Spire STL Pipeline Project

Resource Report 3
Fish, Wildlife, and Vegetation

FERC Docket No. CP17-40-_ _ _

Amendment to FERC Application
April 2017

Public

RESOURCE REPORT 3 - FISH, WILDLIFE, AND VEGETATION	
SUMMARY OF FILING INFORMATION	
Information	**Found in**
1. Classify the fishery type of each surface waterbody that would be crossed, including fisheries of special concern - Title 18 Code of Federal Regulations (CFR) part (§) 380.12(e)(1)	Section 3.1.1, Table 3.1-1, and Section 3.1.2.
2. Describe terrestrial and wetland wildlife and habitats that would be affected by the project - 18 CFR § 380.12(e)(2)	Section 3.2.2.
3. Describe the major vegetative cover types that would be crossed and provide the acreage of each vegetative cover type that would be affected by construction - 18 CFR § 380.12(e)(3)	Section 3.3, Table 3.3-1.
4. Describe the effects of construction and operation procedures on the fishery resources and proposed mitigation measures - 18 CFR § 380.12(e)(4)	Section 3.1.3.
5. Evaluate the potential for short term, long term, and permanent impact on the wildlife resources and state-listed endangered or threatened species caused by construction and operation of the project and proposed mitigation measures - 18 CFR § 380.12(e)(4)	Section 3.2.2.
6. Identify all federally-listed or proposed endangered or threatened species that potentially occur in the vicinity of the project and discuss the results of the consultations with other agencies. Include survey reports as specified in 18 CFR § 380.12(e)(5)	Section 3.4.1.
7. Identify all federally-listed essential fish habitat that potentially occurs in the vicinity of the project and the results of abbreviated consultations with the National Oceanic and Atmospheric Administration's National Marine Fisheries Service, and any resulting essential fish habitat assessment - 18 CFR § 380.12(e)(6)	Section 3.1.2.

RESOURCE REPORT 3 - FISH, WILDLIFE, AND VEGETATION	
SUMMARY OF FILING INFORMATION	
Information	**Found in**
8. Describe any significant biological resources that would be affected. Describe impact and any mitigation proposed to avoid or minimize that impact - 18 CFR § 380.12(e)(4,7)	Section 3.4.2.
INFORMATION RECOMMENDED OR OFTEN MISSING	
1. Provide copies of correspondence from federal and state fish and wildlife agencies along with responses to their recommendations to avoid or minimize impacts on wildlife, fisheries, and vegetation.	Appendices 1-C.
2. Provide a list of significant wildlife habitats crossed by the project. Specify locations by milepost, and include length and width of crossing at each significant wildlife habitat.	Table 3.2-1.
3. Provide a description of project-specific measures that would be implemented during construction and operation of the project to avoid or minimize impacts on migratory birds. Include comments from the U.S. Fish and Wildlife Service on the proposed measures.	Section 3.2 and Appendix 1-C.
4. For offshore species be sure to include effects of sedimentation, changes to substrate, effects of blasting, etc. This information is needed on a location-specific (i.e., milepost) basis and may require completion of geophysical and other surveys. Results of such surveys and analyses should be included in the application.	Not Applicable.

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Tables

Appendices

Acronyms and Abbreviations

ATWS	Additional Temporary Workspaces
CFR	Code of Federal Regulations
CWF	coldwater fisheries
EcoCAT	Ecological Compliance Assessment Tool
ECOS	Environmental Conservation Online System
EFH	essential fish habitat
FERC	Federal Energy Regulatory Commission
E&S	erosion and sediment
HDD	horizontal directional drill
IDNR	Illinois Department of Natural Resources
IEPA	Illinois Environmental Protection Agency
INHS	Illinois Natural History Survey
IPaC System	Information, Planning and Consultation System
MBTA	Migratory Bird Treaty Act
MDOC	Missouri Department of Conservation
MP	milepost
NABCI	North American Bird Conservation Initiative
NMFS	National Marine Fisheries Service
PSS	Palustrine Scrub-Shrub
Plan	FERC's Upland Erosion Control, Revegetation, and Maintenance Plan
Procedures	FERC's Wetland and Waterbody Construction and Mitigation Procedures
Project	Spire STL Pipeline Project
RTE species	rare, threatened, or endangered species
Spire	Spire STL Pipeline LLC
TWS	temporary workspace
USACE	United States Army Corps of Engineers
USFWS	United States Fish and Wildlife Service
WWF	warmwater fisheries

Fish, Wildlife, and Vegetation

Resource Report 3 presents a description of the fish, wildlife, and vegetation resources present within Spire STL Pipeline LLC's ("Spire"), proposed Spire STL Pipeline Project ("Project") located in Scott, Greene, and Jersey Counties, Illinois; and St. Charles and St. Louis Counties, Missouri. The report identifies potential impacts on these resources and methods to avoid and/or minimize potential adverse impacts.

3.1 Fisheries and Other Aquatic Resources

3.1.1 Fishery Classification

Fishery classifications for streams crossed by the Project, are included in Resource Report 2, Water Use and Quality, along with other data concerning specific stream crossings. Table 3.1-1 includes a list of the representative fish species likely to occur within the Project area.

Table 3.1-1. Representative Fish Species in Waterbodies Crossed by the Project

Common Name	Scientific Name	Type
Illinois		
Bluegill	*Lepomis macrochirus*	Freshwater
Channel catfish	*Ictalurus punctatus*	Freshwater
Black crappie	*Pomoxis nigromaculatus*	Freshwater
Lake Sturgeon	*Acipenser fluvescens*	Missouri State-Listed Endangered Species; Freshwater[1]
Pallid Sturgeon	*Scaphirhynchus albus*	Federally-Listed Endangered Species; Freshwater[2]
Paddle fish	*Polyodon spathula*	Freshwater
Freshwater drum	*Aplodinotus grunniens*	Freshwater
Missouri		
Paddle fish	*Polyodon spathula*	Freshwater
Lake Sturgeon	*Acipenser fluvescens*	Missouri State-Listed Endangered Species; Freshwater[1]
Pallid Sturgeon	*Scaphirhynchus albus*	Federally-Listed Endangered Species; Freshwater[2]
Carp species	*Mylopharyngodon* spp.	Freshwater
Freshwater drum	*Aplodinotus grunniens*	Freshwater
Shovelnose sturgeon	*Scaphirhynchus platorynchus*	Freshwater

Table 3.1-1. Representative Fish Species in Waterbodies Crossed by the Project (Continued)

Common Name	Scientific Name	Type
Perch species	*Sander* spp.	Freshwater
Catfish species	*Ictalurus* spp.	Freshwater
Largemouth Bass	*Micropterous salmoides*	Freshwater
Black Crappie	*Pomoxis nigromaculatus*	Freshwater
Bluegill	*Lepomis macrochirus*	Freshwater

Notes:

[1] Missouri Department of Conservation ("MDOC"). 2016a. *Missouri Fishing Interactive Map*.

[2] Illinois Department of Natural Resources ("IDNR"). 2016a. *Lake and River Fishing in Illinois*.

As described in Resource Report 2, field surveys were initiated in September 2016 on accessible properties to identify waterbodies and wetlands within the Project study area. Table 2.2-1 in Resource Report 2 identifies the areas where surveys were not conducted due to denied landowner permissions. In areas where surveys have not been completed due to landowner permissions, Spire has supplemented with desktop data from the National Wetlands Inventory and the National Hydrography Dataset, maintained by the United States Geological Survey. Spire has included field data through February 25, 2017 within its Environmental Report. The Project is anticipated to cross 105 stream segments. Of these waterbodies, 38 were classified as perennial, 29 as intermittent, and 36 as ephemeral; one pond and one lake are crossed.

All waterbodies crossed by the Project are designated as warmwater fisheries ("WWF") in Illinois and in Missouri. No known wild trout streams, high-quality waters, waterbodies listed as outstanding or exceptional quality, or state or federal wilds and scenic rivers occur within the Project area [Illinois Environmental Protection Agency ("IEPA") 2016; MDNR 2016 and 2014; and USFWS 2016a]. The Project will cross several Section 303(d) waters, including: Apple Creek, Macoupin Creek, and the Mississippi River in Illinois; the Mississippi River and Missouri River in Missouri along the 24-inch pipeline; and Coldwater Creek in Missouri along the North County Extension.

State designated areas to fish within the Project area and vicinity include the Mississippi River, Missouri River, and Spanish Lake in Missouri. The Project crosses Pool 26 of the Mississippi River between Lock and Dam 25 and 26. There are no waterbody restrictions for fishing in Pool 26, other than specific areas for fishing are restricted during waterfowl season strictly for hunting purposes (IDNR 2016b). Otherwise, fishing occurs year-round in the Mississippi River (IDNR 2016b, IDNR 2016c).

Common sport fish species that occur within the states regulated fishing areas are included in Table 3.1-1. The classification information with the corresponding milepost ("MP") per stream crossed by each facility is included on the surface water table in Table 2.2-2 in Resource Report 2.

3.1.2 Fisheries of Special Concern

Fisheries of special concern are defined as waterbodies given special designation by state environmental regulatory agencies as important commercial or recreational fisheries or otherwise protected fishery areas. Based on the National Marine Fisheries Service's ("NMFS") online essential fish habitat ("EFH") mapper tool, there is no EFH within the Project area (NMFS 2016). There are also no national Wild and Scenic Rivers within the Project area (USFWS 2016a).

No streams crossed by the Project are listed on the Missouri 10CSR20.7 Water Quality Standards Table C - Waters Designated for Cold-Water Fisheries (MDNR 2014). Streams listed on the Missouri combined stream spawning season list includes stream reaches which support resident species [e.g., rare, threatened or endangered ("RTE") species or other sensitive species, rainbow trout, rock bass, smallmouth bass, suckers, etc.], or species that migrate into a reach seasonally to spawn (e.g., walleye, white bass, etc.). No streams crossed by the Project within St. Charles or St. Louis County are present on the spawning list and no streams crossed by the Project are designated within the one-mile buffer receiving waters for the listed streams [United States Army Corps of Engineers ("USACE") 2012].

The Project crosses two fisheries of special concern, the Mississippi and Missouri Rivers, which contain federally- and state-listed endangered aquatic species. Based on consultation with the United States Fish and Wildlife Service ("USFWS") and review of the USFWS Information, Planning and Consultation ("IPaC") System, the Project is within the ranges of the federally endangered Higgins eye pearlymussel (*Lampsilis higginsii*) and pallid sturgeon (*Scaphirhynchus albus*). The Higgins eye pearlymussel is an inhabitant of larger rivers where it is usually found in areas with deep water and moderate currents. It can be found locally in the upper Mississippi River (USFWS 2016b). According to the USFWS's Environmental Conservation Online System ("ECOS"), Higgins eye pearlymussel is not known to or believed to occur the counties crossed by the Project, but is located approximately 35 miles upstream of the Project area (USFWS 2016b). Pallid sturgeon are a bottom-oriented, large river obligate fish inhabiting the Mississippi and Missouri rivers and some tributaries. According to ECOS, pallid sturgeons are known to or believed to occur within the area associated with the proposed 24-inch pipeline crossing of the Mississippi and Missouri Rivers in St. Charles and St. Louis counties (USFWS 2016c). However, pallid sturgeons are scarce in the Missouri River downstream of Gavin's Point Dam and scarce in the Mississippi River (USFWS 2016d).

In Illinois, Spire performed a 0.5-mile buffer Project review search utilizing the Illinois Natural Heritage Program Ecological Compliance Assessment Tool ("EcoCAT"). Based on a review of the species list and electronic data received from the Natural Heritage Program, no state-listed aquatic species are anticipated within the Project areas (IDNR 2016d). State listed species are discussed in Section 3.4.

The MDOC's Preliminary Natural Heritage Review Report identified several species and communities of concern that may be crossed, or are within close vicinity to the Project, including pallid sturgeon, lake sturgeon, flathead chubs, and mussel species. These species are associated with the Project's crossing of the Mississippi and Missouri Rivers (MDOC, 2016b).

The REX Receipt Station, Laclede/Lange Delivery Station, and Chain of Rocks Station were sited in upland areas and are not anticipated to impact fisheries of special concern. Table 3.1-2 details the fisheries of special concern in the Project area.

Table 3.1-2. Fisheries of Special Concern in the Vicinity of the Project

Facility/Waterbody Name	MP	County	State	Fishery Concern
24-Inch Pipeline				
Mississippi River	45.1	Jersey	Illinois	Contains federally-listed and state-listed threatened and endangered species, also is a state fish and wildlife designated area.
	45.4	St. Charles	Missouri	Contains federally-listed and state-listed threatened and endangered species, also is a state fish and wildlife designated area.
Missouri River	58.0	St. Charles	Missouri	Contains federally-listed and state-listed threatened and endangered species.
	58.1	St. Louis	Missouri	Contains federally-listed and state-listed threatened and endangered species.

3.1.3 Construction and Operation Impacts

The Project will employ specific construction techniques in the Project workspaces, to avoid and/or minimize the effects of construction on habitats in and along the streams and downstream of crossing locations. Waterbody crossing methodology is identified and discussed in Resource Report 2. These stream crossings include open-cut techniques, dry ditch crossing methods (flume techniques), and HDD techniques. Minor waterbodies with no discernible flow at the time of construction and a dry ditch crossing method is not specifically required by the Procedures, the waterbody may be crossed using the open-cut/conventional lay method (i.e., bed and bank disturbance with no stream flow bypass equipment installed). For conventional trench crossings, the pipeline will placed below each waterbody to meet a minimum depth of cover of five feet, provided no rock is encountered. No wet open-cut crossings are proposed as part of the Project's construction activities.

Crossing the streams via dry ditch methods will temporarily affect water flow and quality. In general, construction activities will disturb streambeds and banks as well as increase erosion and sediment ("E&S") potentials. Increased sedimentation and the disruption of water flow may increase turbidity levels within the stream. Significant increases in turbidity and sedimentation can directly impact fish by altering behavior, such as inability to feed

normally due to decreased visibility, and affect physiology, such as damaging gill structures. However, it is anticipated that individual fish will displace to similar adjacent habitats up or downstream during in-stream construction activities, and thus will not be directly affected by the Project.

In addition, alteration of stream banks and removal of riparian vegetation may affect bank stability resulting in deposition of eroded soils downstream. Riparian vegetation contributes to the shading of rivers and their tributaries. It is a factor in the amount of solar radiation that reaches the water surface, which, in turn, controls the input of heat into the stream system. Installing pipelines near or across waterways, would necessitate the removal of some of the riparian growth. Once this vegetation is removed, the water may be subject to full sunlight exposure, which could cause increases to stream temperature.

Waterbody crossings conducted in open or agricultural areas typically lack an abundance of vegetative cover, and thus an adverse impact on aquatic resources associated with vegetation removal is not anticipated in these areas. In areas with riparian vegetation, Spire will adhere to the measures outlined in the Federal Energy Regulatory Commission's ("FERC") *Upland Erosion Control, Revegetation, and Maintenance Plan* ("Plan") and *Wetland and Waterbody Construction and Mitigation Procedures* ("Procedures") as well as other federal and state requirements identified during the permitting process to minimize sedimentation and turbidity (FERC 2013a, 2013b). Once construction is complete, streambeds and banks will be restored to their pre-construction conditions and contours to the maximum extent practicable, which will aid in preventing erosion and minimizing long-term impacts on fisheries. Operation of the pipeline facilities is not anticipated to impact aquatic organisms and their habitats.

To further avoid and minimize the effects on aquatic organisms and their habitats, Spire will adhere to the measures set forth in FERC's Plan and Procedures such as:

- requiring temporary E&S control measures installed and maintained along the construction right-of-way;
- maintaining appropriate water flow downstream of the crossing;
- routinely inspecting construction equipment for leaks and storing fuel and hazardous materials in upland areas at least 100 feet from waterbodies;
- providing secondary containment when storing hazardous materials or utilizing pumps within 100 feet of a waterbody or wetland; and
- responding quickly to leaks and spills by implementing measured outlined in the Project's Spill Prevention Control and Countermeasure Plan (Resource Report 2, Appendix 2-A).

Refueling and lubricating of vehicles and/or equipment will occur no closer than 100 feet from a waterbody unless no feasible alternative exists or a greater setback is stipulated by a permitting agency. Spire will also locate additional temporary workspaces ("ATWS") a minimum of 50 feet from waterbody and wetland boundaries (except in areas where the adjacent upland consists of cultivated cropland or other disturbed land) unless a reduced setback is requested on a site-specific basis and a modification is approved in accordance with FERC's Procedures. Proposed exceptions to FERC's Plan and Procedures is provided in Resource Report 1, Appendix 1-D.

The Project, as proposed, will result in minimal impacts on fisheries and special status fish species due to the use of the horizontal direction drill ("HDD") method for crossing the Mississippi River and the Missouri Rivers, the use of FERC's Plan and Procedures, and adherence to all permit conditions.

No blasting is anticipated at waterbody crossings, however, a Blasting Plan was developed for the Project in order to minimize the potential for blasting-related adverse impacts as well as address safety concerns. Locations where blasting is anticipated are identified in Resource Report 6.

Spire is proposing to begin construction prior to June 1, 2018, and is therefore, requesting a variance from FERC's Procedures which recommend construction for warmwater fisheries be completed between June 1st and November 30th. Timing restrictions that differ from the FERC Procedures developed in consultation with the applicable state agencies is allowed under Section V of the FERC Procedures. Spire coordinated with the IEPA, MDNR and MDOC to confirm the absence of any regulatory seasonal restrictions that would exist on crossing waterbodies on the Project. The MDNR indicated that the USACE's Nationwide Permit for Missouri indicates a permittee must not excavate from or discharge into the listed waters on the Missouri Combined Stream Spawning List during the specified seasonal restrictions. This list was developed by the MDOC. No streams crossed by the Project within St. Charles or St. Louis Counties, Missouri, are listed on the spawning list and no streams crossed by the Project are designated within the one-mile buffer receiving waters for the listed streams (USACE 2012, Irwin 2016a, 2016b). The IEPA has indicated that they do not have in-stream construction timing restrictions for WWF or coldwater fisheries ("CWF") outside of any regulated RTE species habitat restrictions (Twait 2016a, b, and c). Spire further confirmed with the MDOC that there are no seasonal restrictions associated with the waterbodies crossed by the Project (MDOC 2016c, MDOC 2017). Spire will continue to confirm this information with MDOC and forward any future correspondence to FERC upon receipt. Any aquatic habitat associated with RTE species is associated with the Mississippi and Missouri Rivers and would be avoided by the HDD. Therefore, Spire anticipates that construction can occur at any time of year on the waterbodies crossed by the Project.

Spire will complete a HDD for the Project under potential fish and aquatic habitat in the Mississippi and Missouri Rivers. The HDD will include entry/exit locations north and south of the rivers. Prior to drilling operations, site-specific HDD Procedures will be prepared by the HDD contractor and submitted to Spire for review and approval. Drilling fluid returns (flow of drilling fluids to the HDD entry/exit location) will be continuously monitored visually during the installation. A traditional single-drill rig operation is anticipated to be used to complete the Missouri River HDD installation. For the Mississippi River, it is anticipated that the HDD contractor will use the drill and intersect method to complete the installation due to the need for temporary conductor casings on each end of the HDD alignment (casings will be removed upon completion of pullback operations). The intersect method involves drilling individual pilot bores from each end of the HDD installation and intersecting in a target intersection location established in the bottom horizontal tangent of the HDD profile. Use of the drill and intersect method decreases the flow pathway length for each individual pilot bore. One advantage of this method is a lower required drilling fluid pressure necessary to complete each pilot bore operation.

Although HDD methods generally avoid impacts on water quality by avoiding impact to the stream bank and bottom, a potential for an inadvertent return of drilling mud may occur. The release could result in additional

sediment deposition extending from the discharge point downstream. In the event of an inadvertent release of drilling mud, impacts on fish and other aquatic resources would be similar to those for the open-cut construction method discussed above. Spire would follow the procedures outlined in its HDD Contingency Plan (Resource Report 2, Appendix 2-B) which will minimize permanent or adverse impacts on fishery or aquatic resources in the event of an inadvertent release of pressurized drilling mud. Spire will also ensure the contractor has sufficient spill containment material and supplies as needed to contain any inadvertent returns. These may include, but are not limited to, pumps and hoses, sand bags, straw bales, silt fence, shovels, buckets, soft bristled brooms, and turbidity curtain. Upon discovery of an inadvertent return, the HDD operation will be immediately suspended until the contingency plan is implemented. If the release cannot be contained, then the HDD Operator will suspend drilling operations until appropriate containment is in place. If the release is mitigated and controlled, forward progress of the drilling will be approved by the Environmental Inspector in coordination with the HDD Superintendent and Chief Inspector. Spire will report any releases along the waterbody banks or within live water to the state emergency response centers and resource agencies.

Spire has conducted geotechnical investigations at the Mississippi and Missouri River crossings to determine the feasibility of conducting an HDD of these rivers. Based on these primary evaluations, the proposed Mississippi River and Missouri River are determined to be feasible with a high probability of successful completion.

The HDD installation on the rivers is anticipated to encounter a sequence of soils consisting of layers of soft to medium stiff clayey silt, loose rock fragments (gravel), medium dense silty sand, and silt overlying bedrock materials consisting of predominantly limestone and shale with various layers of mudstone, siltstone and sandstone. To avoid potential risks associate with loss of drilling fluids through the soft soils identified on either drill location, temporary conductor casing has been incorporated into the design. It is the intent of this casing pipe to be installed from the ground surface and seated into the bedrock below eliminating risks associated with loss of drilling fluids to the soil environment. The bedrock materials observed on both drills are ideally suited for an HDD installation, having rock quality designations characterized as fair to excellent. No zones of poor to very poor rock quality, that can give rise to excess loss of drilling fluids through fracture and joint networks, were observed in any of the boreholes.

To further alleviate concerns associated with the potential loss of drilling fluids to the overlying environments, drilling fluid pressure calculations were completed in accordance with the USACE's "Guidelines for Installation of Utilities Beneath Corps of Engineers Levees Using Horizontal Directional Drilling." In completing this evaluation, conservative strength parameters (deemed to be lower than actual strengths for individual layers) were assigned to replicate the sequence/layering of soil and bedrock materials. A factor of safety of two, consistent with that required by USACE was applied to the values calculated based on the cavity expansion values to derive the allowable drilling fluid pressures for this crossing. This allowable drilling fluid pressure was then compared with the drilling fluid pressure required to facilitate the HDD processes. For both river crossings, the allowable drilling fluid pressure was found to be significantly higher than the required drilling fluid pressure for the installation suggesting that hydrofracture or loss of drilling fluids is not anticipated to be an issue with a high degree of certainty for the HDD installations at the Mississippi and Missouri Rivers.

While not anticipated, if an attempted HDD installation is unsuccessful, the proposed HDD alignment could be modified beneath the rivers using the same general location to accommodate an additional HDD attempt, depending on the condition/cause contributing to the original HDD failure. Prior to attempting a second HDD crossing, a risk mitigation workshop shall be held with all parties to determine the cause of the initial failure and any mitigation measures that could be adopted to reduce the risk(s) during the second HDD attempt.

These investigations have been summarized in a Geotechnical Investigation Report (Resource Report 6, Appendix 6-B) which was submitted to FERC in February 2017.

Since Spire is proposing to cross these rivers via HDD, no in-stream construction or disturbance to the streambed is anticipated at these locations. It is anticipated that an HDD of these waterbodies would avoid potential effects of the Project on these species, therefore, Spire has determined that the Project is not likely to adversely affect these species. Section 3.4 further discusses RTE species.

3.2 Wildlife

Vegetation that typifies major natural habitat types is described in Section 3.3. The existing wildlife resources affected by the Project include resources identified with the construction workspace, ATWS, aboveground facilities, and access roads.

Game and nongame-wildlife species are regulated and protected by state and federal agencies such as the USFWS, the IDNR and the MDOC. Regulations such as the Endangered Species Act of 1973, the USFWS Conservation Act of 1980 and the USFWS Conservation Act of 1958 also regulate protected plant and animal species of concern. Additional information on federal and state threatened species can be found in Section 3.4.

The Project area and surrounding vicinity are a combination of upland and waterbody habitats common to the agricultural communities of western Illinois and residential communities surrounding St. Louis, Missouri. A review of pertinent literature and field observations was used to determine the spatial distribution, habitat requirements, and ecological status of wildlife species observed or known to occur in the Project vicinity. The setting and anticipated effects on terrestrial wildlife are described in Sections 3.2.1 and 3.2.2.

3.2.1 Existing Resources

The Project crosses a variety of habitat types commonly found in rural, agricultural, and forested areas of western Illinois and eastern Missouri; the primary land use within the Project area is agricultural land. Other dominant landforms crossed include wooded areas and riverine habitat. Based on correspondence with the USFWS, IDNR, and MDOC, the upper Mississippi River is designated as a state fish and wildlife area and an area for conservation. This area is primarily focused on wetland management, with waterfowl as the primary species of concern.

Certain areas crossed by the Project are reserved for hunting. The wildlife species that inhabit the proposed Project area are typical of those found in the Great Plains habitat. Game species such as white-tailed deer, wild turkey, mourning doves and ring-necked pheasant are present. Resident and migratory waterfowl species (e.g., ducks and sandhill cranes) utilize the Missouri River and surrounding cropland for breeding and migration.

Non-game species such as opossum, cottontail rabbits, various rodents, raccoons, coyotes, red fox and spotted skunk utilize the cropland and riverine habitat as den and foraging locations within the proposed Project area.

Dense grass, shrubs and small trees provide nesting habitat and seed production for a variety of songbirds such as warblers, finches and sparrows. Predatory birds such as red-tail hawks and northern harriers utilize upland meadows for hunting songbirds and small mammals (e.g., cottontail rabbits, voles and shrews). Bald eagles may utilize the Mississippi and Missouri River corridors for fishing and nesting. Several species of snakes, frogs and toads may also be found in general riverine habitat. The Illinois state-listed timber rattlesnake (*Crotalus horridus*) is known to occur within the Principia Hill Prairies West Natural Area Inventory Site. Wildlife species observed during surveys include songbirds, ducks, western meadowlarks, cottontail rabbits, white-tailed deer, and red-tailed hawks.

Spire initiated consultation regarding the Project with the IDNR, MDOC, and USFWS in Illinois and Missouri in August 2016. Information specific to federal and state-listed species is provided in Section 3.4 of this resource report.

3.2.2 Construction and Operation Impacts

Pipeline and aboveground facility construction is expected to have minor, short-term impacts on wildlife habitat, causing localized effects on resident fauna. The Project will result in the loss of approximately 64.63 acres of forested habitat due to construction, with approximately 34.89 acres of forested habitat as a permanent loss due to maintenance/operation of the Project within the 50-foot permanent easement. Temporary work areas will be allowed to revegetate overtime and will not be maintained for the operation of the Project. See Section 3.3.2 for further discussion on forested habitat.

Clearing and grading of the proposed construction workspace for the 24-inch pipeline, North County Extension, and associated facilities will result in the temporary loss of vegetative cover and may result in the loss of less mobile fauna, such as small rodents, reptiles, and invertebrates that may be unable to escape the construction area. Temporary noise from the HDD is anticipated for the duration of the drill, but will be mitigated by appropriate sound barriers and mufflers. It is anticipated that most wildlife can relocate to suitable adjacent habitat during construction. Noise from general construction activities are also anticipated to be temporary, however, noise from new facilities will be permanent. The new REX Receipt Station and Laclede/Lange Delivery Station facilities will be located in agricultural areas. These areas are rural areas and are not anticipated to increase the noise levels in adjacent areas. Although the current land use at the new Chain of Rocks Station is primarily forest and open land, the site is within property consisting of undeveloped former residential land. The paved driveway and some grassy lawn areas are still present on site, with stands of trees and brush. In addition, a portion of the facility is directly adjacent to an existing facility (Enable MRT Chain of Rocks). As the habitat is marginal and previously disturbed, no significant impacts to wildlife are expected. After construction, wildlife is expected to return and use the post-construction habitats. Species diversity is expected to remain at or near pre-construction conditions following restoration of the pipeline workspace.

The Project is concentrated in areas of agricultural activity with forested cover being typically associated with riparian areas and property lines, therefore forested areas are currently fragmented throughout the Project area and the permanent right-of-way in open areas (e.g., existing right-of-way and agricultural fields) generally will not result in significant fragmentation effects of forested areas. The largest area of contiguous forested tracts along the Project are located along the north and south sides of the Mississippi River. The forest has been previously fragmented by roads and existing right-of-way, therefore Spire intends on aligning the proposed permanent right-of-way adjacent to the existing pipeline right-of-way (approximately 30 feet) through this area. The offset distance between the two pipelines and the anticipated final width of combined right-of-ways cannot be determined until access to the property is granted and civil survey is able to be completed. The forested area to the south of the Mississippi River consists of the Upper Mississippi Conservation Area and will not be disturbed as the area is encompassed with Spire's HDD of the Mississippi River.

The impacts likely to occur from the construction and operation of the Project are temporal and not expected to be significant given the mobile nature of the wildlife that occur in the area, the availability of similar habitat adjacent to the Project area, and the compatible nature of the restored right-of-way with species occurring in the area. It is expected that the construction of the Project will have short-term effects to wildlife species. No long-term wildlife impacts are anticipated, as plentiful and suitable wildlife habitat are present adjacent to the proposed Project area.

As stated in Section 3.1, Spire anticipates that the proposed Project will require blasting upon conditions found in the field. A Blasting Plan was developed for the Project. The blasting locations as well as the Blasting Plan are provided in Resource Report 6. Initial clearing and grading of the proposed right-of-way will result in the temporary loss of vegetative cover and may result in the loss of less mobile fauna, such as small rodents, reptiles, and invertebrates that may be unable to escape the construction area. It is anticipated that most wildlife can and will relocate to suitable adjacent habitat during initial construction activities and blasting activities will have minor, short-term impacts on wildlife habitat. After construction, wildlife is expected to return and colonize the post-construction habitats. Species diversity is expected to remain at or near pre-construction conditions following restoration of the pipeline right-of-way.

Unique or sensitive habitat areas, wildlife preserves, or areas of habitats designated for wildlife management within the Project area are presented in Table 3.2-1.

3.2.3 Unique and Sensitive Wildlife and Habitat

Public land, recreation, and other designated areas throughout the Project area were evaluated by utilizing publicly available information, consultations with federal, state, and local agencies and landowners, and field reconnaissance surveys. Based on a review of these data sets, no National Parks, National Wild and Scenic Rivers, or National Wildlife Refuges are crossed by the Project (National Park Service 2014, USFWS 2016a). Additionally, the Project does not cross and is not located within 0.25-mile of Indian reservations, National Wilderness Areas, or state parks (NPS 2014, IDNR 2016e, and MDNR 2015).

According to the Illinois Natural Heritage Inventory Data received, the Project crosses the Principia Hill Prairie West Illinois Natural Area Inventory Site and Natural Heritage Landmark, which are described as high-quality natural communities with specific suitable habitat for state-listed species, a state dedicated nature preserve, land and water reserve, and a natural heritage landmark (IDNR 2013). The location of this natural inventory site is confidential due to a data agreement between Spire and the IDNR. The location of this site is provided in Volume IV, Appendix 3-C, as Privileged and Confidential.

In Illinois, the Project crosses the Principia Hill Prairie West Illinois Natural Area Inventory Site. In Missouri, the Project is within 0.5-mile of a shrub swamp within Landgrant 1692 and a wet mesic bottomland forest within Landgrant 3281 (MDOC 2016b). Shrub swamps provide habitat for yellow warblers and green herons and wet mesic bottomland forests, provide habitat for gray treefrogs, small-mouthed salamanders, mole salamanders, wood ducks, red-shouldered hawks, and northern parula warblers, cerulean warblers, barred owls, prothonotary warblers, as well as nesting trees for Bald Eagles and great blue herons. These resources are further discussed in Section 3.2.3.The MDOC also indicated that karst features may be present within the Project areas. Karst is a landform where layers of water soluble rock, such as limestone, dolomite, or gypsum are found and is characterized by the presence of features such as sinkholes, underground (or internal) drainage through solution-enlarged fractures (joints), and caves. Many species found in caves are rare and require the specific environmental conditions of caves for breeding and hibernation. Public data was reviewed for Illinois and Missouri for the possibility of karst feature along the proposed Project as described in Resource Report 6, Section 6.4.4. Further discussion on karst formations and how they relate to RTE species can be found in Section 3.4.

Based on review of the natural heritage program for Illinois and Missouri, the following unique wildlife habitats are crossed by the 24-inch pipeline. No unique habitats were identified along the North County Extension. Construction at the REX Receipt Station and the Laclede/Lange Delivery Station are proposed in predominately agricultural areas, therefore no impacts to unique wildlife habitats are anticipated from the construction of these Projects. Construction at the Chain of Rocks Station is proposed in predominately forested areas and open lands; this currently undeveloped land was formerly developed residential land. Construction of a portion of the facility is also anticipated adjacent to an existing facility. No unique or sensitive wildlife habitats have been identified at this location. Table 3.2.1 details the sensitive wildlife habitat types affected by construction and operation of the Project.

Table 3.2-1. Unique Wildlife Habitat Types Affected by Construction and Operation of the Project

MP	Crossing Length (feet)	Crossing Width (feet)	Acreage Affected Construction	Acreage Affected Operation	Habitat Type/Name	Avoidance and Minimization Measures
24-Inch Pipeline						
45.7-46.1	1,737	50	2.00	2.00	Upper Mississippi Conservation Area	This area is encompassed as part of Spire's HDD of the Mississippi River. No earth disturbance will occur on this property.
MP 45.4 - MP 46.2	4,282	50 - 365	5.78	5.00	Wet mesic bottomland forest within Landgrant 3281	The Project's HDD of the Mississippi River will intersect Landgrant 3281. However, mesic bottomland forests are anticipated to be avoided by the HDD and no mesic bottomland forests were located within the construction work limits outside of the HDD on the Landgrant. No tree clearing will occur between the HDD entry and exit points.
MP 46.2 - MP 47.5	4,942	25 - 357	16.22	7.68	Shrub Swamp within Landgrant 1692	The Project will intersect Landgrant 1692, however, the Project traverses through agricultural fields. No Palustrine Scrub-Shrub ("PSS") wetlands were located within the construction work limits on the Landgrant.

3.2.3.1 Principia Hills Prairies West Illinois Natural Area Inventory Site and Principia Hill Prairies West Natural Heritage Landmark

The details of location of the Principia Hill Prairie West Natural Area and Natural Heritage Landmark are privileged and confidential and an addendum to Table 3.2-1 is provided in Volume IV, Appendix 3-C. The areas support a high-quality loess hill natural community, a natural heritage landmark, and two state species of concern including a population of Groundplum milkvetch (*Astragalus crassicarpus* var. *trichocalyx*) and timber rattlesnakes. Loess hill prairies, are the most abundant type of prairie in Illinois and occur primarily along the Mississippi River and Illinois River. They are named for their characteristic wind-blown loam soil, which was deposited as the glaciers receded. Two subclasses of loess hill prairies can be recognized: one occurring on loess deposited above bluffs and the other where the loess is deposited just above the floodplains of rivers, mostly on top of mounds of glacial till. The Principia Hill Prairie supports native dry prairie species such as little bluestem, Indian grass, leadplant and purple prairie clover (Robertson et al. 1995). Consultations with the IDNR regarding the Principia Hills Prairies

West Illinois Natural Area Inventory Site indicate that this site has no regulatory implications under Illinois law. Spire has located its proposed 24-inch pipeline segment adjacent to an existing pipeline right-of-way through this area. Biological surveys have not been conducted in this area due to denied landowner survey permissions. Spire is also continuing to work with the landowner to gain access to conduct necessary biological surveys. Dependent on the results of the biological field surveys, Spire will coordinate with the IDNR to determine the appropriate minimization measures to be employed at this location. Further discussions on these species is provided in Section 3.4. Further correspondence from the IDNR received after the FERC application will be provided to FERC upon receipt.

3.2.3.2 Upper Mississippi Conservation Area

The Upper Mississippi Conservation Area and is crossed by the 24-inch pipeline between Mile Post ("MP") 45.7 and MP 46.1. The area is rich in wildlife and habitat diversity and stretches from the Melvin Price Lock and Dam at Alton, Illinois, to LaGrange, Missouri. It is composed of 87 tracts of federal lands totaling over 15,000 acres and managed under a cooperative agreement between the USFWS, the USACE and the MDOC (MDOC 2016d). This property is held in USACE fee title by the USACE St. Louis District. Crossing of this property will require a right-of-way easement (Standard Form 299-Transportation and Utility Systems and Facilities on Federal Lands) with the USACE. Spire is proposing to cross this property as part of its HDD of the Mississippi River. No tree clearing will occur on this property as a result of the construction of the Project.

Public uses of the Upper Mississippi Conservation Area include; fishing, hunting (waterfowl, deer, squirrel, and turkey), trapping, canoeing, and bird watching. Accumulating silt reduced the productivity of this wetland area, and navigation and recreational boating helped move bottom sediments into backwaters and chutes, reducing the number of wetland habitats. In an effort to balance navigation needs and the need for wildlife habitat, Congress authorized the Environmental Management Program in 1986. This federal program is designed to protect the resources and guide future river management. One of the elements of this program was the construction of Habitat Rehabilitation and Enhancement Projects. Water regulation is now possible depending on river elevations, further improving habitat for fish and wildlife. Many people visit the riverine area to enjoy the outdoors, hunt and hike on the new sediment deflection levee or fish below the water control structures (MDOC 2016d). Spire submitted an application for an easement to cross this property concurrently with the FERC application for approval to construct the HDD across the property. Spire will continue to coordinate with the USACE and MDOC throughout the permitting process.

3.2.3.3 Landgrant 3281

In preliminary consultations, the MDOC identified wet mesic bottomland forest within 0.5-mile of the 24-inch pipeline (MDOC 2016b). Towering trees and vine lattices characterize mature bottomland forests. In the lowlands bordering a river are forests of cottonwood, willow, ash, elm, sycamore, silver maple and hackberry. Periodic flooding keeps the understory of these riverfront bottomland forests fairly open. They provide habitat for gray treefrogs, red-shouldered hawks, and northern parula warblers, as well as nesting trees for Bald Eagles and great blue herons. On terraces farther from the river, a number of oak species (e.g., pin oak), shellbark hickory and pecan dominate the forest. The understory of these areas contains shrubs such as pawpaw, spicebush and

deciduous holly. Sedges often cover the ground. Animal inhabitants of these forests include rare cerulean warblers, barred owls, prothonotary warblers, small-mouthed salamanders, mole salamanders and wood ducks. Bottomland hardwood forests most often are found in the southeast Missouri lowlands (MDOC 2016e).

This habitat is state ranked as S2 which implies that the area is imperiled in the state because of rarity of some factors making it very vulnerable to extirpation from the state. There are no regulatory requirements associated with this status and no regulatory implications under Missouri law. The 24-inch pipeline crosses Landgrant 3281 within the HDD of the Mississippi River and federal property. A portion of the HDD entry/exit location on the south side of the river are located within the Landgrant but are located in agricultural fields. Therefore, the Project is not crossing any of the wet mesic bottomland forest associated with Landgrant 3281.

3.2.3.4 Landgrant 1692

In preliminary consultation, the MDOC identified a shrub swamp habitat with 0.5-mile of the 24-inch pipeline (MDOC 2016b). Buttonbush and short-statured willows dominate these often impenetrable wetland thickets. Shrub swamps provide habitat for yellow warblers and green herons. Shrub swamps often are found in or near marshes, swamps or bottomland forests.

This habitat is state ranked as S2 which implies that the area is imperiled in the state because of rarity of some factors making it very vulnerable to extirpation from the state. There are no regulatory requirements associated with this status and no regulatory implications under Missouri law. The 24-inch pipeline crosses Landgrant 1692 within agricultural fields. Therefore, the Project is not crossing any of the shrub swamp wetlands associated with Landgrant 1692.

3.2.3.5 Construction and Operation Impacts

Although individuals of some wildlife species will be affected by construction of the Project, a significant impact on local wildlife populations or unique habitats is not anticipated. Since the Project will not permanently alter the character of the majority of the available habitats, most Project-related impacts are expected to be temporary and short term. Clearing of forest vegetation could result in long-term impacts on wildlife. The Project will involve the permanent removal of some upland forest and wetland forest areas for the permanent easement and Chain of Rocks Station. These areas will be permanently converted from forested to non-forested habitats for the operational life of the Project. It is not anticipated that the Project will contribute to forest fragmentation as much of the forested areas have already been fragmented by agricultural land, and other maintained utility corridors. The long-term impact on forested vegetation is not anticipated to have a significant impact on wildlife due to the previously disturbed conditions surround much of the Project area.

For the unique habitats identified above, the Project will generally avoid impacts to these high quality habitats through avoidance and HDD. Temporary noise in wildlife areas from the HDDs is anticipated for the duration of the drill, but will be mitigated by appropriate sound barriers and mufflers. Noise effects to wildlife habitat is also later discussed in Section 3.4.

Through information obtained from the Public Land System Survey, Spire will cross Landgrant 3281 via HDD and be located within agricultural fields. No wet mesic bottomland forests were found outside of the HDD alignment. No clearing will occur between the HDD entry and exit locations. Spire does not anticipate adverse effects to wet mesic bottomland forests within Landgrant 3281. Likewise, no shrub swamps were located within the construction or operational right-of-way along the portion of the Project across Landgrant 1692 as this portion of the alignment is located within agricultural areas. Spire consulted with the MDOC regarding these properties and MDOC confirmed that no further coordination regarding the crossing of these Landgrants is required (MDOC 2016c).

Spire conducted an assessment of these potential geologic features within Spire's environmental survey corridor to determine their potential suitability as bat habitat. Field portal searches were conducted concurrently with biological field surveys and to date, no portals were located in areas where access has been granted. Further information regarding karst geological features and how they relate to areas of karst is discussed in Section 3.4.A Karst Mitigation Plan is provided in Resource Report 6, Appendix 6-A and describes the general measures to be implemented by Spire to ensure that correct measures for construction in karst formations are taken during construction of the Project. Resource Report 2 Section 2.1.3, Groundwater Impacts and Mitigation, and Resource Report 6, Table 6.4-2, also discuss Spire's planned mitigation measures in the event karst features are encountered.

3.3 Vegetation

3.3.1 Existing Resources

Six dominant vegetation cover types will be affected by the Project: agricultural land, open land, forest/woodland, developed land, wetland, and open water. The most dominant cover type along the Project is agricultural land. Table 3.3-1 identifies the vegetation communities affected by construction and operation of the Project. The plant communities observed during field investigations for wetland and streams were recorded on the USACE Wetland Determination Data Form and provided in the Wetland and Stream Investigation Report in Resource Report 2. The identified dominant species at the data points were correlated with the land use classifications as detailed in Resource Report 8 in order to report the dominant species located in the observed habitat communities described below. Identification of the plants during field observation utilized various field manuals including the "Manual of Vascular Plants of Northeastern United States and Adjacent Canada" by Gleason and Cronquist (1991) and "Steyermark's Flora of Missouri" by Steyermark and Yatskievych (1999).

3.3.1.1 Agriculture (Cropland)

The majority of the environmental survey area consists of this vegetation type. Cropland includes areas that are regularly cultivated and used to grow row crops. Surveyed areas included cropland that had recently been harvested and fallow or idle areas that appeared to be regularly used to grow crops. Commonly observed crops were corn (*Zea mays*) soybeans (*Glycine max*), and sorghum (*sorghum bicolor*).

Table 3.3-1. Vegetation Communities Affected by Construction and Operation of the Project

Facility ID (County, State)[1]	Agriculture		Open Land		Forest		Developed		Wetland		Open Water		Total	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.[2]	Oper.[3]
24-Inch Pipeline														
Pipeline														
Scott County, Illinois	31.34	17.4	3.4	1.88	5.52	3.17	0.58	0.28	0.21	0.14	0.08	0.05	41.13	22.92
Greene County, Illinois	257	143.13	12.29	6.8	6.85	3.7	1.73	0.98	2.45	1.45	0.55	0.36	280.87	156.42
Jersey County, Illinois	144.41	80.23	9.12	5.57	17.06	9.12	0.87	0.52	0.57	0.33	1.8	1.74	173.82	97.53
St. Charles County, Missouri	118.62	65.51	0.86	0.65	1.28	1.16	1.75	0.99	6.47	4.59	4.5	4.44	133.49	77.34
St. Louis County, Missouri	0.05	0.05	0.58	0.33	1.43	0.83	3.64	2.31	0.06	0.04	0.91	0.91	6.67	4.47
Subtotals[4]	**551.42**	**306.32**	**26.25**	**15.23**	**32.13**	**17.98**	**8.57**	**5.09**	**9.76**	**6.55**	**7.84**	**7.51**	**635.97**	**358.67**
ATWS														
Scott County, Illinois	10.56	0.00	1.11	0.00	0.74	0.00	0.08	0.00	0.00	0.00	0.00	0.00	12.48	0.00
Greene County, Illinois	82.88	0.00	3.66	0.00	0.59	0.00	0.33	0.00	0.00	0.00	0.00	0.00	87.46	0.00
Jersey County, Illinois	44.33	0.00	2.33	0.00	2.46	0.00	0.13	0.00	0.00	0.00	0.03	0.00	49.28	0.00
St. Charles County, Missouri	54.54	0.00	0.22	0.00	0.05	0.00	0.50	0.00	1.04	0.00	0.00	0.00	56.35	0.00
St. Louis County, Missouri	2.06	0.00	0.24	0.00	0.23	0.00	1.37	0.00	0.01	0.00	0.00	0.00	3.92	0.00
Subtotals	**194.36**	**0.00**	**7.57**	**0.00**	**4.07**	**0.00**	**2.40**	**0.00**	**1.05**	**0.00**	**0.03**	**0.00**	**209.49**	**0.00**
Cathodic Protection														
Greene County, Illinois	0.68	0.44	0.39	0.26	0.00	0.00	0.06	0.06	0.00	0.00	0.00	0.00	1.12	0.76
Jersey County, Illinois	0.41	0.27	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.27
St. Charles County, Missouri	0.41	0.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.41	0.28
Subtotals	**1.50**	**1.00**	**0.39**	**0.26**	**0.00**	**0.00**	**0.06**	**0.06**	**0.00**	**0.00**	**0.00**	**0.00**	**1.95**	**1.31**

Table 3.3-1. Vegetation Communities Affected by Construction and Operation of the Project (Continued)

Facility ID (County, State)[1]	Agriculture		Open Land		Forest		Developed		Wetland		Open Water		Total	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.[2]	Oper.[3]
Access Roads														
Scott County, Illinois	0.08	0.00	0.49	0.09	0.00	0.00	0.16	0.00	0.00	0.00	0.00	0.00	0.73	0.10
Greene County, Illinois	1.34	0.00	2.65	0.00	0.15	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.16	0.00
Jersey County, Illinois	1.04	0.00	2.91	0.03	0.59	0.00	0.00	0.00	0.00	0.00	0.00	0.00	4.53	0.03
St. Charles County, Missouri	0.89	0.48	1.23	0.91	0.12	0.12	0.82	0.78	0.00	0.00	0.00	0.00	3.06	2.29
St. Louis County, Missouri	0.00	0.00	0.00	0.00	0.00	0.00	2.13	0.00	0.00	0.00	0.00	0.00	2.13	0.00
Subtotals	**3.35**	**0.48**	**7.28**	**1.03**	**0.86**	**0.12**	**3.12**	**0.78**	**0.00**	**0.00**	**0.00**	**0.00**	**14.61**	**2.42**
Subtotals for 24-Inch Pipeline[4]	**750.64**	**307.80**	**41.48**	**16.52**	**37.07**	**18.10**	**14.14**	**5.92**	**10.81**	**6.55**	**7.87**	**7.51**	**862.01**	**362.40**
North County Extension														
Pipeline														
St. Louis County, Missouri	25.63	13.90	7.34	4.72	19.90	13.15	4.33	2.85	1.83	1.58	0.37	0.34	59.41	36.54
ATWS														
St. Louis County, Missouri	24.72	0.00	1.31	0.00	3.43	0.00	0.79	0.00	0.01	0.00	0.00	0.00	30.25	0.00
Cathodic Protection														
St. Louis County, Missouri	0.00	0.00	0.00	0.00	0.00	0.00	0.45	0.30	0.00	0.00	0.00	0.00	0.45	0.30
Access Roads														
St. Louis County, Missouri	0.00	0.00	0.02	0.00	0.09	0.00	2.24	0.00	0.00	0.00	0.00	0.00	2.35	0.00
Subtotals for North County Extension[4]	**50.35**	**13.90**	**8.67**	**4.72**	**23.43**	**13.15**	**7.80**	**3.14**	**1.85**	**1.58**	**0.37**	**0.34**	**92.47**	**36.83**
Aboveground Facilities														
Rex Receipt Station														
Scott County, Illinois	5.00	5.00	0.02	0.02	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.02	5.02

Table 3.3-1. Vegetation Communities Affected by Construction and Operation of the Project (Continued)

Facility ID (County, State)[1]	Agriculture		Open Land		Forest		Developed		Wetland		Open Water		Total	
	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.	Oper.	Const.[2]	Oper.[3]
Laclede/Lange Delivery Station														
St. Louis County, Missouri	3.61	3.61	0.00	0.00	0.34	0.34	0.03	0.03	0.00	0.00	0.00	0.00	3.99	3.99
Chain of Rocks Station														
St. Louis County, Missouri	0.00	0.00	1.94	1.93	3.78	3.29	1.79	1.74	0.00	0.00	0.00	0.00	7.51	6.97
Subtotals for Aboveground Facilities[4]	**8.62**	**8.62**	**1.96**	**1.95**	**4.13**	**3.64**	**1.82**	**1.78**	**0.00**	**0.00**	**0.00**	**0.00**	**16.52**	**15.98**
Staging Areas														
Scott County, Illinois	27.82	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	27.82	0.00
Jersey County, Illinois	0.00	0.00	2.83	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.83	0.00
St. Charles County, Missouri	2.87	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.87	0.00
Subtotals for Staging Areas[4]	**30.70**	**0.00**	**2.83**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**33.53**	**0.00**
Totals[4,5]	**840.30**	**330.31**	**54.94**	**23.19**	**64.63**	**34.89**	**23.77**	**10.85**	**12.65**	**8.13**	**8.24**	**7.85**	**1,004.53**	**415.22**
Acreage Affected in Illinois	606.89	246.48	41.19	14.66	33.96	15.99	3.94	1.84	3.23	1.93	2.45	2.16	691.66	283.04
Acreage Affected in Missouri	233.41	83.83	13.74	8.54	30.67	18.90	19.84	9.01	9.43	6.20	5.79	5.69	312.87	132.17

Notes:

1 Impacts associated with mainline valves are included in the pipeline impacts. Impacts associated with the pig launcher and pig receiver are included in the aboveground facility impacts.

2 Land affected during construction for the pipeline facilities is comprised of the 50-foot permanent easement and 40 feet of temporary workspace ("TWS") and ATWS where applicable.

3 Land affected during operation of the pipeline includes only the 50-foot permanent easement.

4 May not equal the sum of the column due to rounding.

5 Acreages associated with the area between the HDD sites include the 50-foot permanent easement only. This area is included for both construction and operation, however, no clearing is proposed.

3.3.1.2 Open Land

Open land is defined as land that is actively maintained in scrub-shrub herbaceous vegetation and is mainly associated with existing right-of-ways and pasture. Open land throughout the Project area included primarily herbaceous species such as white snakeroot (*Ageratina altissima*), annual ragweed (*Ambrosia artemisiifolia*), great ragweed (*Ambrosia trifida*), common milkweed (*Asclepias syriaca*) , devil's beggartick (*Bidens frondosa*), asiatic dayflower (*Commelina communis*), orchardgrass (*Dactylis glomerata*), Queen Anne's lace (*Daucus carota*), barnyard grass (*Echinochloa crus-galli*), Indian goose grass (*Eleusine indica*), Virginia wild rye (*Elymus virginicus*), common boneset (*Eupatorium perfoliatum*), Japanese hop (*Humulus japonicas*), jewelweed (*Impatiens capensis*), ivy-leaf morning-glory (*Ipomoea hederacea*), common morning-glory (*Ipomoea purpurea*), white grass (*Leersia virginica*), great blue lobelia (*Lobelia siphilitica*), fall panic grass (*Panicum dichotomiflorum*), reed canary grass (*Phalaris arundinacea*), American pokeweed (*Phytolacca americana*), Allegheny blackberry (*Rubus allegheniensis*), sawtooth blackberry (*Rubus argutus*), pale dock (*Rumex atissimus*), curly dock (*Rumex crispus*), tall false rye grass (*Schedonorus arundinaceus*), Japanese bristlegrass (*Setaria faberi*), yellow bristlegrass (*Setaria pumila*), green bristlegrass (*Setaria viridis*), Canada goldenrod (*Solidago canadensis*), purpletop tridens (*Tridens flavus*), red clover (*Trifolium pretense*), and white clover (*Trifolium repens*).

3.3.1.3 Forest

This vegetation type includes shrubland and forested areas having a predominance of trees that lose their leaves at the end of the frost-free season or at the beginning of a dry season. The forested habitat observed included bottomland forest (riparian forested areas bordering waterbodies). Forest communities observed throughout the Project area included boxelder (*Acer negundo*), silver maple (*Acer saccharinum)*, trumpet creeper (*Campsis radicans)*, hickory (*Carya* spp.), common hackberry (*Celtis occidentalis)*, sweet woodreed (*Cinna arundinacea)*. green ash (*Fraxinus pennsylvanica)*, honeylocust (*Gleditsia triacanthos)*, black walnut (*Juglans nigra)*, Canadian woodnettle (*Laportea canadensis)*, Amur honeysuckle (*Lonicera maackii)*, osage orange (*Maclura pomifera)*, Canadian clearweed (*Pilea pumila)*, American sycamore (*Platanus occidentalis)*, eastern cottonwood (*Populus deltoids)*, northern white oak (*Quercus alba)*, shingle oak (*Quercus imbricaria)*, northern red oak (*Quercus rubra*), Shumard's oak (*Quercus shumardii)*, brier (*Smilax* spp.), Carolina horsenettle (*Solanum carolinense)*, eastern poison ivy (*Toxicodendron radicans*), and stinging nettle (*Urtica dioica*).

3.3.1.4 Developed

Developed land includes industrial/commercial lands, roadways, railroads and residential lands. Disturbed areas such as these are typically devoid of undisturbed vegetation or consist of impervious surfaces. Vegetation cover in residential lands generally consists of mowed lawns and landscaped areas. The vegetation present within developed portions of the Project areas included primarily red clover (*Trifolium pretense*), white clover (*Trifolium repens*) crabgrass (*Digitaria sanguinalis*), orchard grass (*Dactylis glomerata*), Kentucky bluegrass (*Poa pratensis*), red fescue (*Festuca rubra*), tall fescue (*Festuca arundinacea*), and common dandelion (*Taraxacum officinale*).

3.3.1.5 Wetland

Wetland includes wetlands classified as palustrine forested, PSS and palustrine emergent. Wetland acreages were based on data collected during the stream and wetland identification surveys that began in September 2016. The vegetation present within wetlands crossed by the Project areas included primarily silver maple (Acer saccharinum), valley redstem (*Ammannia coccinea)*, sedge (*Carex* spp.), southern hackberry (*Celtis laevigata*), barnyard grass (*Echinochloa crus-galli*), rice cut grass (*Leersia oryzoides*), fall panic grass (*Panicum dichotomiflorum*), water smartweed (*Persicaria amphibia*), marshpepper knotweed (*Persicaria hydropiper*), swamp smartweed (*Persicaria hydropiperoides)*, dotted smartweed (*Persicaria punctate*), reed canary grass (*Phalaris arundinacea*), American sycamore (*Platanus occidentalis*), eastern cottonwood (*Populus deltoids*), sandbar willow (*Salix interior*), black willow (*Salix nigra*), smooth hedge nettle (*Stachys tenuifolia)*, white panicled American aster (*Symphyotrichum lanceolatum*), American elm (*Ulmus americana*), and rough cocklebur (*Xanthium strumarium*).

3.3.1.6 Open Water

Open water includes lakes, ponds and waterbodies greater than 10 feet. Four perennial waterbodies crossed by the 24-inch pipeline were identified as greater than 100 feet wide, which include; the Mississippi River, Missouri River, an unnamed tributary to the Mississippi River and Macoupin Creek (Feature ID: SMO-WJW-001 and SIL-TMA-039). Vegetation observed within the floodway and along the banks of the rivers include; boxelder (*Acer negundo*), silver maple (*Acer saccharinum*), southern hackberry (*Celtis laevigata*), sweet woodreed (*Cinna arundinacea*), fall panic grass (*Panicum dichotomiflorum*), smartweed species (*Persicaria* spp.), American sycamore (*Platanus occidentalis*), eastern cottonwood (*Populus deltoids*), white panicled American aster (*Symphyotrichum lanceolatum*), American elm (*Ulmus Americana*), and stinging nettle (*Urtica dioica*).

3.3.2 Construction and Operation Impacts

Existing land use classifications and wetland acreages were based on data collected during the stream and wetland identification surveys that were conducted in 2016 and 2017. Further field investigations will be conducted in the remaining areas once landowner permissions have been obtained. Aerial imagery from ESRI world imagery was utilized to supplement these areas (ESRI 2015). Agricultural vegetation cover types will primarily be affected the Project construction workspace, ATWS, aboveground facilities, and access roads. Overall Project cover types affected by the Project include; agriculture, open land, forested habitat, developed, wetlands, and open water. Table 3.3-1 summarizes the total acreage of each vegetative community anticipated to be impacted during construction and operation of the Project.

Additional information on temporary and permanent impacts from construction and operation of the Project are discussed below and in Resource Report 8.

3.3.2.1 Agriculture

With the exception of areas where permanent aboveground facilities that will be constructed, all agricultural land affected by the Project will be restored to its original use, including the permanent pipeline easement. Agricultural land will be returned to its original contour to maintain pre-construction hydrology. Vegetative impacts to agricultural lands will be seasonal and temporary with the construction of the Project and anticipated to restore during operation of the Project. Spire will negotiate with and reimburse landowners for any damages or loss to their productivity as a result of the construction of the proposed Project. The reimbursement to these landowners will be based on the market prices for the specific crops at the time of easement negotiations with each affected landowner.

3.3.2.2 Open Land

To minimize impacts to land used as pasture, Spire will utilize topsoil conservation measures as further discussed in Resource Report 7. Open land will be returned to its original contour to maintain pre-construction hydrology. Vegetative impacts to open lands will be seasonal and temporary with the construction of the Project and anticipated to restore during operation of the Project.

3.3.2.3 Forest

The forested habitat observed included bottomland forest (riparian forested areas bordering waterbodies). The Project has been designed to minimize the amount of workspace needed to only that which is necessary to safely construct the proposed pipeline facilities, particularly in forested areas. The Project will involve the permanent removal of some upland and wetland forested areas for the permanent easement. These areas will be permanently converted from forested to herbaceous for the operational life of the Project. While construction of the Project would remove forest cover, the amount of forest cover lost as a result of the Project would not significantly reduce the available forest cover relative to adjacent habitats as the majority of the area has already been fragmented by agricultural land.

The largest area of contiguous forested tracts along the north and south sides of the Mississippi River will be colocated with an existing pipeline corridor. Spire intends on aligning the proposed permanent right-of-way adjacent to an existing pipeline right-of-way (approximately 30 feet) through this area. However, the offset distance between the two pipelines and the anticipated final width of combined right-of-ways cannot be determined until access to the property is granted and civil survey is able to be completed.

Spire has sited its proposed HDD entry/exit site on the north side of the Mississippi River. An expanded area of ATWS will be necessary at this location and will be cleared temporarily during construction activities. Spire has sited this workspace adjacent to the existing pipeline right-of-way and a minor existing aboveground facility. Upon the completion of construction, these areas of ATWS will be allowed to revert to pre-existing vegetative cover. The HDD entry/exit site is located on the south side of the Mississippi River. Spire has sited its workspaces within an agricultural field. No clearing of vegetation will occur between the HDD entry and exit points as Spire intends to utilize a gyroscopic guidance system that does not require the installation of a tracer wire along the HDD alignment on the ground surface. No ground disturbance is anticipated for utilizing this guidance system. Spire's

HDD contractor and inspectors will complete regular inadvertent return walks throughout the duration of the drill which would require minimal foot traffic along the HDD alignment.

3.3.2.4 Developed

The majority of the roads will be crossed by open-cut methodologies with the exception of large county and state roadways which will be crossed via conventional bore.

The proposed 24-inch pipeline crosses the Kansas City Southern Railroad and the Burlington Northern & Santa Fe Railroad. The North County Extension crosses the Burlington Northern & Santa Fe Railroad. Each railroad along the 24-inch pipeline route will be crossed via conventional bore. The North County Extension's crossing of the Burlington Northern & Santa Fe Railroad will be crossed via HDD as part of the Coldwater Creek crossing. The use of conventional bore and HDD will avoid impacts on the normal operation of the active railroads during construction and operation of the proposed Project. For safety purposes, Spire will consider the specific requirements of each railroad company when designing and constructing each railroad crossing.

Construction along the Project is primarily located in agricultural areas. Construction activities through residential areas will occur in limited areas along the Project. These activities would result in short-term impacts, including the removal of existing vegetation and landscaping from the workspaces and access areas. Lawn areas and landscaping would be restored in a sequential manner in accordance with FERC's Plan.

3.3.2.5 Wetland

Wetlands that are open-cut may experience temporary construction impacts that may include loss of herbaceous and scrub-shrub vegetation. Impacts to forested wetlands may include long-term conversion to emergent and/or scrub-shrub wetland types through tree removal. No permanent loss of wetlands are expected to occur from the construction of the Project but functional changes to the wetland community may result. Upon the completion of construction, topsoil, contour elevations and hydrologic patterns will be restored and disturbed areas will be reseeded to promote the re-establishment of native hydrophytic vegetation. TWS and ATWS will be restored to pre-construction grades and contours reseeded. TWS and ATWS areas will not be maintained for operation of the Project and will be allowed to revert to their pre-construction land use and vegetation cover types. Wetlands that are encompassed as part of a HDD are not anticipated to be directly impacted from construction activities and impacts to these features will be avoided.

3.3.2.6 Open Water

The Mississippi River and Missouri Rivers, Coldwater Creek, Spanish Lake Park and associated tributaries and wetlands, are proposed to be crossed using HDD. The HDDs will allow for trenchless construction across the waterbodies and will eliminate vegetative clearing activities surrounding the waterbodies. Macoupin Creek is currently proposed as an open-cut crossing and is discussed further in Resource Report 2. Construction impacts include all areas of disturbance, including TWS, permanent easement, ATWS, and access roads. Spire intends to implement the FERC's Procedures as a minimum standard for crossing and restoring waterbodies affected by the Project. Open water impacted during operation will not result in a change of land use designation.

During construction Spire will implement best management practices and adhere to the FERC Procedures to minimize impacts on open water resources and minimize erosion and sediment run off. Construction would result in short-term impacts and all open water areas will be restored to pre-construction conditions.

3.3.2.7 Revegetation Practices

Spire will work in accordance with FERC's Plan, the Agricultural Impact Mitigation Agreement for Illinois, and also in accordance with the landowner's requests.

Inspections will be conducted after the first and second growing seasons. Revegetation in non-agricultural areas shall be considered successful if upon visual survey the density and cover of non-nuisance vegetation are similar in density and cover to adjacent undisturbed lands. In agricultural areas, revegetation shall be considered successful when upon visual survey, crop growth and vigor are similar to adjacent undisturbed portions of the same field, unless the easement agreement specifies otherwise. Wetland revegetation shall be considered successful if all of the following criteria are satisfied:

- the affected wetland satisfies the current federal definition for a wetland;
- vegetation is at least 80 percent of either the cover documented for the wetland prior to construction, or at least 80 percent of the cover in adjacent wetland areas that were not disturbed by construction;
- if natural rather than active revegetation was used, the plant species composition is consistent with early successional wetland plant communities in the affected ecoregion; and
- invasive species and noxious weeds are absent, unless they are abundant in adjacent areas that were not disturbed by construction.

Routine vegetation mowing or clearing over the full width of the permanent right-of-way in uplands shall not be performed more than every three years. No routine vegetation mowing or clearing will occur between April 15th and August 1st (in accordance with FERC's Plan) of any year unless specifically approved in writing by the responsible land management agency or the USFWS. Vegetation within wetlands and adjacent perennial waterbodies, will be limited to a 10-foot-wide strip centered directly over the pipeline where maintenance clearing of woody vegetation is needed (with selective removal of trees within 15 feet of the pipeline with roots that could compromise the integrity of the pipeline coating). Spire will utilize herbicides and/or pesticides as necessary to provide weed control at aboveground facilities in Illinois which are located adjacent to agricultural lands in accordance with the Project-specific Agricultural Impact Mitigation Agreement for Illinois. Herbicide use will be conducted by an applicator licensed in the State of Illinois. Spire does not propose to utilize herbicides on its pipeline right-of-way. Measures will be taken (as described above) to control the spread of noxious weeds during construction. Spire will monitor the disturbed areas to address the success of revegetation in accordance with FERC's Plan. If species or colonies are found in numbers which are significantly different from the existing nearby off right-of-way locations, Spire will conduct mowing or hand cutting/removal of the species in these areas.

Vegetation between the HDD entry/exit locations on the Mississippi River and Missouri River will not be cleared during construction or maintained during operations.

3.3.3 Noxious Weeds and Invasive Species

To avoid and minimize the potential for the introduction of noxious weed and invasive species seeds to new areas in the Project corridor, Spire has prepared a Noxious Weeds/Invasive Plant Control Mitigation Plan, included in Appendix 3-A. Implementation of this plan will avoid and/or minimize adverse effects from noxious and invasive plant species.

State-listed noxious weeds in Illinois include; common ragweed (*Ambrosia artemisifolia*), giant ragweed (*Ambrosia trifida*), marijuana (*Cannabis sativa*), milk thistle (*Carduus nutans*), Canada thistle, kudzu (*Pueraria montana*), perennial sowthistle (*Sonchus arvensis*), Columbus grass (*Sorghum almum*), and johnsongrass (*Sorghum halepense*).

State-listed noxious weeds in Missouri include; Marijuana (*Cannabis sativa*), Canada thistle (*Cirsium arvense*), Field bindweed (*Convolvulus arvensis*), Common teasel (*Dispacus fullonum*), Purple loosestrife (*Lythrum salicaria*), Scotch thistle (*Onopordum acanthium*), Kudzu (*Pueraria montana*), Multiflora rose (*Rosa multiflora*), and Johnsongrass (*Sorghum halepense*).

3.4 Endangered, Threatened, and Special Status Species

3.4.1 Existing Resources

Spire initiated consultation regarding the Project with the USFWS in June 2016 and held a meeting with the USFWS Rock Island Field office in July 2016. Prior to the initiation of field surveys, Spire reviewed various sources of available data to determine federally-listed and state-listed or protected species that could potentially inhabit or traverse the Project areas. The USFWS IPaC system was utilized to identify the federally-listed species that could potentially inhabit or traverse the Project area in Scott, Greene, and Jersey Counties, Illinois and St. Charles and St. Louis Counties, Missouri (USFWS 2016f, 2017b). Spire reviewed this list and the information received during consultation with the USFWS to determine the species potentially affected by construction of the Project (USFWS 2016e). Federally-protected species that may occur in the vicinity of the Project are listed in Table 3.4-1.

In order to determine state-listed species which have the potential to occur within the Project area, Spire initiated consultation with the IDNR and MDOC in June 2016. Spire performed a 0.5-mile Project review search through the IDNR's EcoCAT. No Illinois state-listed RTE species were present on the EcoCAT search receipt for Scott and Greene Counties (IDNR 2016d). The state-listed species that have a potential to occur within the Project, within Jersey County, Illinois, are presented in Table 3.4-1 and discussed further in this section.

Consultation from the MDOC was received in July 2016 (MDOC 2016b). Per further consultation, the MDOC stated that their concerns on state-listed species are limited to those contained on the federal list for aquatic species (MDOC 2016c). The state-listed species that have a potential to occur within the Project in Missouri, are presented in Table 3.4-1 and discussed further in this section.

Copies of agency correspondence are included in Resource Report 1, Appendix 1-C.

Table 3.4-1. Federal and State-Listed Species Potentially Occurring in the Vicinity of the Project

Common Name (*Scientific Name*)	Federal Status	State Status[1]	Project Component	Habitat	Status of Biological Surveys (Status, Anticipated Survey Dates, and Results)	Anticipated Project Impacts
Birds						
Least Tern (*Sterna antillarum*)	Endangered	Illinois-Endangered[2] Missouri-Endangered[2]	24-inch pipeline (Illinois and Missouri)	Least terns nest on barren to sparsely vegetated sandbars along rivers, sand and gravel pits, lake and reservoir shorelines, and occasionally gravel rooftops.	No surveys to be conducted.	Least terns are likely to nest along the Mississippi and Missouri Rivers within the Project area. Spire anticipates avoiding Least tern nesting habitat by the HDD of the Mississippi and Missouri Rivers, therefore Spire anticipates that the HDD is not likely to adversely affect the species.
Piping Plover (*Charadrius melodus*)	Threatened	Illinois-Endangered[2]	24-inch pipeline (Illinois Missouri)	Piping plovers utilize wide, flat, open, sandy beaches for habitat and often nest along small creeks or wetlands.	No surveys to be conducted.	Piping plovers are likely to nest along the Mississippi and Missouri Rivers within the Project area. Spire anticipates avoiding piping plover nesting habitat by the HDD of the Mississippi and Missouri Rivers, therefore Spire anticipates that the HDD is not likely to adversely affect the species.
Red Knot (*Calidris canutus rufa*)	Threatened	Illinois-Threatened[2]	24-inch pipeline (Illinois and Missouri)	Red knots utilize large waterbodies with gravel and/or sandy edges.	No surveys to be conducted.	The species is not likely to breed in the area and may only be present as a transient species seeking out foraging opportunities. Spire anticipates that the Project is not likely to adversely affect the species.
Migratory Bird Species	Protected under the MBTA	-	24-inch pipeline (Illinois and Missouri), North County Extension	Refer to Table 3.4-2.	No surveys to be conducted. Tree clearing restrictions implemented and discussed in Section 3.4.2.3.	Spire has avoided forested areas to the maximum extent practicable. In addition, Spire anticipates that tree clearing would be conducted prior to May 1, 2018 and after August 1, 2018 to avoid the nesting season for the majority of the bird species on the Birds of Conservation Concern list.
Bald eagle (*Haliaeetus leucocephalus*)	Protected under the Bald and Golden Eagle Protection Act	-	24-inch pipeline (Illinois and Missouri), North County Extension	Bald eagles utilized large, tall trees near rivers or reservoirs and prefer trees which have 1 or two open edges in which they roost or nest in the upper open branches, allowing for easy surveillance for food and accessibility.	Spire identified 24 locations in which it will conduct bald eagle nest surveys based on the initial field review of the Project areas. Of these locations, 20 locations were surveyed in February 2017. The remaining areas will be surveyed once landowner permission has been obtained. Spire provided the results of the February 2017 surveys to the USFWS and MDOC in March 2017. Results were also concurrently filed with FERC.	USFWS has indicated that the closest known bald eagle nest is four miles from the Project area. To date, no bald eagle nests have been identified in the vicinity of the Project areas. Spire will consult with the USFWS if bald eagle nests are found in any of the Project areas remaining to be surveyed.
Aquatics						
Higgins Eye pearlymussel (*Lampsilis higginsii*)	Endangered	Missouri-Endangered[2]	24-inch pipeline (Illinois and Missouri)	Higgins Eye pearlymussel utilize larger rivers where they are usually found in deep water with moderate currents.	No surveys to be conducted.	Species is not known to occur within the immediate counties crossed by the Project, therefore the Project will have no effect on this species.
Pallid sturgeon (*Scaphirhynchus albus*)	Endangered	Illinois-Endangered[2] Missouri-Endangered	24-inch pipeline (Illinois and Missouri)	Pallid sturgeons are a bottom-oriented, large river obligate fish inhabiting the Mississippi and Missouri rivers and some tributaries. Floodplains, backwaters, chutes, sloughs, islands, sandbars, main channel waters, and are often associated with sandy and fine bottom materials.	No surveys to be conducted.	Range of the species is scarce in the Mississippi and Missouri Rivers. Spire would avoid pallid sturgeons by utilizing HDD techniques to cross the Mississippi and Missouri Rivers, therefore Spire anticipates that the Project is not likely to adversely affect the species.
Lake Sturgeon (*Acipenser fulvescens*)	-	Illinois-Endangered[2] Missouri-Endangered	24-inch pipeline (Missouri)	Lake sturgeons have been known to inhabit the Missouri River and have also been known to occur in the larger tributaries to the river. They prefer rivers with firm, silt-free bottoms of sand, gravel and rock.	No surveys to be conducted.	Spire anticipates avoiding lake sturgeon habitat by the HDD of the Missouri River, and no other large tributaries of the Missouri will be crossed by the Project therefore Spire anticipates the Project will not impact these species.
Flathead chubs (*Platygobio gracilis*)	-	Missouri-Endangered	24-inch pipeline (Missouri)	Flathead chubs have been known to inhabit the Missouri River and prefer turbid waters where the current is swift and the bottom is composed of sand and fine gravel. They can also inhabit pools of small creeks with clear water, little current, with coarse gravel and bedrock bottoms.	No surveys to be conducted.	Spire anticipates avoiding flathead chub habitat by the HDD of the Missouri River. Additionally, no small creeks with pools of clear water, little current, with coarse gravel and bedrock bottoms were located along the Project during the biological surveys. Spire anticipates that the Project will not impact these species.

Table 3.4-1. Federal and State-Listed Species Potentially Occurring in the Vicinity of the Project (Continued)

Common Name (*Scientific Name*)	Federal Status	State Status	Project Component	Habitat	Status of Biological Surveys (Status, Anticipated Survey Dates, and Results)	Anticipated Project Impacts
State-listed mussel species	-	Unknown	24-Inch pipeline (Missouri)	Habitat for state-listed mussel species within the Project area consists of the larger waterbody crossings of the Mississippi River, Missouri River, and Coldwater Creek.	No surveys to be conducted.	State-listed mussel species are likely to inhabit the Mississippi River, Missouri River and Coldwater Creek. Spire is not planning to perform surveys for mussels. However, Spire will be avoiding these rivers through HDD crossing techniques. Spire anticipates that the Project will not impact these species.
Mammals						
Indiana bat (*Myotis sodalis*)	Endangered	Illinois-Endangered Missouri-Endangered	24-inch pipeline (Illinois and Missouri), North County Extension	Habitat for Indiana bat consists of woodlands, streams, caves, and abandoned mines.	Mist net surveys to determine the presence/absence of listed bats will be conducted in May and June 2017. Results of the mist net surveys will be provided to the USFWS in July 2017.	Pending the results of mist net surveys.
Northern long-eared bat[3] (*Myotis septentrionalis*)	Threatened	Illinois-Threatened	24-inch pipeline (Illinois and Missouri), North County Extension	Habitat for northern long-eared bat consists of woodlands, streams, caves, and abandoned mines.	Mist net surveys to determine the presence/absence of listed bats will be conducted in May and June 2017. Results of the mist net surveys will be provided to the USFWS in July 2017.	Incidental take of northern long-eared bats resulting from Project development, including Project tree clearing, is not prohibited under Section 9 because the Project design meets the requirements of the final Section 4(d) rule, for the northern long-eared bat. Because incidental take of northern long-eared bats as a result of Project development is not prohibited, further consultation with the USFWS on effects to the species, under Section 7, will be limited. If northern long-eared bats are captured during the surveys, Spire will request concurrence from USFWS that the Project may affect the northern long-eared bat, but that any resulting incidental take of the northern long-eared bat is not prohibited by the final 4(d) rule.
Gray bat (*Myotis grisescens*)	Endangered	Illinois-Endangered[2] Missouri-Endangered	24-inch pipeline (Illinois and Missouri), North County Extension	Habitat for gray bat consists of streams, rivers, lakes, and reservoirs, caves, and abandoned mines	Portal searches were conducted concurrently with the stream and wetland delineation surveys in 2016 and 2017. Portals will be conducted in the remaining Project areas once landowner permission has been obtained. Gray bats would not be tracked to diurnal roosts, due to the improbability of detecting bats located in subterranean voids (e.g., caves/mines), and the overall low effect of Project development on gray bats or their habitat.	To date, no caves or abandoned mine portals were found during the portal searches. It is unlikely that the Project will affect any roosting or hibernating habitat for the species. In addition, because the Project will minimally affect the other types of habitat utilized by the gray bat, such as for foraging and traveling (i.e., rivers, streams, lakes, and reservoirs), the overall effects of the Project on gray bats are expected to be insignificant and/or discountable and therefore not rise to the level of take, or be extremely unlikely to occur.
Plants						
Decurrent false aster (*Boltonia decurrens*)	Threatened	Illinois-Threatened[2] Missouri-Endangered	24-inch pipeline (Illinois and Missouri), North County Extension	Habitat for decurrent false aster includes floodplains bordering big rivers, floodplain wetlands, mudflats, boarders of lakes marshes and sloughs, old fields, levees, roadsides and agricultural fields with full sun exposure. The species is also found in areas that have periodic disturbance such as periodic flooding, scour, mowing or cultivation to maintain an open environment. The flowering period occurs during late summer into autumn, lasting about one to two months.	One location in Jersey County, Illinois was surveyed in 2016 as an area of potential suitable habitat. Surveys were conducted in October 2016. No populations of decurrent false aster were identified. No surveys were conducted in Missouri. Results of this survey were summarized in Volume IV, Appendix 3-B which was provided to FERC in January 2017. Additional decurrent false aster surveys will be conducted in September 2017 in Missouri based on consultation with the USFWS. Results will be provided to the USFWS in October 2017.	No populations or suitable habitat were identified in Illinois. If individuals are located during the surveys, Spire will coordinate with the USFWS to determine the appropriate avoidance and/or minimization measures.
Eastern prairie fringed orchid (*Platanthera leucophaea*)	Threatened	Illinois-Endangered[2] Missouri-Endangered[2]	24-inch pipeline (Illinois)	Habitat for eastern-prairie fringed orchid consists of early to mid-successional habitats such as grass and sedge dominated areas including mesic prairies, sedge meadows, bogs and fens with full sun exposure. The species is also found in areas with very low or no disturbance to the substrate, areas with little or no woody vegetation competition. The flowering period occurs in late June through early July and lasts for seven days.	Based on initial biological surveys, Spire determined that three potential habitat locations in Illinois warranted species-specific surveys for Eastern prairie fringed orchid. Surveys will be conducted in June 2017. Results of these surveys will be provided to the USFWS in July 2017.	If individuals are located during the surveys, Spire will coordinate with the USFWS to determine the appropriate avoidance and/or minimization measures.

Table 3.4-1. Federal and State-Listed Species Potentially Occurring in the Vicinity of the Project (Continued)

Common Name (*Scientific Name*)	Federal Status	State Status	Project Component	Habitat	Status of Biological Surveys (Status, Anticipated Survey Dates, and Results)	Anticipated Project Impacts
Mead's milkweed (*Asclepias meadii*)	Threatened	Illinois-Endangered[2] Missouri-Endangered[2]	24-inch pipeline (Illinois)	Habitat for Mead's milkweed includes dry-mesic to mesic upland tallgrass prairies, barrens, igneous glades and railroad rights-of-way with full sun exposure. The species is also found in areas of late-successional prairie habitats, usually found in undisturbed habitats with high diversity of native vegetation. The flowering period occurs late May to mid-June.	Based on initial biological surveys and desktop review, Spire determined that two potential habitat locations in Illinois warranted species-specific surveys for Mead's milkweed. Spire does not currently have landowner permission to survey these areas. Spire will conduct habitat assessment of these areas prior to construction. Results of these surveys will be provided to the USFWS upon completion.	If habitat/individuals are located during the surveys, Spire will coordinate with the USFWS to determine the appropriate avoidance and/or minimization measures.
Ground plum milkvetch (*Astragalus crassicarpus* var. *trichocalyx*)	-	Illinois-Endangered	24-inch pipeline (Illinois)	Habitat for ground plum milkvetch consists of dry prairies, glades, open woods and bluff tops with full sun exposure. The species may be found growing within disturbed areas such as roadsides that have a regular occurrence of moderate disturbance such as mowing to maintain an open environment. The flowering period occurs in April through May.	IDNR indicates potential occurrences for ground plum milkvetch in one location in Illinois. Spire does not currently have landowner permission to survey these areas. Spire will conduct a habitat assessment prior to construction and will work with the landowner to minimize impact to the species if habitat is present.	If habitat/individuals are located during the surveys, Spire will coordinate with the landowner to determine the appropriate avoidance and/or minimization measures.
Reptiles						
Timber Rattlesnake (*Crotalus horridus*)	-	Illinois-Threatened	24-inch pipeline (Illinois)	Timber rattlesnakes are most commonly found in mature forest in rugged, hilly, sometimes rocky terrain, or along rock bluffs and forest surrounding river corridors or riparian areas. Foraging habitat includes upland forests and disturbed habitats including edges of fields where prey is more abundant. Timber rattlesnakes have been documented at bluffs along the Mississippi River in Illinois and locally within the Principia Hills West Property north of the Mississippi River.	IDNR indicates that timber rattlesnake dens have been located near the Project's proposed construction right-of-way as recent as 2016 in Jersey County, Illinois. Landowner permission on this property has been denied, therefore, surveys cannot be conducted until access is granted. Coordination with the IDNR is ongoing.	It is anticipated that Timber Rattlesnakes are likely to be encountered in this area. Spire is proposing to monitor the right-of-way during construction to remove any snakes that may be present in order to avoid direct take of the species. In addition, Spire will pursue Incidental Take Authorization for this species with the IDNR.

Notes:

[1] Source for State Species Listings: IDNR 2016i, MDOC 2016e

[2] Indicates that the species was not identified through consultations with either the IDNR or MDOC.

[3] The northern long-eared bat is not state-listed in Missouri. However, Spire will provide the results of the mist net surveys conducted in 2017 to the MDOC as a courtesy.

3.4.1.1 Birds

Least tern (*Sterna antillarum*), piping plover (*Charadrius melodus*), and red knot (*Calidris canutus rufa*) were identified from the USFWS's IPaC System because of their association with habitat at the Mississippi River and/or Missouri River crossings. These species are associated with shorelines and river islands.

Least terns and piping plovers are likely to nest along the Mississippi and Missouri Rivers. Spire is not planning to perform surveys for least terns or piping plovers; however Spire has provided additional information to the USFWS detailing how the drilling methods will prevent the possibility of inadvertent returns during drilling in January 2017. To date, no written correspondence with the USFWS regarding these species has been received, however, USFWS has indicated that the additional information provided should be sufficient to address concerns for these species (USFWS 2017a). Spire anticipates avoiding nesting habitat by conducting a HDD of the rivers; therefore Spire anticipates that the Project is not likely to adversely affect the species.

The Missouri USFWS IPaC Report for the 24-inch pipeline indicated that the red knot may occur within this Project area (USFWS 2016f). The red knot was not identified in the Illinois USFWS IPaC Trust Resources Report or the USFWS IPaC Trusted Resources Report for the North County Extension (USFWS 2017b). According to the USFWS *Rufa Red Knot Background Information and Threats Assessment* (November 2014; Docket No. FWS-R5-ES-2013-0097), the red knot breeds in the central Canadian Arctic. Red knot breeding habitat is located in drier tundra areas of Alaska and northern Canada and not within the Project area. Red knot arrive on their breeding grounds in late May or early June. Soon after young are hatched in mid-July, female red knot begin to migrate south, with males following about a month later and young soon after; departure from the breeding grounds begins in mid-July and continues through August (USFWS 2014a). Based on a literature review (Baker et al.2013) and available observation data online (eBird), red knot are not likely to breed within the Project area, but rather are a rare transient in the Project area in Missouri with observations not recorded annually. Within the Project area red knot have been observed within the past 10 years but confined to observations in September during fall migration and located approximately 2.5 miles from the Project along the Mississippi River in Alton Slough. The last and only recorded observation of red knot at Alton Slough in the past 10 years was in 2014 (Byrd and Johnston 1991).

3.4.1.2 Bald and Gold Eagle Protection Act

Bald eagles historically occurred throughout North America, with the largest natural area breeding populations in Alaska and Canada, and significant populations in the Great Lakes states, Florida, the Pacific Northwest, the Greater Yellowstone area, and the Chesapeake Bay region (MDNR 2012). Bald eagles are associated with aquatic habitats (coastal areas, rivers, lakes, and reservoirs) with forested shorelines or cliffs in North America (Buehler 2000). Nests are typically located within 1.5 km (one-mile) of foraging habitat (Livingston et al. 1990). The species, therefore, typically forages and nests in the vicinity of large aquatic ecosystems, including lakes, rivers, reservoirs, and wetlands. Adults tend to use the same breeding area, and often the same nest, annually (USFWS 2015a). The nest is added to yearly and correspondingly, increase in size with age. An eight- to ten-year-old nest may be six to eight feet deep and about the same in width.

The USFWS Rock Island Field Office has indicated that the closest known bald eagle nest is four miles from the Project alignment (USFWS 2016e). IDNR did not identify any known bald eagle nest locations within the vicinity of the Project. Consultation with the MDOC indicates that there may be an active nest on Slim Island (which is located approximately 0.5-miles from the closest Project HDD location at the Mississippi River), however, MDOC could not verify the location or record of this nest (MDOC 2016f).

The USFWS has recommended that bald eagle surveys be conducted in wooded riparian areas along the Project route. Spire reviewed the Project area utilizing aerial imagery to select locations for proposed bald eagle nest searches. Areas selected for searches were located in wooded riparian corridors where the Project crosses large bodies of water. Nest surveys in areas where landowner access has been obtained was conducted in February 2017 to coincide with when bald eagles are active in constructing or repairing nests for the upcoming breeding season. No nests were identified as a result of this survey. Results of these surveys was provided to the USFWS, FERC and the MDOC in March 2017. Further bald eagle studies will be conducted in the remaining areas once landowner permissions are obtained. If nests are identified during these surveys, Spire will coordinate with the USFWS to determine the appropriate construction measures that would need to be implemented as established in the USFWS National Bald Eagle Management Guidelines (USFWS 2007a).

3.4.1.3 Migratory Bird Treaty Act

The USFWS is the principal federal agency charged with protecting and enhancing populations and habitat of migratory bird species under the Migratory Bird Treaty Act ("MBTA") (MBTA, 16 U.S. C. 703-712; Chapter 128; July 13, 1918; 40 Stat. 755, as amended) and Executive Order 13186 (66 CFR 3853), which directs federal agencies to avoid or minimize adverse impacts on migratory birds and to identify where unintentional take is likely to have a measurable negative effect on migratory bird populations. Unlike the Endangered Species Act, neither the MBTA nor its implementing regulations at 50 CFR Part 21, provide for permitting of "incidental take" of migratory birds. While the MBTA has no provisions for allowing unauthorized take, the USFWS recognizes that some birds may be killed during site preparation and construction, even if all reasonable measures to avoid it are implemented. The following discussion identifies Spire's commitment to reasonable measures to minimize impacts to migratory birds and their habitats.

According to the North American Bird Conservation Initiative ("NABCI"), the Project is located within Bird Conservation Region 22 - Eastern Tallgrass Prairie (NABCI 2016). Historically this region was the tallest and lushest grasslands of the Great Plains, but today is dominated by agriculture. Threats to the upland and wetland habitats of this region include urbanization, recreational development, and agricultural expansion (NABCI 2016).

Spire completed a review for MBTA species likely to occur within the Project area by utilizing the USFWS's IPaC System. These species are provided in Table 3.4-2.

Table 3.4-2. USFWS IPaC Report Birds of Conservation Concern Potentially Occurring in the Vicinity of the Project

Common Name (*Scientific Name*)	Breeds in Region	Aquatic Habitat Association	Ground Nesting	Shrub Nesting	Tree Nesting	Nesting Time Period[3]
Acadian Flycatcher (*Empidonax virescens*)	X[2]	-[1]	-	X	X	June-July
Bald Eagle (*Halieetus leucocephalus*) [3]	X	-	-	-	X	January - July
Bell's Vireo (*Vireo bellii*)	X	-	-	X	X	May-July
Black-billed Cuckoo (*Coccyzus erythropthalmus*)	X	-	-	-	X	May-September
Black-crowned Night-heron (*Nycticorax nycticorax*)	X	X	-	-	X	May-July
Blue-winged Warbler (*Vermivora cyanoptera*)	X	-	X	-	-	May-June
Cerulean Warbler (*Setophaga cerulea*)	X	-	-	-	X	May-July
Dickcissel (*Spiza americana*)	X	-	X	-	-	May-August
Field Sparrow (*Spizella pusilla*)	X	-	X	-	-	May-July
Fox Sparrow (*Passerella iliaca*)	-	-	X	X	X	May-July
Henslow's Sparrow (*Ammodramus henslowii*)	X	-	X	-	-	May-August
Kentucky Warbler (*Geothlypis formosa*)	X	-	X	-	-	May-August
Least Bittern (*Ixobrychus exilis*)	X	X	X	-	-	May-August
Loggerhead Shrike (*Lanius ludovicianus*)	X	-	-	X	X	April-July
Mississippi Kite (*Ictinia mississippiensis*)	X	-	-	-	X	May-July
Northern Flicker (*Colaptes auratus*)	X	-	-	-	X	May-July
Peregrine Falcon (*Falco peregrinus*)	X[4]	-	-	-	-	March-August
Pied-billed Grebe (*Podilymbus podiceps*)	X	X	X	-	-	February-November
Prothonotary Warbler (*Protonotaria citrea*)	X	-	-	-	X	May-July
Red-headed Woodpecker (*Melanerpes erythrocephalus*)	X	-	-	-	X	May-August
Rusty Blackbird (*Euphagus carolinus*)	-	X	-	X	X	May-July
Short-eared Owl (*Asio flammeus*)	-	-	X	-	-	May-July
Willow Flycatcher (*Empidonax traillii*)	X	-	-	X	X	May-August
Wood Thrush (*Hylocichla mustelina*)	X	-	-	X	X	May-August
Worm-eating Warbler (*Helmitheros vermivorum*)	X	-	X	-	-	May-July

Notes:

Source: USFWS 2016f, 2017

[1] A hyphen (‘) denotes that this category is not associated with this species.

[2] An ‘X ‘denotes that this category is associated with this species.

[3] Nesting dates were determined through review of the Indiana and Missouri Breeding Bird Atlases. Illinois’s Breeding Bird Atlas did not contain recent information on the region, therefore Indiana’s dates were utilized in consultation with the USFWS (USFWS 2017a, Indiana Division of Natural Resources 2005, Jacobs and Wilson 1997).

[4] Species nests on cliffs and human structures.

The majority of the migratory birds identified in the USFWS IPaC Reports are known to breed in the Project area; the fox sparrow, rusty blackbird, and short-eared owl are non-breeding species of concern for the region. Excluding the non-breeding species, eight species are known to be ground nesting species and 13 species are tree and/or shrub nesting species in the Project area. Additionally, three of these species are associated with large expansive aquatic habitat systems. Based on the review of the species potentially present in the Project areas, nesting typically occurs between May 1st and August 1st. In order to limit disturbance to migratory birds, Spire has routed the pipeline segments through predominately active agricultural areas and adjacent to existing utility easements to the extent practicable. If the Project is approved and federal permits are received in sufficient time, Spire will attempt to clear trees prior to April 1, 2018 to coincide with the recommended clearing window for listed bat species. If this schedule cannot be met, Spire requested and received approval to conduct clearing activities between April 1, 2018 and May 1, 2018 without significantly impacting migratory bird species (USFWS 2017a). This information is further discussed Section 3.4.2.3. Spire will continue to consult with USFWS regarding this potential clearing timeframe as it relates to listed bat species.

3.4.1.4 Aquatic Species

As previously discussed in Section 3.1.2, Fisheries of Special Concern, the Project is within the ranges of the Higgins eye pearlymussel (associated with the Mississippi River), pallid sturgeon, Missouri state-listed lake sturgeon, flathead chubs, and state-listed mussel species. Higgins eye pearlymussel is not known to or believed to occur within the counties crossed by the Project but can be found within the Upper Mississippi River (USFWS 2016b). Pallid sturgeons are known to or believed to occur downstream of the 24-inch pipeline crossing of the Mississippi River and within the 24-inch pipeline crossing of the Missouri River (USFWS 2016c). Lake sturgeons and flathead chubs have been known to inhabit the Missouri River (MDOC 2016e).

Spire will cross both the Mississippi and Missouri Rivers utilizing a HDD. Utilizing trenchless crossing methods across these waterbodies will minimize direct in-stream impacts to these species in any areas of suitable habitats along the banks and shores of the rivers; therefore the Project is not likely to adversely affect this species. Spire will also follow the procedures outlined in its HDD Contingency Plan (Resource Report 2, Appendix 2-B) which will minimize permanent or adverse impacts on fishery or aquatic resources in the event of an inadvertent release of pressurized drilling mud. Spire provided additional information to the USFWS in January 2017 detailing the HDD construction techniques that will prevent the possibility of inadvertent returns during drilling. To date, no further written correspondence with the USFWS regarding the Higgins eye pearlymussel or pallid sturgeon has been received, however, the USFWS has indicated that the additional information provided should be sufficient to address concerns for these species (USFWS 2017a).

3.4.1.5 Bat Species

The Project is within the range of three federally-listed bats, including the endangered Indiana bat, endangered gray bat, and threatened northern long-eared bat. Federal and state seasonal tree clearing restrictions prohibit tree clearing between April 1st and October 15th for Indiana bat and northern long-eared bat. The MDOC indicated they would defer to the USFWS determination regarding listed bat species (MDOC 2016c). The IDNR will require continued consultation independent of USFWS determinations.

Throughout the consultation process, the USFWS Rock Island Field Office has recommended performing mist net surveys (USFWS 2016e). Spire will conduct mist net surveys beginning in May 2017. A Bat Survey Study Plan was submitted to the USFWS Rock Island Field Office and the IDNR in March 2017 for their review prior to the commencement of mist net surveys. Spire will submit the results of the surveys to FERC, USFWS and IDNR in July 2017. Results of the surveys will also be submitted to the MDOC as a courtesy.

Mist net surveys will be conducted in accordance with the latest Range-wide Indiana Bat Survey Protocols; currently the 2016 Range-wide Indiana Bat Summer Survey Guidelines, April 2016 (Guidelines). Due to the linear nature of the Project, mist net surveys will follow protocols required for a linear project in the Ozark-Central Recovery Unit for Indiana bat.

If listed bat species are not captured during mist net surveys, Spire has assumed that the USFWS would not implement tree clearing restrictions for bat species. If listed-bat species are captured, further coordination with the USFWS and IDNR will be required.

Spire anticipates commencing construction in January 2018 provided that federal authorizations and state permits have been received. Tree clearing activities are currently proposed to be initiated in February 2018. In the event that tree clearing cannot be conducted prior to April 1, 2018 (to coincide with the recommended clearing window for listed bat species), and listed bat species are captured during the 2017 mist net surveys, Spire will consult with USFWS and IDNR regarding impact mitigation measures such as avoidance, timing restrictions on clearing in certain areas, and supplemental surveys to prevent adverse impacts on the species. Spire is proactively working with the USFWS to develop a Biological Assessment in the event that Indiana bats are captured during mist net surveys and tree clearing needs to be conducted after April 1, 2018 (USFWS 2017c). Spire does not anticipate clearing trees between May 1 and July 31, 2018 in order to adhere to the Spire's proposed migratory bird seasonal restriction.

Should a Biological Assessment be required, Spire will file its Biological Assessment with FERC who will initiate formal consultation USFWS. Spire would also then coordinate with the IDNR to include this species as part of its Incidental Take Authorization as described in Section 3.4.1.7.

Indiana Bat

The Indiana bat is federally listed and also state-listed in Illinois and Missouri.

The Indiana bat is relatively small, weighing only one-quarter of an ounce, and has a wingspan of nine to 11 inches. The fur is dark-brown to grayish. Indiana bats hibernate during winter in caves or, occasionally, in abandoned mines. For hibernation, the bats require cool, humid caves with stable temperatures under 50°F but above freezing. Very few caves within the range of the species have these conditions. The hibernacula typically have large volumes of Indiana bats and often have large rooms and vertical or extensive passages (USFWS 2006).

In April and May, Indiana bats begin migrating to their summer roosting sites. When active, Indiana bats roost in dead trees, dying trees, or live trees with exfoliating bark. During the summer months, most reproductive females occupy roost sites that receive direct sunlight for more than half the day. Roost trees generally are found within canopy gaps in a forest, fence line, or along a wooded edge. Maternity roosts are found in riparian zones,

bottomland, floodplain habitats, wooded wetlands, and upland communities. Indiana bats forage in semi-open to closed forested habitats, forest edges, and riparian areas (USFWS 2007b).

Agency consultation with regard to the Indiana bat will continue with the USFWS and IDNR upon the completion of mist net surveys.

Northern Long-eared bat

The northern long-eared bat is listed federally- and also state-listed in Illinois.

The northern long-eared bat is a medium sized bat with a body length of three to 3.7 inches and a wingspan of nine to 10 inches. Their fur color can be medium to dark brown on the back and tawny brown on the underside (USFWS 2015b). In winter, northern long-eared bats spend winter hibernating in various sized caves or mines with constant temperatures, high humidity, and no air currents. Most often they can be found in small crevices or cracks. During the summer, northern long-eared bats roost singly or in colonies underneath bark, in cavities or in crevices of both live trees and snags (dead trees) (USFWS 2015b). Northern long-eared bats are flexible in selecting roosts and choose trees based on suitability to retain bark or provide cavities or crevices. Northern long-eared bats have also been found rarely roosting in structures, like barns and sheds.

Under Section 4(d) of the Endangered Species Act ("ESA"), the USFWS has the discretion to develop prohibitions and exceptions that are tailored to the specific conservation needs of a federally-threatened species, including prohibitions and exceptions to incidental take prohibitions defined in Section 9 of the ESA. In such cases, these regulations may be incorporated into a separate, species-specific, rule under Section 4(d) of ESA, and may be more or less restrictive than the incidental take prohibitions defined in Section 9 of ESA. Accordingly, the USFWS published a final rule for the northern long-eared bat on January 14, 2016, that prohibits incidental take of northern long-eared bats in portions of the United States affected by White Nose Syndrome (including the Project area) only when it: 1) occurs within a hibernaculum, 2) results from tree removal activities that occur within 0.25-mile of a known hibernaculum, or 3) results from the removal a known, occupied maternity roost tree or other trees within 150 feet of a known, occupied maternity roost tree during the pup season from June 1st through July 31st. Incidental take of northern long-eared bats that does not occur as a result of any of the actions prohibited by the final 4(d) rule for the species would not require further consultation with the USFWS under Section 7 of the ESA.

The Project will not affect any documented northern long-eared bat hibernacula. Field searches for unknown hibernacula provided no evidence that unknown northern long-eared bat hibernacula exist in the Project Area. Similarly, based on the most recent information provided by the USFWS, the Project is not within 0.25-mile of a known northern long-eared bat hibernaculum, nor is it within 150 feet of a known, occupied maternity roost. Therefore, Incidental take of northern long-eared bats resulting from Project development, including Project tree clearing, is not prohibited under Section 9 because the Project design meets the requirements of the final Section 4(d) rule, for the northern long-eared bat. Because incidental take of northern long-eared bats as a result of Project development is not prohibited, consultation with the USFWS on effects to the species, under Section 7,

required will be limited. Mist net surveys to determine the presence/absence of listed bats will be conducted between May 15 and August 15, 2017.

If northern long-eared bats are captured during the surveys, Spire will request concurrence from USFWS that the Project may affect the northern long-eared bat, but that any resulting incidental take of the northern long-eared bat is not prohibited by the final 4(d) rule.

In Illinois, the IDNR does not recognize the federal 4(d) rule for northern long-eared bats. Therefore, if northern long-eared bats are captured during the mist net surveys, and tree clearing needs to be conducted between April 1 and October 15, 2018, Spire would coordinate with the IDNR to include this species as part of its Incidental Take Authorization as described in Section 3.4.1.7.

Gray Bat

Gray bats differ from other listed bat species in the Project area because they utilize caves and/or abandoned mines year-round for roosting and hibernating, unlike forest-roosting bats, which roost in trees during the summer and hibernate in caves and/or abandoned mines in the winter. Field portal searches were conducted concurrently with biological field surveys and no portals were located. Spire provided information related to its portal searches to the USFWS in March 2017 as part of its Bat Survey Study Plan. Portal searches will be conducted as necessary along the remaining Project areas once landowner access has been obtained. A list of areas remaining for biological survey is provided in Table 2.2-1 in Resource Report 2. The USFWS indicated their approval of these methodologies during a conference call in April 2017 (USFWS 2017a).

Further discussion on karst formations can be found in Resource Report 6, Geology. Because no caves or abandoned mine portals were found during initial surveys, it is unlikely that the Project will affect any roosting or hibernating habitat for the species. In addition, because the Project will minimally affect the other types of habitat utilized by the gray bat, such as for foraging and traveling (i.e., rivers, streams, lakes, and reservoirs), the overall effects of the Project on gray bats are expected to be insignificant and/or discountable and therefore not rise to the level of take. Regardless, gray bats could still utilize the Project area and be captured during mist net surveys. Generally, when gray bats are captured during mist net surveys, they are not radio-tracked to diurnal roosts because, unlike forest-roosting species, it is improbable that a radio-tagged gray bat would be located in an underground roost (where the radio signal cannot be detected from the surface).

3.4.1.6 Plant Species

A review of the USFWS's IPaC System (and consultation with the USFWS) indicated that the federal- and state-listed decurrent false aster, eastern prairie fringed orchid, and Mead's milkweed species are potentially located within the vicinity of the Project (USFWS 2016f, 2017a).

Decurrent false aster is typically found bordering big rivers, floodplains and prairie wetlands that experience disturbance. It generally flowers during summer into autumn (USFWS 1990). Consultation with the USFWS in August 2016, indicated decurrent false aster surveys could be limited to Jersey County in Illinois in locations of forested floodplains that are frequently flooded and disturbed (Allred 2016a, b). One location, Otter Creek, was

identified for decurrent false aster surveys. Surveys for decurrent false aster in Illinois were completed in October 2016 and no individuals were located. Due to the sensitivity of data relative to rare species, full results of this survey were provided as privileged information in Volume IV, Appendix 3-B. Spire submitted this report to the USFWS for review and concurrence in January 2017. Based on further consultation with the USFWS, an additional six areas have been proposed for decurrent false aster surveys in Missouri along the 24-inch pipeline and North County Extension. These additional surveys are proposed to occur in September 2017 to coincide with the flowering period of this species. Results of these surveys will be provided to the USFWS in October 2017. If any individuals are located during the surveys, Spire will coordinate with the USFWS. Spire will also concurrently file the results of these surveys with FERC as part of Volume IV, Privileged, Appendix 3-B, upon completion.

Eastern prairie fringed orchid is present in mesic prairies and wetlands. It flowers from late June through early July and flowering lasts approximately seven to 10 days (USFWS 1999). Based on initial biological field surveys, Spire identified three locations of potential suitable habitat in Illinois. Surveys will be conducted in June 2017. Results of these surveys will be provided to FERC and the USFWS in July 2017. If any individuals are located during the surveys, Spire will coordinate with the USFWS. Spire will also concurrently file the results of these surveys with FERC as part of Volume IV, Privileged, Appendix 3-B, upon completion.

Mead's milkweed is generally found in tallgrass prairies or late successional prairie habitats. It generally flowers from late May to mid-June (USFWS 2003). Based on initial biological surveys and desktop review, Spire identified two locations of potential suitable habitat in Illinois. Landowner permission has not been granted in the locations where surveys for Mead's milkweed are proposed. Once survey permission has been granted, Spire will conduct a habitat assessment to determine if suitable habitat for Mead's milkweed is present in the Project area and further coordinate with the USFWS. Spire will also concurrently file the results of these surveys with FERC as part of Volume IV, Privileged, Appendix 3-B, upon completion.

Data from the Illinois Natural Heritage Program indicated that the Project could be in close proximity to a recorded population of groundplum milkvetch (*Astragalus crassicarpus* var. *trichocalyx*), an Illinois state-listed species, at one location in Jersey County, Illinois. Groundplum milkvetch generally flowers April through May (Mohlenbrock 2014). Initial biological surveys on this property have not been conducted due to landowner permissions. Once access has been granted, Spire will conduct a habitat assessment in the Project area to determine if potential suitable habitat for this species is present within the Project's construction right-of-way. If this species is found to be present within the Project area, Spire will further coordinate with the landowner in accordance with the Illinois Endangered Species Protection Act (520 ILCS 10) (Illinois General Assembly 2016).

3.4.1.7 Reptiles

Timber rattlesnakes, a state-listed species in Illinois, are most commonly found in mature forest in rugged, hilly, sometimes rocky terrain, or along rock bluffs and forest surrounding river corridors or riparian areas. According to the Illinois Natural History Survey ("INHS") associated with the University of Illinois at Urbana-Champaign's Prairie Research Institute, timber rattlesnakes are active from April to October and are known to sun on rock ledges near dens (INHS 2016). Foraging habitat includes upland forests and disturbed habitats including edges of fields where prey is more abundant (INHS 2016; Brannan 2015a; Brannan 2015b).

Based on consultation with the IDNR, timber rattlesnakes could potentially occur in one location crossed by the Project in Jersey County, Illinois (IDNR 2016f). Timber rattlesnakes have been documented at bluffs along the Mississippi River in Illinois and locally within the Principia Hills West Property north of the Mississippi River. IDNR provided Spire with recent (2016) timber rattlesnake survey data which identified two potential den buffers adjacent to Spire's proposed 24-inch pipeline workspaces (IDNR 2016g). Initial biological surveys have not been conducted on this property because landowner survey permission has not been obtained. Spire is continuing to work with the landowner in this area.

Under the Illinois Endangered Species Protection Act (520 ILCS 10), it is unlawful to harm, hunt, shoot, pursue, lure, wound, kill, destroy, harass, gig, spear, ensnare, trap, capture, collect, or to attempt to engage in such conduct with federal or state-listed species (ILGA 2016). The IDNR may authorize, under prescribed terms and conditions, any taking otherwise prohibited if that taking is incidental to, and not the purpose of, the carrying out of an otherwise lawful activities. As such, Spire intends to coordinate with the IDNR to develop a Conservation Plan to obtain Incidental Take Authorization for timber rattlesnakes at this location (IDNR 2016h).

3.4.1.8 Communities of Concern

Information on the communities of concern can be found in Sections 3.2.1 and 3.2.3.

3.4.2 Construction and Operation Impacts

Below is a discussion related to potential construction and operation-related impacts to endangered and threatened species and migratory birds.

3.4.2.1 Federally-listed Bird Species

The trenchless crossings of the Mississippi River and Missouri River would avoid and/or minimize the potential effects of the Project on the river shorelines and island habitat that federally-listed birds may utilize. Spire has prepared an HDD Contingency Plan related to inadvertent returns (Resource Report 2, Appendix 2-B). Accordingly, the Project is not likely to adversely affect these species.

3.4.2.2 Bald and Gold Eagle Protection Act

No records of known nests are located on or within 660 feet of the Project's construction workspace. Based on recommendations from the USFWS, Spire conducted surveys at wooded riparian areas crossed by the Project in February 2017. A total of 24 locations were identified for nest surveys. Nest surveys were conducted in 20 locations along the 24-inch pipeline and the North County Extension. No nests were identified as a result of these surveys. Results of these surveys was provided to the USFWS, FERC and the MDOC in March 2017. Further bald eagle nest searches will be conducted in the remaining areas once landowner permissions are obtained. If nests are identified during these surveys, Spire will coordinate with the USFWS to determine the appropriate construction measures that would need to be implemented as established in the USFWS National Bald Eagle Management Guidelines (USFWS 2007a).

3.4.2.3 Migratory Bird Treaty Act

Displacement of individuals and the loss or conversion of habitat from operation activities poses the greatest risk of impact to migratory birds. In December 2016, the USFWS indicated that loss of habitat associated with right-of-way clearing and habitat fragmentation are detrimental to migratory birds in landscapes heavily dominated by agriculture, urban sprawl, or other land use practices that restrict and fragment habitat. In order to minimize these risks, Spire implemented the following avoidance and minimization measures:

- Spire has routed its pipeline such that it avoids trees to the extent practicable by routing the majority of the 24-inch pipeline and North County Extension through agricultural fields;
- Spire has limited its construction right-of-way to the minimal width needed within wooded areas to safely construct and operate the proposed facilities;
- Other than tree clearing for the right of way on the north side of the Mississippi River, no interior forests are crossed by the Project. However, the proposed location of the 24-inch pipeline across the Mississippi River will parallel an existing pipeline right-of-way, therefore minimizing new fragmentation to an otherwise relatively undisturbed tract of interior forest habitat;
- Spire has maximized the use of existing right-of-ways by colocating the route (approximately one-third of the 24-inch pipeline is colocated, and approximately one-quarter of the North County Extension is colocated) with an existing linear easement as to further reduce impacts to the forest or other land uses in the Mississippi River Valley; and
- The majority of the 24-inch pipeline route and approximately 40 percent of the North County Extension route traverses agricultural lands that will be disturbed by spring agricultural prepping activities.

Based on a review of the tree and/or shrub nesting species, the majority of these species have a nesting time period (i.e., eggs or young in the nest) from May through July. In order to protect nesting migratory birds, Spire would not clear trees for construction between May 1 and August 1, 2018. Spire anticipates commencing construction in January 2018 provided that federal authorizations and state permits have been received. Tree clearing activities are currently proposed to be conducted between February 1 and May 1, 2018 (assuming these clearing dates also meet the allowable timeframes for listed bat species pending ongoing agency consultations). Some bird species, such as the loggerhead shrike, begin their nesting season earlier in the year, whereas some species may have active nests into August or September, such as black-billed cuckoo, red-headed woodpecker, willow flycatcher, and wood thrush. Should impacts to loggerhead shrike occur through the removal of shrubs and/or trees prior to May 1st, those individuals are likely to re-nest in suitable undisturbed adjacent habitat with sufficient time remaining in the breeding season to not only raise one brood, but multiple broods (Yosef 1996). For those species that may have active nests into August and September, impacts to those nesting species are not anticipated as tree clearing activities for the Project are anticipated to be completed prior to the start of their nesting season in May.

Kentucky warbler and worm-eating warbler are ground nesting species in wooded habitat and, therefore, are not anticipated to be impacted by the Project as the principle habitat they occupy (trees and shrubs) is proposed to be disturbed through the removal of vegetation prior to May 1st, which is the beginning of their active nesting time period. Other ground nesting species, such as the blue-winged warbler, dickcissel, field sparrow, and Henslow's sparrow nest in areas dominated by grasses, with the exception of blue-winged warbler which nests in herbaceous vegetation within edge and scrub-shrub habitat. Habitat for the blue-winged warbler can be assumed to be present over a majority of the Project where edges between wooded and open areas exist, therefore it can be anticipated that most areas where blue-winged warbler would nest would be disturbed during tree clearing activities proposed to be completed prior to May 1st, which would coincide with the beginning of their nesting season in May. As for the other ground nesting species that occupy open herbaceous land (i.e., dickcissel, field sparrow, and Henslow's sparrow), this nesting habitat is anticipated to disturbed prior to their breeding season commencing in May through a) spring agricultural field preparation by private landowners, and b) the use of the construction right-of-way by contractor vehicles and construction equipment. The USFWS concurred that Project clearing in actively cultivated lands would not be subject to timing restrictions (USFWS 2017a). As a result of tree clearing activities occurring prior to nests being occupied with eggs and/or young, these species may already be displaced from the Project during or prior to territory establishment and pair bonding and therefore would find suitable nesting sites in adjacent undisturbed habitat.

Lastly, species that primarily occupy aquatic habitat, such as black-crowned night-heron, least bittern, and pied-billed grebe are not anticipated to be impacted by the Project as large expansive wetland and/or aquatic habitats are not anticipated to be impacted by the Project. Although the Project crosses the Upper Mississippi Conservation Area on the south side of the Mississippi River, no tree clearing or surface disturbance within that area is proposed. Additional information regarding the Upper Mississippi Conservation Area is located in Resource Report 8.

From a habitat perspective, the proposed Project is not anticipated to significantly increase habitat fragmentation. The largest tract of forest crossed by the Project is located on the northern side of the Mississippi River. This area is fragmented by the presence of an existing pipeline right-of-way and roadways. In order to minimize impacts to this area, Spire has routed its pipeline adjacent to the existing pipeline corridor. Colocating the proposed 24-inch pipeline with the existing pipeline right-of-way minimizes impacts to this natural resource while still meeting the purpose and need of the Project.

Habitat loss for the Project will primarily be confined to where wooded areas will be cleared for construction and operation. Approximately six percent of the total area required for construction is considered forest and will be cleared. Furthermore, impacts to forest are scattered throughout the proposed 59 miles of the 24-inch pipeline and six miles of the North County Extension which equates to less than one acre per mile of tree clearing for the Project. Furthermore, approximately 30 acres of forest clearing will be allowed to revert back to forest, whereas only approximately 35 acres of forest will be a permanent loss, which is only approximately eight percent of the area required for operation of the Project.

Impacts to habitats used by the three non-breeding species of concern for the region (fox sparrow, rusty blackbird, and short-eared owl) are not anticipated following completion of the Project as large or concentrated areas of grassland habitat are not proposed to be converted to other land uses and large expanses of aquatic habitat will not be impacted. Habitat loss for the other grassland species of conservation concern that may breed in the Project area is also not anticipated as almost all of the impacted grassland and/or agricultural related habitat will be allowed to revert back to prior land use following construction.

Spire will minimize operational impacts to nesting birds of conservation concern by completing routine vegetation mowing or clearing over the full width of the operational right-of-way in uplands outside of the migratory bird nesting season of April 15th through August 1st as prescribed in FERC's Plan.

To date, no recommended clearing windows have been provided by the USFWS. However, Spire requested and received approval from the USFWS to conduct clearing activities, if needed, between April 1, 2018 and May 1, 2018 (USFWS 2017a). The implementation of the avoidance and minimization measures described herein as well as the abundance of suitable and similar habitat adjacent to the Project are anticipated to alleviate the potential for direct impacts to nesting adults and their young, regional population-level impacts, and the habitat of birds of conservation concern. Construction activities are not anticipated to impact migratory bird species to the degree to which the regional breeding success of these species would be compromised if nests were to be disturbed, therefore, significantly measureable negative impacts on migratory birds and their habitats are not anticipated as a result of construction and operation of the Project.

3.4.2.4 Aquatic Species

Spire is proposing to cross the Mississippi and Missouri Rivers via HDD, therefore no in-stream construction or disturbance to the stream bed is anticipated at these locations. Although successful HDD methods do avoid impacts on water quality by avoiding impact to the stream bank and bottom, a potential for an inadvertent return of drilling mud does exist. The return could result in a release of drilling fluids and a subsequent plume extending from the discharge point downstream. Depending on the type and volume of material released, indirect impacts on fish and habitat could be experienced. To minimize these potential affects, Spire would implements its HDD Contingency Plan provided in Resource Report 2, Appendix 2-B and subsequently consult with the USFWS in the event of an inadvertent return.

It is anticipated that HDD of these waterbodies would avoid potential effects of the Project on the federal- and state-listed aquatic species, therefore, the Project is not likely to adversely affect these species.

3.4.2.5 Bat Species

Spire is continuing coordination with the USFWS related to the potential presence of the Indiana bat, northern long-eared bat, and gray bat within the Project area. Spire will conduct mist net surveys in 2017 and will further coordinate with USFWS, IDNR, and MDOC regarding bat species. Spire will also concurrently file the results of these surveys with FERC as part of Volume IV, Privileged, Appendix 3-B, upon completion. Further correspondence with these agencies is provided in Appendix 1-C.

3.4.2.6 Plant Species

Surveys were conducted for decurrent false aster in October 2016 at one location in in Jersey County, Illinois. No individuals or suitable habitat were identified at this location. Based on consultation with USFWS, additional species-specific surveys are required in Missouri along the 24-inch pipeline and the North County Extension. If any individuals are located during the surveys, Spire would attempt to avoid direct impacts to the species. Surveys are anticipated to be conducted in September 2017. Results of these surveys will be provided to the USFWS in October 2017. No further surveys are necessary for decurrent false aster in Illinois (USFWS 2017a).

Spire will conduct species-specific surveys for eastern prairie fringed orchid in Illinois in June 2017 in accordance with the flowering period of this species. If any individuals are located during the surveys, Spire would attempt to avoid direct impacts to the species. Results of these surveys will be provided to the USFWS in July 2017.

Landowner permission has not been granted in the location where surveys for Mead's milkweed and the ground plum milkvetch are proposed. Once survey permission has been granted, Spire will conduct a habitat assessment to determine if suitable habitat for these species is present in the Project areas. The results of the surveys for Mead's milkweed will be provided to the USFWS. The results of the ground plum surveys will be provided to the IDNR.

Spire will also concurrently file the results of these surveys with FERC as part of Volume IV, Privileged, Appendix 3-B, upon completion.

3.4.2.7 Reptiles

It is anticipated that timber rattlesnakes are likely to be encountered within the Project area north of the Mississippi River. Spire is working with IDNR to develop a Conservation Plan as part of the incidental take permit process. The following descriptions of avoidance, minimization, and mitigation measures are currently being proposed by Spire. Discussions with IDNR on these measures are ongoing.

The area to be monitored for timber rattlesnakes encompasses the area north of the Mississippi River, approximately from MP 44.0 to MP 45.1. Qualified rattlesnake monitors (with certifications and state level permits) will inspect workspaces during construction to handle and relocate any rattlesnakes identified within or near the Project workspace, for the safety of both the snake and construction personnel. Spire will install obstructive barriers (such as silt fencing) around the perimeter of active construction areas. The obstructive barriers would isolate the work area to deter timber rattlesnakes from entering. The obstructive barriers and all active construction workspaces would be inspected by the rattlesnake monitor each morning prior to work. If breaches are found in the barriers, construction work would not begin until repairs are completed and the surrounding workspace is re-inspected for timber rattlesnakes.

Pits, trenches, or holes excavated during construction will either be immediately backfilled or covered overnight to prevent trapping and killing timber rattlesnakes. Requirements may be included in the Project construction specifications for backfill to be completed before end of the day and the open trenches should be checked for

snakes. Typical construction has the trench opened ahead of the pipe being laid and backfilled during construction. It is anticipated that the trench length left open would be minimal (less than 40 feet).

No blasting is proposed to occur within 100 feet of known rattlesnake dens. Blasting is currently proposed to occur approximately 600 feet from the nearest known dens. If blasting is needed in other locations in this area, it will be conducted in a manner that will not compromise the structural integrity of rock features or alter subsurface hydrology (e.g., maximum charge of two inches per second ground acceleration avoids impact to nearby structures). All blasting shall be subject to the following limitations:

- Maximum peak particle velocity of two inches per second in any of three mutually perpendicular axes, measured at the lesser distance of the nearest facility or the edge of the long-term right-of-way;
- Maximum drill size shall be 2.5 inches unless approved by Spire;
- Maximum quantity of explosive per delay shall be governed by the recorded measurements as influenced by work site conditions;
- Explosive agents and ignition methods shall be approved by Spire. Ammonium nitrate-fuel oil and other free flowing explosives and blasting agents are not acceptable and shall not be used;
- Drill holes shall not be left loaded overnight; and
- Good stemming material is to be used in all holes.

Areas where the ground has been disturbed for construction of the pipeline and access roads will be seeded with a native seed mixture as presented in Resource Report 7. This will help restore vegetative cover and reduce the potential for erosion and create habitat for wildlife.

Project construction will result in removal and displacement of rock within the workspace. When relocating rocks or boulders, construction staff can create potential habitat for timber rattlesnake. This includes placement of rock into piles on the edge of the right-of-way, ideally on south-facing slopes that receive direct sunlight. The structures would consist of flat rocks in a layered stack structure with an open crevice and exposed flat surfaces so that rattlesnakes can use the warm surfaces to bask.

Spire is in the process of developing mitigation strategies with IDNR. The IDNR has indicated that potential mitigation could include:

- support for research;
- habitat acquisition, protection, and restoration;
- support for restoration of the rare high-quality hill prairies in the vicinity; and/or
- a monetary donation to a conservation organization that seems equitable and fits within the overall project budget to propose within the Plan (Skufca 2017).

Spire will continue to coordinate with the IDNR to develop mutually agreeable mitigation measures to be implemented in this area for timber rattlesnakes. This information will be presented in Spire's Incidental Take Authorization Permit to be submitted to the IDNR in July 2017.

3.4.2.8 Communities of Concern

Impacts to communities of concern were previously discussed in Section 3.2.2 and 3.2.3. No impacts to communities of concern are anticipated from construction and operation of the Project.

3.4.3 Agency and Stakeholder Consultation

In August 2016, Spire initiated consultation with the USFWS Rock Island Office, IDNR, and MDOC. Agency correspondence has been included in Resource Report 1, Appendix 1-C. Further correspondence with the agencies will be provided to the FERC upon receipt.

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APPENDIX 3-A

Noxious Weed/Invasive Plant Control and Mitigation Plan

Spire STL Pipeline Project

Noxious Weeds/Invasive Plant Species Control and Mitigation Plan

FERC Docket No. CP17-40-_ _ _

April 2017

Public

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Acronyms and Abbreviations

BMP	Best Management Practices
EI	Environmental Inspector
FERC	Federal Energy Regulatory Commission
Plan	FERC's Upland Erosion Control, Revegetation, and Maintenance Plan
Project	Spire STL Pipeline Project
Spire	Spire STL Pipeline LLC
USDA	United States Department of Agriculture

Noxious Weeds/Invasive Plant Species Control and Mitigation Plan

This Noxious Weeds/Invasive Plant Species Control and Mitigation Plan describes the general control measures to be implemented by Spire STL Pipeline LLC ("Spire") and its contractors during construction and post-construction activities of the Spire STL Pipeline Project ("Project"). Where deemed appropriate and feasible, measures identified within this plan will be applied to work areas during construction and post-construction activities to avoid and/or minimize the spread of existing noxious weeds or invasive plant species within the Project's permanent easement.

1.1 Noxious Weeds and Invasive Plant Species

Botanists familiar with the vegetative community types and noxious weeds potentially occurring within the Project area developed a list of noxious and invasive species for survey purposes based on the Illinois Noxious Weed Law and the Missouri Noxious Weed List (Illinois Administrative Code 2002; and Missouri Department of Agriculture 2011), In addition, species on the United States Department of Agriculture's ("USDA") Introduced, Invasive and Noxious Plants Federal Noxious Weed List was reviewed for additional species that have the potential to occur in the Project area. A list of potential noxious and invasive species reviewed for the Project area is provide in Attachment A (USDA 2013).

Baseline noxious weed and invasive plant species surveys ("Surveys") were performed concurrently during the biological field surveys by qualified environmental specialists. Surveys were performed by walking the ground within the Project's survey corridor and access roads in a systematic sequence to ensure optimal coverage and identification of invasive plant species as listed on the Noxious Weeds and Invasive Plant Species List. For each distinct occurrence of an invasive plant species observed within the Project corridor, Global Positioning System data points were collected to document the specific location of the invasive plant species occurrence. For each data point collected, the plant species name plus a general identifier for the general level of infestation was recorded. Weed infestation levels were generalized into low (single plants), moderate (small cluster of invasive species), and high categories (widespread infestation). At certain locations, multiple data points were taken if more than one noxious weed species was observed and distributed within distinct areas of close proximity. The locations and extent of noxious weeds identified during baseline surveys is provided in Attachment B.

1.2 Control and Mitigation Plan

During construction, exposed topsoil may provide for the recruitment of invasive species, and the potential exists for equipment to bring in seeds to non-infested areas. In order to counteract the potential for the introduction and/or spread of noxious weeds and invasive plant species listed in Attachment A. Spire, in conjunction with recommendations from the USDA's Conservation Program in Scott, Greene, and Jersey Counties, Illinois, and in St. Charles and St. Louis Counties, Missouri, has developed best management practices ("BMPs") that will be

implemented on the Project during construction (Behymer 2016, Fuller 2016, Muenks 2016, Perkins 2016, Wamsley 2016).

1. Prior to the start of Project construction actives, Spire will provide contractors and environmental inspector's ("EIs") maps that depict the location and level of infestation for plant species occurrences identified within the Noxious Weed Surveys.
2. Adhere to erosion control measures in Federal Energy Regulatory Commission's ("FERC") *Upland Erosion Control, Revegetation, and Maintenance Plan* ("Plan") and FERC's *Wetland and Waterbody Construction and Mitigation Procedures* to ensure that sediment movement into newly disturbed soils are minimized to avoid the potential of invasive plant species seed distribution.
3. Use construction techniques along the pipeline route that minimize the time that bare soil is exposed and, therefore, minimize the opportunity for exotic species to become established.
4. Ensure all vehicles, equipment, and materials are inspected and cleaned of any visible vegetation and/or soil before entering or leaving areas of known noxious weed infestations identified within the construction right-of-way.
5. All disturbed areas will be reseeded promptly after final grading, weather and soil conditions permitting, and in consideration of written recommendations from the local soil conservation authorities. Prompt reseeding will ensure that any bare soil within the Project corridor is not available for exotic or invasive species for an extended period of time providing the opportunity for the establishment of plant species listed on the Noxious Weeds and Invasive Plant Species List.
6. As described in the FERC Plan, mulch if available, consisting of a local sources or certified weed-free straw or hay or other erosion-control materials will be used during constructions activities and installation of permanent erosion control measures.
7. During active construction activities and until the Project right-of-way is successfully revegetated as outlined in FERC's Plan, Spire will require all EIs to inspect the Project right-of-way for any new growth of plant species listed on the Noxious Weeds and Invasive Plant Species List. If new areas of growth are observed, Spire will coordinate with landowners and applicable agencies to address concerns.
8. Spire will utilize herbicides and/or pesticides as necessary to provide weed control at aboveground facilities in Illinois which are located adjacent to agricultural lands in accordance with the Project-specific Agricultural Impact Mitigation Agreement for Illinois. Herbicide use will be conducted by an applicator licensed in the state of Illinois. Spire does not propose to utilize herbicides on its pipeline right-of-way. Measures will be taken (as described above) to control the spread of noxious weeds during construction. Spire will monitor the disturbed areas to address the success of revegetation in accordance with FERC's Plan. If species or colonies are found in numbers which are significantly different from the existing nearby off right-of-way locations, Spire will conduct mowing and/or hand cutting/removal of the species in these areas.

It may not be possible to eradicate invasive species in the Project area because of such issues as seed drift or colonization from off-site locations. Therefore, Spire's overall goal is to control the invasive species to the extent

that wetlands and uplands are not dominated by the invasive species to the point where the functions and values of the systems/habitats are adversely compromised. Spire has included the use of BMPs to control the transport of invasive species from areas where they may currently occur along the Project route. Measures, such as training personnel in the identification of invasive species, inspecting and cleaning equipment, and practices to encourage rapid stabilization, restoration, and revegetation of disturbed work areas, have been incorporated to minimize adverse impacts resulting from the presence of invasive species.

Spire has provided a copy of this plan as a courtesy to the USDA's Conservation Program representatives in Illinois per request.

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ATTACHMENT A

Noxious Weeds and Invasive Plant Species List

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Attachment A. Noxious Weeds and Invasive Plant Species List

Scientific Name	Common Name
Federal Species Known to Occur in Illinois or Missouri	
Heracleum mantegazzianum	Giant Hogweed
Nassella trichotoma	Serrated tussock
Orobanche	Broomrape
Ottelia alismoides	Ducklettuce
Cuscuta	Dodder
Illinois State List	
Ambrosia artemisiifolia	Common ragweed
Ambrosia trifida	Giant ragweed
Cannabis sativa	Marijuana
Carduus nutans	Musk Thistle
Cirsium arvense	Canada thistle
Pueraria montana	Kudzu
Sonchus arvensis	Perennial sowthistle
Sorghum almum	Columbus grass
Sorghum halepense	Johnsongrass
Missouri State List	
Cannabis sativa	Marijuana
Cirsium arvense	Canada thistle
Carduus nutans	Musk thistle
Convolvulus arvensis	Field bindweed
Dipsacus fullonum	Common teasel
Dipsacus laciniatus	Cut-leaved teasel
Lythrum salicaria	Purple loosestrife
Onopordum acanthium	Scotch thistle
Pueraria montana	Kudzu
Rosa multiflora	Multiflora rose
Sorghum halepense	Johnsongrass

ATTACHMENT B

Noxious Weed Locations

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Attachment B. Noxious Weed Locations

Milepost/ County, State	Feature I.D.	Species	Cover	Within Construction Work Areas (Y/N)	Distance to Construction Work Areas (feet)
24-Inch Pipeline					
Scott County, Illinois					
0.9	NOX-TMA-001	Giant ragweed *(Ambrosia trifida)*	Low	No	13
1.0	NOX-TMA-002	Giant ragweed	Low	Yes	0
1.0	NOX-TMA-003	Giant ragweed	Low	Yes	0
1.0	NOX-TMA-004	Giant ragweed	Low	No	78
2.2R	NOX-TMA-005	Ambrosia spp.	Low	No	410
2.4	NOX-TMA-006	Giant ragweed	Low	No	635
2.4	NOX-TMA-007	Giant ragweed	Low	No	749
2.6	NOX-TMA-008	Common ragweed *(Ambrosia artemisiifolia)*	Low	No	654
2.7	NOX-TMA-009	Sorghum halepense	Low	No	454
3.1	NOX-TMA-010	Common ragweed	Moderate	No	3
3.4	NOX-TMA-012	Johnsongrass	Low	No	111
3.4	NOX-TMA-011	Giant ragweed	Low	No	119
Greene County, Illinois					
3.6	NOX-TMA-013	Common ragweed	Moderate	No	221
3.7	NOX-TMA-014	Ragweed spp.	Moderate	No	93
3.7	NOX-TMA-015	Ragweed spp.	Moderate	No	102
3.8	NOX-TMA-016	Common ragweed	Moderate	Yes	0
4.2	NOX-TMA-017	Common ragweed	Low	Yes	0
4.5	NOX-TMA-019	Ragweed spp.	Moderate	No	29
5.8	NOX-TMA-020	Common ragweed	Low	No	38
5.8	NOX-TMA-021	Ragweed spp.	Low	No	16
6.4	NOX-TMA-022	Ragweed spp.	Low	No	273
8.6	NOX-TMA-025	Giant ragweed	Moderate	Yes	0
11.5	NOX-TMA-024	Giant ragweed	High	No	43
12.0	NOX-TMA-023	Giant ragweed	Low	No	26
14.1	NOX-TMA-026	Giant ragweed	Moderate	No	5
15.0	NOX-TMA-027	Giant ragweed	Low	Yes	0
15.6	NOX-TMA-028	Giant ragweed	Low	No	3

spire

Attachment B. Noxious Weed Locations (Continued)

Milepost/ County, State	Feature I.D.	Species	Cover	Within Construction Work Areas (Y/N)	Distance to Construction Work Areas (feet)
19.5	NOX-TMA-029	Giant ragweed	Moderate	No	4
25.3R	NOX-JJP-004	Giant ragweed	High	Yes	0
25.3R	NOX-TMA-033	Giant ragweed	High	No	810
26.1	NOX-TMA-031	Giant ragweed	High	No	43
26.1	NOX-TMA-032	Giant ragweed	Moderate	No	5
27.6	NOX-TMA-030	Giant ragweed	Moderate	Yes	0
Jersey County, Illinois					
35.5R	NOX-CDK-011	Johnsongrass *(Sorghum halepense)*	Low	No	790
35.8R	NOX-CDK-009	Johnsongrass	High	No	860
36.5R	NOX-CDK-008	*Giant ragweed*	Moderate	No	979
36.5R	NOX-CDK-010	Johnsongrass	Low	No	1,078
58.3 (TAR-021)	NOX-CDK-012	Johnsongrass	Low	No	11
North County Extension					
St. Louis County, Missouri					
5.9	NOX-JJP-003	Johnsongrass	Low	Yes	0
6.0	NOX-JJP-002	Johnsongrass	Low	Yes	0
6.0	NOX-JJP-001 (end)	Giant ragweed	Low	No	24
6.0	NOX-JJP-001 (start)	Giant ragweed	Low	No	31

APPENDIX 3-B

Species Specific Reports for Rare, Threatened, and Endangered Species Surveys

CONTAINS PRIVILEGED INFORMATION – DO NOT RELEASE

APPENDIX 3-C

Unique Wildlife Habitat Types Affected by Construction and Operation of the Project

CONTAINS PRIVILEGED INFORMATION – DO NOT RELEASE