

# MANAGEMENT INDICATOR SPECIES REPORT

## MOUNTAIN VALLEY PIPELINE

### JEFFERSON NATIONAL FOREST EASTERN DIVIDE RANGER DISTRICT

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U.S. Department of Agriculture, Forest Service  
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## LIST OF ACRONYMS AND ABBREVIATIONS

ATWS	additional temporary workspace
BA	Biological Assessment
BE	Biological Evaluation
FERC	Federal Energy Regulatory Commission
hp	Horsepower
IUCN	International Union for Conservation of Nature
JNF	Jefferson National Forest
MIS	Management Indicator Species
MVP	Mountain Valley Pipeline, LLC
Project	Mountain Valley Pipeline Project
ROW	right-of-way
TES	Threatened, endangered, Forest Service sensitive
T/E/S	Threatened/Endangered/Sensitive
Transco	Transcontinental Gas Pipe Line Company, LLC
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
WAP	Wildlife Action Plan
WERMS	Wildlife Environmental Review Map Service

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## **1.0 Introduction**

### **1.1 Project Introduction**

Mountain Valley Pipeline, LLC (MVP), a joint venture between EQT Midstream Partners, LP, NextEra Energy, Inc., WGL Holdings, Inc., Con Edison Gas Midstream, LLC, and RGC Midstream, LLC, is seeking a Certificate of Public Convenience and Necessity (Certificate) from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act authorizing it to construct and operate the proposed Mountain Valley Pipeline Project (Project) located in 17 counties in West Virginia and Virginia. MVP plans to construct an approximately 488.3-kilometer (303.4-mi), 106.7-centimeter (42-in) diameter natural gas pipeline to provide timely, cost-effective access to the growing demand for natural gas for use by local distribution companies, industrial users, and power generation in the Mid-Atlantic and southeastern markets, as well as potential markets in the Appalachian region.

The proposed pipeline will extend from the existing Equitrans, L.P. transmission system and other natural gas facilities in Wetzel County, West Virginia to the existing Transcontinental Gas Pipe Line Company, LLC's (Transco) Zone 5 compressor station 165 in Pittsylvania County, Virginia (Appendix A, Figure 1). In addition to the pipeline, the Project will require approximately 171,600 horsepower (hp) of compression at three compressor stations currently planned along the route as well as measurement, regulation, and other ancillary facilities required for the safe operation of the pipeline. The pipeline is designed to transport up to 2.0 million dekatherms per day of natural gas.

### **1.2 Mountain Valley Pipeline and Jefferson National Forest**

Approximately 3.5 miles of the proposed alignment cross Jefferson National Forest (JNF) lands in Monroe County, West Virginia and Giles and Montgomery counties, Virginia. The 6-mile Pocahontas Road (Forest Road 972) and 1-mile Mystery Ridge Road (Forest Road 11080) in Giles County, Virginia are currently proposed to provide access to portions of the alignment near Peters Mountain. Additionally, two additional temporary workspaces (ATWS) are currently proposed in Montgomery County. No ancillary facilities or new access roads are proposed to be constructed on JNF land.

A Biological Evaluation (BE) for this Project was submitted on March 3, 2017. The BE assesses potential impacts to species identified as sensitive by the Regional Forester (Forest Service Sensitive Species).

This report assesses the potential effects of the Project on Management Indicator Species (MIS). Federal regulations require that National Forests select MIS during development of forest plans because changes in MIS populations are believed to

indicate the effects of management activities. Consideration of MIS is intended to assist the U.S. Forest Service (USFS) during planning to help compare effects of potential project alternatives as a focus for wildlife monitoring. These MIS are chosen to represent the following groups of species: threatened and endangered species; species with special habitat needs; species commonly hunted, fished, or trapped (demand species); non-game species of special interest; and species selected to indicate effects on other species of selected major biological communities (USDA 2004).

### **1.3 Proposed Alignment on JNF Land**

The Project crosses into the JNF in Monroe County, West Virginia, southwest of the town of Lindside, and continues to the edge of JNF land at the border of Virginia. The proposed alignment continues through Virginia and crosses the JNF again in Montgomery County.

The West Virginia portion of the Project lies in the Allegheny Plateau, Allegheny Mountains, and Valley and Ridge Physiographic regions. In Virginia, the Project lies in the Valley and Ridge, Blue Ridge, and Piedmont Physiographic regions. All JNF areas crossed by the Project are within the Valley and Ridge Province (Fenneman 1938).

The geologic strata of the Valley and Ridge mountains consist of several bedrock formations. Silurian sandstones underlie ridge tops and upper to middle slopes are underlain by shale and minor sandstone. The lower portion of the mountains is underlain by a layer of calcareous shale, shale, and minor limestone. Mountain bases are characterized by limestone and valleys are underlain by dolomite. The Valley and Ridge Province is underlain by essentially the same strata as the Allegheny Plateau, which is located in western and central New York, northern and western Pennsylvania, northern and western West Virginia, and eastern Ohio. The Valley and Ridge Province, however, contains older parts of the stratigraphic column. Structurally, the Valley and Ridge is much more severely deformed than the Allegheny Plateau. The ridges were formed where stronger rocks resisted erosion, and the valleys were formed by constant erosion and down-cutting over time. The Valley and Ridge contrasts the Allegheny Plateau with its longitudinal ridges and much deeper dips in the strata (Fenneman 1938). Elevations of the Project within the JNF range between approximately 518 and 1,097 meters (1,700 and 3,600 ft).

The West Virginia/Virginia border approximately forms the western edge of the Valley and Ridge Province, which extends from southeast Tennessee northeast to eastern Pennsylvania in a fairly narrow band. The Valley and Ridge is part of the Oak-Chestnut forest described by Braun (1950). The region was traditionally dominated by oak and chestnut, but chestnut has been replaced in the canopy by oaks and hickories (Braun 1950). The portion of the JNF crossed by the Project is composed primarily of deciduous forest.

## 2.0 Management Indicator Species

There are 13 designated MIS for the JNF (Table 1). These species occupy a variety of habitats throughout the Forest. Categories of MIS include Threatened/Endangered/Sensitive (T/E/S) Indicators, Special Habitat Indicators, Demand Species Indicators, Special Species Indicators, and Biological Community Indicators. T/E/S Indicators are species that are federally or state listed as endangered or threatened that occur in the planned area. Special Habitat Indicators are plant and animal species with special habitat needs that may be significantly influenced by management programs. Demand Species Indicators are species that are commonly hunted, fished, or trapped. Special Species Indicators are non-game plant or animal species of special interest. The only Special Species Indicator designated by JNF is Peaks of Otter Salamander. Biological Community Indicators are additional plant or animal species whose population fluctuations possibly indicate the effects of management practices on other species of selected major biological communities or on water quality.

Table 1. Management Indicator Species on Jefferson National Forest.

Scientific Name	Common Name	Indicator Category
<i>Empidonax virescens</i>	Acadian Flycatcher	Special Habitat Indicator
<i>Ursus americanus</i>	American Black Bear	Demand Species Indicator
<i>Setophaga pensylvanica</i>	Chestnut-sided Warbler	Special Habitat Indicator
<i>Pipilo erythrophthalmus</i>	Eastern Towhee	Biological Community Indicator
<i>Meleagris gallopavo</i>	Eastern Wild Turkey	Demand Species Indicator
<i>Setophaga citrina</i>	Hooded Warbler	Biological Community Indicator
<i>Seiurus aurocapilla</i>	Ovenbird	Special Habitat Indicator
<i>Plethodon hubrichti</i>	Peaks of Otter Salamander	T/E/S Indicator; Special Species Indicator
<i>Dryocopus pileatus</i>	Pileated Woodpecker	Special Habitat Indicator
<i>Setophaga pinus</i>	Pine Warbler	Biological Community Indicator
<i>Piranga olivacea</i>	Scarlet Tanager	Biological Community Indicator
<i>Odocoileus virginianus</i>	White-tailed Deer	Demand Species Indicator
Multiple species	Wild Trout	Biological Community Indicator; Demand Species Indicator

### 2.1 Acadian Flycatcher (*Empidonax virescens*)

#### 2.1.1 Ecology

The Acadian Flycatcher (*Empidonax virescens*) is a widely distributed species across mixed forest landscapes of the eastern U.S. Although the species prefers to nest in deciduous forest stands, it has been documented using coniferous trees in the northeastern and southeastern United States (Mumford 1964). The Acadian Flycatcher



is generally associated with water and is often found along streams in lowland forests (Mumford 1964).

### **2.1.2 Geographic Range**

The breeding range of the Acadian Flycatcher extends from central Texas north to western Wisconsin and east to Massachusetts and south to central Florida (Mumford 1964). The species migrates north in the spring from its winter habitat in Central and South America maintaining migratory flyways through Mexico, Central America, and the Caribbean (Mumford 1964). The Acadian Flycatcher can be found statewide in Virginia during the breeding season (USDA 2004).

### **2.1.3 Conservation Status**

Breeding Bird Survey data suggest that populations of the Acadian Flycatcher are relatively stable; however, the species has a high rate of fecundity and is sensitive to forest fragmentation and localized disturbance (IUCN 2008a). The species also experiences brood parasitism by Brown-headed Cowbirds although it occurs at lower rates than other edge species in fragmented habitats. Due to its extremely large range, the Acadian Flycatcher is listed as a species of least concern by the International Union for Conservation of Nature (IUCN) and is currently not listed by the U.S. Fish and Wildlife Service (USFWS) (IUCN 2008a). The Acadian Flycatcher is not currently a federally or state-listed species.

### **2.1.4 Indicator Category**

The JNF lists the Acadian Flycatcher as a Special Habitat Indicator using the presence and absence of this species in mature riparian forests to help indicate the effectiveness of management (USDA 2004). The species was selected as an MIS due to its affinity for mature riparian forests and its ability to serve as a marker for changes to riparian habitat (USDA 2004).

## **2.2 American Black Bear (*Ursus americanus*)**

### **2.2.1 Ecology**

American black bears (black bear; *Ursus americanus*) are a large, omnivorous mammal occupying a variety of habitats. The breeding period for black bears is typically in June and July, and young are born between January and February. Black bears forage opportunistically on a variety of plants and animals (USDA 2004). This species uses roads and trails with low traffic as travel ways and also forage in the created edge habitat. However, roads with high traffic volume negatively impact black bear populations.

### **2.2.2 Geographic Range**

Black bears can be found throughout most of North America north of Mexico except for desert habitats in the southwestern United States. Intensive agriculture and human settlement has displaced black bears from much of the midwestern United States.

Numbers of black bears in the JNF are increasing, as the JNF and surrounding lands provide quality, non-motorized habitat (USDA 2004).

### **2.2.3 Conservation Status**

The black bear is a species of least concern throughout its distribution (Garshelis et al. 2016). The species is widespread, and populations have experienced recent increases. It is not a federally or state-listed species.

### **2.2.4 Indicator Category**

The black bear is a Demand Species Indicator. Monitoring this species aids the USFS in evaluating population and usage trends. Additionally, the USFS is able to monitor harvest levels and hunting demand as this aids in indicating the effectiveness of the agency's management in meeting public demand (USDA 2004).

## **2.3 Chestnut-sided Warbler (*Setophaga pensylvanica*)**

### **2.3.1 Ecology**

Chestnut-sided Warblers (*Setophaga pensylvanica*) prefer brushy patches, brambles, and briars in second-growth deciduous woods, fields, and edge habitats. Deforestation in the eastern United States has greatly expanded the range and population of Chestnut-sided Warblers since the early 19<sup>th</sup> century. The Chestnut-sided Warbler is a seasonal migrant maintaining breeding habitat across the northeastern United States and Canada before migrating to Mexico, Central America, and the Caribbean. During the breeding season, the males are highly territorial and form monogamous (and sometimes bigamous) pairs (King and Byers 2002).

### **2.3.2 Geographic Range**

Within the United States, the breeding range of the Chestnut-sided Warbler extends across the Great Lakes region, into New England, and down the Appalachian and Blue Ridge Mountains as far south as western Virginia and North Carolina. Its migratory range is expanded to include the Midwest from the eastern edge of North Dakota south to the eastern third of Texas and Mexico. In winter, the species migrates into southern Mexico, Central America, and the Caribbean (IUCN 2008e).

The Chestnut-sided Warbler can be found during breeding season throughout the mountainous portion of western Virginia and across the entire extent of the JNF (USDA 2004).

### **2.3.3 Conservation Status**

Due to its extremely large range, the Chestnut-sided Warbler is listed as a species of least concern by the IUCN. It is not currently listed by the USFWS (IUCN 2008e), nor is it listed at the state level.

### **2.3.4 Indicator Category**

The JNF lists the Chestnut-sided Warbler as a Special Habitat Indicator using changes in presence of this species in areas that provide high-elevation early-successional habitats to indicate effectiveness of management in achieving desired conditions within these sites (USDA 2004). The species was selected as an MIS due to its affinity for high-elevation, early-successional forest habitats (USDA 2004).

## **2.4 Eastern Towhee (*Pipilo erythrophthalmus*)**

### **2.4.1 Ecology**

The Eastern Towhee (*Pipilo erythrophthalmus*) is a small bird found in early successional habitats. The species forages on insects, seeds, and berries, rarely consuming small invertebrates, and typically forages on the ground with a scratching behavior. Eastern Towhees nest in early successional areas, within shrublands, thickets, or brush (Bell and Whitmore 1997). Nests are typically placed 1.5 meters (5 ft) above the ground (Bell and Whitmore 1997). Clutch size averages three to four eggs, with a range of two to six eggs. The eggs are incubated for approximately two weeks, and the young fledge a week and a half later (Bell and Whitmore 1997).

### **2.4.2 Geographic Range**

The Eastern Towhees occur across the eastern half of the United States. They occur year-round south of Kentucky, West Virginia, Illinois, and Missouri and north of these states in the breeding season (spring and summer) (IUCN 2016d). Eastern Towhees that breed in the northeastern United States winter in the southeast among resident populations.

Eastern Towhees occur throughout JNF year round, preferentially using regenerating forest openings (USDA 2004).

### **2.4.3 Conservation Status**

Eastern Towhees are considered a species of Least Concern by the IUCN (IUCN 2016d). Note that while this species is generally covered by the Project Migratory Bird Conservation Plan, it is not addressed individually because of its relatively common status. The species has a large range, stable population trend, and large population size (IUCN 2016d). In Virginia, the species is listed as Tier IV in the Virginia Wildlife Action Plan (WAP) indicating a moderate conservation need.

### **2.4.4 Indicator Category**

The Eastern Towhee is a Biological Community Indicator. Monitoring Eastern Towhees aids in addressing the quality of key successional stage habitats (USDA 2004). Trends in Eastern Towhee population presence and abundance within early-successional/early-seral forests are used to indicate management effectiveness of this type of habitat (USDA 2004).

## **2.5 Eastern Wild Turkey (*Meleagris gallopavo*)**

### **2.5.1 Ecology**

The Eastern Wild Turkey (Wild Turkey; *Meleagris gallopavo*) is a large, ground-dwelling bird found in woodland habitats. The species occupies a variety of habitats, preferring herbaceous cover for nesting and mature forest stands during fall and winter. Females incubate a clutch of 10-12 eggs for up to 28 days beginning in late April or early May. In the northern areas, eggs hatch in early June, while hatching may be earlier in southern portions of the species' range (USDA 2004).

### **2.5.2 Geographic Range**

Wild Turkeys are common in woodlands throughout the eastern United States and Canada. Populations in particular areas of the JNF appear to be increasing with an average of 4 individuals per square mile. Total population size has been estimated at approximately 6,500 individuals (USDA 2004). More recently, Wild Turkey populations have been increasing throughout its distribution (IUCN 2016b).

### **2.5.3 Conservation Status**

The Wild Turkey is a species of least concern throughout its distribution. Wild Turkeys have a large, secure population, which appears to be increasing (IUCN 2016b). It is not a federally or state-listed species.

### **2.5.4 Indicator Category**

The Wild Turkey is a Demand Species Indicator. Monitoring this species addresses questions concerning trends for demand species and their use. Monitoring trends in harvest levels and hunting demand for wild turkeys aids in indicating the effectiveness of their management in meeting public demand (USDA 2004).

## **2.6 Hooded Warbler (*Setophaga citrina*)**

### **2.6.1 Ecology**

The Hooded Warbler (*Setophaga citrina*) inhabits mixed-age hardwood forests and cypress-gum swamps, preferring edge habitats during the breeding season (Twedt et al. 1999). In winter, individuals become highly territorial and segregate by sex with males occupying areas of mature forest while females prefer to winter in scrub, secondary forest, and disturbed habitat (Twedt et al. 1999).

### **2.6.2 Geographic Range**

The Hooded Warbler utilizes breeding habitat in the southeastern United States and north to southern Canada (IUCN 2008d). The species maintains minimal migratory habitat in southern Florida and the Great Plains before migrating south into Mexico, Central America, and the Caribbean (Moorman et al. 2002). Hooded Warblers are common throughout Virginia during the breeding season (USDA 2004).

### **2.6.3 Conservation Status**

The Hooded Warbler is listed as a species of least concern by the IUCN due to its expansive range. It is not currently listed by the USFWS (IUCN 2008d), nor is it listed at the state level. The Audubon Society considers the species vulnerable due to its high level of brood parasitism by Brown-headed Cowbirds and because it favors infinitesimal tropical understory during winter (IUCN 2008d).

### **2.6.4 Indicator Category**

The JNF lists the species as a Biological Community Indicator using changes in presence and abundance of Hooded Warblers in mature mesic deciduous forest to help indicate the effectiveness of management to provide dense understory and mid-story structure within these forest communities (USDA 2004). The species was selected as an MIS due to its affinity for mid- to late-successional mesic deciduous forests (USDA 2004).

## **2.7 Ovenbird (*Seiurus aurocapilla*)**

### **2.7.1 Ecology**

The Ovenbird (*Seiurus aurocapilla*) resides in large tracts of mature deciduous forest or mixed deciduous-coniferous forest, requiring large expanses of mature forest with closed canopy and sparse ground cover (Seagle and Sturtevant 2005). The Ovenbird typically lays four to five eggs during the breeding season, and, despite high rates of brood parasitism by Brown-headed Cowbirds, survival rates are generally high with young leaving the nest after 10 to 20 days (Seagle and Sturtevant 2005).

### **2.7.2 Geographic Range**

The Ovenbird has an extensive breeding range and can be found primarily in central Canada and the northern half of the United States from northwest Arkansas north to the Dakotas and east to the Atlantic Ocean. Ovenbirds also establish breeding populations in southern Mexico and throughout Central America. The species may occur seasonally throughout the Midwestern United States into the Southeast; however, there is a great level of seasonal uncertainty (Seagle and Sturtevant 2005). This species is common throughout the JNF (USDA 2004).

### **2.7.3 Conservation Status**

The Ovenbird is listed as a species of least concern by the IUCN due to its expansive range and stable population levels. It is not currently listed by the USFWS (IUCN 2008c), nor is it listed at the state level.

### **2.7.4 Indicator Category**

The JNF currently lists the Ovenbird as a Special Habitat Indicator using trends in presence and abundance in mature deciduous forests to help indicate the effectiveness of management to maintain desired conditions relative to forest interior habitats (USDA 2004). The species was selected as an MIS due to its strong

association with mature forest interiors and its relative abundance thus making it a suitable candidate species for long term forest monitoring (USDA 2004).

## **2.8 Peaks of Otter Salamander (*Plethodon hubrichti*)**

### **2.8.1 Ecology**

The Peaks of Otter salamander (*Plethodon hubrichti*) can be found primarily on north-facing slopes in mature, moist Appalachian hardwood forests (Mitchell et al. 1996). It is frequently found in shaded coves and ravines, often in rhododendron and on the underside of downed logs or dispersed within wet leaf litter (Mitchell et al. 1996). The species is a terrestrial breeder utilizing direct development, and eggs are deposited under large rocks or within the soil where they hatch in August and September (IUCN 2008b). Peaks of Otter salamanders are non-migratory and typically hold home ranges of approximately 0.6m<sup>2</sup>. The species is not evenly distributed across its range, with the highest density of individuals occurring in areas of deep, moist soil in mature hardwood stands (Mitchell et al. 1996).

### **2.8.2 Geographic Range**

Peaks of Otter salamanders are restricted to the Virginia counties of Bedford, Botetourt, Buena Vista, Lexington, and Rockbridge with the majority of its known range occurring within the JNF and along portions of the Blue Ridge Parkway (IUCN 2008b), perhaps because this is where humans are most active within its range.

Peaks of Otter salamanders are typically found in mature Appalachian hardwood forest at elevations above 550m. Peaks of Otter salamanders have been found to occur in average densities of 0.24 individuals/m<sup>2</sup> within the JNF (Mitchell et al. 1996).

### **2.8.3 Conservation Status**

Peaks of Otter salamanders are currently listed as Species of Concern by the IUCN, and its listing status is currently pending review by the USFWS (IUCN 2008b). The USFWS and the Commonwealth of Virginia list the species as a “species of special concern”, whereas the USFS lists it as a “sensitive” species. This species is also a Tier I species in the WAP indicating a critical conservation need (USDA 2004). In an effort to aid in the survival and recovery of the species, the USFS have designated approximately 7,700 acres as habitat conservation areas.

### **2.8.4 Indicator Category**

Within the JNF, the Peaks of Otter salamander is listed as a T/E/S Indicator Species and Special Interest Species Indicator using trends in populations of this species to indicate effectiveness of management activities (USDA 2004). The species was selected as an MIS due to its endemic distribution within the JNF and along portions of the Blue Ridge Parkway (USDA 2004).

## **2.9 Pileated Woodpecker (*Dryocopus pileatus*)**

### **2.9.1 Ecology**

Pileated Woodpeckers (*Dryocopus pileatus*) generally favor mature deciduous forest or mixed deciduous-coniferous forest but may also be found in secondary growth wood lots with larger diameter trees (Daniels et al. 2017). Pileated Woodpeckers maintain and defend large territories and form monogamous breeding pairs, and females lay one clutch of between one and six eggs per year (Daniels et al. 2017). After hatching, the young typically mature within three to five months before leaving the nest, although they do not venture far from their natal territory even as adults (Daniels et al. 2017).

### **2.9.2 Geographic Range**

The Pileated Woodpecker has an extensive range that spreads south from central Canada along the west coast of the United States and east from Oklahoma to the Atlantic Ocean (Daniels et al. 2017). This species is found throughout the JNF (USDA 2004).

### **2.9.3 Conservation Status**

Due to its extensive range and recent increase in population, the Pileated Woodpecker is currently listed as a species of least concern by the IUCN and is not currently listed by the USFWS (IUCN 2016a), nor is it listed at the state level.

### **2.9.4 Indicator Category**

The JNF currently lists the Pileated Woodpecker as a special habitat indicator using trends in presence and abundance of this species across the forest to help indicate the effectiveness of management (USDA 2004). The species was selected as an MIS due to its habitat requirement of large snags for nesting and feeding. As such, species occurrence may be correlated with forest habitats containing adequate numbers of snags, which are used by multiple species of birds, mammals, and amphibians (USDA 2004).

## **2.10 Pine Warbler (*Setophaga pinus*)**

### **2.10.1 Ecology**

The Pine Warbler (*Setophaga pinus*) is a small, woodland bird in the wood warbler family (Parulidae). Pine Warblers breed in pine and pine-hardwood stands in the northeastern and northcentral United States and are generally restricted to nesting in pine trees (USFWS 1982). This species gleans insects from foliage but will feed on seeds, fruits, and berries in the winter (USFWS 1982). Nests are constructed from pine tree materials and placed on a horizontal branch, in a cluster of cones, or in the needles at the end of a branch up to 50 feet (15m) from the ground (USFWS 1982).

### **2.10.2 Geographic Range**

Pine Warblers primarily reside in the southeastern United States (USFWS 1982); however, they are found in the northeastern and north-central United States during the summer breeding season. This species can be found in pine, mixed pine, and other hardwood stands throughout JNF (USDA 2004).

### **2.10.3 Conservation Status**

The Pine Warbler is considered a species of least concern throughout its range (IUCN 2012). The species has an expansive range and population totals and range size do not approach levels considered vulnerable (IUCN 2012). It is not a federally or state-listed species.

### **2.10.4 Indicator Category**

Due to a decline in pine habitat throughout the JNF, pine forests are of particular focus for management practices. The Pine Warbler is a Biological Community Indicator MIS that addresses the management concern regarding the desirable ranges of variability of landscape and stand level composition, structure, and function of major forest communities. This species helps to assess the prevalence of pine habitat present within an area, although the presence of Pine Warblers indicates little more than presence of pine trees due to their general preference for the habitat without discriminating levels of understory. The trends in presence and abundance of Pine Warblers in mature pine forests are used to help indicate the effectiveness of management practices in pine habitats (USDA 2004).

## **2.11 Scarlet Tanager (*Piranga olivacea*)**

### **2.11.1 Ecology**

Scarlet Tanagers (*Piranga olivacea*) commonly inhabit the canopy of oak forests but have also been documented in maple, beech, and mixed pine-oak forests and occasionally interior coniferous forests (Roberts and Norment 1999). In winter, Scarlet Tanagers reside in lowland tropical rain forests just east of the Andes (Roberts and Norment 1999). As a forest interior species, Scarlet Tanagers are highly susceptible to forest fragmentation and brood parasitism in areas of expanding forest edge. During the breeding season, the species is aggressively territorial. Scarlet Tanagers form monogamous pairs and, due to this high level of intraspecific competition, rarely occur in high densities (Roberts and Norment 1999).

### **2.11.2 Geographic Range**

The Scarlet Tanager utilizes breeding habitat as far south as central Arkansas, north to southern Canada, and east to the Atlantic Ocean (IUCN 2016e). The species maintains migratory habitat the southeastern and southern Midwestern United States before wintering in South America (Roberts and Norment 1999). The Scarlet Tanager is common throughout Virginia during the breeding season and can be found in drier, more open oak forests throughout the JNF (USDA 2004).



### **2.11.3 Conservation Status**

Due to its extremely large range, the Scarlet Tanager is listed as a species of least concern by the IUCN and is not currently listed by the USFWS (IUCN 2016e), nor is the species listed at the state level.

### **2.11.4 Indicator Category**

The JNF lists the Scarlet Tanager as a Biological Community Indicator using trends in presence and abundance of these species in drier mid- and late-successional oak and oak-pine forests to help indicate effectiveness of management to establish desired conditions in these forest communities (USDA 2004). The species was selected as an MIS due to its affinity for drier oak forests and to represent the upland oak community and its response to forest management practices (USDA 2004).

## **2.12 White-tailed Deer (*Odocoileus virginianus*)**

### **2.12.1 Ecology**

White-tailed deer (*Odocoileus virginianus*) are large, herbivorous mammals found in a variety of forest types and successional stages (Horsley et al. 2003). Breeding occurs in October through mid-December, and young are born between May and June (USDA 2004). White-tailed deer forage on a variety of plants and are considered keystone herbivores, acting to restructure ecological communities (Rooney and Waller 2003).

### **2.12.2 Geographic Range**

White-tailed deer can be found throughout the United States and Canada (IUCN 2016c). Numbers remain high in the JNF, but populations are larger on private lands, as higher densities are associated with areas with greater amounts of agriculture. Individuals average approximately 39 per square mile (USDA 2004).

### **2.12.3 Conservation Status**

White-tailed deer are a species of least concern throughout their distribution due to the ability of the species to adapt to a wide range of human-dominated and natural habitats, large population sizes, occupancy of many protected areas, and stable population trends (IUCN 2016c). It is not a federally or state-listed species.

### **2.12.4 Indicator Category**

White-tailed deer are a demand species indicator. Monitoring white-tailed deer addresses monitoring concerns regarding trends for demand species and their use. Monitoring trends in harvest levels and hunting demand for white-tailed deer aids in indicating the effectiveness of their management in meeting public demand (USDA 2004).

## **2.13 Wild Trout**

### **2.13.1 Ecology**

Three species of trout are considered “wild” within JNF, including brook (*Salvelinus fontinalis*), rainbow (*Oncorhynchus mykiss*), and brown (*Salmo trutta*). Populations are only considered wild if they can successfully reproduce without the aid of stocking programs (USDA 2004). Wild trout require a cold environment, less than 20.5°C (69°F) and dissolved oxygen at more than 7 parts per million (ppm) (USDA 2004).

Brook trout are the dominant predatory fish in a stream ecosystem, barring the presence of rainbow and brown trout, and forage primarily on invertebrates but also small fish and invertebrates (USDA 2004). This species spawns from October through November, sometimes as late as December. Rainbow trout prefer cool waters but can tolerate a wide range of temperature conditions (Flebbe 1994). Rainbow trout typically spawn between February and June, depending on location and water temperature (Flebbe 1994). Brown trout spawn from October through November or December. Females create redds in habitats between pools and riffles (Bernatchez 2001). As with brook trout, hatching occurs from mid- to late-January through mid-March.

### **2.13.2 Geographic Range**

Brook trout is the only native trout species that occurs within the JNF. This species is native to waters in the eastern United States but has been introduced throughout the continent (Flebbe 1994). Rainbow and brown trout are non-native invasive fish occurring within the JNF but have also been introduced throughout the United States (Flebbe 1994). These two species were introduced and stocked for sport fishing, but some populations in the JNF have become naturalized (Flebbe 1994).

### **2.13.3 Conservation Status**

All three trout species are managed for sport fishing, and brown trout may outcompete brook trout in some areas (USDA 2004). Wild trout species are regarded as species of least concern throughout their range. In Virginia, the brook trout is listed as a Tier IV species in the WAP indicating a moderate conservation need.

### **2.13.4 Indicator Category**

Wild trout are both Biological Community and Demand Species Indicators, and presence of these species indicates good water quality (USDA 2004). Management of wild trout addresses monitoring questions concerning the status and trend in aquatic habitat conditions in relationship to aquatic communities and the trends for demand species and their use (USDA 2004). This species is viewed as a “management indicator” because monitoring trends in presence and abundance of wild trout indicates the effects of acidification of stream systems, an important quality for aquatic systems, as brook trout are the most acid tolerant, and rainbow trout are the least tolerant of acidification (Larson et al. 1995).

## 3.0 Field Surveys

### 3.1 Summary

Field surveys for threatened, endangered, and Forest Service sensitive (TES) species were completed along the length of the proposed alignment. These surveys included bat presence/absence mist netting, portal searches for potential winter bat habitat, plant surveys, avian habitat assessments and nest surveys, and an abbreviated mussel survey on the current and abandoned Creek Creek crossings.

A 91-meter (300-ft) study corridor was used for field surveys unless a larger corridor was specified by applicable guidelines. Surveys were based on guidance provided by federal and state agencies, including the USFS for activities on JNF lands. The survey method consisted of walking the study corridor searching for different habitat types and species occurrences. Plant surveys employed a meander search method (Goff et al. 1982) where new habitat variations or unique areas were constantly being searched for in order to maximize floristic variation. Wildlife surveys consisted of searching for individuals and/or signs of their presence. Searching for individuals consisted largely of visually scanning vegetation and looking under logs and rocks. Searching for signs of species consisted of studying scat, tracks, calls, nests, and/or egg masses detected during the survey.

Survey intensity was concentrated on potential sites where ground disturbance will be greatest. Specific locations for each survey type are provided in the BE.

No federally listed species were identified during surveys. Two Forest Service Sensitive Species were observed along the proposed alignment: eastern small-footed bat (*Myotis leibii*) and rock skullcap (*Scutellaria saxatilis*). One additional Forest Service Sensitive Species, American barberry (*Berberis Canadensis*), was identified along an abandoned alignment.

### 3.2 Management Indicator Species

In addition to surveying for the TES species, field scientists documented observations of MIS. Of the 13 MIS established for JNF, 11 were observed during field surveys in 2015 and 2016. Two adult black bear were observed along Pocahontas Road (both observations occurring in August 2015). Black bear cubs were also observed along Pocahontas Road (July 2015). Numerous sightings of wild turkeys and white-tailed deer occurred throughout JNF. Additionally, the avian MIS were observed or heard at multiple points during habitat assessment and survey efforts. Only the Peaks of Otter salamander and wild trout were not observed.

## 4.0 Discussion

### 4.1 Evaluation of Effects

Effects determinations for MIS are provided and defined as follows: A **No Impacts** determination is appropriate when the action will have no impacts on the species. A **Beneficial Impacts** determination is appropriate when positive effects occur without any adverse effects. Two types of **May Impact Individuals** determinations can be made: one is appropriate when the impact is not likely to cause a trend toward federal listing or loss of viability, and the other is appropriate when the impact is likely to cause a trend toward federal listing or loss of viability.

#### 4.1.1 Acadian Flycatcher (*Empidonax vireescens*)

A **May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability** determination is made for the Acadian Flycatcher.

This species is highly sensitive to forest disturbance, especially the loss of snags, along the riparian habitats in which it nests (Hespenheide 1971, Guilfoyle et al. 2002). As with many avian species, forest fragmentation often yields a higher occurrence of brood parasitism from Brown-headed Cowbirds as well as a general decrease in fecundity; however, the establishment of forested corridors between habitat patches may prove beneficial as it facilitates dispersal of flycatchers and reduces the overall occurrence of brood parasitism (Brittingham and Temple 1983, Donovan and Flather 2002). The Acadian Flycatcher does not occur on the JNF during winter months; therefore, clearing activities are not expected to impact individuals, but long-term adverse impacts to potential habitat may occur.

#### 4.1.2 American Black Bear (*Ursus americanus*)

A **May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability** determination is made for the black bear.

Although black bears can thrive in a variety of habitats, constant disturbance is detrimental (USDA 2004). The species needs remote habitat away from people, requiring large, dead trees (old succession or old growth) as a component of their habitat preference. Roads themselves are not detrimental to black bears, but the use of the roads by the public affects bears. The loss of habitat from construction of the Project should not be a major constraint. However, the construction activities themselves may temporarily disturb this species during the time when their young are born.

#### 4.1.3 Chestnut-sided Warbler (*Setophaga pensylvanica*)

A **Beneficial Impact** determination is made for the Chestnut-sided Warbler.

This species preference for disturbed, early-successional scrub-shrub habitat makes the species one of the few to directly benefit from human activities (Niemi and Hanowski 1984, Lent and Capen 1995, DeGraaf and Yamasaki 2003). Chestnut-sided Warblers do not occur on the JNF during the winter months, so clearing activities will have no direct effect on individuals. There are no projected negative effects of tree clearing activities on the population of Chestnut-sided Warblers within the JNF (King and Byers 2002) as tree clearing will create habitat for the species.

#### **4.1.4 Eastern Towhee (*Pipilo erythrophthalmus*)**

**A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability** determination is made for the Eastern Towhee.

Eastern Towhees are typically found in areas of dense understory, including edge and early-successional habitat, nesting and foraging on the ground and in shrubs (Bell and Whitmore 1997). Densities of the Eastern Towhee have been documented to be negatively associated with high densities of live trees and seem to prefer shrubby areas with open canopy (Bell and Whitmore 1997). The revegetation of the temporary construction right-of-way (ROW) will likely provide additional foraging and roosting habitat for this species. However, due to its year-round presence on JNF, direct impacts, while unlikely, may occur.

#### **4.1.5 Eastern Wild Turkey (*Meleagris gallopavo*)**

**A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability** determination is made for the Wild Turkey.

This is a common species with a wide distribution and increasing numbers (IUCN 2016b). Wild turkeys prefer mature forest but also need permanent, open areas populated with grasses, forbs, and low woody fruit-producing plants (USDA 2004). Nesting in late-April through early-June, wild turkeys prefer areas of dense herbaceous understory including old fields and clearcuts and show a high fidelity to nesting areas from year to year (Badyaev 1995, Badyaev and Faust 1996). The creation of ROWs through mature forested habitat may ultimately provide this species with the necessary variety of habitats, yielding early-successional areas of dense herbaceous understory. However, the initial removal of mature habitat may temporarily displace individuals, resulting in temporary impacts.

#### **4.1.6 Hooded Warbler (*Setophaga citrina*)**

**A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability** determination is made for the Hooded Warbler.

Forest fragmentation may negatively impact Hooded Warbler populations as the species prefers shady scrub-shrub habitat where it forages on the forest floor (Donovan and Flather 2002). Conversely, forest fragmentation may enhance scrub habitat by

creating an influx of sunlight into areas previously dominated by closed canopy forest, thus facilitating early successional growth. Female Hooded Warblers prefer forest edge for nesting, and the creation of corridors may aid the species during the breeding season, although forest fragmentation frequently results in reduced productivity in breeding pairs due to an increase in brood parasitism (Brittingham and Temple 1983).

The Hooded Warbler does not occur on the JNF during winter months, so clearing activities are not expected to impact individuals, but long-term adverse impacts to potential habitat may occur.

#### **4.1.7 Ovenbird (*Seiurus aurocapilla*)**

**A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability** determination is made for the Ovenbird.

This species prefers mature, deciduous forests with closed canopies, which makes it especially sensitive to disturbance. Habitat fragmentation results in reduced habitat quality, lower reproductive pairing success, and increased brood parasitism across the species breeding range (Faaborg et al. 1993, Villard et al. 1993, Burke and Nol 1998, Bayne et al. 2005). The Ovenbird does not occur on the JNF during the winter months, so clearing activities will have no direct effect on individuals, but long-term adverse impacts to potential habitat may occur. Given the wide range of this species, these potential adverse impacts are not expected to lead toward federal listing or loss of viability.

#### **4.1.8 Peaks of Otter Salamander (*Plethodon hubrichti*)**

**A No Impacts** determination is made for the Peaks of Otter salamander.

The Project area is not within the known range of the Peaks of Otter salamander. The closest Project crossing of JNF occurs approximately 47 kilometers (29.2 mi) southwest of these known occurrences. As part of the BE process, this species is designated as an OAR Code 1 (Project located out of known species range). As such, no direct or indirect effects are expected to occur to this species or its habitat as a result of the Project.

#### **4.1.9 Pileated Woodpecker (*Hylatomus pileatus*)**

**A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability** determination is made for the Pileated Woodpecker.

The Pileated Woodpecker requires large expanses of mature deciduous forest with an abundance of dead snags, downed logs, and stumps (Conner et al. 1975, Bull and Holthausen 1993). The species may also be found in secondary-growth woodlots with larger diameter trees (Daniels et al. 2017). While forest clearing activities may supplement foraging by creating additional foraging habitat along the edges of the ROW (Conner and Crawford 1974, Conner 1980), long-term adverse impacts to

nesting habitat may occur. Additionally, since Pileated Woodpeckers occupy JNF year-round, there is the remote possibility of direct impacts to individuals during construction. Given the wide range of this species, these potential adverse impacts are not expected to lead toward federal listing or loss of viability.

#### **4.1.10 Pine Warbler (*Setophaga pinus*)**

**A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability** determination is made for the Pine Warbler.

This species requires stands of mature pine forests and infrequently occupies mixed pine-hardwood habitats (USFWS 1982). Potentially suitable habitat for this species exists along the proposed alignment. Although the JNF is primarily occupied by Pine Warblers during the summer breeding season, a few individuals may remain during winter months and are at risk of direct impact. Given that Pine Warblers do not utilize edge habitat and rely upon mature pine and sometimes mixed pine-hardwood stands, fragmentation of these woodlots is likely to adversely affect the species. Given the wide range of this species, these potential adverse impacts are not expected to lead toward federal listing or loss of viability.

#### **4.1.11 Scarlet Tanager (*Piranga olivacea*)**

**A May Impact Individuals – Is Not Likely to Cause a Trend Toward Federal Listing or Loss of Viability** determination is made for the Scarlet Tanager.

Scarlet Tanagers are habitat specialists that inhabit the interior of hardwood and mixed hardwood-coniferous forests. Due to the narrow habitat requirements of the species, Scarlet Tanagers are highly susceptible to forest fragmentation and the resulting increase in brood parasitism that results from increasing edge habitat (Donovan and Flather 2002). The Scarlet Tanager does not occur on the JNF during the winter months, so clearing activities will have no direct effect on individuals, but long-term adverse impacts to potential habitat may occur. Given the wide range of this species, these potential adverse impacts are not expected to lead toward federal listing or loss of viability.

#### **4.1.12 White-tailed Deer (*Odocoileus virginianus*)**

**A Beneficial Impacts** determination is made for the white-tailed deer.

This species thrives in forested areas with interspersed successional stages that provide a variety of habitats (Horsley et al. 2003, Rooney and Waller 2003). White-tailed deer feed on low vegetation and avoid forests where canopy cover approaches 100 percent, blocking sunlight and prohibiting understory growth (Rooney and Waller 2003). The creation of ROWs may fragment continuous forested areas, providing the variety of habitats favored by white-tailed deer. The creation of additional foraging habitat will be beneficial for the species, and the loss of forested habitat is not expected to outweigh these beneficial effects given the abundance of forested habitat on JNF.

#### **4.1.13 Wild Trout**

A **No Impacts** determination is made for the wild trout.

There are no JNF crossings of designated wild trout streams, according to the Virginia Department of Game and Inland Fisheries Wildlife Environmental Review Map Service (WERMS). However, results from the Hydrologic Analysis of Sedimentation performed within the vicinity of the JNF suggest that sediment loads in excess of 10 percent are expected within two streams designated as Trout Streams by the WERMS dataset: an Unknown Tributary to Stony Creek within the New River drainage and Mill Creek within the Roanoke drainage. Mill Creek, however, is unlikely a wild trout stream given that only brown trout, a non-native species, are known to occur within the system. With the incorporation of mitigation measures (described in section 4.3), no direct or indirect effects are expected to occur.

#### **4.1.14 Topsoil Segregation**

In a response to a request from the USFS received on November 15, 2016, MVP agreed to conduct topsoil segregation within the disturbed areas of the JNF. Topsoil segregation involves removing and storing topsoil separate from subsoil in disturbed areas. Following construction activities, topsoil is reapplied to disturbed areas. The removal, storage, and reapplication of topsoil will better facilitate growth of vegetation promoting the establishment of early successional habitat in disturbed areas. The act of segregating topsoil is unlikely to have negative impacts to species because topsoil segregation (1) will be temporary, (2) will occur in areas that are already disturbed, and (3) will occur in an active construction area. Topsoil segregation is likely to have a beneficial impact due to the more timely establishment of vegetation that will promote nesting and foraging habitat for early successional avifauna.

#### **4.1.15 Herbicide Use**

Nonnative plant species can spread rapidly in areas without natural controls (e.g., predation or disease), which can result in a reduction of plant diversity, alteration of ecological functions (e.g., plant-pollinator networks), and competition with native plants for resources (e.g., sunlight and nutrients). Herbicide use is common in treating and eradicating noxious, nonnative vegetation. Following construction, MVP will replant disturbed areas of the Project with native vegetation as directed by the USFS in documents received on November 21, 2016, titled Suggested Seed Mixes for Pipeline Rights-of-Way and Associated Disturbance on the Monongahela and George Washington-Jefferson National Forests and Suggested Seeding Techniques for Pipeline Rights-of-Way and Associated Disturbance on the Monongahela and George Washington-Jefferson National Forests. MVP will only use herbicides as directed by the USFS to address nonnative plants via treatment of individual problem plants/areas. To reduce the risk to non-target flora and fauna, MVP will comply with all local, state, and federal requirements related to the type and use of herbicides, including any requirements specified by the USFS on the JNF. As stated in MVP's Restoration and Rehabilitation Plan, MVP will take measures to avoid the introduction of noxious,



nonnative vegetation. Such measures will help to reduce and eliminate the use of herbicides in portions of the Project.

As previously mentioned, herbicides will be used to reduce noxious, nonnative plant species in order to promote native vegetation. The establishment of native vegetation in disturbed areas is expected to improve the overall quality of habitat for fauna, including birds that use early successional habitat. Improving long-term habitat quality by reducing the colonization and spread on nonnative plants will outweigh the short-term impacts associated with herbicide use.

Short-term impact could include the potential to directly kill some individuals during application, but this is unlikely as most locally rare species will be able to flee the area. Other impacts could include a decrease in cover for smaller species and an increase in organic matter. MVP will follow the Herbicide Use Plan as approved by the USFS to minimize the short-term effects to species in the area of herbicide use.

## **5.0 Mitigation Measures**

Conservation measures to avoid and minimize the potential for adverse effects from construction, operation, and maintenance activities on federally listed species and Forest Service Sensitive Species and their suitable habitat are detailed in the Biological Assessment (BA) and BE respectively.

Project-wide mitigation measures will be implemented on JNF. These measures include:

- Routing Project facilities to avoid sensitive resources where possible;
- Reduction of the ROW in sensitive stream and wetland habitats;
- Co-locating Project facilities with existing pipeline or utility ROWs where feasible;
- Implementing the Project's Migratory Bird Habitat Conservation Plan:
  - Minimizing habitat fragmentation to the maximum extent possible;
  - Conducting environmental training of MVP personnel and inspection of construction and restoration activities;
  - Restricting maintenance activities to outside of the breeding/nesting season;
- Implementing the Project's Exotic and Invasive Species Control Plan during construction, operation, and maintenance of the Project:

- Avoiding introduction of exotic/invasive species in organic materials brought on-site during construction by thoroughly cleaning equipment prior to mobilization to Project area;
- Cleaning equipment and arranging a location where a JNF-designated employee can examine and certify equipment is clean and permitted for use on USFS property;
- Conducting selective spot treatment or eradication of exotic/invasive plant species encountered during construction and operation of the Project;
- Stripping topsoil from full width of the construction ROW and storing it separate from other soil.
- Committing to using only USFS-requested seed mixes, in coordination with the USFS, during all restoration efforts;
- Minimizing the time bare soil is exposed during construction to minimize opportunity for exotic/invasive plants to become established;
- Contaminants:
  - Implementing the Project-specific Spill Prevention, Control, and Countermeasure Plan;
  - Instituting preventative measures such as personnel training, equipment inspection, and refueling procedures to reduce likelihood of spills;
  - Prohibiting the parking, storage, or servicing of construction equipment, vehicles, hazardous materials, fuels, chemicals, lubricating oils, and petroleum products within 100-foot radius of any waterbody;
- Soil and Erosion Control:
  - Implementing the approved Project-specific Erosion and Sediment Control Plan;
  - Maintaining surface and ground water quality using appropriate erosion control practices and best management practices;
  - Complying with the FERC Upland Erosion Control, Revegetation, and Maintenance Plan (May 2013) and the FERC Wetland and Waterbody Construction and Mitigation Procedures (May 2013);
  - Installing erosion control measures immediately once construction begins;
- Sensitive Rare, Threatened, or Endangered Species Habitat;
  - Implementing the Project-specific Karst Management Plan to protect and minimize impacts to karst, karst-like features, and caves;
  - Committing to tree clearing activity outside of June-July to minimize impacts to non-volant, juvenile bats;

- Abiding by all time-of-year restrictions for in-stream construction in waterbodies containing rare, threatened, or endangered aquatic species;
- Co-locating the pipeline with existing Mystery Ridge Road to the extent practicable to avoid further fragmenting wildlife habitat;
- Using existing Pocahontas Road and Mystery Ridge Road on JNF to avoid creation of new access roads;
- Collecting seeds from discovered rock skullcap plants for planting upon completion of construction activities.

Tree clearing is proposed to occur in winter on JNF, which will reduce potential direct impacts to avian species that only use the area for summer breeding. The Project schedule is dependent upon obtaining all necessary authorizations, which will then dictate when Project tree-clearing activities can begin. MVP will begin tree-clearing activities as soon as allowed, which could be as early as November 2017. In that case, the majority of clearing will be completed by March 31, 2018. However, because of uncertainty associated with the Project's dependency on authorizations, and in order to estimate potential impacts as realistically as possible, the following clearing schedule is assumed for preparation of impact assessments:

- January to March 2018 – 167 miles
- April to May 2018 – 101 miles
- August to November 2018 – 32 miles

This schedule is based on the following assumptions: a clearing rate of 762 linear meters (2,500 feet) per day and clearing crews working 6 days per week with no clearing on standard federal holidays. If clearing begins earlier than January, then a greater portion of the Project will be cleared during winter 2018, meaning that actual impacts to migratory birds will be less than assumed for this discussion. In addition, MVP is committed to the following clearing restrictions for identified areas along the Project:

- Areas within 8 kilometers (5 miles) of Indiana bat hibernacula or within 0.4 kilometer (0.25 mile) of northern long-eared bat hibernacula will be cleared before March 31, 2018, or after November 15, 2018,
- Identified loggerhead shrike suitable habitat will be cleared before March 31, 2018, or after July 31, 2018, and
- No clearing of any areas along the Project will occur between June 1 and July.

Additional avoidance and minimization measures, and mitigation measures that will benefit management indicator aquatic species include:

- For all wild trout stream crossings, MVP will abide by the in-stream construction restriction from October 1 – March 31;

- For coldwater stream crossings, MVP will abide by the in-stream construction restriction from September 15 – March 31 in West Virginia and March 1 – June 30;
- MVP has committed to fish relocations at all perennial stream crossings in Virginia.

Pipeline construction will be completed by December 2018 with a target in-service date for the Project of December 2018.

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**APPENDIX A  
FIGURES**



Path: G:\Current\593\_EQT\_MVP\MXD\Biologic\_Eval\20160324\_BE\_Sedimentation\Figure1 Project Location 20170519.mxd (ganderson) - 5/19/2017

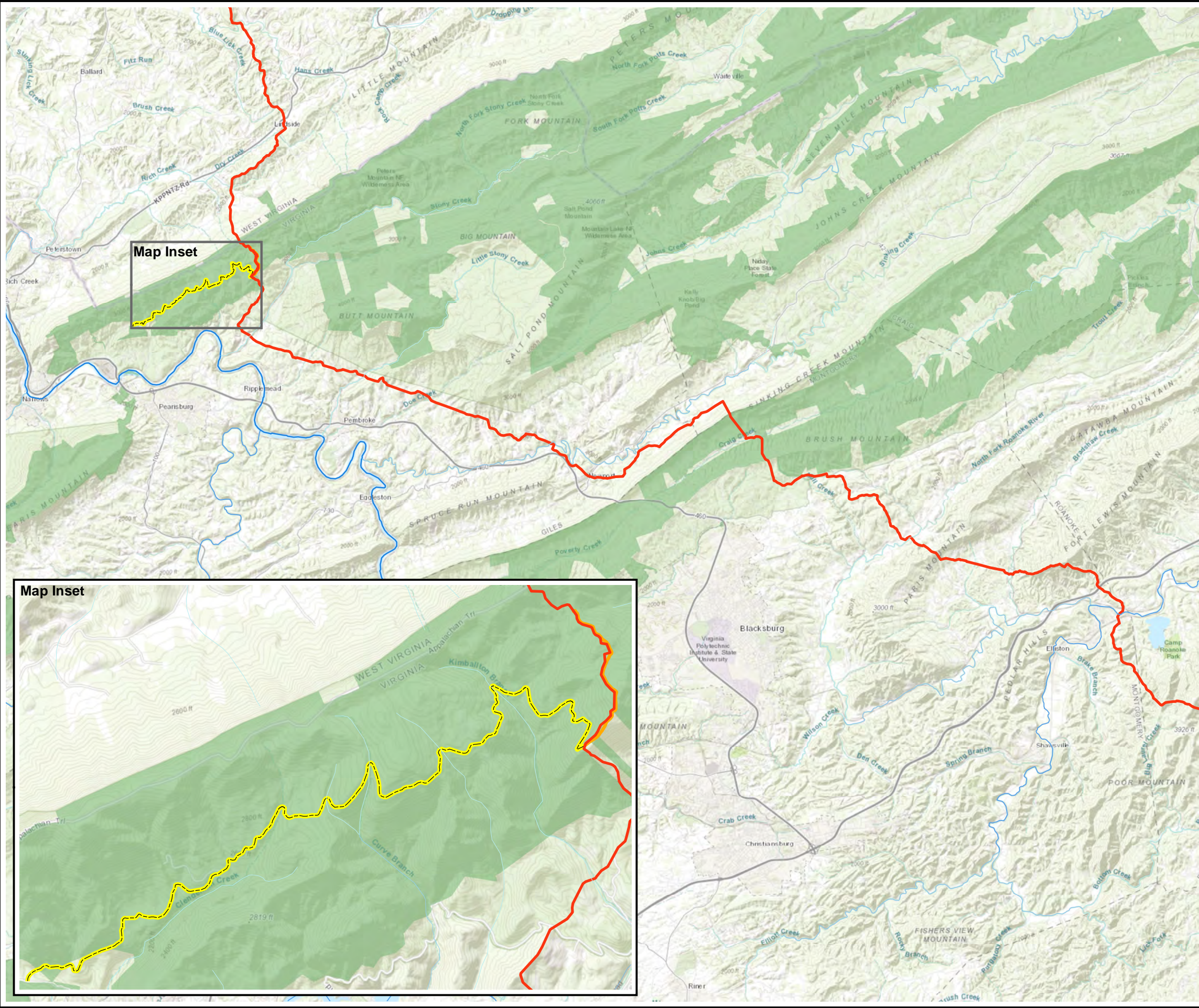
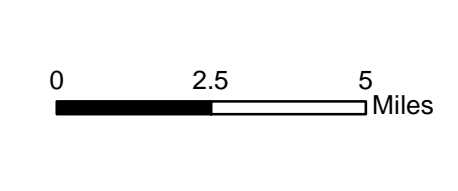
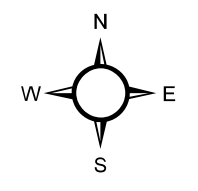
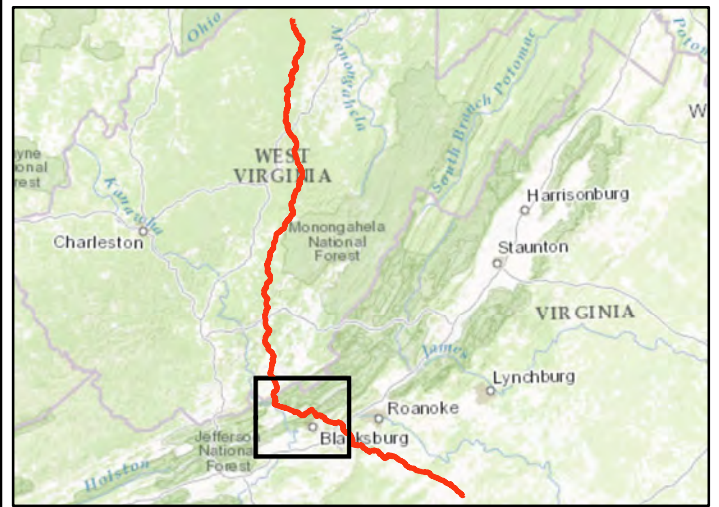


Figure 1. Location of the proposed Mountain Valley Pipeline within the vicinity of the Jefferson National Forest in Virginia and West Virginia.

- Stream
- Pocahontas Road
- Proposed Route
- U.S. Forest Service (National Forest) Lands



Base Map: ESRI ArcGIS Web service - "US TOPO MAPS" accessed - 5/19/2017



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