWS 2007c) and the Northern States Bald Eagle Recovery Plan, (USFWS 1983) provide guidelines for assessing impact and determining the effect of a proposed action to bald eagle breeding habitat. These guidelines are detailed in **Appendix I**. While there are no known nests within the working alignments for any of the alternatives, there are one or more nests within one mile of working alignments for each alternative (**Table 3.16-5**). Local Improvement 8 is the only improvement location with a documented bald eagle nest within one mile. New nests are discovered annually; therefore, an assessment of nest proximity to the preferred alternative in the Tier 2 phase of the Mid-States Corridor project will be warranted. Locations with the greatest probability of new bald eagle nest development within or near the alternatives would be the Patoka River and East Fork White River floodplains.

Draft Environmental Impact Statement



**MID-STATES
CORRIDOR**

Alternatives	Distance from Working Alignment to Documented Bald Eagle Nests					
	Nest 1 Dubois County 2012	Nest 2 Dubois County 2012	Nest 3 Daviess County 2018	Nest 4 Dubois County 2010	Nest 5 Daviess County 1993	Nest 6 Daviess County 2010
B	0.9 mile	0.6 mile	0.6 mile			
C				0.5 mile		
M				0.5 mile		
O				0.5 mile		
P				0.5 mile	0.4 mile	0.6 mile

Table 3.16-5: Documented Bald Eagle Nests Within 1 Mile of Alternative Working Alignments

Lake sturgeon (*Acipenser fulvescens*) - 12 Month Proposed Listing and Proposed Critical Habitat Review

The lake sturgeon is a large benthic, stream bottom, inhabitant of the sturgeon family that occurs in large streams and rivers and has been found associated with a variety of substrates from mud and clay to sand and gravel. Lake sturgeons feed on a variety of benthic invertebrates and have also been known to prey on fish. On May 23, 2018, USFWS received a petition from the Center for Biological Diversity to list the lake sturgeon as endangered/threatened under the Endangered Species Act. It is currently on the National Domestic Listing Workplan for a 12-month finding in fiscal year 2024.

In the United States, the lake sturgeon is currently known from multiple streams and lakes of the Great Lakes. They are known to occur in Lake Michigan, Huron, Erie, Superior and Ontario, as well as select rivers in the Midwest including those within the Upper Mississippi River, Lower Mississippi River, Missouri River, Ohio River, Arkansas-White River and Coosa River basins. Within the Ohio River basin, the species once occurred within the Ohio, Allegheny, Scioto, Wabash, White, Cumberland and Tennessee rivers. Although stocking of sturgeon in the Cumberland and Tennessee rivers has been attempted, the only naturally reproducing population of the lake sturgeon in the Ohio River basin is within the East Fork White River in Martin and Lawrence counties of Indiana. Genetic studies of the East Fork White River lake sturgeon revealed that this population is distinct from all other extant populations in the Great Lakes region and the Mississippi River basin (Center for Biological Diversity 2018).

The Indiana Natural Heritage Data Center data set identifies a 41-mile long reach of the East Fork White River in Martin and Lawrence counties as lake sturgeon habitat. This extends from Williams Dam in Lawrence County downstream to a point approximately 10 miles upstream of the US 231 bridge over the East Fork White River. The decommissioned Williams Dam hydropower structure continues to impede lake sturgeon movements further upstream for spawning. As a result of this obstacle, lake sturgeon spawning is confined to the limited available habitat immediately downstream of the dam.

Maintaining sustainable populations of the lake sturgeon is hampered in part by the reproductive biology of the fish. Female sexual maturity is not typically achieved until 14 to 33 years of age, and females do not spawn every year. Excluding natural mortality, there are a number of stressors that can potentially affect the species range-wide. Barriers such as flood control and hydroelectric dams pose one of the more significant threats by blocking passage to potential spawning areas, altering stream flow and thermal properties of the water and water quality alteration. Other detrimental effects are caused through pollution/contamination, dredging/channelization, overfishing and disease/predation.

None of the alternatives would cross the 41-mile reach of the East Fork White River where the IDNR indicates the lake sturgeon is known to occur. Furthermore, the East Fork White River crossing by Alternatives C, M, O and P would each use an existing bridge crossing location to span the river. The expressway facility type would require a new



bridge structure at this location; however, this location is downstream of the current known reach of the river where the lake sturgeon resides. While Alternative M would not directly encroach upon the East Fork White River, it does generally parallel the river to the north from Jasper to SR 37 and traverses nine different 14-digit watersheds that discharge directly into the East Fork White River. At its closest point, Alternative M is approximately 0.3 mile north of the East Fork White River reach occupied by the lake sturgeon. None of the local improvements associated with the alternatives would involve the East Fork White River or directly affect the quality of habitat within the river.

Hoosier cavefish (*Amblyopsis hoosieri*) – Status Undetermined

The northern cavefish (*Amblyopsis spelaea*) is an obligate cave dwelling fish of the Pennyroyal and Mitchell plateaus of Northern Kentucky and Southern Indiana. The cavefish was one of 404 aquatic species petitioned for listing under the Endangered Species Act by the Center for Biological Diversity on April 20, 2010 (Center for Biological Diversity 2010). It is currently on the National Domestic Listing Workplan for a 12-month finding in fiscal year 2022. However, in 2014 (Chakrabarty 2014), a genetic, geographic and morphological evaluation of the northern cavefish concluded that the Indiana population was a separate species from the originally described Kentucky population and was subsequently designated as the Hoosier cavefish (*Amblyopsis hoosieri*). Although the current review is to list the northern cavefish and not the Hoosier cavefish, it is anticipated that the recently described species in Indiana will also be considered for endangered/threatened species status.

The Indiana Natural Heritage Data Center dataset includes 60 records of the species from Martin, Lawrence, Orange, Crawford, Washington and Harrison counties. Within the Mid-States Corridor Study Area, the Hoosier cavefish has been documented from 20 different 14-digit watersheds. Watersheds of most concern for the alternatives are present through eastern Martin, southwestern Lawrence and northwestern Orange counties and include East Fork White River-Henshaw Bend, East Fork White River, Bryantsville Karst Area, Beaur Creek-Georgia Karst Area, Beaver Creek-South Fork, Dry Branch (Orange), Lost River-Rise and Lost River-Shirley Creek.

The principal threats to the Hoosier cavefish are generally those common to most aquatic cave species, namely changes in water flow conditions, cave collapse, degradation of water quality and siltation. Alternative O traverses through the Dry Branch, Lost River-Rise, and Lost River-Shirley Creek watersheds where there are records of the species as close as 0.3 mile from the working alignment. None of the local improvements associated with Alternative O are located in Hoosier cavefish watersheds. Because there are currently no known occurrences of the species north of the East Fork White River, there is no anticipated potential for impact from Alternative M. Similarly, Alternatives B, C and P are too far removed from the cave and karst region of the Study Area to have an impact on the Hoosier cavefish.

Mussels

The USFWS identified four endangered mussel species, one proposed threatened species and one species under 12-month proposed listing and proposed critical habitat review as species of potential concern for the Mid-States Corridor project. Each of these are large stream and river inhabitants that are subjected to similar threats throughout their ranges: alteration of water flow, disruption of stream sediments through scour, heavy sedimentation, degraded water quality and loss or reduction of host fish. The principal threat to any mussel populations by the Mid-States Corridor project would be new bridge construction or existing bridge reconstruction in areas where endangered species mussel beds are located within close proximity to the proposed crossing. Since mussels are not highly mobile, such actions have the potential for direct take of individuals through bridge pier, cofferdam and causeway construction or via substantial local habitat degradation through substrate scour, shifting of sediments, water flow alterations, and introduction of contaminants from construction spills.



Sheepnose mussel (*Plethobasus cyphus*) - Endangered

The sheepnose mussel is typically found in shallow waters with moderate to swift currents in large rivers and streams consisting of coarse sand and gravel substrates, but have been known to occur in mud, cobble and boulder stream reaches (USFWS 2012d). Lifespans of 30 years are not uncommon. The sauger (*Stizostedion canadense*) is the only known host fish used by the sheepnose mussel in the wild for attachment of glochidia, parasitic larva stage of the mussel. However, other common Indiana fish species have successfully served as hosts in laboratory situations. Principal threats include dams that limit fish passage and mussel distribution, small population sizes, sedimentation, point and non-point source pollution and channelization.

In Indiana, the sheepnose mussel has been recorded in the Ohio River, Wabash River, White River, East Fork White River, Tippecanoe River, Eel River and Kankakee River. The U.S. Fish and Wildlife Service data set and the Indiana Natural Heritage Center Database collectively include only historic and subfossil records from 1967 through 2010 for the sheepnose mussel on the East Fork White River in Martin and Lawrence counties. The USFWS have identified a 42-mile reach of the East Fork White River as the only likely habitat for the sheepnose mussel to potentially be affected by the Mid-States Corridor project. While there are relatively recent live and fresh dead occurrences of the species in the Ohio River, lack of similar accounts for the East Fork White River suggests that the sheepnose mussel may no longer be extant in this aquatic system. None of the alternatives would cross this portion of the East Fork White River, and there are no records of the species from the Patoka River or Lost River. Alternatives M and P parallel this reach of the East Fork White River to the west and south, coming within 0.3 mile of the river near Loogootee.

Fat pocketbook mussel (*Potamilus capax*) - Endangered

The fat pocketbook mussel is generally confined to large rivers with flowing water a few inches to eight-feet deep over stable sand, silt and/or clay substrates (USFWS 1989). Life span is short, generally four to five years (Watters et al. 2009). The freshwater drum (*Aplodinotus grunniens*) is the only host fish known for the fat pocketbook (New York Department of Environmental Conservation 2013, Watters et al. 2009). Since listing, the fat pocketbook has shown signs of population increases and expansion into larger streams, including the Ohio River, Wabash River, and White River (USFWS 2012c). While siltation and sedimentation can be limiting factors for the fat pocketbook, the species is considered to be somewhat tolerant of these conditions (USFWS 1989).

In Indiana, the fat pocketbook mussel has been recorded in the Ohio River, Wabash River, White River, East Fork White River and Tippecanoe River. The data set obtained include historic, subfossil, fresh dead and live mussel records from 1995 through 2010 for the fat pocketbook mussel on the White River and East Fork White River from its confluence with the Wabash River into Martin County. Based on the presence of relatively recent fresh dead and live captures, the fat pocketbook is considered extant within the White River and East Fork White River. The USFWS identify an 83-mile reach of the White River and East Fork White River as the only likely habitat for the fat pocketbook mussel to be potentially affected by the Mid-States Corridor project. Alternatives B, C, M and P would each cross the East Fork White River along this reach; however, Alternative O would not. Alternatives C, M and P would cross at the existing US 231 bridge at Hayesville. Alternative B would cross further to the west in the general vicinity of where fresh dead fat pocketbook mussels have previously been identified.

Rough pigtoe mussel (*Pleurobema plenum*) - Endangered

The rough pigtoe mussel is an inhabitant of medium to large rivers of sand and gravel substrates, particularly shoal areas (USFWS 1984). It is a short-term breeder, meaning it breeds in the spring and releases glochidia in the summer of the same year. Native host fish species have not been identified for the rough pigtoe mussel; however, the spotfin shiner (*Cyprinella spiloptera*), striped shiner (*Luxilus chrysocephalus*), longnose dace (*Rhinichthys cataractae*) and the western blacknose dace (*Rhinichthys obtusus*) have yielded live rough pigtoe mussels in controlled laboratory studies (USFWS 2021a). Impoundments for flood control, navigation, hydroelectric power and recreation are the greatest



threat to the rough pigtoe mussel due to reduced water flow, changes in temperature and anoxic conditions (USFWS 1984). Additionally, sedimentation results in increased turbidity, which reduces light penetration and generates suspended solids that are an irritant to mussel gills (USFWS 1984).

In Indiana, the rough pigtoe mussel has been recorded in the lower Ohio River, Wabash River, White River and East Fork White River. The data set obtained include historical, subfossil, weathered dead and live mussel records from 1992 through 2010 for the rough pigtoe mussel on the East Fork White River in Martin and Lawrence counties. Although the most recent live record was from 1992, the rough pigtoe mussel is considered possibly extant in the East Fork White River. The USFWS identify a 46-mile reach of the East Fork White River as the only likely habitat for the rough pigtoe mussel that might be affected by the Mid-States Corridor project. None of the alternatives would cross this portion of the East Fork White River, and there are no records of the species from the Patoka River or Lost River. Alternatives M and P parallel this reach of the East Fork White River to the west and south, coming within 0.3 mile of the river near Loogootee.

Fanshell mussel (*Cyprogenia stegaria*) - Endangered

The fanshell mussel occurs in medium to large relatively deep rivers with gravel substrates and moderate currents (USFWS 1991b). Fanshell mussels typically live 12 or 13 years, although 26 years has been observed (Jones and Neves 2002). Suitable host fish species identified in Virginia included several species of darters and sculpins (Jones and Neves 2002), so it is inferred that darters and sculpins native to Indiana would likely serve a similar role for fanshell mussels in regional drainages such as the East Fork White River.

In Indiana, the fanshell mussel has been recorded in the Wabash River, White River and East Fork White River. The data obtained includes numerous records from 1990 through 2014 for the fanshell mussel on the East Fork White River in Daviess, Dubois, Martin, Lawrence, Jackson, and Bartholomew counties. Since many of these accounts are live or fresh dead specimens observed within the last 20 years, the fanshell mussel is considered extant in the East Fork White River. Higher concentrations of the species occur downstream of the Williams Dam. The USFWS identify a 129-mile reach of the White River and East Fork White River from the Wabash River confluence into Lawrence County as likely habitat for the fanshell mussel that might be affected by the Mid-States Corridor project. Alternatives B, C, M and P would each cross the East Fork White River along this reach; however, Alternative O would not. Alternatives C, M and P would cross at the existing US 231 bridge at Hayesville. Alternative B would cross further to the west in the general vicinity of where fresh dead fanshell mussels have previously been identified.

Round hickorynut (*Obovaria subrotunda*) – Proposed Threatened 4(d) Rule

Round hickorynut habitat varies from riffle, run and pool areas of streams of sand and gravel with gentle flows, to larger rivers at depths up to 6.5 feet in sandy mud (USFWS 2019f). While the round hickorynut can sustain brief seasonally low-flow conditions, it is not tolerant of intermittent and periodic dry event situations (USFWS 2019f). The round hickorynut lifespan is between 10 and 16 years (USFWS 2019f). This species is a long-term breeder, gravid throughout the winter. Host fish are predominantly darters of the genera *Ammocrypta*, *Etheostoma* and *Percina*, but also include banded sculpins (*Cottus carolinae*) (USFWS 2019f). Principal threats to the round hickorynut include multiple impairments from impoundments, channelization, non-native species, chemical contaminants, mining, urban and industrial development, oil and gas drilling, coal mining, agriculture and sedimentation (USFWS 2019f, Center for Biological Diversity 2010).

The round hickorynut mussel has been recorded in the Ohio River, Wabash River, White River, East Fork White River, Eel River, Tippecanoe River, Richland Creek and various other rivers and streams throughout Indiana. The Indiana Natural Heritage Center Database includes numerous historical, subfossil and weathered dead records (1991 through 2010) for the round hickorynut mussel on the East Fork White River in Daviess, Dubois, Martin, Lawrence, Jackson, and Bartholomew counties. However, since only a single fresh dead record outside the Mid-States Corridor



12-county Study Area has been documented, considering the species as extant within the lower East Fork White River is questionable. The USFWS did not identify any portion of the East Fork White River as likely habitat for the round hickorynut mussel that might be affected by the Mid-States Corridor project.

Salamander mussel (Simpsonaias ambigua) - 12 Month Proposed Listing and Proposed Critical Habitat Review

The salamander mussel is typically found in swift current streams where it is under flat rocks or wedged between large rocks in the streambed, as opposed to burrowing into finer sand and silt substrates (Center for Biological Diversity 2010, Roe 2003, Carman 2002). Longevity of the salamander mussel is unknown (Animal Diversity Web 2021). Unlike all other North American mussels, the salamander mussel uses the mudpuppy (*Necturus maculosus*), an amphibian not a fish, as its host for glochidia development (Center for Biological Diversity 2010, Roe 2003). The salamander mussel is a long-term breeder. Like most mussels, the salamander mussel is threatened most by the effects of impoundments, siltation, mining, channel modifications, pollution and non-native competition with the Asiatic clam and zebra mussel (Roe 2003). Because the salamander mussel is host-specific, any environmental threat to the mudpuppy is also a threat to the mussel.

The salamander mussel has been recorded in the Wabash River, White River, East Fork White River, Eel River, Tippecanoe River and various other rivers and streams throughout Indiana. The Indiana Natural Heritage Center Database includes only four records from 1999 through 2010 for the salamander mussel on the East Fork White River in Daviess and Martin counties. Three of these records represent fresh dead or live specimens in Martin County; therefore, the species is still likely extant within the East Fork White River. The single historical and weathered dead record in Daviess County is to the west of Alternative B. The USFWS did not identify any portion of the East Fork White River as likely habitat for the salamander mussel that might be affected by the Mid-States Corridor project. Although there are no live or fresh dead records in the general vicinity of the possible US 231 bridge crossing for Alternatives C, M, O and P, or the potential new East Fork White River crossing for Alternative B, the salamander mussel is considered an Endangered Species Act proposed listing species of concern for the Mid-States Corridor project.

Monarch butterfly (Danaus plexippus plexippus) – Candidate

Summer breeding habitat for the monarch butterfly is directly associated with the range of milkweeds in the United States and Canada, namely the common milkweed (*Asclepias syriaca*), which the monarch butterfly is dependent on for breeding habitat, egg incubation and as a larval/adult food source. During breeding and migration, monarch butterflies also make use of trees for roosting cover and stopover sites. In the winter, monarch butterflies migrate to forest habitats in Mexico, or to a lesser extent Southern Florida and Caribbean islands. The continued decline in monarch butterfly populations has largely been attributed to a coincident reduction in milkweed, which has been directly linked to the substantially increased usage of glyphosate-based herbicides (i.e., Roundup®) on corn and soybean crops in the Midwest over the past 25-plus years. Neonicotinoid insecticides for the control of agricultural pests are also cited as having a non-discriminatory effect on monarch butterflies. Chemical runoff from roadways and the use of herbicides for right-of-way vegetation control have also contributed to milkweed reductions. Conversion of grasslands to corn crops to meet an increasing demand for ethanol has also been cited as a contributing factor to the loss of monarch butterfly milkweed habitat. The USFWS was petitioned by the Center for Biological Diversity, Center for Food Safety, the Xerces Society for Invertebrate Conservation and Dr. Lincoln Brower on August 26, 2014 to list the monarch butterfly as threatened and designate critical habitat under the Endangered Species Act (Center for Biological Diversity et al. 2014).

Potential habitat for the monarch butterfly is likely present to varying extents throughout the Mid-States Corridor Study Area, and no physiographic region (Crawford Upland versus Wabash Lowland and Boonville Hills) may have a greater potential or larger acreage of suitable habitat. Since Alternatives B and C are aligned through larger expanses



Taxon	Species	Common Name	IDNR Status	Alternative ²				
				B	C	M	O	P
Mammal	<i>Lasiurus borealis</i>	eastern red bat	special concern					1 mile
	<i>Myotis austroriparius</i>	southeastern bat	special concern			1 mile		
	<i>Myotis grisescens</i>	gray bat	endangered	1 mile	1 mile	1 mile	1 mile	1 mile
	<i>Myotis lucifugus</i>	little brown bat	endangered				Alignment	1 mile
	<i>Myotis septentrionalis</i>	northern long-eared bat	endangered	2 mile	2 mile	1 mile	1 mile	1 mile
	<i>Myotis sodalis</i>	Indiana bat	endangered	1 mile	2 mile	1 mile	2 mile	1 mile
	<i>Nycticeius humeralis</i>	evening bat	endangered	1 mile				1 mile
	<i>Perimyotis subflavus</i>	tri-colored bat	endangered				Alignment	1 mile
	<i>Sorex fumeus</i> ¹	Smoky shrew	special concern					
	<i>Sorex hoyi</i> ¹	pygmy shrew	special concern					
Bird	<i>Taxidea taxus</i>	American badger	special concern	1 mile	1 mile	Alignment	1 mile	1 mile
	<i>Buteo platypterus</i>	broad-winged hawk	special concern				2 mile	
	<i>Cistothorus platensis</i>	sedge wren	endangered	2 mile	2 mile	2 mile	2 mile	2 mile
	<i>Haliaeetus leucocephalus</i>	bald eagle	special concern	1 mile	1 mile	1 mile	1 mile	1 mile
	<i>Helmitheros vermivorm</i>	worm-eating warbler	special concern			2 mile		
	<i>Ixobrychus exilis</i>	Least bittern	endangered	Alignment	Alignment	Alignment	Alignment	Alignment
	<i>Lanius ludovicianus</i>	loggerhead shrike	endangered	1 mile	Alignment	Alignment	1 mile	Alignment
	<i>Mniotilta varia</i>	Black-and-white warbler	special concern					1 mile
	<i>Nyctanassa violacea</i>	yellow-crowned night-heron	endangered		1 mile	1 mile	1 mile	1 mile
	<i>Rallus elegans</i>	king rail	endangered	Alignment	Alignment	Alignment	Alignment	Alignment
Fish	<i>Sternula antillarum athalassos</i> ¹	interior least tern	endangered					
	<i>Tyto alba</i>	barn owl	endangered	1 mile	1 mile	1 mile	1 mile	1 mile
	<i>Acipenser fulvescens</i>	lake sturgeon	endangered			1 mile		1 mile
	<i>Amblyopsis hoosieri</i>	Hoosier cavefish	endangered				1 mile	
	<i>Etheostoma maculatum</i>	spotted darter	special concern			1 mile		1 mile
	<i>Agkistrodon piscivorus leucostoma</i>	western cottonmouth	endangered		1 mile	1 mile	1 mile	1 mile
	<i>Nerodia erythrogaster neglecta</i>	copperbelly water snake	endangered	Alignment	Alignment	Alignment	Alignment	Alignment
	<i>Opheodrys aestivus</i>	rough green snake	special concern		1 mile	1 mile	1 mile	1 mile
	<i>Terrapene carolina carolina</i> ¹	eastern box turtle	special concern					
	<i>Acris blanchardi</i>	Blanchard's cricket frog	special concern		1 mile	1 mile	1 mile	1 mile
Reptile	<i>Lithobates areolatus circulosus</i>	northern crawfish frog	endangered	1 mile				1 mile
	<i>Necturus maculosus</i>	common mudpuppy	special concern	1 mile	1 mile	1 mile	1 mile	1 mile
	<i>Nerodia erythrogaster neglecta</i>	copperbelly water snake	endangered	Alignment	Alignment	Alignment	Alignment	Alignment
	<i>Opheodrys aestivus</i>	rough green snake	special concern		1 mile	1 mile	1 mile	1 mile
	<i>Terrapene carolina carolina</i> ¹	eastern box turtle	special concern					
	<i>Acris blanchardi</i>	Blanchard's cricket frog	special concern		1 mile	1 mile	1 mile	1 mile
	<i>Lithobates areolatus circulosus</i>	northern crawfish frog	endangered	1 mile				1 mile
	<i>Necturus maculosus</i>	common mudpuppy	special concern	1 mile	1 mile	1 mile	1 mile	1 mile
	<i>Nerodia erythrogaster neglecta</i>	copperbelly water snake	endangered	Alignment	Alignment	Alignment	Alignment	Alignment
	<i>Opheodrys aestivus</i>	rough green snake	special concern		1 mile	1 mile	1 mile	1 mile
Amphibian	<i>Terrapene carolina carolina</i> ¹	eastern box turtle	special concern					
	<i>Acris blanchardi</i>	Blanchard's cricket frog	special concern		1 mile	1 mile	1 mile	1 mile
	<i>Lithobates areolatus circulosus</i>	northern crawfish frog	endangered	1 mile				1 mile
	<i>Necturus maculosus</i>	common mudpuppy	special concern	1 mile	1 mile	1 mile	1 mile	1 mile
	<i>Nerodia erythrogaster neglecta</i>	copperbelly water snake	endangered	Alignment	Alignment	Alignment	Alignment	Alignment
	<i>Opheodrys aestivus</i>	rough green snake	special concern		1 mile	1 mile	1 mile	1 mile
	<i>Terrapene carolina carolina</i> ¹	eastern box turtle	special concern					
	<i>Acris blanchardi</i>	Blanchard's cricket frog	special concern		1 mile	1 mile	1 mile	1 mile
	<i>Lithobates areolatus circulosus</i>	northern crawfish frog	endangered	1 mile				1 mile
	<i>Necturus maculosus</i>	common mudpuppy	special concern	1 mile	1 mile	1 mile	1 mile	1 mile
Mussel	<i>Cyprogenia stegaria</i>	eastern fanshell pearlymussel	endangered	Alignment	Alignment	Alignment	1 mile	Alignment
	<i>Epioblasma rangiana</i> ¹	northern riffleshell	endangered					
	<i>Epioblasma triquetra</i> ¹	snuffbox	endangered					
	<i>Obovaria subrotunda</i>	round hickorynut	endangered	Alignment		1 mile	2 mile	1 mile
	<i>Plethobasus cyphus</i>	sheepnose	endangered			1 mile	1 mile	1 mile
	<i>Pleurobema clava</i>	clubshell	endangered	Alignment		1 mile	2 mile	1 mile
	<i>Pleurobema cordatum</i>	Ohio pigtoe	special concern	2 mile	Alignment	Alignment	1 mile	Alignment
	<i>Pleurobema plenum</i>	rough pigtoe	endangered			1 mile	1 mile	1 mile
	<i>Potamilus capax</i>	fat pocketbook	endangered	Alignment	Alignment	Alignment	1 mile	Alignment
	<i>Ptychobranhus fasciolaris</i>	kidneyshell	special concern			2 mile		
Butterfly/Moth	<i>Simpsoniaia ambigua</i>	salamander mussel	special concern	2 mile		1 mile		1 mile
	<i>Theliderma cylindrica</i>	rabbitsfoot	endangered	2 mile		1 mile	2 mile	1 mile
	<i>Toxolasma lividum</i>	purple lilliput	special concern			2 mile		
	<i>Villosa lienosa</i>	little spectaclecase	special concern			2 mile	2 mile	1 mile
	<i>Fontigens cryptica</i> ¹	hidden springs snail	endangered					
	<i>Arrhopalites whitesidei</i> ¹	Whiteside's springtail	endangered					
	<i>Isotoma anglicana</i> ¹	a springtail	watch list					
	<i>Onychiurus reluctus</i>	a springtail	watch list				Alignment	
	<i>Pseudosinella aera</i> ¹	Cave obligate springtail	endangered					
	<i>Pseudosinella collina</i> ¹	hilly springtail	rare					
Beetle	<i>Pseudosinella fonsa</i>	Fountain Cave springtail	threatened				Alignment	
	<i>Sinella alata</i> ¹	a springtail	watch list					
	<i>Sinella cavernarum</i>	a springtail	watch list				Alignment	
	<i>Tomocerus missus</i> ¹	relict cave springtail	watch list					
	<i>Danaus plexippus</i> ³	monarch butterfly						
	<i>Atheta annexa</i> ¹	rove beetle	watch list					
	<i>Dryobius sexnotatus</i>	six-banded longhorn beetle	threatened				1 mile	
	<i>Pseudanophthalmus shilohensis mayfieldensis</i> ¹	Monroe cave beetle	endangered					

Draft Environmental Impact Statement



**MID-STATES
CORRIDOR**

Taxon	Species	Common Name	IDNR Status	Alternative ²				
				B	C	M	O	P
	<i>Pseudanophthalmus stricticollis</i>	Marengo cave ground beetle	watch list				1 mile	
	<i>Pseudanophthalmus youngi</i>	Young's cave ground beetle	rare				2 mile	
Mayfly	<i>Ephemerella excrucians</i> ¹	lowlands spiny crawler mayfly	watch list					
	<i>Spinadis simplex</i> ¹	Wallace's deepwater mayfly	endangered					
Millipede	<i>Conotyla bollmani</i>	Bollman's cave millipede	watch list				2 mile	
Crayfish/ Amphipod	<i>Crangonyx indianaensis</i> ¹	Indiana cave amphipod	watch list					
	<i>Crangonyx packardi</i>	Packard's cave amphipod	watch list			1 mile	1 mile	
	<i>Orconectes inermis testi</i> ¹	a trolobitic crayfish	rare					
	<i>Orconectes inermis inermis</i>	ghost crayfish	watch list			Alignment	Alignment	
Ostracod	<i>Pseudocandona jeanneli</i>	Jeannel's cave ostracod	endangered				1 mile	
	<i>Sagittocythere barri</i>	Barr's commensal cave ostracod	watch list			2 mile		
Arachnid	<i>Apochthonius indianensis</i>	Indiana cave pseudoscorpion	endangered			1 mile	1 mile	
	<i>Porrhomma cavernicola</i>	Appalachian cave spider	endangered				2 mile	
Flatworm	<i>Sphalloplana weingartneri</i>	Weingartner's cave flatworm	watch list				1 mile	
Plant	<i>Asplenium bradleyi</i>	Bradley's spleenwort	endangered				1 mile	
	<i>Calycocarpum lyonii</i> ¹	cup-seed	threatened					
	<i>Chelone obliqua var. speciosa</i>	rose turtlehead	watch list			1 mile		
	<i>Eupatorium album</i> ¹	White thoroughwort	rare					
	<i>Hottonia inflata</i>	featherfoil	threatened		1 mile	1 mile	1 mile	1 mile
	<i>Hymenocallis occidentalis</i>	Carolina spider-lily	watch list	2 mile	2 mile	2 mile	2 mile	2 mile
	<i>Itea virginica</i>	Virginia willow	endangered		1 mile	1 mile	1 mile	1 mile
	<i>Limnobium spongia</i>	American frog's-bit	endangered		1 mile	1 mile	1 mile	1 mile
	<i>Ludwigia decurrens</i> ¹	primrose willow	watch list					
	<i>Nothoscordum bivalve</i>	crow-poison	rare			2 mile		
	<i>Panax quinquefolius</i>	American ginseng	watch list					2 mile
	<i>Poa paludigena</i>	bog bluegrass	rare	2 mile	2 mile	2 mile	2 mile	2 mile
	<i>Rhexia mariana var. mariana</i> ¹	Maryland meadow beauty	threatened					
	<i>Spiranthes vernalis</i>	grassleaf ladies'-tresses	watch list				1 mile	
	<i>Styrax americanus</i>	American snowbell	rare	1 mile	1 mile	1 mile	1 mile	1 mile
State endangered				16	15	22	27	25
State threatened				0	1	1	3	1
State rare				2	2	3	3	2
State special concen				5	6	13	8	11
Watch list				1	1	5	9	2
State species total				24	25	44	50	41

¹ Indicates species of IDNR interest for the Mid States Corridor project where known records are beyond two miles from any of the proposed alternatives.

² Proximity determinations based on the expressway facility type Variation for Alternatives B, C, M, O and P.

³ Indiana Natural Heritage Data Center currently lacks occurrence data for the monarch butterfly and IDNR has not yet determined a state status for the species.

Table 3.16-6: Alternative Proximity Analysis Summary for State Listed Species

of agricultural land where milkweeds are particularly declining, there may be less suitable remaining habitat within these corridors. Because milkweeds are not uncommon along highway right-of-ways, each of the local improvement locations has the potential to support quality nectar and breeding habitat for the monarch butterfly.

3.16.4.2 Indiana Department of Natural Resources State Listed Species

Table 3.16-6 includes the summary results of the proximity analysis for 88 Indiana state-listed species based on the information from the Indiana Natural Heritage Data Center. This summary also includes the 15 federally endangered, threatened, candidate, proposed listing review, and delisted species addressed in **Section 3.16.4.1**. In general, considering the limitations of the datasets used for this analysis, Alternatives M, O and P have a greater number of known state-listed species records within relatively close proximity to the working alignments than



Alternatives B and C. This is due in part to the greater number of cave obligate species in the Crawford Upland region of the Study Area where only Alternatives M and O would have any potential for impacts to these species.

Coordination responses from the IDNR Division of Fish and Wildlife dated September 12, 2019 and March 27, 2020, collectively identified 88 state-listed species of potential occurrence and concern for the Mid-States Corridor Study Area. Brief descriptions of these species are included in Appendix I. The Division of Fish and Wildlife made special note of concerns regarding impacts to the following species by the Mid-States Corridor project.

Pygmy shrew (Sorex hoyi) – Special Concern

This species is one of the smallest shrews in the world (Whitaker et al. 1994). Its habitat varies throughout its range from high elevation spruce-Fraser fir uplands to bottomland gum-bald cypress lowland forests, but is also known from old field, newly clear-cut areas, early to mid-successional forest stages, bluegrass pasture, marsh, brushland, riparian woodland, bogs, rich mesophytic forests and low areas along streams (Caldwell et al. 1982, Cudmore and Whitaker 1983, Ford et al. 2007, Laerm et al. 1994). The pygmy shrew was first documented in Indiana in 1981 (Caldwell et al. 1982). It has since been observed in various forest habitats in the unglaciated region of South-Central Indiana from Perry, to Owen, to Bartholomew, to Clark counties (Cudmore and Whitaker 1983). The pygmy shrew favors upland forests of sugar maple, American beech, red oak, chestnut oak, white oak, white ash and hickories in Indiana (Cudmore and Whitaker 1983). Alternatives O and M have the greatest potential for impacts to oak-hickory forest communities, the preferred habitat of the pygmy shrew in Indiana. However, based on the known range of the species in Indiana, suitable habitat may also exist along Alternative P. The probability of impacts to this species from the majority of the local improvements is low since it is not likely the species would frequent woodland edge habitat.

Loggerhead shrike (Lanius ludovicianus) – Endangered

The loggerhead shrike became established in Indiana following settlement of the territory when large areas of forest land were cleared for agriculture with fencerows separating many fields (Pruitt 2000). The loggerhead shrike typically perches on utility lines and fences within landscapes dominated by pasture/hayfields with hedgerows that typically include eastern red cedar, osage orange and sassafras. They forage in grasslands and open shrublands with scattered trees (Castrale et al. 1998). Winter habitat is considered to be similar to summer habitat, and it is known to overwinter in Southern Indiana (Pruitt 2000). It is most known for its unusual behavior of impaling its prey (insects, small mammals, birds, reptiles and amphibians) on thorns or barbed-wire fences (Castrale et al. 1998). Records of the loggerhead shrike are more common in Southwestern Indiana; however, confirmed occurrences of the species are known from the Mid-States Corridor Study Area in South-Central Indiana (Castrale et al. 1998). Declines in the Indiana populations have been attributed to loss of pasture/hayfield land to row crops, increases in farm size, elimination of hedgerows, increased pesticide use, loss of wintering habitat and low over-winter survival (Castrale et al. 1998, Pruitt 2000). IDNR has indicated that there are fewer than 10 known pairs of the species in Indiana, although there were as many as 98 nesting pairs documented in 1989 (Castrale et al. 1998). Additionally, IDNR indicates that direct loss from roadway mortality and indirect loss from habitat fragmentation and increased predation may result from construction of high-speed roads within known loggerhead shrike habitat. Potential impacts to the loggerhead shrike are more of a concern with Alternatives B and C where habitat is more prevalent within the general landscape setting than Alternatives M, O and P. Some of the roadside edge habitat associated with the local improvements may also have elements favorable to the loggerhead shrike, particularly those in open areas such as Local Improvements 1, 10, 11 and 12.

Barn owl (Tyto alba) – Endangered

Habitat for barn owls is largely pastures, hayfields, wet meadows, small fields and even reclaimed mine land where small mammal prey is prevalent and suitable shelter, such as barns, large trees with cavities, silos, church steeples and cupolas, is present for nesting (Castrale et al. 1998). In Indiana, barn owls are largely confined to the southern



third of the state (Castrale et al. 1998). There are numerous barn owl records from the mid-70s through 2018 within the Mid-States Corridor Study Area. The greatest threats to barn owls are loss of preferred habitat, habitat fragmentation from various land use changes and possibly to a lesser extent, night vehicle collisions. It is more frequent within the Wabash Lowlands and Boonville Hills regions associated with Alternatives B, C and P, but less prevalent within the Crawford Upland physiographic region for Alternatives M and O. Loss of barn owl habitat and habitat fragmentation from the local improvements are not of particular concern since the existing highways where these improvements would occur already represent fragmenting elements in the landscape.

Western Cottonmouth (Agkistrodon piscivorus leucostroma) – Endangered

The western cottonmouth is one of four venomous viper snakes native to Indiana. This species is only known from two locations in Indiana, both with differing habitats. Western cottonmouths are typically associated with wetlands, sluggish streams and shallow lake habitats (Minton 2001). Within the Patoka River floodplain in Dubois County, a western cottonmouth was documented within a large woodland wetland of red maple, pumpkin ash and swamp cottonwood (Minton 2001). The second was within the rocky bluffs along the Ohio River in Harrison County. Western cottonmouths are reliant on rocky crevices in bluffs and rock outcrops as hibernation habitat (Minton 2001). Their diet varies from amphibians, other reptiles, occasionally birds and small mammals and even cicadas (Minton 2001). Alternatives C, M, O and P pass immediately east of the Buffalo Pond Nature Preserve, the type locality for the western cottonmouth in Dubois County. Resident western cottonmouths are likely confined to this large wetland forest habitat; however, any movements by the snake to the east or southeast across the East Fork White River into bottomland forest habitat south of the river could necessitate crossing of a new highway facility. Based on known occurrences of the species, none of the local improvements are perceived to impact the western cottonmouth.

Copperbelly watersnake (Nerodia erythrogaster neglecta) – Endangered

Copperbelly watersnake distribution includes two distinct regions separated by the 40th Parallel. North of the 40th Parallel, the species is confined to isolated populations in Northeastern Indiana, Northwestern Ohio, and Southern Michigan. South of the 40th Parallel populations occur within Southwestern Indiana, Southeastern Illinois, and Northwestern Kentucky, as well as the vicinity of Muscatatuck National Refuge in Southeastern Indiana. While the northern population is considered threatened under the Endangered Species Act, the southern populations are protected under the Copperbelly Water Snake Conservation Agreement and have therefore been excluded from the Endangered Species Act. Copperbelly watersnakes are most common to shrub swamps, shallow woodland pond, emergent wetlands and bottomland floodplain forests, but tend to avoid flowing water regimes (Minton 2001, Center for Reptile and Amphibian Conservation and Management no date). However, adjacent upland areas are also used by copperbelly watersnakes for activities such as shedding, birthing, refuge from weather stresses and escape from conditions that pose threats in wetlands (Center for Reptile and Amphibian Conservation and Management no date). Because copperbelly watersnakes have relatively large home ranges and frequently move among different aquatic habitats, direct destruction and fragmentation of habitat is of concern. Additionally, copperbelly watersnakes display fidelity to hibernation areas where they use crayfish burrows to overwinter. Changes in groundwater hydrology can therefore render such areas unsuitable for future use (Center for Reptile and Amphibian Conservation and Management no date). The copperbelly watersnake is most commonly known from the Patoka National Wildlife Refuge to the west of the Mid-States Corridor Study Area in Pike and Gibson counties. However, there are Indiana Natural Heritage Data Center records in Dubois County associated with the Buffalo Pond Nature Preserve, Barnes-Seng Wetland Conservation Area and the Wening-Sherritt Seep Springs Nature Preserve. Alternatives C, M, O and P pass immediately east of the Buffalo Pond area along the Patoka River. Local Improvement 2 represents the most probable of the local improvements that has the potential for impacts to the copperbelly watersnake.



Rough green snake (*Opheodys aestivus*) – Special Concern

The Indiana range for the rough green snake is the southern half of the state where suitable habitat is present. It prefers dry sparse woods and thickets adjacent to streams and wetlands (Minton 2001). Rough green snakes are typically arboreal, but often crossroads where they risk being killed by traffic (Minton 2001). Their diets are primarily insects (Minton 2001). Clearing of woodland habitat for development poses threats to the species, although the greater threat is likely roadkill incidents. Within the Mid-States Corridor Study Area, the Indiana Natural Heritage Data Center includes several records scattered throughout Pike, Dubois, Martin, Orange and Lawrence counties. In most instances, these accounts are far removed from the alternatives; however, the species is also known from the Buffalo Pond Nature Preserve, immediately west of Alternatives C, M, O and P. While there are no current known population occurrences of the rough green snake in the vicinity of any local improvements, the widespread distribution of the species within the Mid-States Corridor Study Area suggests there is potential for an unknown population in the eastern woodland areas of the Study Area where rough green snakes may cross existing highways at local improvement locations.

Eastern box turtle (*Terrepenne carolina carolina*) – Special Concern

The eastern box turtle is most common in upland hilltop and ravine woodland habitat and to a lesser extent in bottomland areas that are not frequently flooded (Minton 2001). Tree root areas, decaying logs/stumps and dense vine cover are frequented for shelter (Minton 2001). Eastern box turtle diets are primarily plant and fungi based, although they have been observed to scavenge carrion (Minton 2001). Eastern box turtles are still relatively abundant in favorable woodland habitat in Indiana; however, populations are on the decline due to habitat loss from development, pollution, casual and commercial collecting as pets and roadkill incidents. The collection of box turtles in Indiana was prohibited by law in 2004. Disease from agents such as ranavirus and necrotizing bacteria are also agents resulting in reductions of native box turtle populations (Adamovicz et al. 2018). Because eastern box turtles almost exclusively stay in forest habitats, Alternatives M and O, and to a lesser extent Alternative P would pose the greatest threat to the species. However, there are some remnant woods associated with the Patoka River and East Fork White River affected by Alternatives B and C that might also fragment habitat used by eastern box turtles. Eastern box turtles are frequently observed crossing roads and highways; therefore, each of the local improvements, particularly those associated with Alternatives M, O and P, represent areas of concern for eastern box turtle collision impacts.

Crawfish frog (*Lithobates areolatus circulosus*) – Endangered

Crawfish frogs inhabit open grassy, damp areas sometimes near patches of woodland where they use the burrows of the large chimney-building crayfish (Minton, 2001). This species rarely strays from the burrows during the summer and winter seasons. Typically, an individual will occupy a single burrow between breeding seasons and return to the same burrow following breeding. At spring breeding, they migrate to fishless seasonal/semipermanent wetlands that hold water until at least mid-July and can be over one km from non-breeding burrows. The crawfish frog feeds nocturnally (Minton 2001); however, circumdiel activity patterns of aboveground activity for prolonged periods of time have been observed (Hoffman et al. 2010). Crawfish frogs feed on beetles, crayfish, small amphibians and reptiles. Breeding calls can be as early as February and extend to mid-April, but mid-March to mid-April is more typical (Minton 2001, Kinney and Lannoo, 2010). Crawfish frogs were relatively plentiful until the 1970s when unexplained declines were experienced (Minton 2001). Mining, suburban development and farming are cited as likely causes for localized extirpation (Engbrecht and Lannoo 2010). The Indiana range is predominantly Southwest and West-Central Indiana, with four predominant areas of occurrence. Two of these locations within the Mid-States Corridor Study Area include the Aikman Creek and neighboring Beech/Bear Creek watershed west of Glendale Fish and Wildlife Area and the Doans Creek and First Creek/Rocky Branch watersheds in the vicinity of the I-69/US 231



interchange. Based on Indiana Heritage Data Center accounts of the species, Alternative B in Daviess County and Alternative P in northern Daviess and southern Greene counties have the greatest potential for impacts to crawfish frog habitat. The potential for crawfish frog presence within the edge habitat along the local improvement highways is considered very remote due to the habitat requirements of the species.

Blanchard's cricket frog (*Acris blanchardi*) – Special Concern

Blanchard's cricket frog favors more permanent water conditions in open landscape settings, such as ponds, strip mine ponds, drainage ditches, marshes and the edges of lakes and large streams with aquatic vegetation (Minton 2001). They surface from hibernation and begin breeding in late April (Minton 2001). Their diet is primarily submerged and surface aquatic insects including beetles, spiders, midges, water boatman and springtails (Minton 2001). Blanchard's cricket frog is found throughout Indiana where suitable habitat exists. Most of the Natural Indiana Heritage Data Center records for Blanchard's cricket frog in Southwest Indiana are associated with the Patoka River National Wildlife Refuge in Pike and Gibson counties, the lower White River in Gibson and Knox counties and southwest Posey County. However, within the Mid-States Corridor Study Area, the species has previously been documented from the Buffalo Pond Nature Preserve immediately west of the Alternatives C, M, O and P in Dubois County. Impacts to Blanchard's cricket frog from the local improvements are considered minimal based on its habitat requirements and known distribution within the Mid-States Corridor Study Area.

3.16.5 Local Improvements

As with the new terrain alignment portions of the alternatives, the 18 individual local improvements associated with the respective alternatives were also evaluated using the proximity analysis methodology. The results of this analysis have been incorporated into **Table 3.16-2** and **Table 3.16-6**. In general, because the local improvements would largely be confined to disturbed areas or fringe habitat along existing highways, the potential for listed species presence in the immediate vicinity is reduced and the potential for impact to these natural resources is low, but cannot be discounted. Of the 18 local improvements proposed, Local Improvement 2 along US 231 between Huntingburg and Jasper has the greatest potential for impacts to quality wetland habitat used by species such as the bald eagle, sedge wren, least bittern, king rail, barn owl, copperbelly watersnake, Carolina spider-lily and American snowbell. This area also represents favorable habitat for both the Indiana bat and the northern long-eared bat.

3.16.6 Mitigation

Compensatory mitigation for impacts to federally- and/or state-listed species was not determined at the Tier 1 EIS or Tier 1 Biological Assessment stage for the Mid-States Corridor study. Upon selection of a preferred alternative and completion of field surveys for species of concern, a strategy plan will be prepared including elements proposed to avoid, minimize and mitigate direct and indirect impacts to respective species and their habitats.

3.16.7 Summary

Rare animal and plant species within Indiana are protected under the Endangered Species Act for imperiled species, the Bald and Golden Eagle Act for bald eagles, the Migratory Bird Treaty Act and the Indiana Nongame and Endangered Species Conservation Act. The USFWS and IDNR identified a total of 88 species of concern for the Mid-States Corridor project including seven federally-listed species, five federally proposed listing species, one federal candidate species, the bald eagle and 69 additional Indiana state-listed species (endangered, threatened, rare, species of concern, and watch list status). Seventeen species, three fish and 14 mussel species, are associated with river habitats, namely the East Fork White River. Similarly, 23 of the state-listed invertebrate species are cave obligate or reliant on the cave habitats in Lawrence and Orange counties. For the federally-listed species of concern for the



Mid-States Corridor project, critical habitat has only been designated for the Indiana bat. Indiana bat critical habitat in Indiana is located greater than 10 miles to the north and southeast of the proposed alternatives; therefore, no impacts to these sensitive areas are anticipated.

The USFWS identified the Indiana bat, northern long-eared bat and gray bat, along with the fanshell mussel, sheepsnose, rough pigtoe and fat pocketbook as endangered or threatened species currently listed under the Endangered Species Act that are known to occur within the Mid-States Corridor Study Area. Critical habitat for the Indiana bat is greater than 10 miles from any of the alternatives. Additionally, the little brown bat, tri-colored bat, lake sturgeon, Hoosier cavefish, salamander mussel and monarch butterfly are species currently under consideration for listing as endangered or threatened by the USFWS.

Based on known occurrences and distribution of federal and state-listed species, Alternatives C and B would likely affect fewer species through the more agricultural dominated Wabash Lowland landscape within the western portion of the project area than Alternatives M and O, which would traverse the more heavily wooded and karst rich/cave habitat landscapes of the Crawford Upland landscape in the east. While the East Fork White River, Buffalo Pond Nature Preserve, Barnes-Seng Wetland Conservation Area, Hoosier National Forest properties and the various cave habitats in the Mid-States Corridor project area are hot spots for endangered species where potential impacts to listed species have been avoided or minimized, lands under private ownership also support habitat for many species in need of protection.

The number of federally-listed species with known records in the general vicinity of preferred Alternative P is comparable to potential impacts for Alternatives M and O, including the Indiana bat, northern long-eared bat, gray bat, little brown bat, tri-colored bat, fanshell mussel, sheepsnose, rough pigtoe, fat pocketbook and salamander mussel. While Alternative P would not cross the reach of the East Fork White River known to support the lake sturgeon, it would cross a couple of the watersheds that feed directly into the East Fork White River. Unlike Alternative O, the preferred Alternative P would not be of potential concern for impacts to the Hoosier cavefish. The number of state-listed species with records proximal to the preferred Alternative P is slightly less than Alternative M and to a larger degree less than Alternative O. These include eight species of mammals, including Indiana bat, northern long-eared bat, gray bat, little brown bat, tri-colored bat and evening bat; eight species of birds, including sedge wren, least bittern, loggerhead shrike, yellow-crowned night-heron and king rail; two species of fish including lake sturgeon; three reptile species, including western cottonmouth and copperbelly water snake; three amphibian species including northern crawfish frog; ten species of mussels, including fanshell pearlymussel, round hickorynut, sheepsnose, clubshell, rough pigtoe, fat pocketbook and rabbitsfoot; and seven species of plants, including featherfoil, Virginia willow, and American frog's-bit. Because all of the state-listed invertebrate species, except the monarch butterfly, are limited to the karst/cave region of the Study Area, Alternative P is not expected to have any impact upon these watersheds, or any cave obligate populations that inhabit these watersheds.

Consultation with the USFWS has been initiated for the federally-listed, proposed listing, and candidate species (bat, fish, mussel, and insect), and will be ongoing throughout the life of the Mid-States Corridor project. All efforts will be made to avoid known and suitable habitat for federally-listed species. Similarly, coordination with the IDNR for state-listed species has been initiated and all efforts will be made to avoid these species and their high-quality natural communities.

