



Federal Species

According to the USFWS Illinois County Distribution of Federally Listed Threatened, Endangered, Proposed, and Candidate Species list (USFWS 2015a) and the Illinois Natural Heritage Database, Illinois Threatened and Endangered Species by County (IDNR 2015c), two federally threatened plant species, one federally threatened invertebrate species, seven federally endangered species (two mammal, one bird, and four invertebrate species), and one proposed federally endangered species, the northern long-eared bat, are known to occur within the counties crossed by the Alternative Routes (**Table 5-4**). Additionally, all counties crossed by the Alternative Routes have potential habitat for Indiana bat and northern long-eared bat. Pike County also has potential habitat for the gray bat. Based on the location-specific data from the Illinois Natural Heritage Database, however, only one known location of any federally listed threatened, endangered, proposed, or candidate species or designated critical habitat occurs with the ROW or within 1 mile of any of the Alternative Routes (**Table 5-5**). No critical habitat for any federally listed species has been designated along any of the Alternative Routes.

The following sections describe habitat characteristics for each species.

Mammals

Gray Bat

Gray bats are found in caves within 2 miles of rivers, streams or lakes, where they hibernate and form maternity and nursery colonies, mostly in the Ozarks. In summer, gray bats forage in areas with open water of rivers, streams, lakes, or reservoirs, and most foraging locations are relatively close to the caves (USFWS 2015a). Therefore, it is important to maintain forested corridors or dispersal routes to foraging habitats. Overall, the species is recovering and numbers have increased significantly in many areas (USFWS 2009).

Gray bats are known to occur in 11 counties in Illinois in the extreme southern and west-central parts of the state. The gray bat is known to occur in Pike County, which Alternative Routes A, B, C, D, E, F, and G cross (USFWS 2015a). USFWS has not designated critical habitat for the gray bat; however, gray bat hibernacula were assigned priority numbers based on the number of gray bats they contained. None of the Priority 1, 2, or 3 hibernacula occur within counties that the Alternative Routes cross. However, Pike County contains a Priority 4 hibernaculum, located approximately 7.3 miles from Alternative Route A and approximately 2.4 miles from Alternative Route B. Priority 4 hibernacula are of marginal consequence and require no action (USFWS 1982). Grain Belt Express will implement protection measures, developed in coordination with USFWS and IDNR, to avoid or minimize potential impacts to the gray bat from construction activities.

Indiana Bat

Indiana bats hibernate in limestone caves or occasionally, in abandoned mines (USFWS 2015a). In spring, reproductive females migrate and form maternity colonies where they bear and raise their young in wooded areas under the exfoliating bark of dead trees greater than 9 inches diameter at breast height and retain large, thick slabs of peeling bark. Habitats in which maternity roosts occur include riparian zones, bottomland and floodplain, wooded wetlands, and upland communities (USFWS 2007). Investigations have found evidence of summer breeding populations in 18 Illinois counties.

Males and non-reproductive females typically do not roost in colonies and may stay close to their hibernaculum or migrate to summer habitat. Summer roosts are typically located behind exfoliating bark of large, often dead, trees or snags that are within canopy gaps in forests, in fencelines, or along wooded edges. Indiana bats forage in or along the edges of forested and riparian areas, eating a variety of flying insects found along rivers or lakes and in uplands. Both males and females return to hibernacula in late summer or early fall to mate and enter hibernation (USFWS 2007).

Potential habitat for the Indiana bat occurs statewide in Illinois, and known occurrences are reported in Pike and Macoupin Counties, which the Alternative Routes cross (USFWS 2015a). Illinois is included in the Ozark-Central Recovery Unit for the Indiana bat. These recovery units serve to protect both core and peripheral populations. USFWS has not designated Indiana bat critical habitat within counties crossed by the Alternative Routes.

All counties crossed by the Alternative Routes have known summer records of Indiana bat (USFWS 2015a). Indiana bat hibernacula were assigned priority numbers based on the number of Indiana bats they contained. None of the Priority 1 through 3 hibernacula occur within counties crossed by the Alternative Routes. However, Pike County contains a Priority 4 hibernaculum, which is located approximately 6.0 miles from Alternative Route A and 7.3 miles from Alternative Route B. Priority 4 hibernacula are defined as least important to recovery and long-term conservation of Indiana bat and typically have current or observed historical populations of fewer than 50 bats. Illinois has 28 recorded maternity colonies of Indiana bat with recorded maternity colonies in Macoupin, Pike, and Scott Counties, which are crossed by the Alternative Routes. These records are based on the presence of reproductively active females and/or juveniles between May 15 and August 15 (USFWS 2007).

Threats to the Indiana bat vary during the annual cycle. During hibernation, threats include modifications or disturbance to caves and mines and human disturbance. During summer months, possible threats relate to the loss and degradation of forested habitat. Migration pathways and swarming sites may also be affected by habitat loss and degradation. However, little is known about the migratory habits and habitats of the Indiana bat.

Grain Belt Express will implement protection measures, developed in coordination with USFWS and IDNR, to minimize any potential impacts to the Indiana bat from construction activities.

Northern Long-eared Bat

Northern long-eared bats are found statewide in Illinois, roosting and foraging in deciduous upland and riparian forests and using snag or den trees that are 9 to 36 inches diameter at breast height and that have loose bark during the spring and summer. In autumn, northern long-eared bats swarm in wooded areas surrounding caves and mines where they hibernate (USFWS 2015a).

USFWS issued a proposal to list the northern long-eared bat as endangered in October 2013 with an extended public comment period open until January 2, 2014, and reopened the comment period on November 18, 2014, until December 18, 2014. On January 15, 2015, USFWS opened a 60-day comment period on a proposed special rule under Section 4(d) of the ESA that will provide the maximum benefit to the species while limiting the regulatory burden on the public. The Section 4(d) rule will apply only in the event that USFWS lists the northern long-eared bat as threatened. Comments were accepted during a 60-day comment period through March 17, 2015 (USFWS 2015b). A final decision on listing the northern long-eared bat was to be made no later than April 2, 2015.

The primary threat to the northern long-eared bat is white-nose syndrome, a disease that has killed an estimated 5.5 million cave hibernating bats in the United States and Canada. Other threats include destruction, modification, or curtailment of its habitat or range and human-made factors affecting the northern long-eared bat's continued existence. These threats combined with white-nose syndrome heighten the level of risk. USFWS has not designated critical habitat for the northern long-eared bat. The northern long-eared bat utilizes habitat similar to the Indiana bat; therefore, the measures identified to minimize threats to the Indiana bat would also apply to the northern long-eared bat. These habitat conditions, threats, and minimization efforts are discussed above in the section for Indiana bat.

Franklin's Ground Squirrel

The Franklin's ground squirrel occurs in tallgrass prairie and is often found along the edges between grasslands and woodlands, forest, thickets, and wetlands. The Franklin's ground squirrel is known to occur in Macoupin and Christian Counties, which are crossed by the Alternative Routes (IDNR 2015c; Nyboer et al. 2006). However, no known occurrences of the Franklin's ground squirrel occur within the ROW or within 1 mile of any of the Alternative Routes. The Project is not anticipated to affect the Franklin's ground squirrel because the Project would have limited impacts on prairie habitat. Grain Belt Express will coordinate with IDNR regarding potential impacts to Franklin's ground squirrel and will develop protection measures to avoid or minimize those impacts.

Gray/Timber Wolf

A reclassification of federal protection status for the gray/timber wolf was published in the Federal Register on April 1, 2003. This reclassification established three distinct population segments, whereby USFWS Region 3 (which includes Illinois) is entirely within the Eastern Gray Wolf Distinct Population Segment, where all wolves are federally endangered. The Illinois Endangered Species Protection Act states that all species classified as threatened or endangered by USFWS are automatically placed on the state list.

No known self-sustaining gray/timber wolf populations have been documented in Illinois since 1889. In 2002, a wolf from the Great Lakes pack was shot in Illinois. The gray/timber wolf occurs in forest and prairie habitat and individual wolves have been spotted in Pike County, which is crossed by the Alternative Routes (IDNR 2015c; Nyboer et al. 2006). However, no known occurrences of the gray/timber wolf occur within the ROW or within 1 mile of any of the Alternative Routes. Because the gray/timber wolf does not regularly occur in the areas around the Alternative Routes, none of the Alternative Routes are likely to affect the gray/timber wolf.

Birds

Piping Plover

The piping plover is a rare summer migrant in Illinois and a rare resident along Lake Michigan; however, the species is known to occur in Shelby County, which is crossed by the Alternative Routes (USFWS 2015a; IDNR 2015c; Nyboer et al. 2006). Piping plovers nest on sparsely vegetated beaches, cobble pans, and sand spits of glacially formed sand dune ecosystems along the Great Lakes' shoreline, and in the winter, piping plovers forage and roost along barrier and mainland beaches, sand, mud, and algal flats, washover passes, salt marshes, and coastal lagoons (USFWS 2003). However, no known occurrences of the piping plover have been documented within the ROW or within 1 mile of any of the Alternative Routes. Furthermore, the piping plover only potentially occurs in Shelby County during its fall and spring migration period. Because the occurrence of piping plover is infrequent in the areas around the Alternative Routes and the Alternative Routes do not cross known piping plover habitat, the Alternative Routes are not expected to affect the piping plover.

Invertebrates

Spectaclecase

Spectaclecase mussels are found in large rivers having riffles and a stable bottom of large rocks or boulders where they live in areas sheltered from the main force of the river current. The species often clusters in firm mud and in sheltered areas, such as beneath rock slabs, between boulders, and under tree roots. They are known to occur in the Mississippi River in Pike County, which the Alternative Routes cross (IDNR 2015c; Nyboer et al. 2006). However, no known occurrences of the spectaclecase occur within the ROW or within 1 mile of any of the

Alternative Routes. The Mississippi River will be spanned and no structures will be placed in the river; therefore, the Project is not likely to impact the spectaclecase.

Sheepnose

Sheepnose mussels are currently found in the Mississippi River in Illinois on mud or gravel bottoms at water depths of a few centimeters to 2 meters. Most populations are apparently small and isolated. There are historical records from the Rock, Kaskaskia, Embarras, Sangamon, and Fox Rivers. They were historically known to occur within 1 mile of Alternative Routes H, I, L, and M in the Kaskaskia River in Shelby County, with the last recorded occurrence in 1970 (IDNR 2015c). There are no known occurrences of the sheepnose within the ROW of any of the Alternative Routes. The Kaskaskia River will be spanned and no structures will be placed in the river; therefore, the Project is not likely to impact the sheepnose.

Fat Pocketbook

The fat pocketbook mussel prefers sand, mud, and fine gravel bottoms of large rivers. It buries itself in these substrates in water ranging in depth from a few inches to 8 feet with only the edge of its shell and its feeding siphons exposed. The fat pocketbook occurs in the lower Wabash River, which the Alternative Routes cross (USFWS 2015a; IDNR 2015c; Nyboer et al. 2006). However, no known occurrences of the fat pocketbook have been documented within the ROW or within 1 mile of any of the Alternative Routes. The Wabash River will be spanned and no structures will be placed in the river; therefore, the Project is not likely to impact the fat pocketbook.

Higgins Eye

The Higgins eye mussel is a freshwater mussel of larger rivers with sand and gravel bottoms where it is usually found in deep water with moderate currents. Higgins eye mussel has been found in parts of the upper Mississippi River. The Higgins eye has been found in the Mississippi River in Pike County, which the Alternative Routes cross (USFWS 2015a; IDNR 2015c; Nyboer et al. 2006). However, no known occurrences of the Higgins eye have been documented within the ROW or within 1 mile of any of the Alternative Routes. The Mississippi River will be spanned and no structures will be placed in the river; therefore, the Project is not likely to impact the Higgins eye.

Rabbitsfoot

The rabbitsfoot is a freshwater mussel found in sand and gravel substrates in areas having currents in 2 to 3 meters of water. The rabbitsfoot is found in the north fork of the Vermilion River in Clark County, which the Alternative Routes cross (USFWS 2015a; IDNR 2015c; Nyboer et al. 2006). However, no known occurrences of the rabbitsfoot have been documented within the ROW or within 1 mile of any of the Alternative Routes. The Vermilion

River will be spanned and no structures will be placed in the river; therefore, the Project is not likely to impact the rabbitsfoot.

Snuffbox

Snuffbox mussels are usually found in medium to large rivers where they usually inhabit bottoms composed of sand and coarse gravel, often in riffles in running water. The snuffbox has been found in the Embarras River in Cumberland County, which the Alternative Routes cross (IDNR 2015c; Nyboer et al. 2006). However, no known occurrences of the snuffbox have been documented within the ROW or within 1 mile of any of the Alternative Routes. The Embarras River will be spanned if crossed by the Alternative Routes and no structures will be placed in the river; therefore, the Project is not likely to impact the snuffbox.

Plants

Decurrent False Aster

The decurrent false aster is found on moist, sandy floodplains and prairie wetlands along the Mississippi and Illinois River alluvial floodplain. It relies on periodic flooding to scour away other plants and compete for the same habitat (IDNR 2015c; Heckert and Ebinger 2002). Decurrent false aster is known to occur in Pike, Scott, and Greene Counties, which the Alternative Routes cross (USFWS 2015a); however, it has not been located within the ROW or within 1 mile of any of the Alternative Routes. Much of the Mississippi and Illinois River floodplains are actively farmed with little native habitat remaining. The Project is not anticipated to impact the decurrent false aster because the Project spans wetlands wherever feasible.

Eastern Prairie Fringed Orchid

The eastern prairie fringed orchid occurs in a wide variety of habitats, from mesic prairie to wetlands such as sedge meadows, marsh edges, even bogs. It requires full sun for optimum growth and flowering and a grassy habitat with little or no woody encroachment (IDNR 2015c; Heckert and Ebinger 2002). The eastern prairie fringed orchid is known to occur in all of the counties that the Alternative Routes cross, except Pike County (USFWS 2015a). However, no known occurrences of the eastern prairie fringed orchid occur within the ROW or within 1 mile of any of the Alternative Routes. The Project could potentially impact the eastern prairie fringed orchid, most notably through construction activities that occur in mesic prairie. Grain Belt Express will coordinate with USFWS and IDNR to identify protection measures to avoid or minimize potential impacts to the eastern prairie fringed orchid from construction activities.

State Species

Wildlife

Seventy-three state-listed threatened and endangered plant and animal species (11 of which are also federally listed and are discussed above) have known ranges within the counties that the Alternative Routes cross (**Table 5-4**) (USFWS 2015a; IDNR 2015c). Two state-listed endangered species—the lake sturgeon and loggerhead shrike—are known to occur within the ROW of the Alternative Routes, and 16 state-listed threatened and endangered animal species occur within 1 mile of the Alternative Routes. The loggerhead shrike occurs in the ROW of Alternative Routes H, I, L, and M. The lake sturgeon is known to occur in the Mississippi River, which Alternative Routes A and B cross. Additionally, three mussel species—butterfly, elephant-ear, and black sandshell—are known to occur within 1 mile of Alternative Routes A and B. The majority of the fish and mussel species are associated with the large rivers or streams and would likely not be impacted by the Project because these waterbodies will be spanned (Nyboer et al. 2006). More detailed information on state-listed wildlife species in the Study Area can be found in Appendix G. Grain Belt Express will coordinate with IDNR to determine the potential for impacts to state-listed species and will develop protection measures to avoid or minimize potential impacts that could result from the Project.

Plants

Two federally listed threatened plant species occur in counties that the Alternative Routes cross—the decurrent false aster and eastern prairie fringed orchid (USFWS 2015a). These species are described in detail above. An additional 13 state listed threatened and 10 state listed endangered plant species are known to occur in counties the Alternative Routes cross; however, none are known to occur within the ROW of any of the Routes (IDNR 2015c; Heckert and Ebinger 2002) (**Table 5-4**). Grain Belt Express will coordinate with IDNR to determine potential for impacts to state-listed plant species and will develop protection measures to avoid or minimize potential impacts that could result from the Project.

Alternative Route Comparison

Table 5-5 provides a summary of the impacts to special status species along the Alternative Routes in Illinois, including the amount of Indiana and northern long-eared bat habitat. The Indiana and northern long-eared bat habitat numbers represent the amount of forested habitat along each ROW, which will need to be cleared for Project construction. Grain Belt Express included this calculation because the Indiana bat is a federally listed species and the northern long-eared bat is proposed for listing and both could occur in all counties that the Alternative Routes cross.

Segment 1

No known occurrences of federally listed threatened or endangered wildlife, plant, or aquatic species are reported within the ROW or within 1 mile of the Alternative Routes. No

designated critical habitat occurs within the counties that the Alternative Routes cross. Both Alternative Routes A and B cross within 10 miles of known Priority 4 gray and Indiana bat hibernacula. Because there are no documented hibernacula within the ROW or within 1 mile of any of the Alternative Routes, the Project would not impact any known gray, Indiana, or northern long-eared bat hibernacula. Similar to any linear infrastructure project, forested habitat will need to be cleared for the ROW and access roads, which could potentially impact Indiana and northern long-eared bat summer roosting habitat. Alternative Route A crosses the most acres of forested areas and would require the most tree removal (**Table 5-5** below). Overall, Alternative Route B crosses less forested habitat in its ROW so it would have the least potential impact to bat species.

One reported occurrence of a state-listed endangered fish species, the lake sturgeon, occurs within the ROW of Alternative Routes A and B at the crossings of the Mississippi River; however, neither Route would impact the fish because the Project spans the river. Alternative Route A is within 1 mile of three reported occurrences of state-listed threatened and endangered terrestrial plant species, no reported occurrences of state-listed terrestrial wildlife species, and four reported occurrences of aquatic state-listed species. Alternative Route B is within 1 mile of four reported occurrences of terrestrial state-listed threatened and endangered plant species, one reported occurrence of state-listed terrestrial wildlife species, and five reported occurrences of aquatic state-listed species.

Habitat for the state-listed threatened timber rattlesnake occurs in Pike County in areas of bluffs and rock outcrops. IDNR indicated during coordination that the timber rattlesnake could occur in the bluffs between the Mississippi and Illinois Rivers and impacts to the rattlesnake in this area were of concern. Alternative Route B crosses fewer areas of unfragmented forest and timber rattlesnake habitat, including approximately 24 percent less forest than Alternative Route A.

All the Alternative Routes cross the Mississippi River, which is known habitat for the state-listed lake sturgeon, river redhorse, and the western sand darter fish; the federally listed fat pocketbook, Higgins eye, and spectaclecase mussels; and the state-listed ebonyshell, butterfly, and black sandshell mussels. However, no impacts are anticipated to aquatic species, including fish and mussel species because the Project spans the Mississippi River and other streams and rivers. If access roads are required to cross smaller streams, Grain Belt Express will implement typical best management practices to further avoid or minimize impacts to aquatic habitats and water quality, as discussed in Section 5.1.1, *Water Resources*. Therefore, no impacts are expected to federally or state-listed listed aquatic species from any of the Alternative Routes in Segment I.

Table 5-5. Impacts to Special Status Species within the Alternative Routes

Routing Criterion	Measure	Alternative Routes																
		Segment 1				Segment 2				Segment 3				Segment 4				
		A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q
Known federal threatened and endangered species ¹	Within ROW (count)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Within 1 mile (count)	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0
Plant species occurrences	Within ROW (count)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Within 1 mile (count)	3	4	2	3	3	3	3	3	3	1	1	3	3	1	1	1	1
State threatened and endangered species ¹	Within ROW (count)	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0	0
	Within 1 mile (count)	0	1	4	4	4	1	1	3	3	5	5	3	3	5	5	1	0
Aquatic species occurrences	Within ROW (count)	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Within 1 mile (count)	4	5	0	0	0	0	0	4	4	5	5	4	4	5	5	0	0
Potential habitat of the Indiana and northern long-eared bats ³	Within ROW (acres)	110	74	450	564	571	583	590	388	445	492	504	398	454	497	509	67	59

¹ Known federal threatened and endangered species data were obtained from IDNR as a part of its Natural Heritage Inventory database.

² Designated critical habitat information was obtained from the USFWS Federally Endangered, Threatened, Proposed, and Candidate Species Illinois County Distribution list (USFWS 2015a).

³ This includes forested areas within the ROW (acres).

Bald eagles are protected by the federal Bald and Golden Eagle Act and the Migratory Bird Treaty Act. Habitat for the bald eagle exists along major rivers and streams, including the Mississippi River (USFWS 2015a) in Segment 1. The USFWS's National Bald Eagle Management Guidelines recommend that disturbances maintain a buffer of at least 660 feet between Project activities and nests (USFWS 2015a). Grain Belt Express will coordinate with USFWS and IDNR to determine whether any bald eagle nests are located within 660 feet of the Mississippi River crossing and will develop an Avian Protection Plan to evaluate potential risks to avian species and develop specific protection measures to avoid and minimize potential impacts to eagles. Implementing an Avian Protection Plan with such measures will enable Grain Belt Express to construct the Project through areas potentially inhabited by eagles.

Segment 2

No known occurrences of federally listed threatened or endangered terrestrial or aquatic species or candidate species are reported within the ROW or within 1-mile of any of the Alternative Routes. No designated critical habitat occurs within the counties the Alternative Routes cross.

Because no documented gray, Indiana, or northern long-eared bat hibernacula exist within the ROW or within 1 mile of any of the Alternative Routes, the Project is not expected to impact any known gray, Indiana, or northern long-eared bat hibernacula. The removal of forested habitat for ROW and access road clearing, could, however, impact potential Indiana and northern long-eared bat summer roosting habitat. In Segment 2, the southern Alternative Routes cross the most tracts of contiguous forest, whereas the northern routes cross more agricultural fields. All of the Alternative Routes in Segment 2 would require the removal of forested areas within the ROW; however, Alternative Routes F and G follow paths farther south for their entire lengths and, therefore, cross the most forested land. Conversely, Alternative Route C is the only route in Segment 2 that stays along a northerly route for its entirety and, therefore, crosses the least amount of forest in smaller forest patches. Because Alternative Route C would impact the least amount of forested habitat and is the shortest route, it would likely have the least potential to impact the Indiana and northern long-eared bats (see **Table 5-5** above).

Within Segment 2, there are no state-listed threatened or endangered wildlife, plant, or aquatic species within the ROW of any Alternative Routes and no state-listed aquatic species within 1 mile of any Alternative Route. Alternative Routes C, D, and E are all within 1 mile of known occurrences of the Illinois chorus frog and the loggerhead shrike, while Alternative Routes F and G are within 1 mile of timber rattlesnake. IDNR indicated during coordination that the timber rattlesnake could occur in the bluffs between the Mississippi and Illinois Rivers and impacts to the rattlesnake in this area were of concern. The western portions of Alternative Routes F and G generally parallel the Mississippi River floodplain, approximately 2 to 3 miles to the east of the levee, staying in the forested bluffs for approximately 20 miles, whereas

Alternative Route C directly crosses the bluff. As discussed above, Alternative Route C would affect the least amount of forested habitat. Additionally, Alternative Route C is the shortest route and has the least amount of grassland and wetland habitats within the ROW. Therefore, Alternative Route C is expected to have the least impact on state-listed terrestrial wildlife species.

The impacts the Alternative Routes would have on state-listed plant species would be similar because all Alternative Routes, except Alternative Route C, cross within 1 mile of three listed plant species. Alternative Route C crosses within 1 mile of two listed plant species. Grain Belt Express will coordinate with IDNR to determine the potential for impacts to state-listed species and develop typical best management practices and protection measures to avoid or minimize potential impacts that could result from the Project.

All the Alternative Routes cross the Illinois River, which is known habitat for the state-listed greater redhorse fish and the federally listed fat pocketbook, Higgins eye, and snuffbox mussels; however, there are no known occurrences of any aquatic species within the ROW or 1-mile of any of the Alternative Routes. Transmission line structures will not be placed in any rivers or streams; if access roads need to cross smaller streams, Grain Belt Express will implement typical best management practices to protect water quality and aquatic species from impacts.

As discussed above, although not federally or state-listed, the bald eagle is protected. Habitat for the bald eagle exists in Segment 2 for all Alternative Routes, particularly along major rivers and streams such as the Illinois River. Grain Belt Express will coordinate with USFWS and IDNR to determine whether bald eagle nests are located within 660 feet of the Project and will develop an Avian Protection Plan to evaluate potential risks to avian species and develop specific protection measures to avoid and minimize potential impacts to eagles. Implementing an Avian Protection Plan with such measures will enable Grain Belt Express to construct the Project through areas potentially inhabited by eagles.

Segment 3

No known occurrences of federally listed threatened or endangered terrestrial or aquatic species are reported within the ROW, and there are no known occurrences of federally listed terrestrial species within 1 mile of the Alternative Routes. One federally listed species, the sheepnose mussel, is historically known to occur within 1 mile of Alternative Routes H, I, L, and M in the Kaskaskia River; however, it has not been located here since 1970. Grain Belt Express will span the river, but it does not expect to conduct any in-water work. If access roads need to cross tributaries of the Kaskaskia River, Grain Belt Express will implement typical best management practices to protect water quality and aquatic species from impacts. Therefore, the Project would not affect the sheepnose mussel. No designated critical habitat occurs within the counties the Alternative Routes cross.

Because no documented gray, Indiana, or northern long-eared bat hibernacula occur within the ROW or within 1 mile of any of the Alternative Routes, the Project would not impact any known Indiana or northern long-eared bat hibernacula. The removal of forested habitat for ROW and access road clearing, would, however, potentially impact Indiana and northern long-eared bat summer roosting habitat. Segment 3 is generally less forested than Segment 2, having smaller patches of forest interspersed with agricultural and pasture land, except along the forested riparian systems of the larger rivers. All of the Alternative Routes in Segment 3 would require the removal of forested areas within the ROW; however, Alternative Route H has the fewest acres of forest within the ROW. As a result, Alternative Route H would likely have the least potential impact to bat habitat (see **Table 5-5** above).

Within Segment 3, one reported occurrence of a state-listed threatened or endangered terrestrial species, the loggerhead shrike, occurs within the ROW of Alternative Routes H, I, L, and M in Shelby County in open agricultural areas interspersed with grasslands. Although Alternative Routes H, I, L, and M have known occurrences of the loggerhead shrike, the Alternative Routes parallel an existing transmission line through this area. Because loggerhead shrikes prefer open grassland areas with nearby perches, the Project could improve shrike habitat by clearing the ROW of forested habitats. All of the Alternative Routes cross within 1 mile of known occurrences of state-listed barn owl and Blanding's turtle. Alternative Routes J, K, N, and O cross within 1 mile of two other state-listed wildlife species—the Kirtland's snake and the ornate box turtle. During coordination, IDNR indicated that the ornate box turtle is susceptible to impacts while in their hibernacula in friable soils. Grain Belt Express will coordinate with IDNR to determine the potential for impacts to state-listed species and will develop typical best management practices and protection measures to avoid or minimize potential impacts that could result from the Project.

All the Alternative Routes cross the Kaskaskia, Little Wabash, and Embarras Rivers, which are known habitat for one or more of the following: the state-listed eastern sand darter, harlequin darter, western sand darter, and bigeye shiner fish, as well as the state-listed black sandshell mussel. As stated above, Grain Belt Express will span all rivers and streams, and it does not expect to conduct any in-water work. If access roads need to cross streams, Grain Belt Express will implement typical best management practices to protect water quality and aquatic species from impacts. Therefore, no impacts are anticipated to aquatic species, including fish and mussels.

Segment 4

No known occurrences of federally listed threatened or endangered terrestrial or aquatic species are reported within the ROW or within 1 mile of Alternative Routes P and Q. No designated critical habitat occurs within the counties the Alternatives Routes cross. Because no documented gray, Indiana, or northern long-eared bat hibernacula occur within the ROW or within 1 mile of either of the Alternative Routes in Segment 4, neither Alternative Route would

impact known Indiana or northern long-eared bat hibernacula. As is the case with any linear infrastructure project, forested habitat will need to be cleared for the ROW and access roads, which could potentially impact Indiana and northern long-eared bat summer roosting habitat. Both Alternative Routes contain about the same amount of forested habitat within the ROW; therefore, both Alternative Routes would impact bat habitat to the same extent.

No known areas of state-listed threatened and endangered terrestrial or aquatic wildlife and/or plant species are crossed by the ROW of Alternative Routes P and Q. Alternative Route P is within 1 mile of one reported occurrence of a state-listed plant species and one reported occurrence of the state-listed timber rattlesnake. Alternative Route Q is within 1 mile of one reported occurrence of a state-listed plant species and no terrestrial wildlife species. Neither Alternative Route in Segment 4 is within 1 mile of a state-listed threatened or endangered aquatic species. Both Alternative Routes within Segment 4 would impact state-listed threatened or endangered species to a similar extent. Grain Belt Express will coordinate with IDNR to determine the potential for impacts to state-listed species and will develop typical best management practices and protection measures to avoid or minimize potential impacts that could result from the Project.

All the Alternative Routes cross the Wabash River, which is known habitat for the state-listed gravel chub and harlequin darter fish, the federally listed rabbitsfoot and snuffbox mussels, and the state-listed butterfly mussel; however, none of these species are known to occur within 1 mile of either Alternative Route. Because the Project spans the Wabash River, no impacts are anticipated to aquatic species, including fish and mussels. Transmission line structures will not be placed in any rivers or streams; if access roads need to cross smaller streams, Grain Belt Express will implement typical best management practices to protect water quality and aquatic species from impacts.

5.1.4 Geology and Soils

The Study Area within Pike County is located in the Lincoln Hills section of the Ozark Plateaus physiographic province. The majority of the Study Area is located within the Till Plains section of the Central Lowland physiographic province (Illinois State Geological Survey 2015). Illinois has identified and described level IV ecoregions in the state (Woods et al. 2006). Ecoregions are areas of general similarity in ecosystems and take into account physiography, geology, soils, and vegetation. Moving from west to east, the Study Area includes portions of the Upper Mississippi Alluvial Plain, River Hills, Western Dissected Illinoian Till Plain, Illinois/Indiana Prairies, Southern Illinoian Till Plain, Wabash River Bluffs and Low Hills, and Wabash-Ohio Bottomlands ecoregions. Karst regions are located in the western portion of the Study Area, most commonly within the River Hills ecoregion (**Figure 5-3**).



Karst topography is characterized as being formed from limestone that readily dissolves in the presence of water; caves and sinkholes are formed by this process and can sometimes be a conduit to groundwater, making these areas environmentally sensitive. Caves and underground streams and rivers in karst areas provide habitat for animals specially adapted to this environment. Special status species, including sensitive bat communities that hibernate and breed in these geological formations are considered in Section 5.1.4.

The Study Area is divided into five major land resource areas including the Indiana and Ohio Till Plain, Illinois and Iowa Deep Loess and Drift, Central Mississippi Valley Wooded Slopes, Southern Illinois and Indiana Thin Loess and Till Plain, and the Central Claypan Areas (USDA 2006). Major soil resource concerns include erosion via wind and water, and loss of organic matter through poor management practices (USDA 2006). In general, most of the Study Area has been converted to cropland. Extensive parts of the till plain have been tilled, ditched, and tied into the original drainage system to make the land suitable for cropland and settlement (Woods et al. 2006).

General Impacts and Mitigation

Transmission construction activities such as vegetation clearing, access road construction, grading, and foundation construction can potentially impact soils by disturbing the native structure of the soil, creating areas of higher erosion potential, compaction, and lower soil permeability/fertility. The severity of soil impacts depends on several variables, including vegetation cover, the slope of the land, soil particle size, thickness of the soil profile, depth to a restrictive layer, soil moisture content, and protection measures employed during construction.

Unvegetated soil surfaces are more susceptible to erosion and loss of soil productivity. Removing stumps during tree clearing would increase the potential for soil erosion; leaving topsoil exposed increases the potential of loss by wind and water. Best management practices to minimize erosion impacts may include leaving stumps in the ground, covering exposed soil, and reseeding after construction.

Prime farmland and/or farmland of statewide importance will be permanently removed from productivity when present at a given structure location. However, these impacts are anticipated to be minimal because only 0.0009 to 0.018 acre of farmland is removed from production at any structure site (respectively, monopole and lattice tower with multiple footings estimates), with only 4 to 7 structures typically needed per mile. Permanent impacts to soil would be limited to the areas of farmland that have been removed from production at the structure sites. Although additional temporary impacts would occur during construction from soil disturbing activity, normal farming and grazing can continue up to the base of each structure after construction.

Prior to construction activities, geotechnical investigations will be conducted to determine the presence of karst topography or caves along the Proposed Route. In the event that caves or karst topography are discovered during these investigations, special engineering considerations will be incorporated into the design and construction of the transmission line. In addition, best management practices will be implemented to minimize any erosion in areas with karst topography and environmental protection measures will be incorporated to avoid and minimize potential impacts to sensitive species associated with karst environments.

Alternative Route Comparison

As a result of the implementation of mitigation measures similar to those discussed above and the limited footprint of permanent impacts on soil productivity created by the structures themselves, any impacts to soils would likely be minor for all Alternative Routes; therefore, impacts on soil resources do not provide a usable comparison between Alternative Routes.

In comparing Alternate Routes in each segment, both the amount of karst topography and inactive mining land and the length of steep slopes (15 to 20 percent and greater than 20 percent) was also used as an indicator of potential soil impacts. As discussed above, karst topography areas contain sensitive environmental resources and could require special engineering considerations. Similarly, steep slopes could increase the risk of soil erosion and will be taken into consideration during engineering and best management practices will be implemented during construction to prevent erosion. Proper engineering methods will be employed to prevent any Inactive mines from resulting in subsidence. Additionally, protection measures will be employed during construction on agricultural lands to avoid or mitigate soil compaction. Grain Belt Express has signed an Agriculture Impact Mitigation Agreement with the Illinois Department of Agriculture that identifies commitments to mitigate soil compaction and damages to crops, irrigation drainage tiles, irrigation systems, and other related impacts. A copy of the Agricultural Impact Mitigation Agreement is provided as an exhibit to the direct testimony of Grain Belt Express witness, Mark Lawlor.

Segment 1

Within Segment 1, both Alternative Routes A and B cross the same length of Karst topography (**Table 5-6**). In general, there are no notable differences between the Alternative Routes with respect to soil resources; however, Alternative Route A crosses more areas with steep slopes.

Segment 2

Within Segment 2, Alternative Routes F and G cross a greater length of karst topography and also are the only routes that will include an area with a known sinkhole within the ROW (**Table 5-6**). Similarly, Alternative Routes F and G also cross 1,000 feet of greater than 20 percent slopes and approximately 4,000 feet more 15 to 20 percent slopes than the other Alternative Routes. Alternative Route C is the only route that crosses more than a tenth of a

Table 5-6. Alternative Routes Geology and Soils Resources Information

Resource Category	Alternative Routes																		
	Segment 1			Segment 2						Segment 3						Segment 4			
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q		
Karst Topography (miles)	13	13	34	34	34	42	42	-	-	-	-	-	-	-	-	-	-	-	
Steep Slopes 15%-20% (feet)	1,160	1,160	5,490	6,010	6,010	9,780	9,780	1,320	1,460	960	1,090	1,380	1,520	1,020	1,150	510	60	60	
Steep Slopes >20% (feet)	960	600	2,180	2,210	2,210	3,560	3,560	490	400	230	140	490	400	230	140	90	60	60	
Inactive Mines Crossed (miles)	0	0	6.3	0.1	0.1	0.0	0.0	2.3	2.3	1.3	1.3	3.7	3.7	1.2	1.2	0	0	0	

mile of inactive mined land, indicating subsidence can be a concern in these areas on this Alternative Route. Engineering methods and best management practices can address these concerns; however, overall, Alternative Routes F and G would pose greater geologic and soil concerns than the other Alternative Routes in Segment 2.

Segment 3

Karst topography does not exist within Segment 3; however, Alternative Routes H, I, L, and M cross approximately twice the amount of greater than 20 percent steep slopes as Alternative Routes J, K, N, and O and 30 to 50 percent more 15 to 20 percent slopes. All of the Alternative Routes in Segment 3 cross some inactive mine land, so subsidence can be a concern; however, Alternative Routes L and M cross the most. Engineering methods and best management practices can address these concerns; however, overall, Alternative Routes H, I, L, and M would pose greater geologic and soil concerns than the other Alternative Routes in Segment 3.

Segment 4

Neither karst topography nor inactive mine land exist within Segment 4; however, Alternative Route P crosses more 15 to 20 percent steep slopes than Alternative Route Q. Overall, however, there is no notable difference in either Alternative Route's impact on soil and geology.

5.1.5 Natural Environment Summary

Segment 1

After analyzing and comparing the two Alternative Routes in Segment 1, Alternative Route B would have slightly less impact on the natural environment than Alternative Route A. Both Alternative Routes would have similar impacts on water resources; however, Alternative Route B crosses less forest, which would result in less impact on forest fragmentation, special-status bat species, and potential timber rattlesnake habitat. Alternative Route B also crosses approximately half as much area of steep slopes, so this route would have less impact on soil and erosion.

Segment 2

After evaluating the five Alternative Routes in Segment 2, Alternative Route C would have less impact on the natural environment than the other routes. Alternative Route C is slightly shorter than the other Alternative Routes and crosses the least amount of forest and pasture/grassland. Additionally, Alternative Route C is the only route that crosses the Study Area along a northerly route, avoiding the more plentiful tracts of contiguous forest to the south with a more direct route through the forested bluffs. As a result, Alternative Route C would likely impact less special-status bat wildlife species and timber rattlesnake. Alternative

Route C, D, and E, however, cross more streams, potentially requiring more access road stream crossings, and cross less area of steep slopes and karst topography.

Segment 3

After evaluating the eight Alternative Routes in Segment 3, there is no obvious Alternative Route with the least impact to the natural environment. Alternative Routes J, K, N, and O would impact water resources, wildlife, and special-status species the least because Alternative Routes H, I, L, and M would require the removal of a large area of riparian forest and there is a known occurrence of the state-listed loggerhead shrike within the ROW in the Hidden Springs State Forest. Of Alternative Routes J, K, N, and O, Alternative Routes J and N parallel the most existing linear infrastructure, which would result in the least amount of forest fragmentation. Similarly, Alternative Routes J, K, N, and O have approximately half as many steep slopes as H, I, L, and M; however, those four routes would have similar impacts on geologic resources.

Segment 4

Of the two Alternative Routes in Segment 4, Alternative Route P would have the least impact on the natural environment, including forest fragmentation and interior-dwelling wildlife species, because it parallels an existing transmission line for 100 percent of its route. Both Alternative Routes would have similar impacts to water resources, special-status species, and geologic resources.

5.2 Built Environment Impacts

Built environment impacts include direct and indirect impacts to developed land use, agricultural land use, recreational and aesthetic resources, and cultural resources. The Routing Team considered a range of factors that relate to existing and future land uses within the Study Area.

The Alternative Routes cross nine counties in the State of Illinois, including Christian, Clark, Cumberland, Greene, Macoupin, Montgomery, Pike, Scott, and Shelby. Land use, based on data from the National Land Cover Database, is shown in **Figure 5-4** and displays the cultivated land, forest, and pasture distribution throughout the Study Area. The predominant type of land use throughout the Study Area is agricultural and includes farmlands, range or grasslands, and pastures. Land use type was digitized directly from aerial photography within the potential 200-foot ROW for each Alternative Route in Segment I and is shown in **Table 5-7**. The following sections provide a comparative analysis of the potential impacts of the Alternative Routes on the built environment.

