

DETAILED HABITAT ASSESSMENTS FOR
INDIANA AND NORTHERN LONG-EARED BATS ALONG
THE PROPOSED MOUNTAIN VALLEY PIPELINE PROJECT
IN CRAIG, FRANKLIN, GILES, MONTGOMERY, PITTSYLVANIA,
AND ROANOKE COUNTIES, VIRGINIA

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1.0 Project Description

Mountain Valley Pipeline, LLC (MVP), a joint venture of EQT Midstream, LLC, NextEra Energy, Inc., WGL Holdings, Inc., Vega Energy Partners, Ltd., and RGC Midstream, LLC, plans to construct the Mountain Valley Pipeline (Project), an approximate 301-mile, 42-inch 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 Project will extend from the existing Equitrans, L.P. transmission system near Mobley in Wetzel County, West Virginia, to Transcontinental Gas Pipe Line Company, LLC's Zone 5 compressor station 165 in Pittsylvania County, Virginia (Figure 1, Appendix A). In West Virginia, approximately 195.5 miles of the pipeline is expected to cross Braxton, Doddridge, Fayette, Greenbrier, Harrison, Lewis, Monroe, Nicholas, Summers, Webster, and Wetzel counties. In Virginia, approximately 105.5 miles of the pipeline is expected to cross Craig, Franklin, Giles, Montgomery, Pittsylvania, and Roanoke counties.

Several alternate routes were originally proposed for the Project in Virginia and West Virginia. Alternative 110 (A110) begins in Monroe County, West Virginia and continues southeast into Craig, Montgomery, and Roanoke counties, Virginia. Alternative 110J (A110J) is a spur from A110 that traverses portions of Craig and Roanoke counties before connecting back with A110. Alternative 110R (A110R) is a spur from A110 in Craig and Montgomery counties, Virginia. Alternative 93 Preston North re-route (A93) and Alternative 87 Preston Southern re-route (A87) deviate from the original proposed route and occur in Montgomery County, Virginia. Alternative 35 occurs in Pittsylvania at the southern terminus of the route. Alternative 135 Spring Hollow re-route, Alternative 210 Cahas Mountain, Alternative 200 Blacksburg, and Alternative 145 were incorporated into the current proposed route.

The current route as proposed includes a permanent right-of-way (ROW) with a width of 50 feet. This encompasses a total of 1,184.56 acres in West Virginia and 639.44 acres in Virginia. The width of the construction ROW is 125 feet which will temporarily impact an additional 1,012.22 acres in West Virginia and 911.68 acres in Virginia. The Project will require the construction of three compressor stations (Bradshaw, Harris, and Stallworth Stations) and four meter (interconnect) stations to receive and move gas from the beginning of the pipeline at the existing Equitrans transmission system in Wetzel County, West Virginia to the terminus at the Transco Station 165 in Pittsylvania County, Virginia. Additional ancillary aboveground facilities include pig launcher and receiver sites at the compressor stations, meter stations, and beginning and end of the pipeline, along with mainline block valve sites

within the pipeline ROW. Temporary and permanent access roads will be used to assist in the safe construction and operation of the Project.

In West Virginia, the Project occurs within multiple northern long-eared bat (*Myotis septentrionalis*) and Indiana bat (*Myotis sodalis*) capture, roost, and hibernacula buffers. Life history and ecology of each species is provided in Appendix B.

This report provides details regarding detailed habitat evaluations in Craig, Franklin, Giles, Montgomery, Pittsylvania, and Roanoke counties, Virginia. Survey efforts in West Virginia are not included in this report, but were submitted to the West Virginia Field Office of the U.S. Fish and Wildlife Service (USFWS).

2.0 Regulatory Setting

2.1 Endangered Species Act

The Federal Endangered Species Act (ESA) [16 U.S.C. 1531 et seq.] was codified into law in 1973. This law provides for the listing, conservation, and recovery of endangered and threatened species of plants and wildlife. Under the ESA, the USFWS is mandated to monitor and protect listed species.

Section 9 of the ESA prohibits the take of listed species unless otherwise specifically authorized by regulation. Take is defined by the ESA as, "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect" [16 U.S.C. 1532(19)]. USFWS further defines harm to include significant habitat modification or degradation [50 CFR §17.3] to the point where it actually kills or injures an individual or significantly impairs essential behavioral patterns, including feeding, breeding, and sheltering. Harassment is an intentional or negligent act or omission that creates the likelihood of injury by annoying an individual to such an extent as to significantly disrupt formal behavior patterns, which include but are not limited to breeding, foraging, and sheltering. Harassment does not cover habitat disturbing activities.

Section 7(a)(2) of the ESA states that each federal agency shall insure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed species or result in destruction or adverse modification of designated critical habitat. Federal actions include (1) expenditure of federal funds for roads, buildings, or other construction projects, and (2) approval of a permit or license, and the activities resulting from such permit or license. Compliance is required regardless of whether involvement is apparent, such as issuance of a federal permit, or less direct, such as federal oversight of a state-operated program. Actions of federal agencies that do not result in jeopardy or adverse modification, but

that could result in a take, must also be addressed under Section 7. Take by a federal agency can be authorized through the Section 7 consultation process, culminating in an Incidental Take Statement (ITS) by the USFWS. The take must be incidental to, and not the purpose of, the carrying out of an otherwise lawful activity.

In 1982 amendments to the ESA, Congress established a provision in Section 10(a)(1)(B) that authorizes incidental take by nonfederal entities. To obtain an Incidental Take Permit (ITP), an applicant must submit a conservation plan specifying impacts that result in take and measures to minimize and mitigate those impacts.

Regardless of whether incidental take might be covered under Section 7 or Section 10, it is the obligation of the project proponent to avoid and minimize impacts to listed species. If, through this process, take is avoided, then an ITS or ITP is not required. The initial step in avoidance and minimization is to determine whether suitable habitat and listed species are present.

2.2 Initial Project Review

On 13 October 2014, MVP submitted letters introducing the Project to the USFWS Gloucester Field Office (USFWS GFO) and Virginia Department of Game and Inland Fish (VDGIF). Environmental Solutions & Innovations, Inc. (ESI), on behalf of MVP, submitted letters to USFWS on 30 October 2014 and 6 March 2015 requesting information on the potential for federally listed species to occur within the Project's limits of disturbance. On 3 April 2015, the USFWS GFO provided formal comments to ESI regarding the Project's potential to impact federally listed species in the Project Area. Agency correspondence is provided in Appendix C.

2.3 Regional Occurrence of Listed Bats

The Project is within the ranges of the federally endangered Indiana bat and federally threatened northern long-eared bat. The northern long-eared bat was recently listed as threatened under ESA in May 2015. Detailed natural histories of Indiana and northern long-eared bats are provided in Appendix B.

2.3.1 Indiana Bat

Winter hibernacula in western Virginia are known from Wise, Bath, Bland, Craig, Giles, Dickenson, Lee, Montgomery, and Tazewell counties (USFWS 2007). The known hibernaculum in Bland County has approximately 230 individuals and is designated as priority 3 hibernacula. Tazewell has priority 2 hibernacula with an estimated 4,000 Indiana bats (USFWS 2007); however, white-nose syndrome (WNS) has likely had detrimental effects on these populations. Approximately 11.78 miles of the Project traverses a protective hibernaculum buffer associated with Tawney's Cave, a Priority 4 Indiana bat hibernaculum in Giles County, Virginia. The status of the current winter population of Indiana bats within Tawney's Cave is uncertain, and the maximum documented winter population is 14 individuals (USFWS 2007).

Summer non-reproductive records are also known from Bath, Bland, Dickenson, Highland, Lee, Tazewell and Wise counties, Virginia.

2.3.2 Northern Long-eared Bat

The northern long-eared bat is rarely found in large numbers during winter cave surveys in Virginia; however, it is frequently captured during the fall swarming period at cave entrances. The northern long-eared bat is assumed to occur throughout Virginia during summer months. According to data maintained in VDGIF's Wildlife Environmental Review Map Service (WERMS), capture records are reported from Craig, Giles, Montgomery, and Roanoke counties.

2.4 Study Plan Approval and Collection Permits

A study plan outlining methods for mist net surveys was submitted to the USFWS GFO and the VDGIF on 3 November 2014. A revised study plan was submitted to the respective agencies on 24 April 2015. Site-specific authorization from the USFWS and VDGIF was received on 8 May 2015 and 11 May 2015 respectively (Appendix C).

Studies were carried out under current VDGIF Scientific Collection and Threatened and Endangered Species permits.

3.0 Methods

3.1 Desktop Analysis

Remote sensing techniques are used to quantify the amount of forest within the area of known occupied habitat before and after Project development. This effort consists of comparing the amount of forest present before and after Project development at the following scales: 1) within areas of known, occupied listed bat habitat (i.e. protective buffers around hibernacula, roost, and capture locations); 2) within 0.25 mile of the Project area (the area immediately surrounding the proposed Project); and 3) the Project's limits of disturbance (LOD) itself, under the assumption that all forest within the Project LOD will be removed by construction. Results of this preliminary analysis are updated using field data to include changes in land cover that have occurred since the area was mapped, providing in-field validation of remotely-sensed data. Map layers are loaded on a GPS-enabled tablet computer allowing biologists to selectively interact (i.e., turn layers on and off or zoom in or out) with maps while in

the field. Using this same tablet computer, biologists create a real-time map layer that pinpoints the location of land cover types as they are identified, and also allows biologists to link these map layers to other data.

Remote sensing and habitat calculations are performed using ArcGIS10.3® (ESRI Corporation, Redlands, California). Capture buffers (5-mile radius for an Indiana bat and 3-mile for a northern long-eared bat), roost tree buffers (2.5-mile radius for an Indiana bat and 1.5-mile radius for a northern long-eared bat), and hibernacula buffers (5-mile radius) are overlain with habitat types obtained from the 2011 National Land Cover Data (NLCD).

3.2 Field Detailed Habitat Assessment

The detailed habitat assessment is completed within a 300-foot survey corridor centered on the pipeline and a 50-foot survey corridor centered on proposed access roads. Any features outside of the survey corridor, such as additional temporary workspace, compressor stations, or contractor yards, are surveyed within their respective LODs. The 300-foot, 50-foot corridor, corridor and additional LODs are collectively referred to as the study area.

The emphasis of this survey is to detect and document potential roost trees that could be used to aid decisions about Project design features and to avoid and minimize impacts to areas of habitat with higher potential for use by Indiana and northern long-eared bats. Experienced and permitted bat biologists walk portions of the study area within listed bat capture/roost buffers and identify trees and “habitat patches” that are biologically similar and suitable for use by roosting and foraging bats based on literature (Brack 1983, Foster and Kurta 1999, Caceres and Barclay 2000, Kurta 2004, Carter and Feldhamer 2005), habitat models (3D/Environmental 1995), and experience with the species. In addition to noting the overall suitability of each habitat patch, biologists also map the location of each potential roost and rate its overall quality on a scale from low to high.

3.2.1 Overall Habitat Potential

3.2.1.1 Overall Roost Potential

During summer, Indiana and northern long-eared bats typically day roost in large dead or dying trees, but any tree that provides exfoliating bark or crevices may be occasionally used. Some colonies of northern long-eared bats also make extensive use of cavities within large, live trees. Potential roosts are defined as any tree, regardless of health (live, partially dead, or dead), dbh, or surrounding landscape features (canopy closure, solar exposure, understory clutter, relative distance from edges, travel corridors, and water) that exhibits at least one roosting structure (exfoliating bark, cracks and crevices, or cavities) capable of holding one or more day- or night-roosting Indiana and/or northern long-eared bats.

Areas of high potential roost quality are defined as areas expected to be occupied by Indiana and/or northern long-eared bats at some point during a roosting season – if the species is present. Generally these areas possess many or all of the following characteristics:

- Many potential roost trees including some that offer a variety of thermal conditions (some with high solar exposure and some in the shade);
- Large diameter trees;
- Relatively open understory;
- Easy access to drinking water and foraging areas;
- Easy access to suitable flyways.

Areas of moderate roosting potential are considered to have a reasonable chance of being used if Indiana and/or northern long-eared bats are present on the surrounding landscape. Most areas of moderate potential have many, but fewer of the characteristics of high potential areas. For example the following characteristics can “downgrade” an otherwise high quality area.

- Lack of multiple high quality roosts;
- Presence of only a few large trees;
- Partially or highly cluttered understories;
- Lack of access to commuting, feeding, drinking, or commuting areas in the surrounding landscape.

Areas of low potential may contain one or more Indiana/northern long-eared bats for short periods of time, but colonies are not likely to be present. Most low quality roosting areas are young forest with cluttered understories and only an occasional low quality roost tree.

Information on each habitat patch was digitally recorded on hand-held tablets, and completed data sheets are provided in Appendix D. Representative photographs are provided in Appendix E. A GIS shapefile containing the delineated habitat patches is provided as an attachment to this report.

3.2.2 Overall Foraging Potential

Indiana bats most often forage at the air/vegetation interface. The minimum requirement for Indiana bat is some type of vegetative structure in association with a relatively open air space. Indiana bats make extensive use of edgy habitats for foraging. Northern long-eared bats are also more generalized in their foraging habitat, making use of both interior forests and edge habitats. Unlike Indiana bats, the species regularly forages in cluttered habitats. Given these differences, foraging habitat is also rated differently for the two species.

3.2.2.1 Indiana Bat Foraging Potential

Areas of high potential for use by foraging Indiana bats will be used on a nearly nightly basis (often by multiple bats) if the bat is present.

- Forests with a distinct canopy layer and either an open understory or a space between the canopy and subcanopy.
- Forest openings (including canopy gaps) up to 10 acres in size
- Forested wetlands
- Shrub/scrub areas
- Fencerows and other areas where forested habitat is bordered by more open land classes
 - Agricultural fields
 - Ponds or uncluttered streams, or rivers
 - Prairie-like areas including portions of reclaimed surface mines

Areas of moderate foraging potential are those that are used by Indiana bats on a somewhat irregular basis and likely represent sites where high value foods are produced under specific conditions. Examples of such areas are:

- Forests with a moderate degree of clutter;
- Isolated farmsteads near forest;
- Forest openings between 10 and 20 acres in size;
- Smaller, more cluttered streams and small roads through forested areas.

Areas of low potential are only occasionally used by foraging Indiana bats. In most cases, these are the centers of areas that provide high-quality foraging at their edges.

- Large, open bodies of water;
- Agricultural fields;
- Maintained grasslands;
- Patches of trees or bushes located more than 200 feet from other such areas;
- Large forest openings of greater than 20 acres in size;
- Housing developments placed within a forested matrix.

Some landscapes are inhospitable to Indiana bats, including those dominated by commercial developments, new housing developments, active surface mines, and large impoundments.

3.2.2.2 Northern Long-Eared Bat Foraging Potential

Areas of high potential for use by foraging northern long-eared bats will be used on a nearly nightly basis (often by multiple bats) if the bat is present.

- Open to moderately cluttered forests;
- Forest openings (including canopy gaps) up to 10 acres in size;
- Forested wetlands;
- Areas where forest abuts open land classes such as meadows, prairies, pipelines, and agricultural fields.

Areas of moderate foraging potential are those that are used by northern long-eared bats on a somewhat irregular basis and likely represent sites where high value foods are produced under specific conditions. Examples of such areas are:

- Forests with a high degree of clutter;
- Shrub/scrub areas;
- Riparian corridors;
- Fencerows and other areas where forested habitat is bordered by more open land classes.

Areas of low potential are only occasionally used by foraging northern long-eared bats. In most cases, these are the centers of areas that provide high-quality foraging at their edges.

- Large, open bodies of water;
- Agricultural fields;
- Maintained grasslands;
- Patches of trees or bushes smaller than 20 acres located more than 200 feet from other such areas;
- Large forest openings of greater than 20 acres in size;
- Housing developments placed within a forested matrix.

Each habitat patch is examined, rated, and mapped for foraging potential concurrent with roost potential ranking. Data sheets are provided in Appendix D.

3.2.3 Ranking Individual Roost Trees

During the field study, the location of each potential roost is mapped and ranked as high, moderate, or low roost potential. Final determination includes consideration of dbh, roosting structures (exfoliating bark, cracks and crevices, cavities), and tree health (live, partially dead, dead). Emphasis is placed on roost structure (as opposed to tree species) because both Indiana and northern long-eared bats roost in many

species of trees. Both bat species use similar trees for roosting, although the northern long-eared bat is less specialized. All potential Indiana bat roosts are suitable for northern long-eared bats. Some trees, such as large, live trees with hollow limbs and trees between 3 and 5 inches dbh have higher potential for use by northern long-eared bats. As such, roosting potential is reported for each species separately.

3.2.3.1 Indiana Bat Roosts

Trees with high quality roost potential possess the following characteristics:

- Greater than 12-inch dbh; some evidence indicates that trees >16-inch dbh are most used by colonies;
- Extensive areas of exfoliating bark or cracks where bats can live;
- Significant solar exposure of at least one potential roost area of the tree;

Trees of moderate quality roost potential have the following characteristics:

- Greater than 6-inch dbh;
- Exfoliating bark or cracks present;
- Potential roosting areas either too small to contain multiple bats or those roosting areas located in the shade;
- Most shagbark or shellbark hickories with a dbh of more than 9 inches.

Low quality trees have the following characteristics:

- Greater than 5-inch dbh;
- Live or dead trees with heavily shaded cracks or small patches of exfoliating bark.

3.2.3.2 Northern Long-Eared Bat Roosts

Trees with high quality roost potential possess the following characteristics:

- Snags greater than 6-inch dbh with extensive areas of exfoliating bark, cavities, or cracks where bats can live and significant solar exposure;
- Live trees greater than 12-inch dbh with multiple hollows (or a large complex of hollows) where bats can live;
- Bat boxes.

Trees of moderate quality roost potential have the following characteristics:

- Greater than 6-inch dbh;
- Exfoliating bark, cavities, or cracks present;

- Potential roosting areas either too small to contain multiple bats or those roosting areas located in dense shade.

Low quality trees have the following characteristics:

- Greater than 3-inch dbh;
- Live or dead trees with densely shaded cracks, crevices, or small patches of exfoliating bark;
- Anthropogenic structure such as sheds and outbuildings, wildlife guards on utility poles.

These guidelines for individual tree classifications are not applicable in all circumstances; other factors can affect ranking. In some cases, smaller trees are rated higher because of exceptional roosting conditions. A similar noteworthy exception may occur when there is a cluster of trees that individually are of moderate quality but collectively form a stand of high quality habitat; both Indiana and northern long-eared bats sometimes use such multiple roosts in lieu of one or more high quality trees. Information on each potential roost tree is digitally recorded on hand-held tablets and completed data sheets are provided in Appendix D. Representative photographs of habitat and potential roost trees are provided in Appendix E. A GIS shapefile containing potential roost tree locations is provided as an attachment to this report.

3.3 Survey Area

Because of the Project evolution since the survey study plan was submitted and accepted (May 2015) and lack of land access, the final areas surveyed differ from what was originally proposed.

3.3.1 Rights-of-Way

As originally proposed and presented to USFWS, the Project route entailed 169.95 miles (273.51 kilometers) in Virginia. The preferred alignment in Virginia consists of 105.52 miles (169.82 kilometers), of which 14.99 miles (24.12 kilometers) occur within protected bat buffers. As of the date of this report, detailed habitat assessments are complete for 6.27 miles (10.09 kilometers) and approximately 8.72 miles (14.03 kilometers) remain unassessed due to land access.

As originally proposed and presented to USFWS, the Project route entailed approximately 14 access roads that extended beyond 0.5 kilometer from the centerline, with a combined length of approximately 1.90 miles (3.10 km) in Virginia. The Project now contains 132 access roads within Virginia, with a combined length of approximately 52.10 miles (83.85 kilometers). All or portions of 20 access roads (approximately 11.08 miles [17.83 kilometers]) are within protected bat buffers. As of the date of this report, detailed habitat assessments are complete for 6.27 miles (10.09 kilometers) and 4.80 miles (7.72 kilometers) remain unassessed due to land

access.

3.3.2 Aboveground Facilities

The study plan submitted to USFWS on April 24, 2015 identified three potential compressor stations located along the proposed project route in Virginia. The final project contains 3 such facilities; however, they are no longer located in Virginia.

Additionally, 7 laydown/ware/pipe yards were initially proposed along the Project route in Virginia; however, the final Project only contains 2 such facilities in Virginia (Table 1). Neither of these facilities are located within a protected bat buffer; therefore, detailed habitat assessments were not conducted

Table 1. Laydown yards associated with the proposed Mountain Valley Pipeline Project in Virginia.

Yard Name from Study Plan	Final Yard Name	Original LOD (Ac)	Original Forest Impact (Ac)	Final LOD (Ac)	Final Forest Impact (Ac)	Location
MVP Route 200 Yard	MVP-PY-005	16.44	0	15.01	0	Franklin Co.
N/A	MVP-PY-006	N/A	N/A	22.84	0	Montgomery Co.

The study plan did not contain any information on proposed interconnect facilities. The final Project contains 4 such facilities; however, only 1 is located in Virginia (Table 2). This facility is not located within a protected bat buffer; therefore, detailed habitat assessments were not conducted.

Table 2. Interconnect facilities associated with the proposed Mountain Valley Pipeline Project in Virginia.

Interconnect Name	LOD (Ac)	Permanent Impact (Ac)	Search Acreage	Location
Transco	6.16	2.41	6.16	Pittsylvania Co.

4.0 Results

4.1 Desktop Analysis

The desktop analysis of NLCD 2011 indicates that the following habitat types occur within the protective bat capture/roost/hibernacula buffers traversed by the Project in Virginia:

- Barren Land (Rock/Sand/Clay) – Barren areas of bedrock, desert pavement, scarps, talus, slides, volcanic material, glacial debris, sand dunes, strip mines, gravel pits, and other accumulations of earthen material. Generally, vegetation accounts for less than 15 percent of total cover.
- Cultivated Crops – Areas used for the production of annual crops, such as corn, soybeans, vegetables, tobacco, and cotton, and also perennial woody crops such as orchards and vineyards. Crop vegetation accounts for greater than 20 percent of total vegetation. This class also includes all land being actively tilled.
- Deciduous Forest – Areas dominated by trees generally greater than 5 meters (16.4 ft) tall and greater than 20 percent of total vegetation cover. More than 75 percent of the tree species shed foliage simultaneously in response to seasonal change.
- Evergreen Forest – Areas dominated by trees generally greater than 5 meters (16.4 ft) tall and greater than 20 percent of total vegetation cover. More than 75 percent of tree species maintain their leaves all year. Canopy is never without green foliage.
- Mixed Forest – Areas dominated by trees generally greater than 5 meters tall, and greater than 20 percent of total vegetation cover. Neither deciduous nor evergreen species are greater than 75 percent of total tree cover.
- Developed, Open Space – Includes areas with a mixture of some constructed materials, but mostly vegetation in the form of lawn grasses. Impervious surfaces account for less than 20 percent of total cover. These areas most commonly include large-lot single-family housing units, parks, golf courses, and vegetation planted in developed settings for recreation, erosion control, or aesthetic purposes.
- Developed, Low Intensity – Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 20-49 percent of total cover. These areas most commonly include single-family housing units.
- Developed, Medium Intensity – Includes areas with a mixture of constructed materials and vegetation. Impervious surfaces account for 50-79 percent of the total cover. These areas most commonly include single-family housing units.
- Developed, High Intensity – Includes highly developed areas where people reside or work in high numbers. Examples include apartment complexes, row houses, and commercial/industrial. Impervious surfaces account for 80

to 100 percent of the total cover.

- Shrub/Scrub – Areas dominated by shrubs; less than 5 meters tall with shrub canopy typically greater than 20 percent of total vegetation. This class includes true shrubs, young trees in an early successional stage, or trees stunted from environmental conditions.
- Grassland/Herbaceous – Areas dominated by grammanoid or herbaceous vegetation, generally greater than 80 percent of total vegetation. These areas are not subject to intensive management such as tilling, but can be utilized for grazing.
- Emergent Herbaceous Wetlands – Areas where perennial herbaceous vegetation accounts for greater than 80 percent of vegetative cover and the soil or substrate is periodically saturated with or covered with water.
- Pasture/Hay – Areas of grasses, legumes, or grass-legume mixtures planted for livestock grazing or the production of seed or hay crops, typically on a perennial cycle. Pasture/hay vegetation accounts for greater than 20 percent of total vegetation.
- Open Water – All areas of open water, generally with less than 25 percent cover of vegetation or soil. Characteristic land cover features include lakes, rivers, reservoirs, streams, ponds, and ocean.

The desktop analysis indicates that 80.33 percent of the area within the protective bat buffers is forested (Table 3). The remaining areas within the buffers consist of mostly pasture/hay (13.31%) and developed space (4.27%). Similarly, the desktop analysis indicates that 74.89 percent of the area within 0.25 mile of the Project is forested habitat. The remaining area consists mostly pasture/hay (16.09%) and developed space (6.78%).

Within the 125-foot construction ROW and additional temporary workspaces, the analysis indicates that 65.69 percent of the area is dominated by forest followed by 20.60 percent of pasture/hay and 11.83 percent developed space (Table 3).

4.2 Field Detailed Habitat Assessments

Detailed habitat assessments began on 19 November and were completed on 21 November 2015.

4.2.1 Overall Habitat Potential

Thirty-one patches of three different habitat types were identified and assessed for roosting and foraging potential for both Indiana and northern long-eared bats (Figures 2 and 3; Table 4) along the Project area in Virginia. The Project study area equals a total of 618.66 acres; however, permission to survey was

Table 3. Land cover types within protected bat capture/roost/hibernacula buffers, within 0.25 mile of the Project, and within the proposed workspace before construction of the Mountain Valley Pipeline Project in Virginia.

Land Cover Type	Within Bat Buffers		Within 0.25 Mile of Project		Within Project Workspace	
	Acres	%	Acres	%	Acres	%
Barren Land	43.58	0.08	2.46	0.04	0.00	0.00
Cultivated Crops	635.54	1.16	109.18	1.56	4.55	1.57
Deciduous Forest	41,660.91	76.04	4,886.12	69.86	128.21	44.13
Evergreen Forest	1,712.75	3.13	174.62	2.50	2.66	0.92
Mixed Forest	637.09	1.16	177.17	2.53	59.96	20.64
Developed, Open Space	1,588.83	2.90	235.22	3.36	18.98	6.53
Developed, Low Intensity	523.87	0.96	143.58	2.05	1.21	0.42
Developed, Medium Intensity	225.51	0.41	94.40	1.35	14.17	4.88
Developed, High Intensity	1.56	<0.01	1.54	0.02	0.00	0.00
Shrub/Scrub	77.28	0.14	2.17	0.03	0.95	0.33
Grassland/Herbaceous	344.63	0.63	40.95	0.59	0.00	0.00
Emergent Herbaceous Wetland	1.33	<0.01	0.00	0.00	0.00	0.00
Pasture/Hay	7,292.57	13.31	1,125.27	16.09	59.85	20.60
Open Water	43.11	0.08	1.56	0.02	0.00	0.00
Total	54,788.57	100.00	6,994.23	100.00	290.53	100.00

Table 4. Summary of habitat patches surveyed for roosting and foraging potential on the proposed Mountain Valley Pipeline Project in Virginia.

Species	Patch Potential	Habitat Type			Patch Potential Total (ac)	Patch Potential within Construction Workspace (ac)
		Open (ac)	Woodland (ac)	Shrub/ Scrub (ac)		
Indiana Bat	Roosting					
	Low	31.68	73.25	2.17	107.10	45.51
	Moderate	0.00	53.46	0.00	53.46	23.91
	High	0.00	25.26	0.00	25.26	10.47
	None	64.65	13.58	0.00	78.23	43.55
	Foraging					
	Low	0.00	129.89	2.17	132.06	54.98
	Moderate	67.64	21.41	0.00	89.05	47.03
Northern Long-eared Bat	High	28.70	12.64	0.00	41.34	20.61
	None	0.00	1.60	0.00	1.60	0.81
	Roosting					
	Low	31.68	7.64	2.17	41.49	18.35
	Moderate	0.00	119.07	0.00	119.07	51.07
	High	0.00	25.26	0.00	25.26	10.47
	None	64.65	13.58	0.00	78.23	43.55
	Foraging					
	Low	0.00	104.64	2.17	106.81	44.51
	Moderate	64.44	46.66	0.00	111.10	56.77
	High	31.90	12.64	0.00	44.54	21.35
	None	0.00	1.60	0.00	1.60	0.81

not given on 354.61 acres (57.32%). Of the 264.05 acres surveyed, habitat patch types included woodland ($n = 165.54$ acres, 62.69%), scrub/shrub-oldfield-early successional ($n = 2.17$ acres, 0.82%), and open ($n = 96.33$ acres, 36.48%). Woodland habitats included hardwood ($n = 5$, 27.78%) and mixed hardwood and evergreen ($n = 13$, 72.22%), and ages varied from young ($n = 7$, 38.89%) to less mature ($n = 11$, 61.11%). Open habitat patch types included agricultural (i.e., cultivated crops, hay fields, pasture land) and developed (i.e., residential areas, roads, utility corridors) areas.

Dominant trees in woodlands included red maple (*Acer rubrum*), sugar maple (*Acer saccharum*), shagbark hickory (*Carya ovata*), American beech (*Fagus grandifolia*), white ash (*Fraxinus americana*), black walnut (*Juglans nigra*), eastern red cedar (*Juniperus virginiana*), tulip poplar (*Liriodendron tulipifera*), white pine (*Pinus strobus*), Virginia pine (*Pinus virginiana*), black cherry (*Prunus serotina*), white oak (*Quercus alba*), chestnut oak (*Quercus montana*), red oak (*Quercus rubra*), eastern black oak (*Quercus velutina*), and black locust (*Robinia pseudoacacia*). The most commonly observed dominant trees in woodland patches were white oak, chestnut oak, and white ash.

Subdominant trees in hardwood forests included red maple, silver maple, sugar maple, tree of heaven (*Ailanthus altissima*), pignut hickory (*Carya glabra*), shagbark hickory, common hackberry (*Celtis occidentalis*), American beech, white ash, eastern red cedar, tulip poplar, pitch pine (*Pinus rigida*), Virginia pine, black cherry, white oak, chestnut oak, red oak, and black locust. The most commonly observed subdominant trees in woodland patches were red maple, eastern red cedar, and shagbark hickory.

Open patches included developed ($n = 3$, 25.00%), pasture ($n = 8$, 66.67%), and roads ($n = 1$, 8.33%),

4.2.1.1 Overall Roost Potential

Roost potential for each patch was ranked as low, moderate, or high for Indiana and northern long-eared bats. For Indiana bats, roost potential was ranked as high in 3.23 percent ($n = 1$) of patches, moderate in 19.35 percent ($n = 6$) of patches, low in 38.71 percent ($n = 12$) of patches, and 38.71 percent ($n = 12$) of patches provided no roost potential. For northern long-eared bats, roost potential was ranked as high in 3.23 percent ($n = 1$), moderate in 35.48 percent ($n = 11$) of patches, low in 22.58 percent ($n = 7$) of patches, and 38.71 percent ($n = 12$) of patches provided no roost potential.

During Project construction, 10.47 acres (13.11%) of high roost potential, 23.91 acres (29.93%) of moderate roost potential and 45.51 acres (56.96%) of low roost potential for the Indiana bat will be lost. Similarly, 10.47 acres (13.11%) of high roost potential, 51.07 acres (63.92%) of moderate roost potential and 18.35 acres (22.97%) of low roost potential for the northern long-eared bat will be lost.

4.2.1.2 Overall Foraging Potential

Foraging potential for each patch was ranked as low, moderate, or high for Indiana bats and northern long-eared bats. For Indiana bats, 14 patches (45.16%) were considered low, 13 (41.94%) moderate, 3 (9.68%) high, and 1 (3.23%) no potential. For northern long-eared bats, 13 patches (41.94%) were considered low, 13 (41.94%) moderate, 4 (12.90%) high, and 1 (3.23%) no potential.

During Project construction, 20.61 acres (16.81%) of high foraging potential, 47.03 acres (38.36%) of moderate foraging potential, and 54.98 acres (44.84%) of low foraging potential for the Indiana bat will be lost. Similarly, 21.35 acres (17.41%) of high foraging potential, 56.77 acres (46.29%) of moderate foraging potential, and 44.51 acres (36.30%) of low foraging potential for the northern long-eared bat will be lost.

4.2.2 Potential Roost Trees

Three hundred five potential roost trees were observed within the survey area, and the trees were ranked as having high, moderate, low, or no potential for both the Indiana and northern long-eared bat (Table 5). Documented potential roost trees comprised 22 species. Potential roost trees ranged in dbh from 13 to 150 centimeters with a mean dbh of 31.50 centimeters (SD = 14.30 cm). The most commonly observed potential roost trees were shagbark hickory ($n = 73$; 23.93%), red maple ($n = 58$; 19.02%), and black locust ($n = 52$; 17.05%) (Table 5).

4.2.2.1 Indiana Bat Roosts

Of the 305 potential roost trees identified, 134 (43.93%) ranked as low, 128 (41.97%) ranked as moderate, 38 (12.46%) ranked as high, and 5 (1.64%) ranked as no potential for the Indiana bat. It is anticipated that 39.67 percent ($n = 119$) of Indiana bat potential roosts will be lost with development. Of these, 14 (11.76%) are ranked as having high roost potential for the Indiana bat, 46 (38.66%) are ranked as moderate, and 59 (49.58%) are ranked as low.

4.2.2.2 Northern Long-eared Bat Roosts

Of the potential roost trees identified, 67 (21.97%) ranked as low, 185 (60.66%) ranked as moderate, and 53 (17.38%) ranked as high for the northern long-eared bat. It is anticipated that 40.00 percent ($n = 122$) of northern long-eared bat potential roost will be lost with development. Of these, 23 (18.85%) are ranked as high roost potential, 75 (61.48%) are ranked as moderate, and 24 (19.67%) are ranked as low potential for the northern long-eared bat.

Table 5. Summary of potential roosts on the proposed Mountain Valley Pipeline Project in Virginia.

Species	Tree Health			Average DBH (cm)	Roost Potential ¹						
	# Live	# Partial	# Dead		Indiana Bat				Northern Long-eared Bat		
					H	M	L	N ²	H	M	L
<i>Acer rubrum</i>	3	2	1	46.67	0	4	1	1	2	3	1
<i>Acer saccharum</i>	3	0	1	76.25	0	1	3	0	0	3	1
<i>Ailanthus altissima</i>	1	0	0	25.00	0	0	1	0	0	1	0
<i>Carya glabra</i>	1	0	1	18.00	0	1	1	0	0	2	0
<i>Carya ovata</i>	69	3	1	27.34	1	55	17	0	3	56	14
<i>Cornus florida</i>	0	1	1	17.50	0	0	2	0	0	2	0
<i>Fagus grandifolia</i>	1	0	0	47.00	0	0	0	1	0	1	0
<i>Fraxinus americana</i>	0	1	0	45.00	0	1	0	0	0	1	0
<i>Juglans nigra</i>	0	0	1	22.00	0	0	1	0	0	0	1
<i>Liriodendron tulipifera</i>	1	0	1	34.00	0	0	2	0	0	1	1
<i>Pinus strobus</i>	1	0	2	31.67	0	3	0	0	2	1	0
<i>Pinus virginiana</i>	0	0	20	25.15	1	1	18	0	2	4	14
<i>Populus grandidentata</i>	0		2	29.00	0	2	0	0	0	2	0
<i>Prunus serotina</i>	2	0	0	40.00	0	1	1	0	0	2	0
<i>Quercus alba</i>	4	1	3	50.00	2	2	4	0	2	5	1
<i>Quercus macrocarpa</i>	0	1	0	35.00	0	1	0	0	0	1	0
<i>Quercus montana</i>	7	14	29	29.82	5	13	29	3	8	25	17
<i>Quercus rubra</i>	4	3	51	30.29	24	22	12	0	26	26	6
<i>Quercus velutina</i>	2	4	3	39.56	3	2	4	0	4	3	2
<i>Robinia pseudoacacia</i>	1	11	40	34.75	0	15	37	0	1	43	8
<i>Ulmus americana</i>	0	0	2	27.50	0	2	0	0	0	2	0
<i>Ulmus rubra</i>	0	0	5	22.20	2	2	1	0	3	1	1
Total	100	41	164	31.50	38	128	134	5	53	185	67

¹Roost Potential: H = High, M = Moderate, L = Low, N = None

²Some roosts were suitable for northern long-eared bats but not for Indiana bats

5.0 Discussion and Conclusion

From 19 to 22 November 2015, portions of the study area within listed capture/roost buffers were surveyed for potentially suitable Indiana and northern long-eared bat habitat. Thirty-one habitat patches and 305 potential roost trees were identified. Project development will result in the loss of 197 trees potentially suitable for both Indiana and northern long-eared bats. Following construction, forested area within 0.25 mile of the Project will decrease from approximately 74.89 percent to 72.17 percent (Table 6). Indiana bats have been known to persist on landscapes with less than 20 percent forest cover (Sparks et al. 2004, Sparks et al. 2005, Watrous et al. 2006, Sparks et al. 2008, Sparks et al. 2009). Although often considered an interior forest species, northern long-eared bats are also known to occupy areas of limited forest cover, including portions of the Indianapolis Airport site (Whitaker and Sparks 2008), and have recently invaded the High Plains (Sparks et al. 2011).

Although this Project will not likely reduce potential roosting or foraging habitat below any critical value, the loss of habitat will still negatively impact both the Indiana and northern long-eared bats in Virginia. Due to the size and timeline constraints of the Project, direct impacts to listed bat species and associated habitat cannot be completely avoided. To quantify potential direct and indirect effects to individuals and habitat, data collected and presented within this report will be used to aid in the development of a *take estimate* model to be included within a Biological Assessment submitted to the USFWS. On behalf of MVP, ESI requests concurrence on the methods, results, and conclusions of this report.

Table 6. Land cover types within protected bat capture/roost/hibernacula buffers, within 0.25 mile of the Project, and within the proposed workspace following construction of the Mountain Valley Pipeline Project in Virginia.

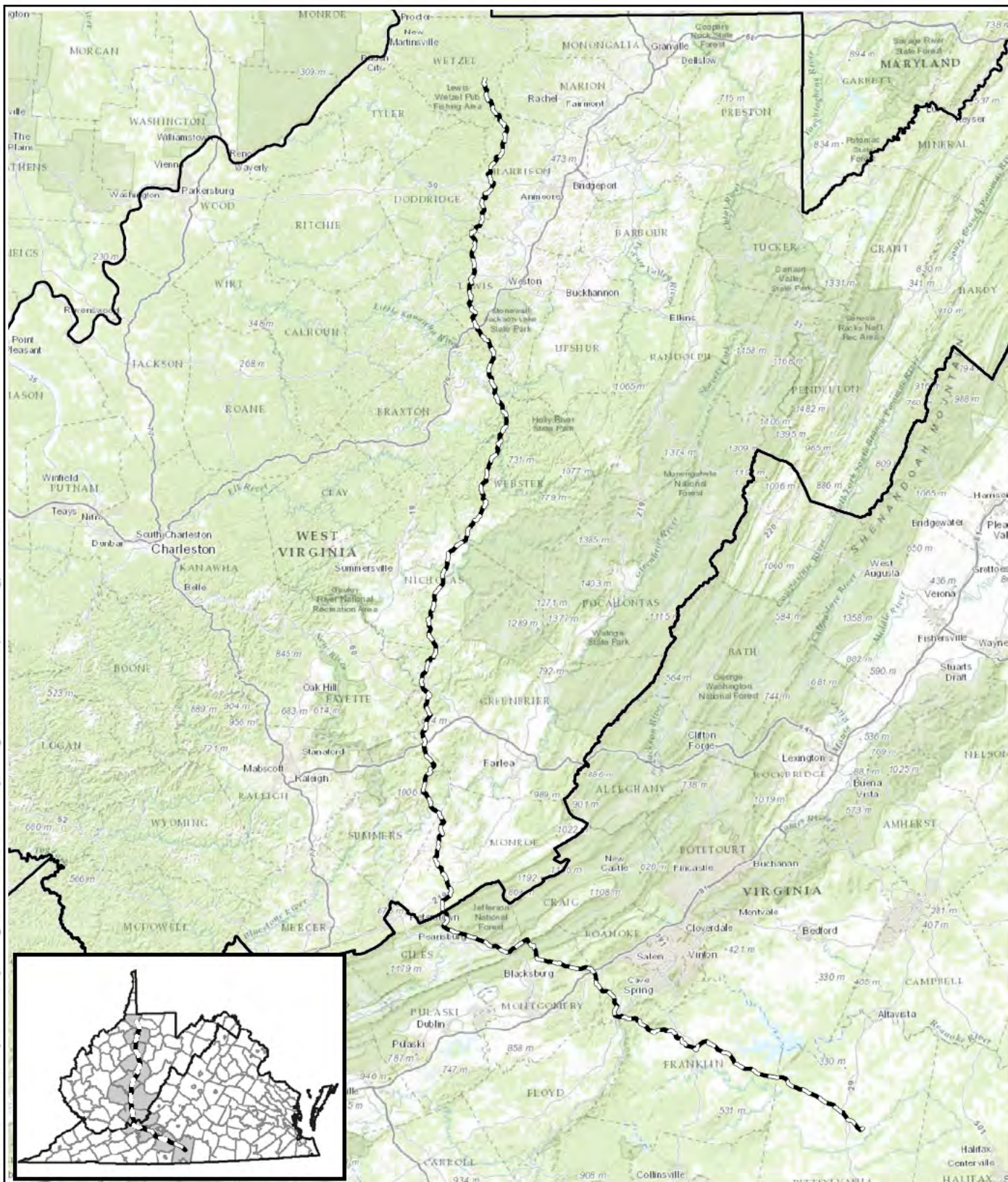
Land Cover Type	Within Bat Buffers		Within 0.25 Mile of Project		Within Project Workspace	
	Acres	%	Acres	%	Acres	%
Barren Land	43.58	0.08	2.46	0.04		
Cultivated Crops	630.99	1.15	104.63	1.50		
Deciduous Forest	41,532.71	75.81	4,757.92	68.03		
Evergreen Forest	1,710.09	3.12	171.96	2.46		
Mixed Forest	577.13	1.05	117.21	1.68		
Developed, Open Space	1,860.39	3.40	506.77	7.25	290.53	100
Developed, Low Intensity	522.67	0.95	142.37	2.04		
Developed, Medium Intensity	211.34	0.39	80.23	1.15		
Developed, High Intensity	1.56	< 0.01	1.54	0.02		
Shrub/Scrub	76.34	0.14	1.23	0.02		
Grassland/Herbaceous	344.63	0.63	40.95	0.59		
Emergent Herbaceous Wetland	1.33	< 0.01	0.00	0.00		
Pasture/Hay	7,232.72	13.20	1,065.42	15.23		
Open Water	43.11	0.08	1.56	0.02		
Total	54,788.57	100.00	6,994.23	100.00	290.53	100.00

6.0 Literature Cited

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APPENDIX A FIGURES



--- Proposed Route

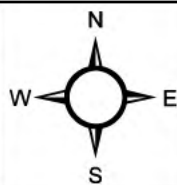
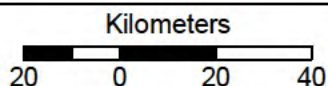


Figure 1. MVP's Proposed Mountain Valley Pipeline Project in West Virginia and Virginia.

Project No.
593.08



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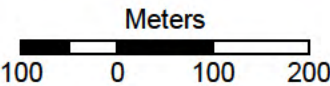
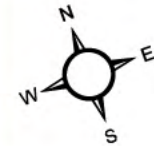
Figure 2. Potentially Suitable Habitat and Roost Trees for the Indiana Bat on the Mountain Valley Pipeline Project in Virginia.



- Mileposts
- Proposed Route
- Known Listed Bat Habitat
- ESI Habitat Survey Boundary

ESI Habitat Patch - Foraging Potential
High Moderate Low No Access

ESI Habitat Patch - Roosting Potential
Moderate Low No Access

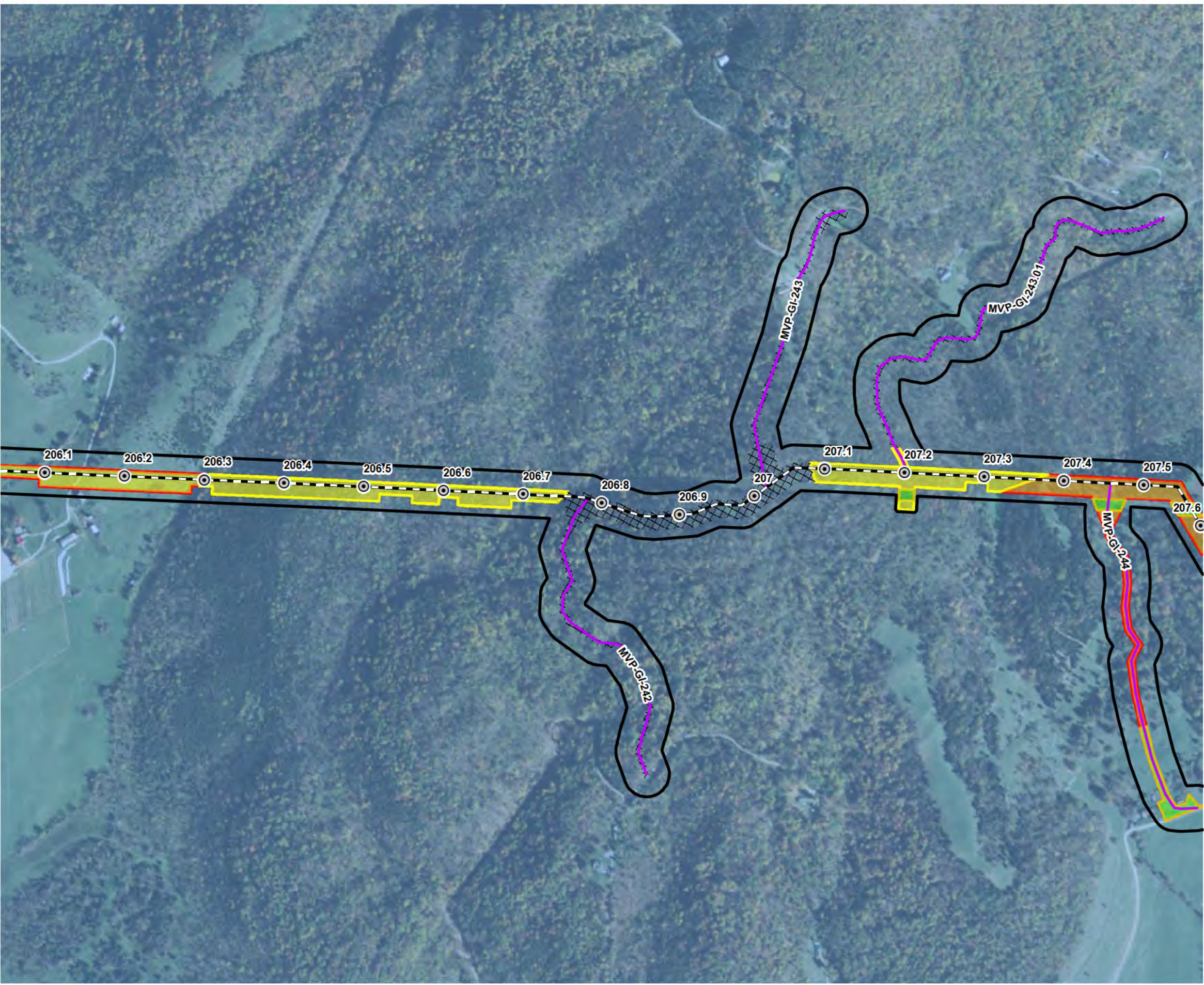


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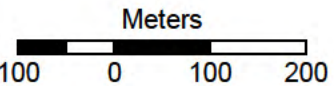
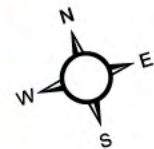
Figure 2. Potentially Suitable Habitat and Roost Trees for the Indiana Bat on the Mountain Valley Pipeline Project in Virginia.



- Mileposts
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ESI Habitat Patch - Foraging Potential
High Moderate Low No Access

ESI Habitat Patch - Roosting Potential
Moderate Low None No Access

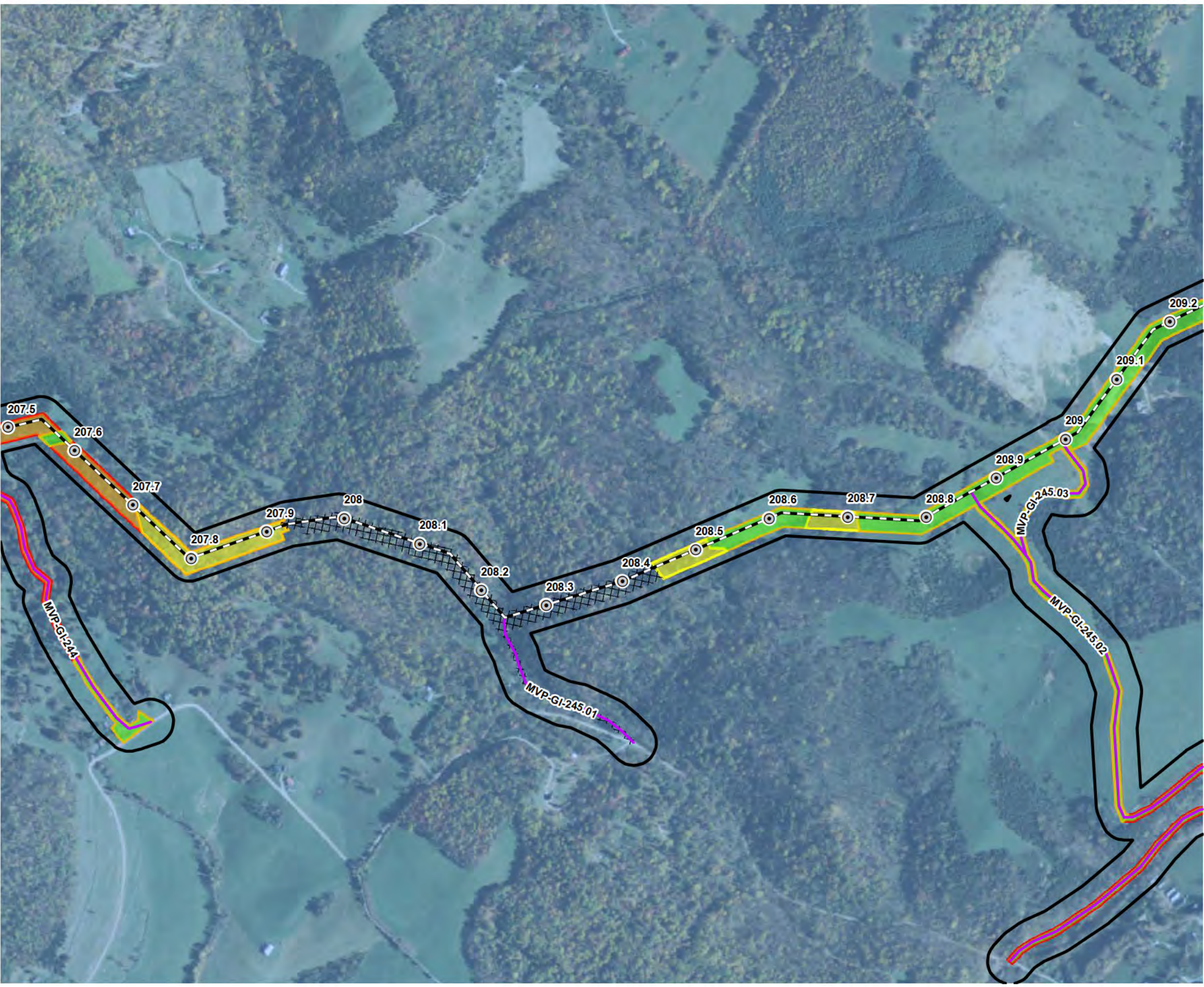


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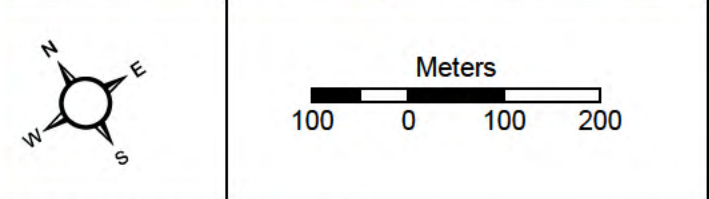
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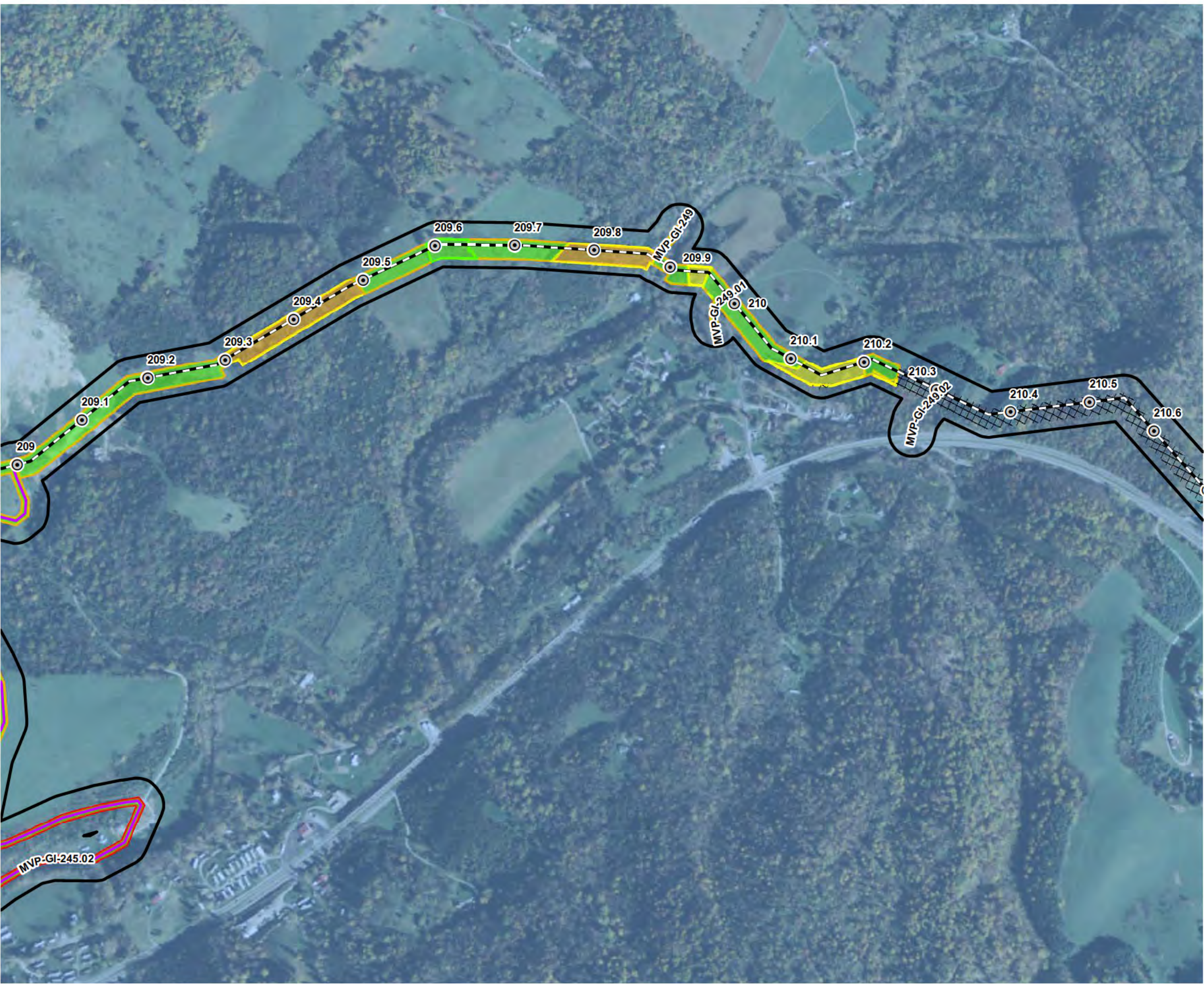
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- - - Proposed Access Road
■ Known Listed Bat Habitat
□ ESI Habitat Survey Boundary

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ESI Habitat Patch - Roosting Potential
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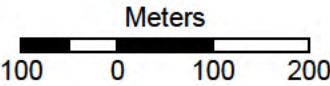
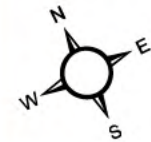
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ESI Habitat Patch - Foraging Potential

XXXX No Access

ESI Habitat Patch - Roosting Potential

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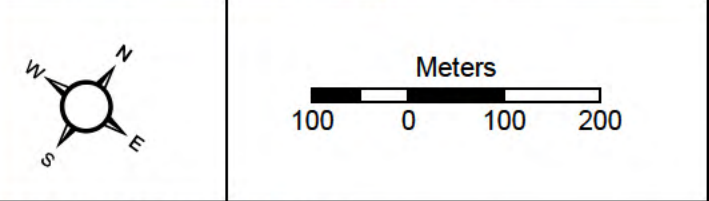
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ESI Habitat Patch - Foraging Potential

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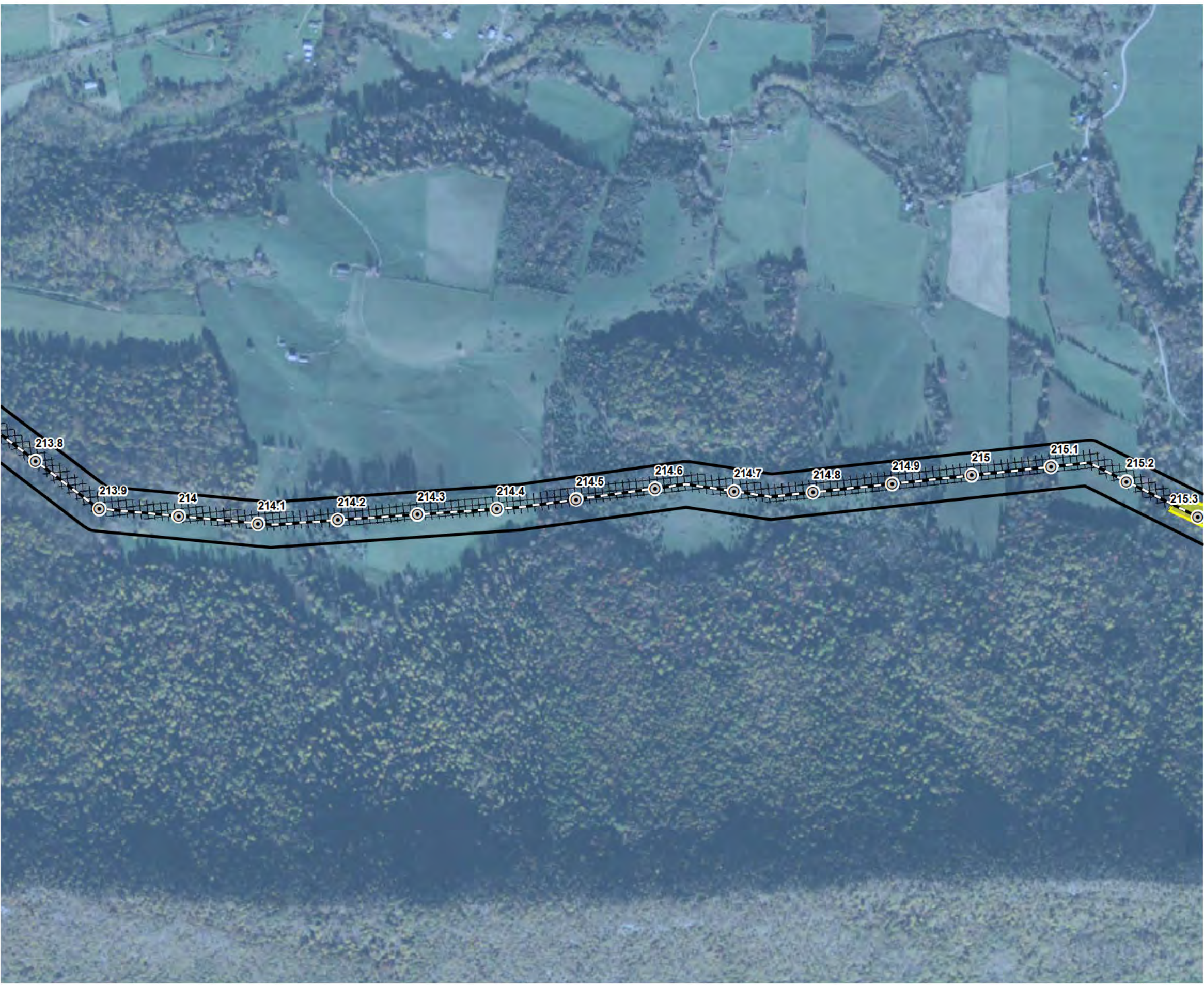
ESI Habitat Patch - Roosting Potential

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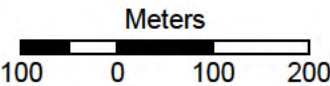
- Mileposts
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- Known Listed Bat Habitat
- ESI Habitat Survey Boundary

ESI Habitat Patch - Foraging Potential

Low No Access

ESI Habitat Patch - Roosting Potential

Low No Access

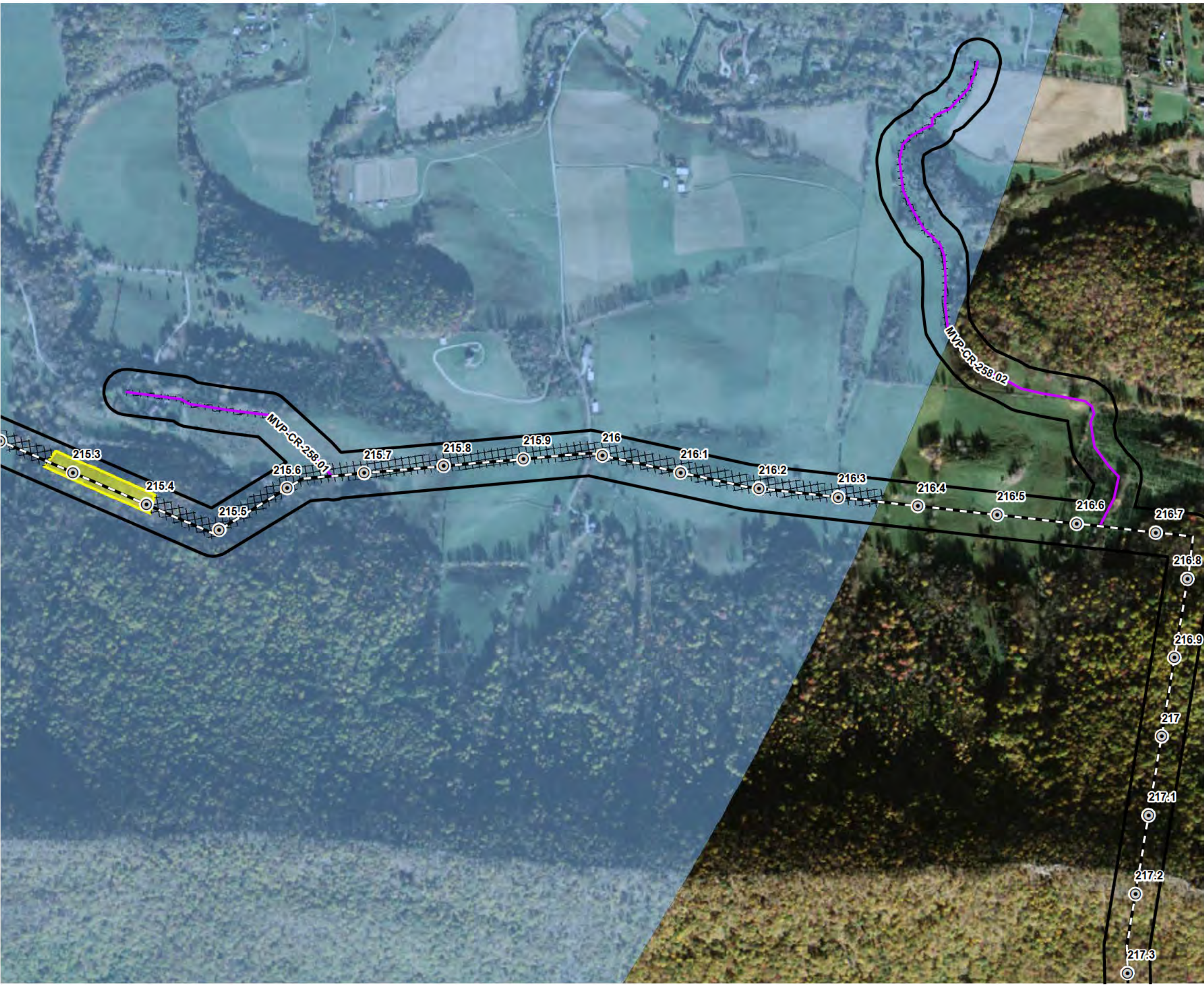


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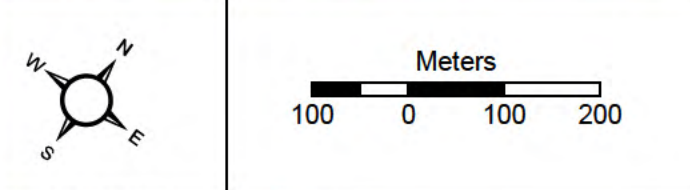
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ESI Habitat Patch - Foraging Potential

Low No Access

ESI Habitat Patch - Roosting Potential

Low No Access



Base Map: ESRI ArcGIS Web service -
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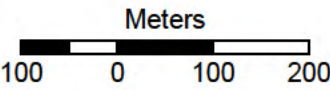
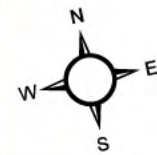
- Proposed Access Road
- Known Listed Bat Habitat
- ESI Habitat Survey Boundary

ESI Habitat Patch - Foraging Potential

- Moderate
- No Access

ESI Habitat Patch - Roosting Potential

- None
- No Access

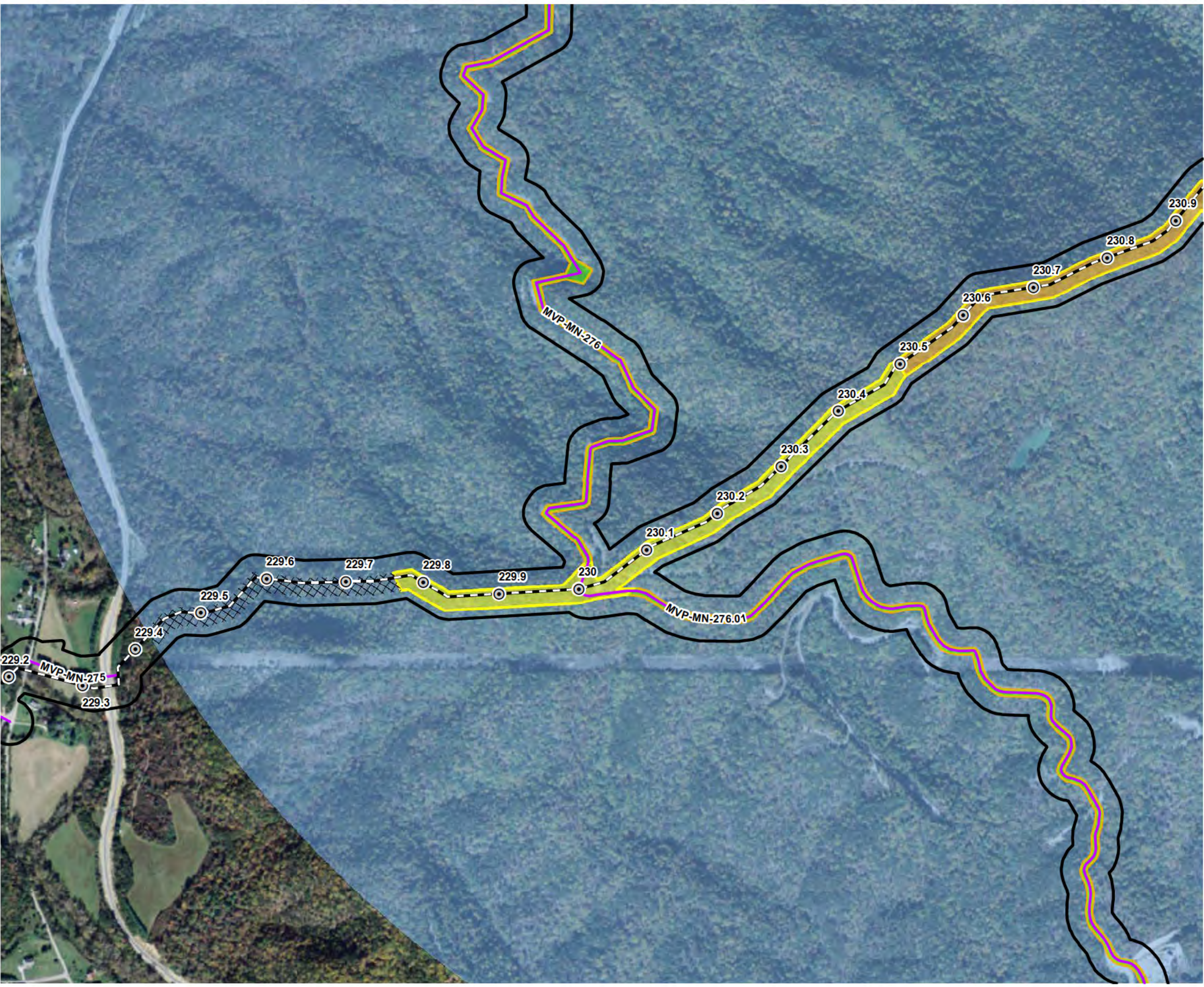


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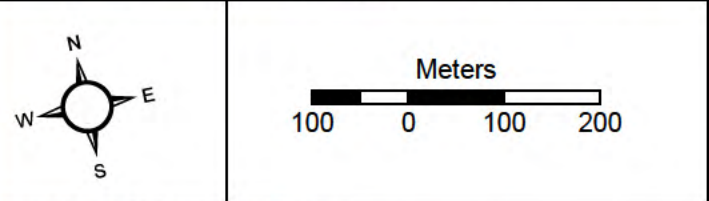


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Figure 2. Potentially Suitable Habitat and Roost Trees for the Indiana Bat on the Mountain Valley Pipeline Project in Virginia.



- Mileposts
 - - - Proposed Route
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 - Known Listed Bat Habitat
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- ESI Habitat Patch - Foraging Potential**
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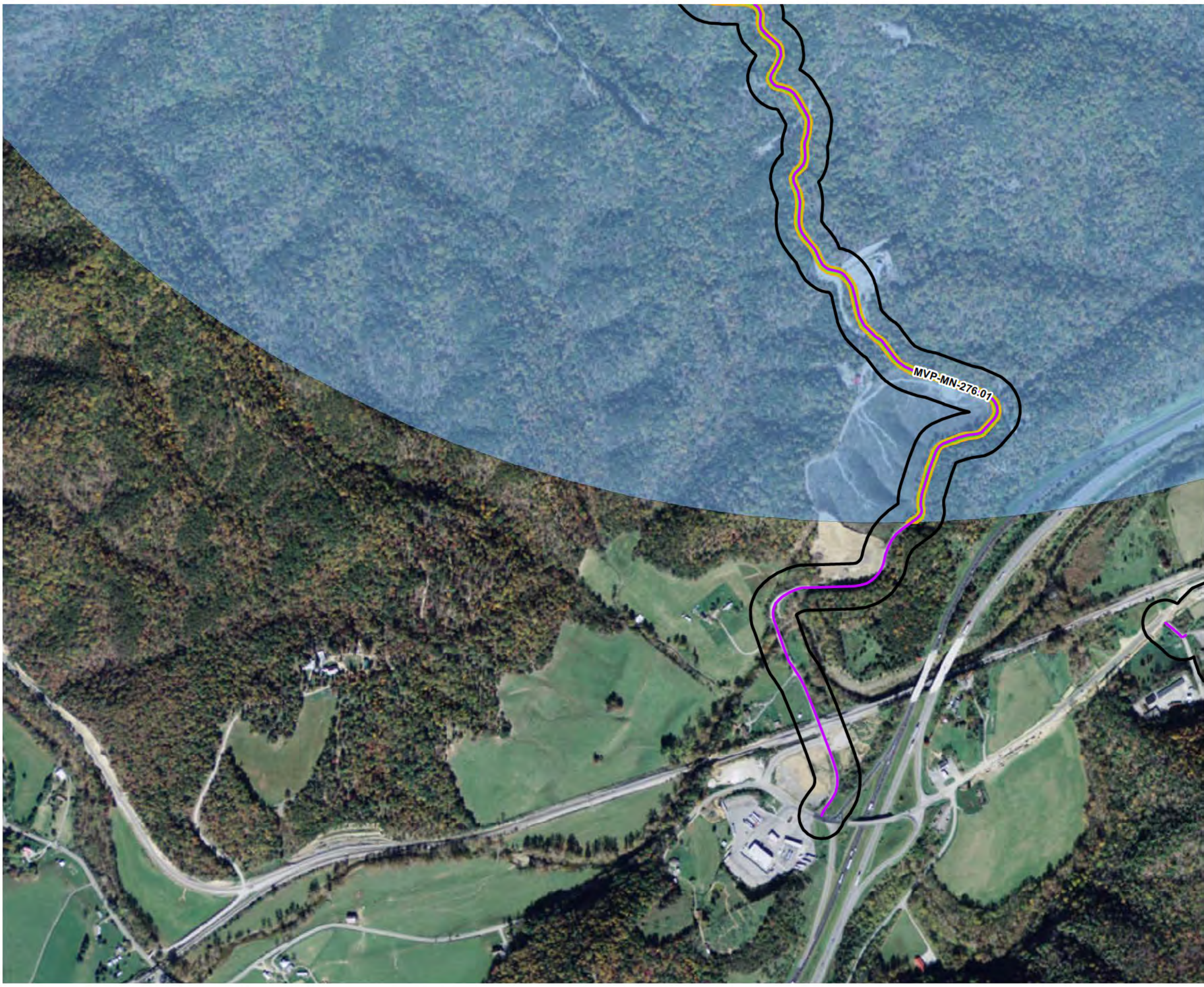


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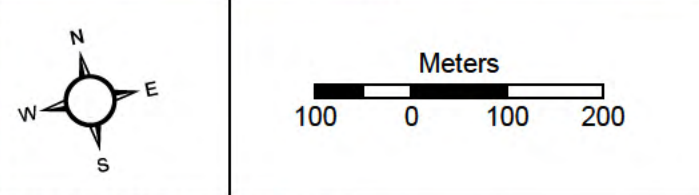
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ESI Habitat Patch - Foraging Potential

- Moderate

ESI Habitat Patch - Roosting Potential

- None

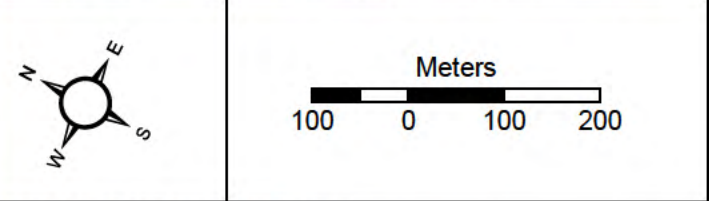


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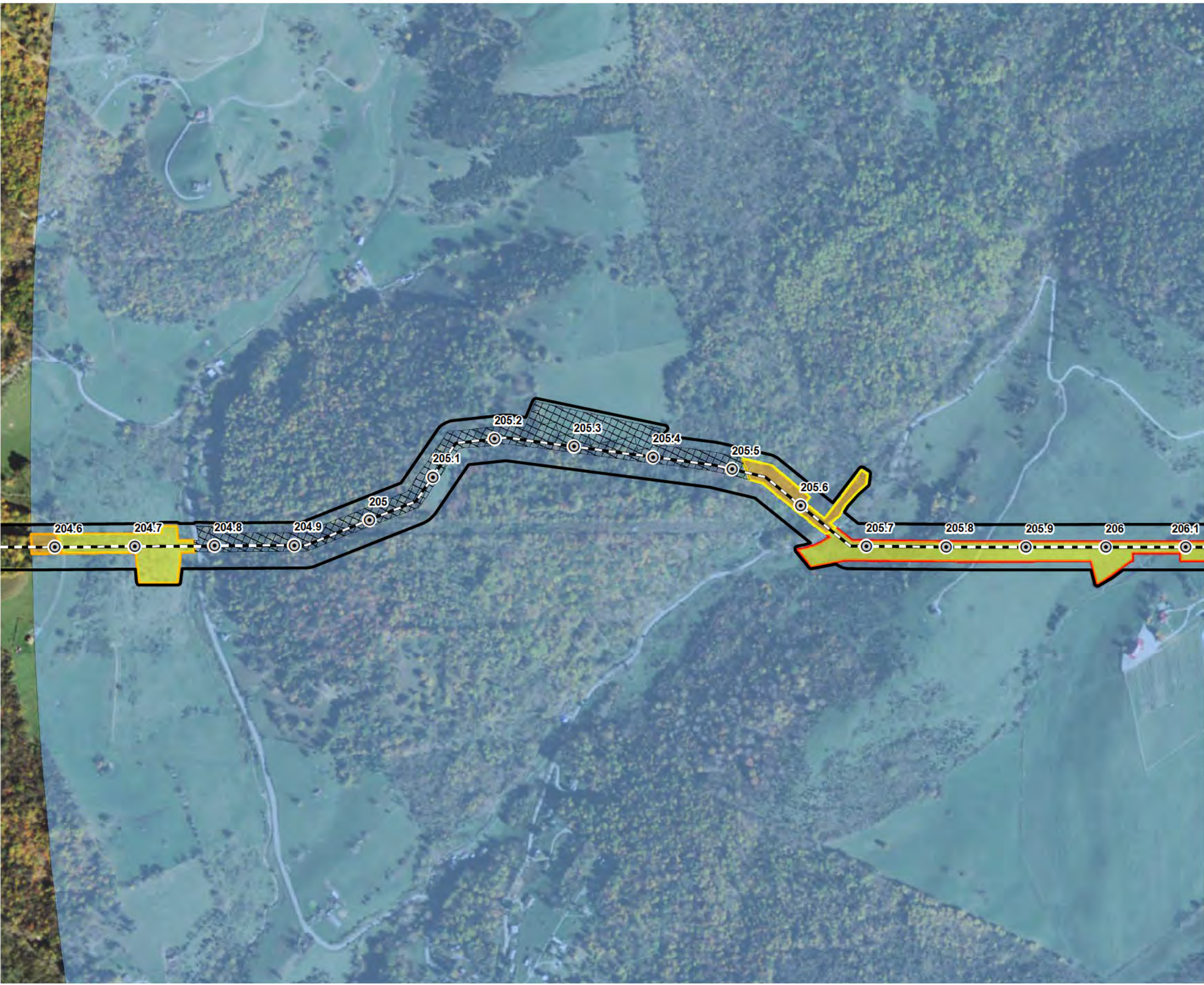


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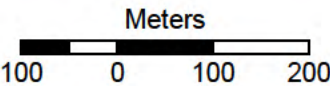
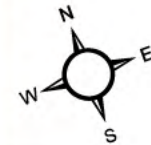
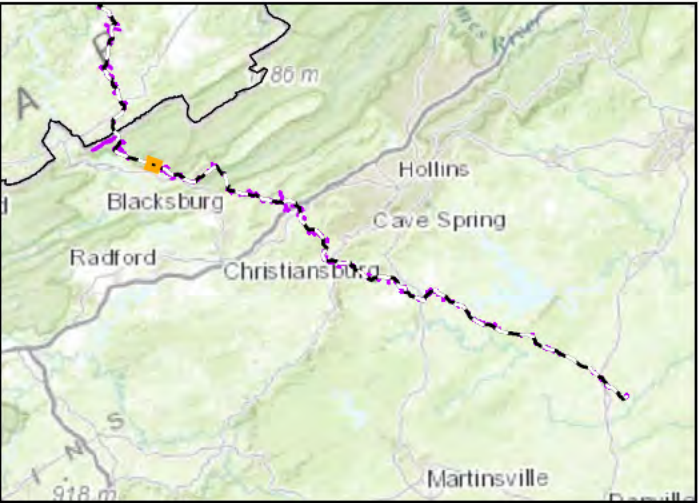
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ESI Habitat Patch - Foraging Potential

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ESI Habitat Patch - Roosting Potential

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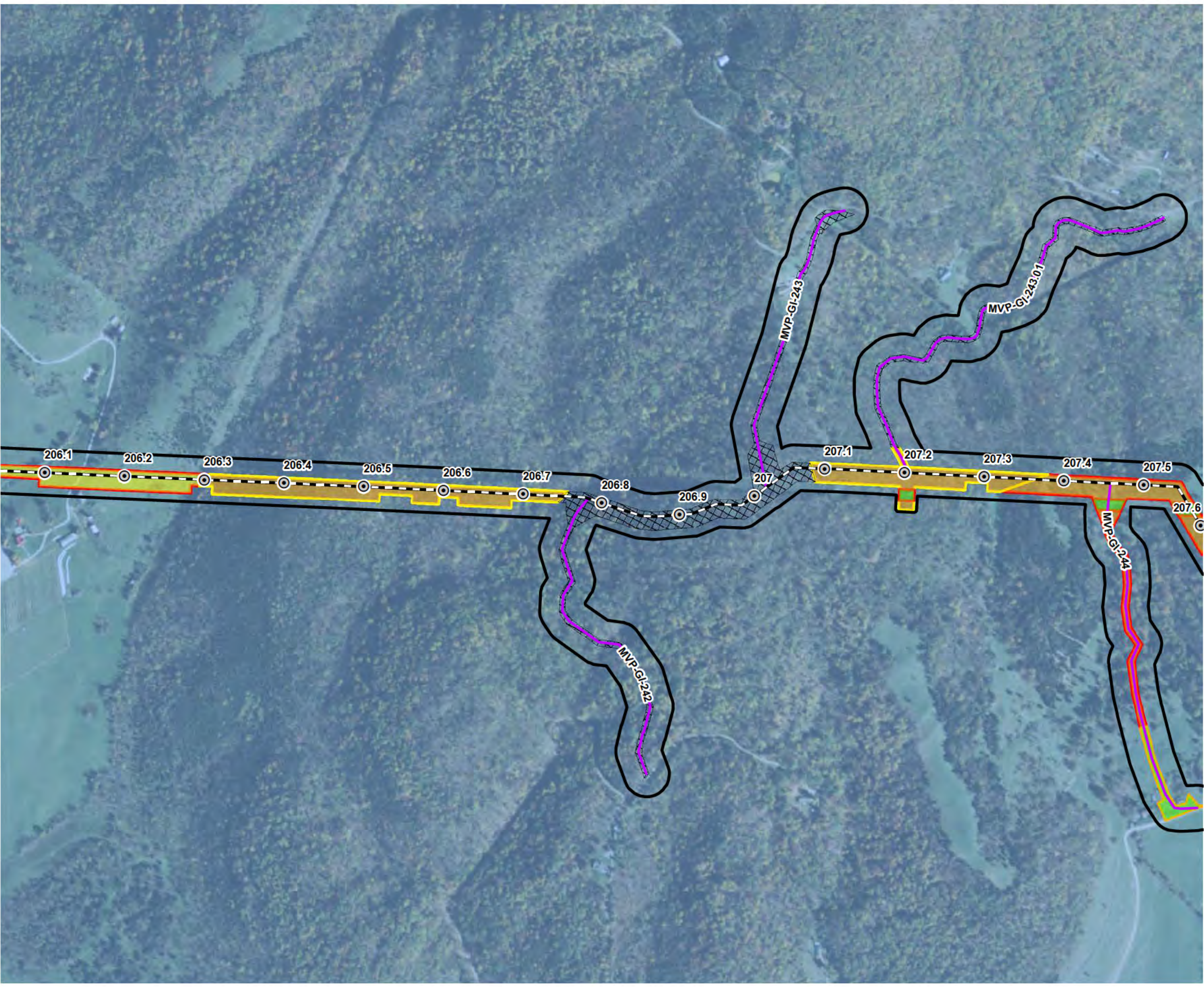


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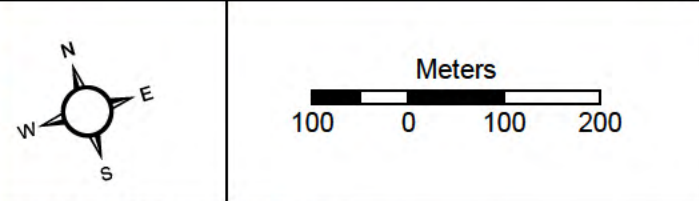
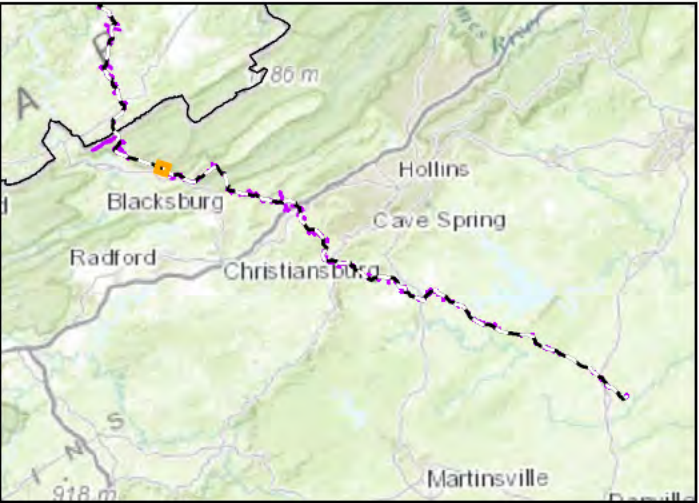


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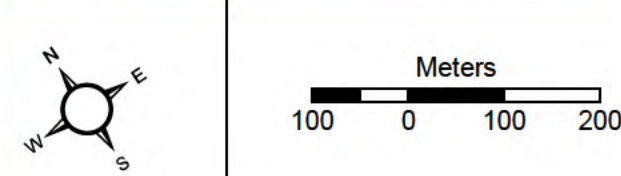
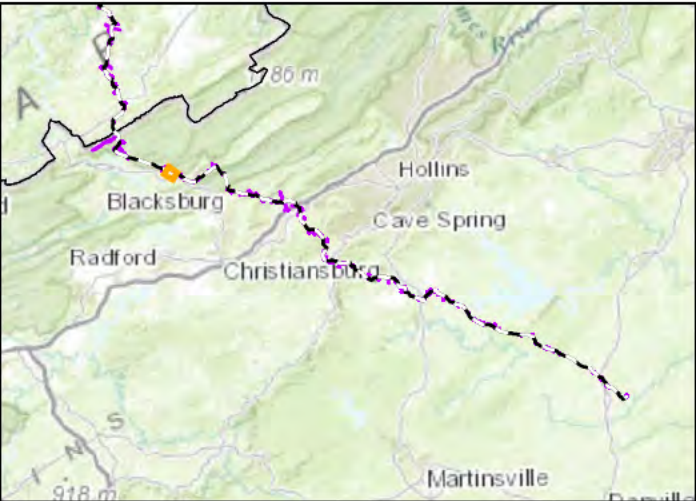


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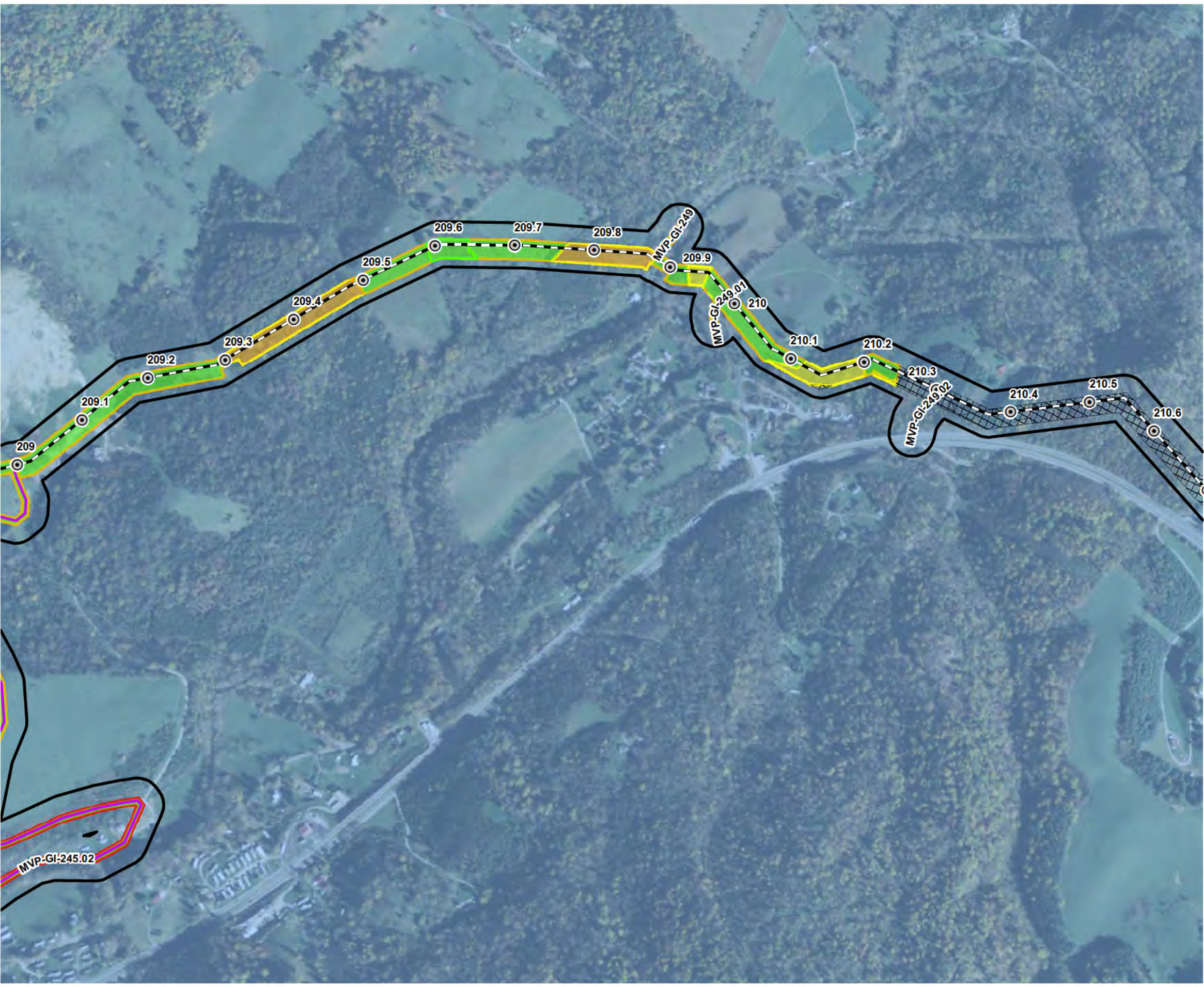


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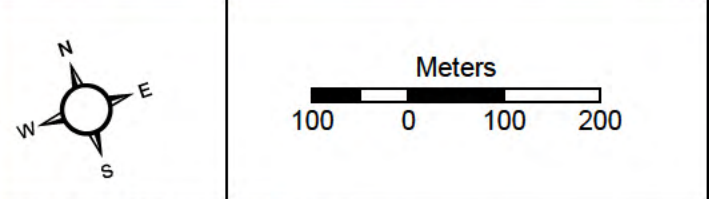
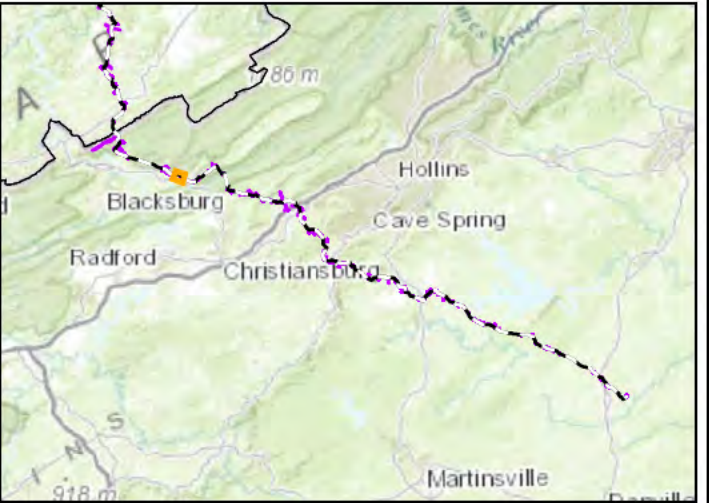


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- ESI Habitat Patch - Foraging Potential**
- | | | | | |
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| High | Moderate | Low | None | No Access |
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- ESI Habitat Patch - Roosting Potential**
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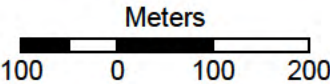
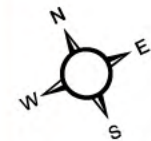
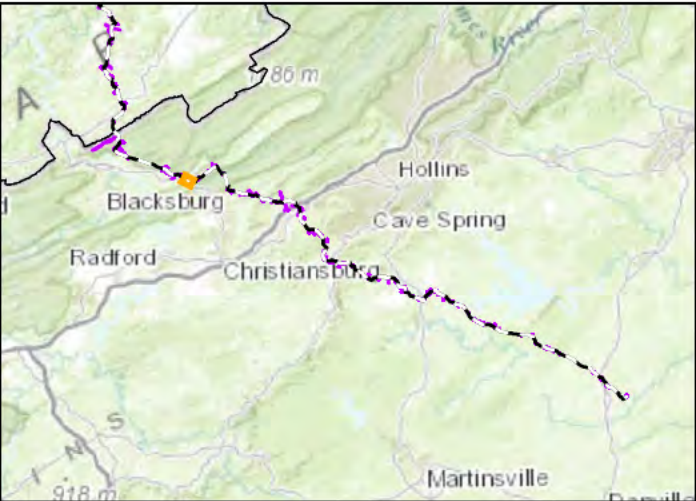
- Mileposts
- - - Proposed Route
- Proposed Access Road
- Known Listed Bat Habitat
- ESI Habitat Survey Boundary

ESI Habitat Patch - Foraging Potential

No Access

ESI Habitat Patch - Roosting Potential

No Access



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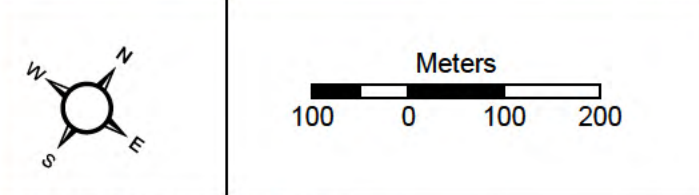
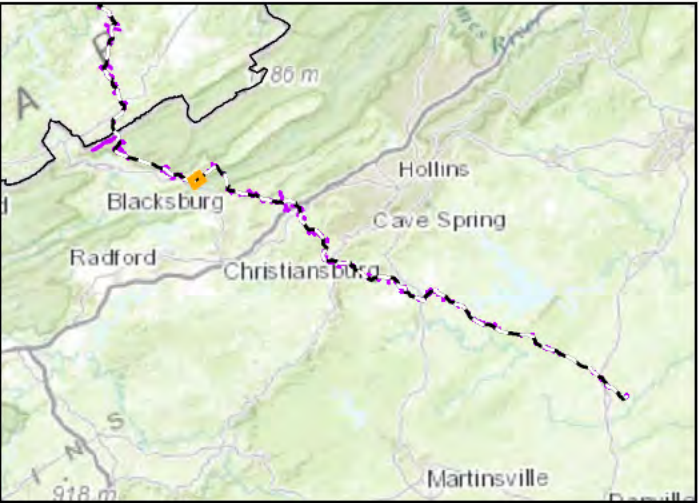


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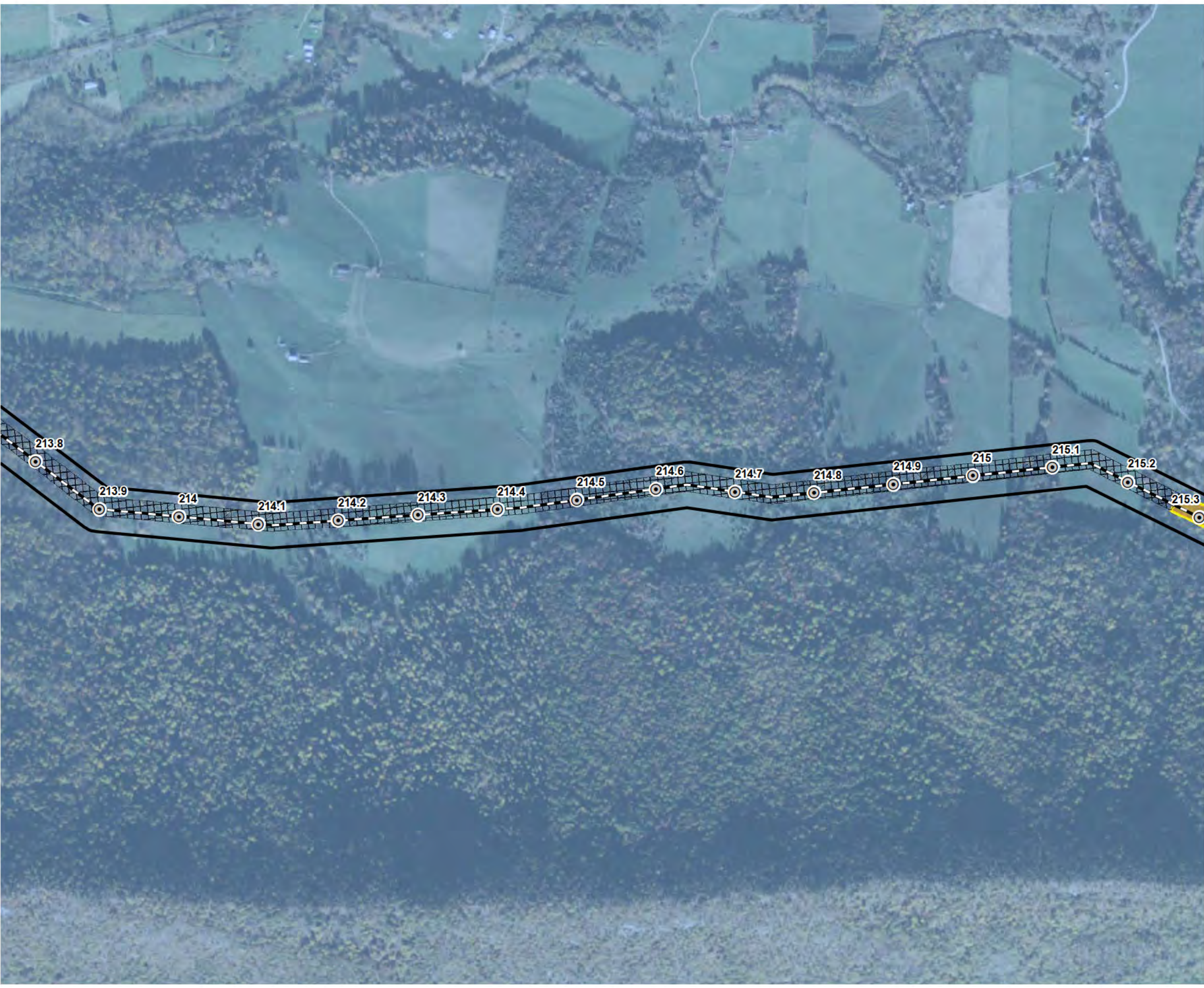


- Mileposts
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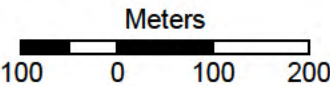
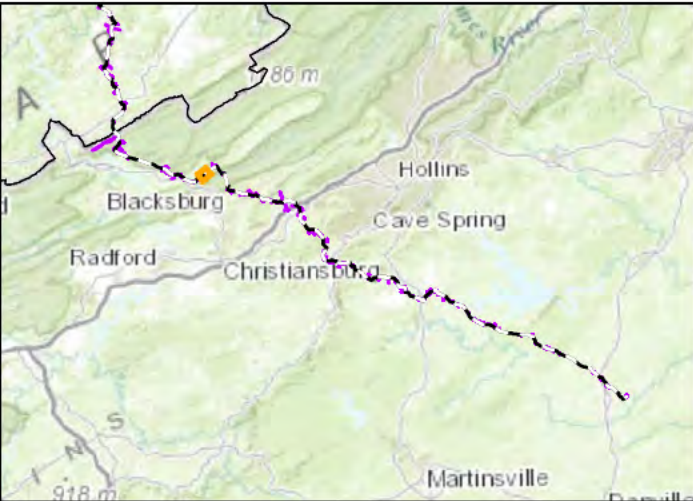
- Mileposts
- Proposed Route
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- ESI Habitat Survey Boundary

ESI Habitat Patch - Foraging Potential

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ESI Habitat Patch - Roosting Potential

Moderate No Access

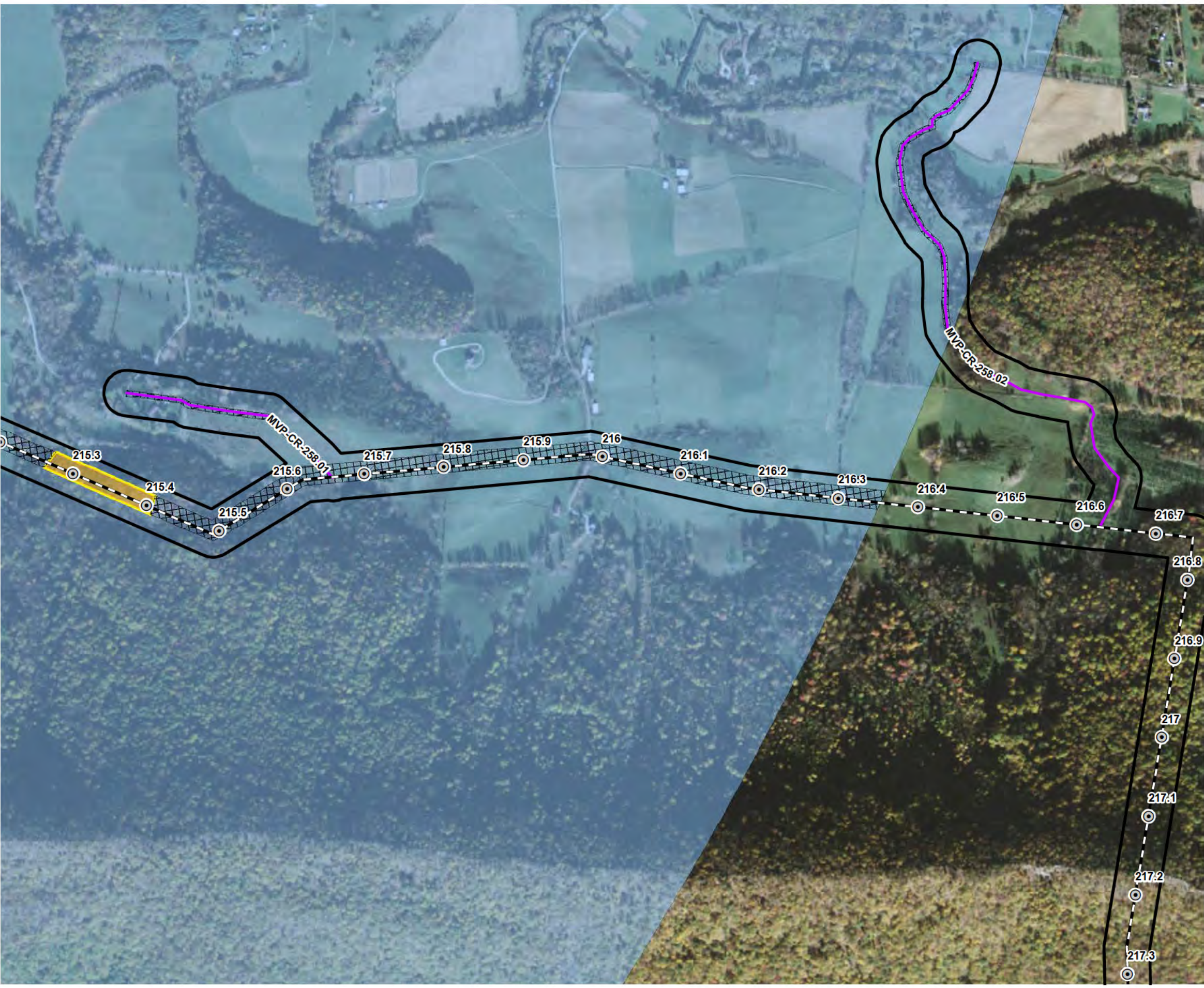


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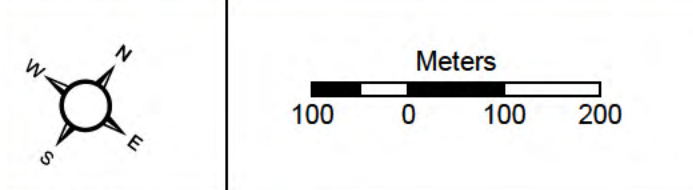
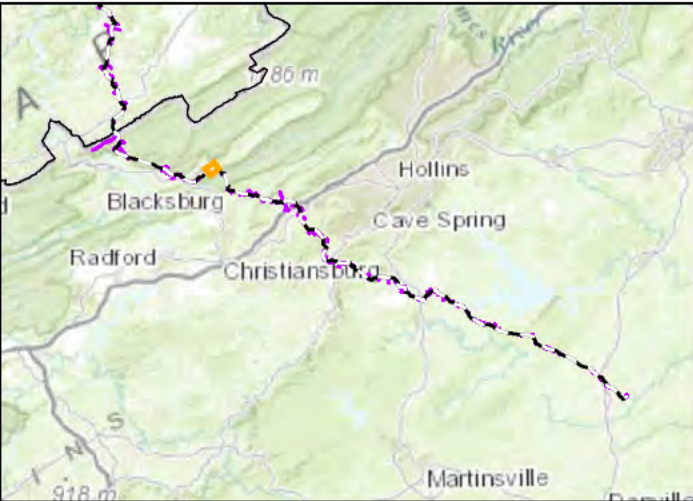


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- Low
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- Moderate
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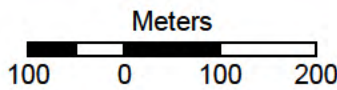
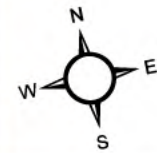
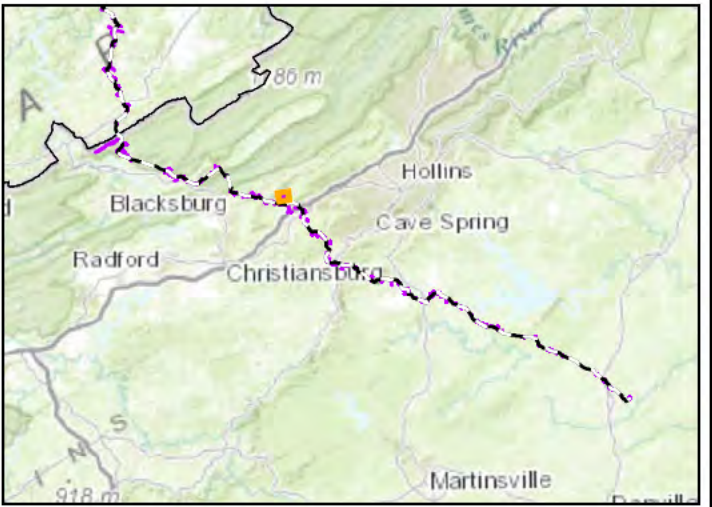
- Proposed Access Road
- Known Listed Bat Habitat
- ESI Habitat Survey Boundary

ESI Habitat Patch - Foraging Potential

- Moderate
- No Access

ESI Habitat Patch - Roosting Potential

- None
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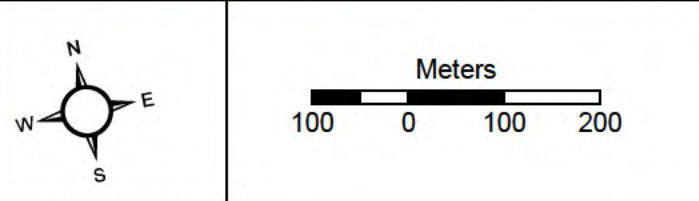
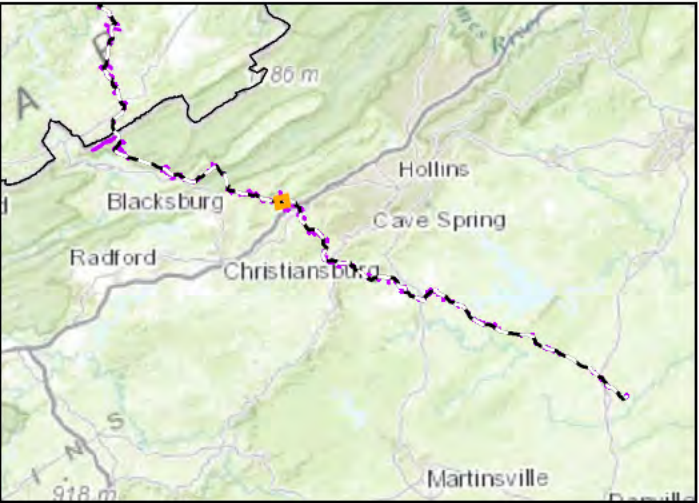


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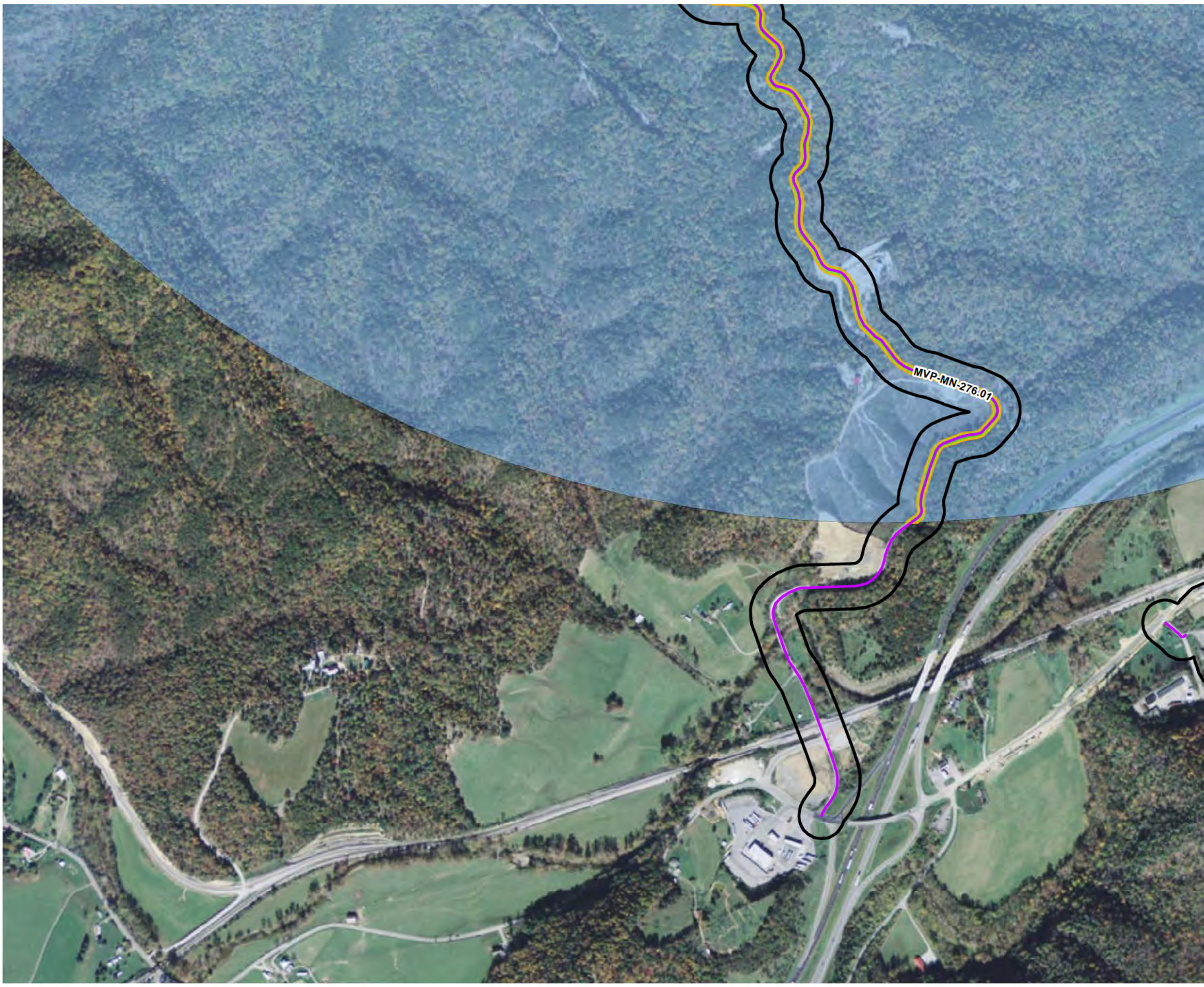


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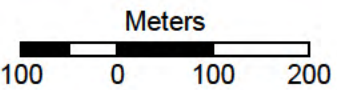
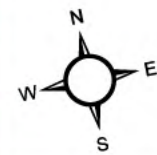
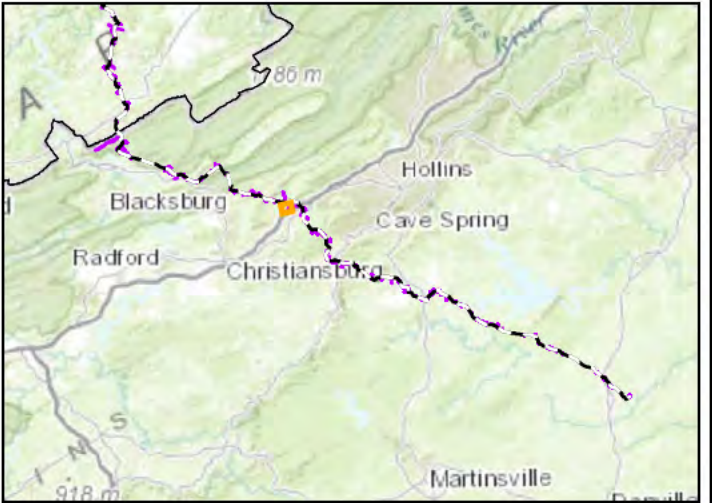
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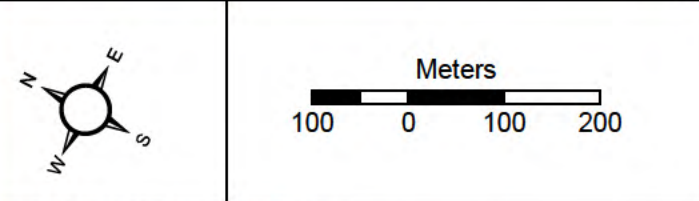
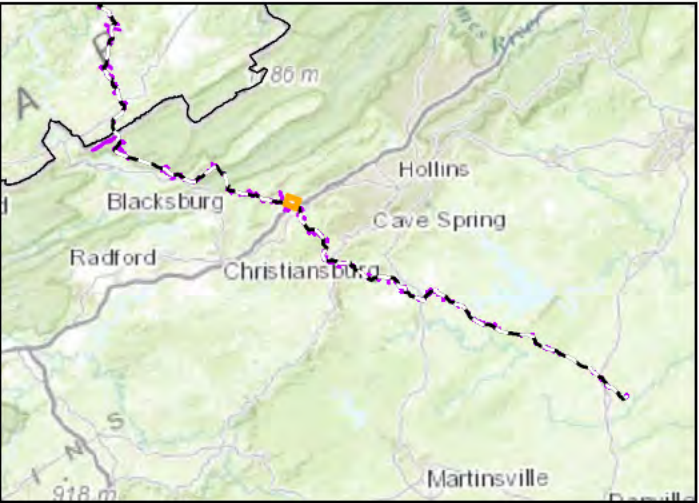


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- ESI Habitat Patch - Roosting Potential**
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APPENDIX B
LIFE HISTORY AND ECOLOGY OF LISTED BATS

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1.0 Life Histories

1.1 Indiana Bat (*Myotis sodalis*)

1.1.1 Description

The Indiana bat is a medium-sized bat in the genus *Myotis*. The forearm length has a range of 35 to 41 millimeters (1.4 – 1.6 in). The head and body length range from 41 to 49 millimeters (1.6 – 1.9 in). Its appearance most closely resembles that of congeners little brown bat (*M. lucifugus*) and northern long-eared bat. Indiana bats differ from similar *Myotis* species in that they have a distinctly keeled calcar (cartilage that extends from the ankle to support the tail membrane). Other minor differences include smaller and more delicate hind feet, shorter hairs on the feet that do not extend past the toenails, and a pink nose. The fur lacks luster, and the wing and ear membranes have a dull, flat coloration that does not contrast with the fur (USFWS 2007). Fur on the chest and belly is lighter than fur on the back, but is not as strongly contrasting as that of similar *Myotis* species. Overall color is slightly grayer, while the little brown bat and northern bat are browner. The skull has a crest and tends to be smaller, flatter, and narrower than that of the little brown bat (USFWS 2007).



1.1.2 Status

The USFWS listed the Indiana bat (*Myotis sodalis*) as endangered on 11 March 1967. The most current range-wide estimate of the population is 523,636 individuals, which represents about 60 percent of the estimated population of 1960 (USFWS 2015). Long-term, detailed documentation of population changes are lacking across most of its range, with the exception of the state of Indiana (Brack et al. 1984, Johnson et al. 2002, Brack et al. 2003), although such information now being acquired in most states. It is probable that habitat loss during summer (USFWS 2007) and winter disturbances during hibernation (Johnson et al. 1998) both contributed to the overall decline of the species.

Federal Register Documents
[41 FR 41914](#); 24 September 1976: Final Critical Habitat, Critical habitat-mammals
[40 FR 58308 58312](#); 16 December 1975: Proposed Critical Habitat, Critical habitat- mammals
[32 FR 4001](#); 11 March 1967: Final Listing, Endangered

A recovery plan for the species was completed on 14 October 1983. In October 1996, the Indiana Bat Recovery Team released a Technical Draft Indiana Bat Recovery Plan. In October 1997, a preliminary version entitled "Agency Draft of the Indiana Bat

Recovery Plan,” which incorporated changes from the 1996 Technical Draft, was released. Subsequently, an agency draft entitled "Indiana Bat (*Myotis sodalis*) Revised Recovery Plan" was distributed for comments in March 1999. In April 2007 USFWS released the "Indiana Bat (*Myotis sodalis*) Draft Recovery Plan: First Revision". Critical habitat was designated on 24 September 1976, and includes 11 caves and 2 abandoned mines in Illinois, Indiana, Kentucky, Missouri, Tennessee, and West Virginia.

1.1.3 Ecology

The Indiana bat is a "tree bat" in summer and a "cave bat" in winter. There are four ecologically distinct components of the annual life cycle: winter hibernation, spring staging and autumn swarming, spring and autumn migration, and the summer season of reproduction. The U.S. Fish & Wildlife Service Recovery Plan (2007) provides a description of the life history. Figure 1 provides an annual chronology of seasonal activities.

1.1.3.1 Summer Roosting Ecology

The summer range of the Indiana bat is large and includes much of the eastern deciduous forestlands between the Appalachian Mountains and Midwest prairies (Figure 2). Distribution throughout the range is not uniform and summer occurrences are more frequent in southern Iowa and Michigan, northern Missouri, Illinois, and Indiana. Greater tree densities do not equate to more bats (Brack et al. 2002). Cooler summer temperatures associated with latitude or altitude likely affect reproductive success and the summer distribution of the species (Brack et al. 2002).

1.1.3.1.1 Males

Some males remain near hibernacula throughout summer while others migrate varying distances (Whitaker and Brack 2002). Males can be caught at hibernacula on most nights during summer (Brack 1983, Brack and LaVal 1985), although there may be a large turnover of individuals between nights (Brack 1983). Woodland roosts appear similar to maternity roosts (Kiser and Elliott 1996, Schultes and Elliott 2002, Brack and Whitaker 2004, Brack et al. 2004), although smaller diameter trees may be used. Less space may be required for a single bat than a colony of bats, or thermal requirements may differ. Males appear somewhat nomadic; over time, the number of roosts and the size of an area used increases. Activity areas encompass roads of all sizes, from trails to interstate highways. Roosts have also been located near roads of all sizes (Kiser and Elliott 1996, Schultes and Elliott 2002, Brack et al. 2004), including adjacent to an interstate highway (Brack et al. 2004).

1.1.3.1.2 Females and Maternity Colonies

When female Indiana bats emerge from hibernation, they migrate to maternity colonies that may be located up to several hundred miles away (Kurta and Murray 2002). Females form nursery colonies under exfoliating bark of dead, dying, and

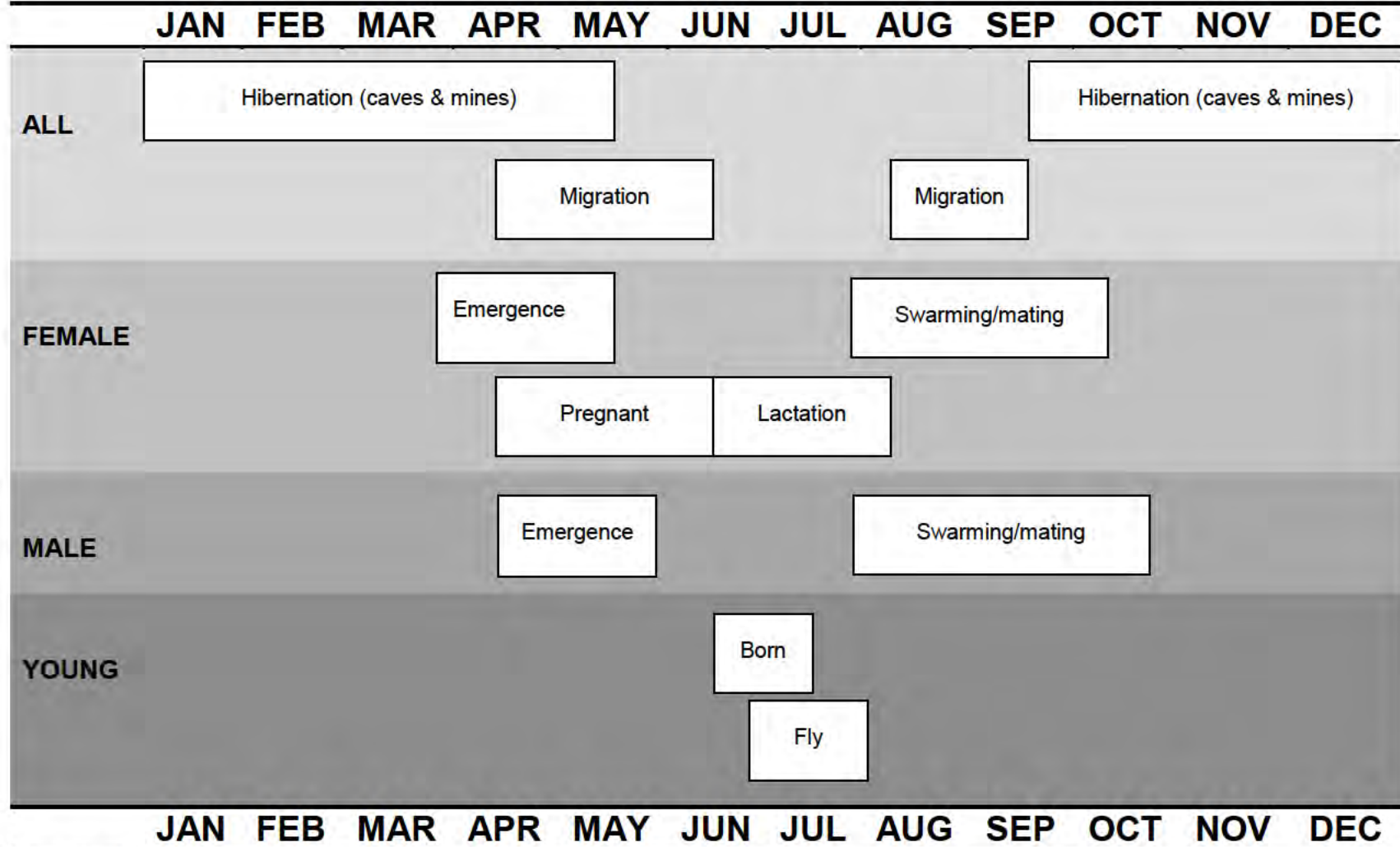


Figure 1. Seasonal chronology of Indiana bat activities.

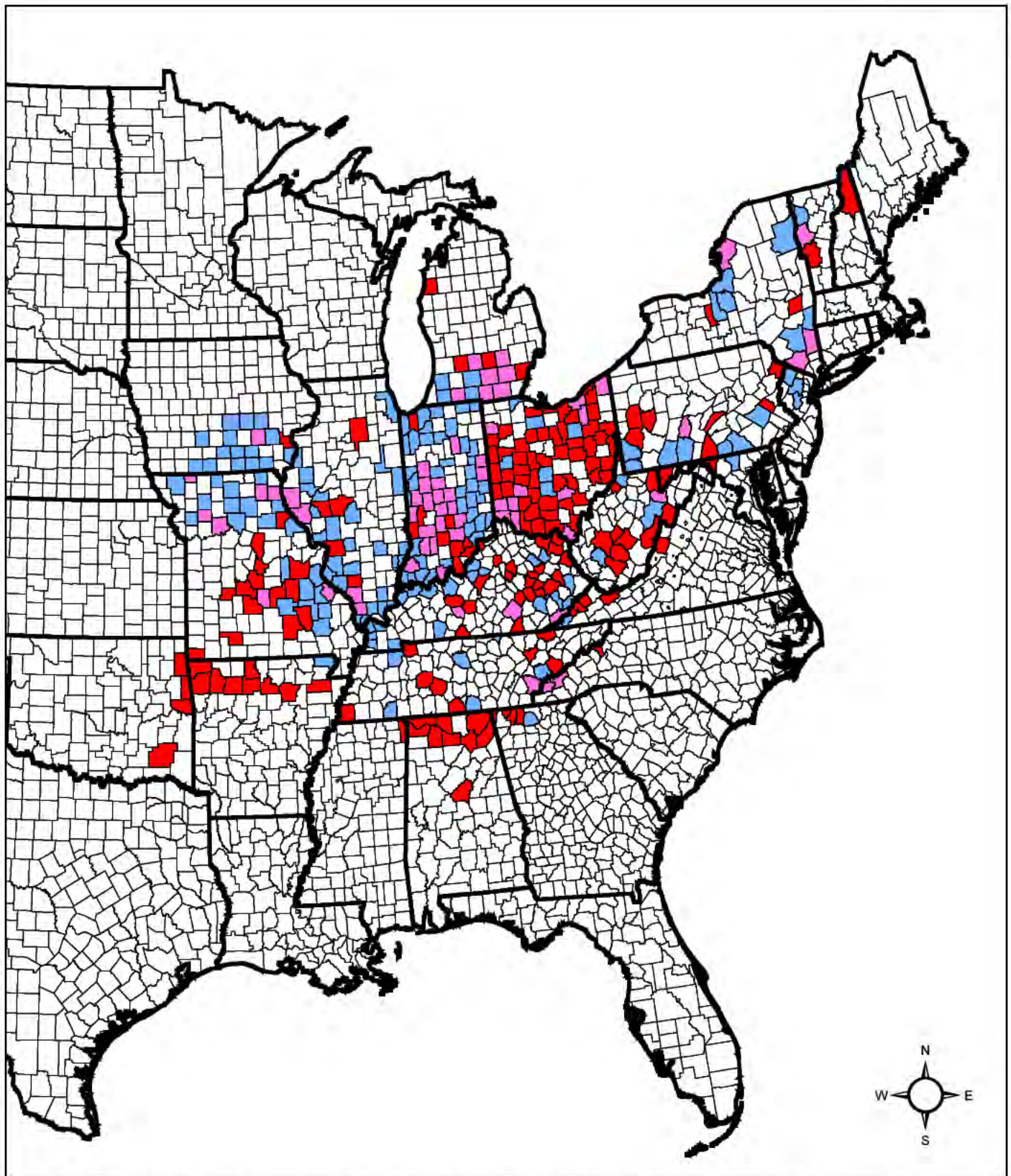
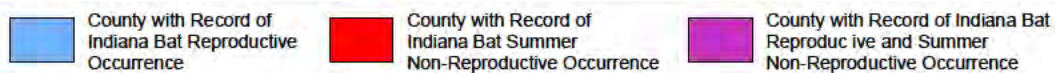


Figure 2. Range-wide distribution of the Indiana bat during summer, showing counties with reproductive (adult female and/or young-of-the-year) and non-reproductive records.



Sources: USFWS, Indiana Bat Revised Recovery Plan, Agency Draft, 2007
Updated: November 2014



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living trees in a variety of habitat types, including uplands and riparian habitats. A wide variety of tree species, including occasional pines (Britzke et al. 2003) are used as nursery colonies indicating that it is tree form, not species that is important for roosts. Since many roosts are in dead or dying trees, they are often ephemeral. Roost trees may be habitable for one to several years, depending on the species and condition of the tree (Callahan et al. 1997) Indiana bats exhibit strong site fidelity to summer roosting and foraging areas (Kurta and Murray 2002, Kurta et al. 2002). Females are pregnant when they arrive at maternity roosts. Parturition typically occurs between late June and early July. A maternity colony typically consists of 25 to 325 adult females. Nursery colonies often use several roost trees (Kurta et al. 1993, Foster and Kurta 1999, Kurta and Murray 2002), moving among roosts within a season. Most members of a colony coalesce into a single roost tree about the time of parturition, which begins to break up again as soon as young are volant.

Roosts that contain large numbers of bats (more than 20 bats) are often called primary roosts, while secondary roosts hold fewer bats. Primary roost trees are often greater than 46 centimeters (18 in) diameter at breast height (dbh) and secondary roost trees are often greater than 23 centimeters (9 in) dbh (Gardner et al. 1991, Callahan et al. 1997, Kurta et al. 2002, Miller et al. 2002, Carter 2003). Numerous suitable roosts may be required to support a single nursery colony, possibly about 45 stems per hectare (20/acre) (Gardner et al. 1991, Miller et al. 2002, Carter 2003). Roost trees are often located where they have solar exposure, with 20 to 80 percent canopy closure (Humphrey et al. 1977, Gardner et al. 1991, Kurta et al. 1993, Kurta et al. 1996, Kurta et al. 2002, Carter 2003). They are often exposed to 10 or more hours of solar radiation per day (Kurta et al. 2002). The need for solar exposure may vary with latitude.

Indiana bats live on anthropogenic landscapes and recent research indicates females do include roads in their active area. Although bats do cross roads, the studies that document this behavior were not designed to gauge a graded response (Gardner et al. 1991, Brown et al. 2001, Kiser et al. 2002, Kurta et al. 2002, Brack and Whitaker 2006).

1.1.3.2 Food Habits and Foraging Ecology

Like many other species of microchiropterans, the Indiana bat often uses travel corridors that consist of open flyways such as streams, woodland trails, small infrequently used roads, and possibly utility corridors, regardless of suitability for foraging or roosting (Brown and Brack 2003). Members of maternity colonies forage in a variety of woodland settings, including upland and floodplain forest (Humphrey et al. 1977, Brack 1983, Gardner et al. 1991). Foraging activity is concentrated above and around foliage surfaces, such as over the canopy in upland and riparian woods, around crowns of individual or widely spaced trees, and along edges. They forage less frequently over old fields, and occasionally over bushes in open pastures. Forest edges, small openings, and woodlands with patchy trees provide more foraging

opportunities than dense woodlands. Most species of woodland bats forage prominently along edges, less in openings, and least within forests (Grindal 1996). Openings also provide a better supply of insects than do wooded areas (Tibbels and Kurta 2003).

1.2 Northern Long-Eared Bat (*Myotis septentrionalis*)

1.2.1 Description

The northern long-eared bat ranges from the northern border of Florida north and west to Saskatchewan and east to Labrador. This bat is common to a variety of forest types ranging from intact to small remnants. Although primarily an eastern species, the northern long-eared bat can be found as far west as Montana, and onto the High Plains.



The northern long-eared bat weighs about 5-8 grams (0.17-0.28 oz) at maturity and its right forearm measures about 34-38 millimeters (1.3 – 1.5 in). The wing membrane connects to the foot at the base of the first toe. The northern long-eared bat is most easily characterized by the long ears (17 mm [0.7 in]), which extend past the muzzle when laid forward, as well as a long and thin tragus (9 mm [0.4 in]) (Whitaker and Mumford 2009). The northern long-eared bats' pelage is typically colored a light to dark brown on the dorsal side and a light brown on the ventral side (Caceres and Barclay 2000, Whitaker and Mumford 2009). Ears and wing membranes are usually a dark brown.

1.2.2 Status

On 2 October 2013, the northern long-eared bat was proposed for listing by USFWS as endangered. On 16 January 2015, USFWS proposed a special 4(d) rule for the northern long-eared bat in the event that the species was ultimately listed as threatened instead. On 2 April

2015, USFWS published notice in the Federal Register of its final decision to list the species as threatened and issue an interim special 4(d) rule exempting certain activities from the ESA's take prohibition. The listing decision and interim 4(d) rule took effect 4 May 2015.

Federal Register Documents

[80 FR 2371 2378](#); 16 January 2015: Proposed Listing: Threatened with a 4(d) Exemption
[80 FR 17973 18033](#); 2 April 2015: Final Rule: Threatened with a 4(d) Exemption

Based on hibernacula studies, the northern long-eared bat has suffered estimated losses of up to 93 to 98 percent in certain areas of the Northeastern U.S. since 2005 (Turner et al. 2011).

1.2.3 Seasonal Ecology

The northern long-eared bat is a "tree bat" in summer and a "cave bat" in winter. During the summer, the species is forest dependent. As with the Indiana bat, there are four ecologically distinct components of the annual life cycle: winter hibernation, spring staging and autumn swarming, spring and autumn migration, and the summer season of reproduction (Figure 3).

1.2.4 Summer Roosting Ecology

The summer range of the northern long-eared bat is large and includes much of the eastern deciduous forestlands from the northern border of Florida north and west to Saskatchewan and east to Labrador (Caceres and Barclay 2000, Whitaker and Mumford 2009) (Figure 4). Distribution throughout the range is not uniform, and summer occurrences are more common in the northern and northeastern portions of the species' range than in southern and western portions (Caceres and Barclay 2000, Amelon and Burhans 2006). Historically, these areas were primarily forested. Through the southern portions of their range, they appear to be less abundant, and are thought of as rare in Alabama, South Carolina, and Georgia (Mumford and Cope 1964, Barbour and Davis 1969, Amelon and Burhans 2006, Whitaker and Mumford 2009, Timpone et al. 2010). Although occasionally captured/recorded in western portions of their range, they are uncommon when records are compared to eastern areas, and may now occupy this area as a result of range expansion following settlement (Sparks et al. 2011).

When female northern long-eared bats emerge from hibernation, they migrate to maternity colonies. The distance traveled from winter hibernacula to summer roosting areas is not known. Maternity colonies are typically found in hollow trees and under bark although they also use bat-houses, buildings, and other anthropogenic structures (Amelon and Burhans 2006). After parturition, pups usually achieve volancy by 21 days (Kunz 1971, Krochmal and Sparks 2007). As the offspring become volant, average number of bats using a maternity roost declines (Lacki and Schwierjohann 2001, Sparks 2003).

A wide variety of deciduous tree species, as well as occasional coniferous species, are used as nursery colonies indicating that it is tree form, not species that is important for roosts (Caceres and Barclay 2000, Carter and Feldhamer 2005). This species regularly uses both live and dead trees (Sasse and Pekins 1996, Foster and Kurta 1999, Lacki and Schwierjohann 2001, Sparks 2003, Timpone 2004, Whitaker et al. 2004, Carter and Feldhamer 2005, Ford et al. 2006, Timpone et al. 2010, Johnson et al. 2012, Silvis et al. 2012, Johnson et al. 2013, Silvis et al. 2014). The northern long-eared bat may choose either tree condition, depending on the presence or availability within an area, or possibly due to competition with or predation from other wildlife (Perry and Thill 2007, Perry et al. 2007). Roost trees may be habitable for one to several years, depending on the species and condition of

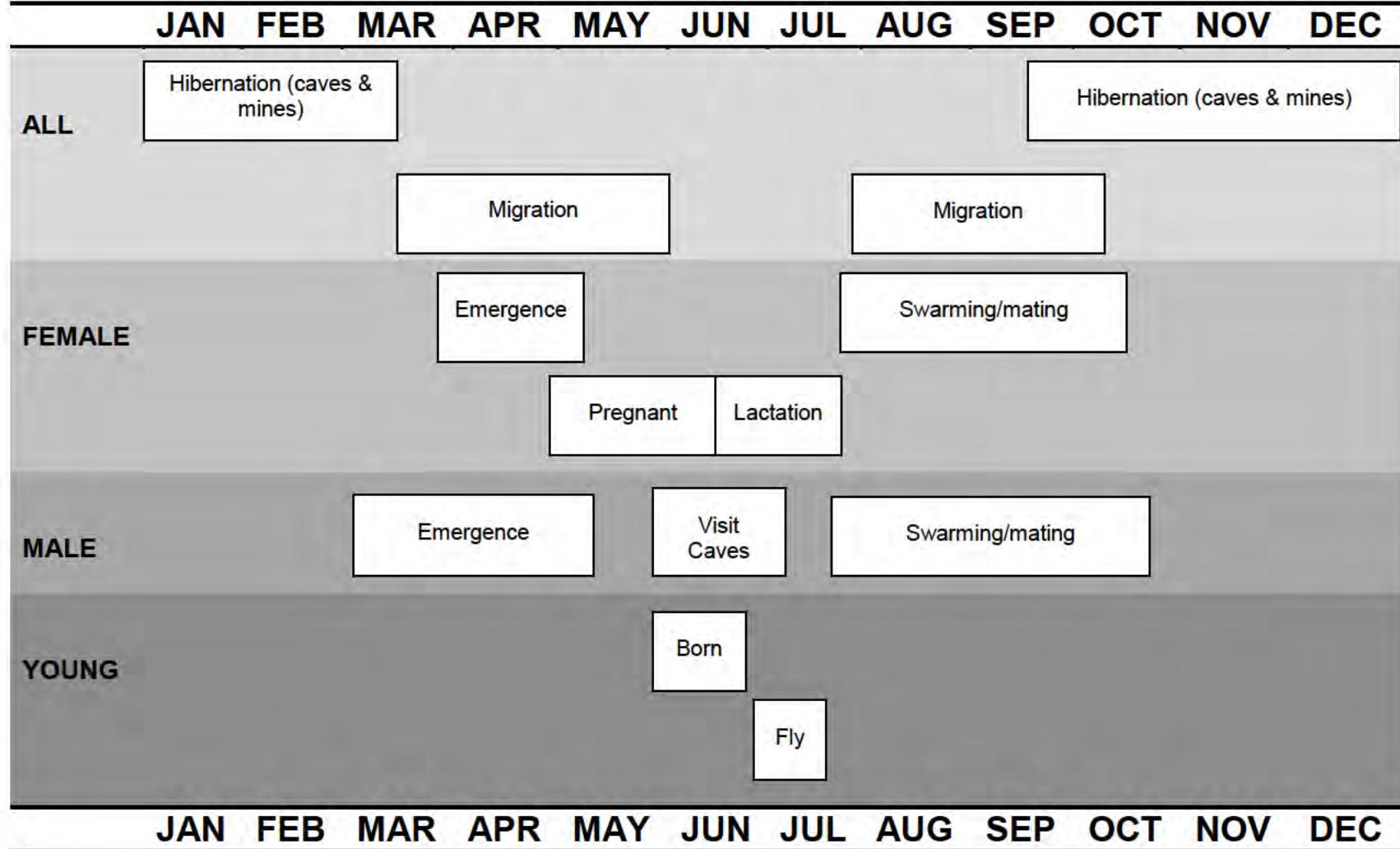
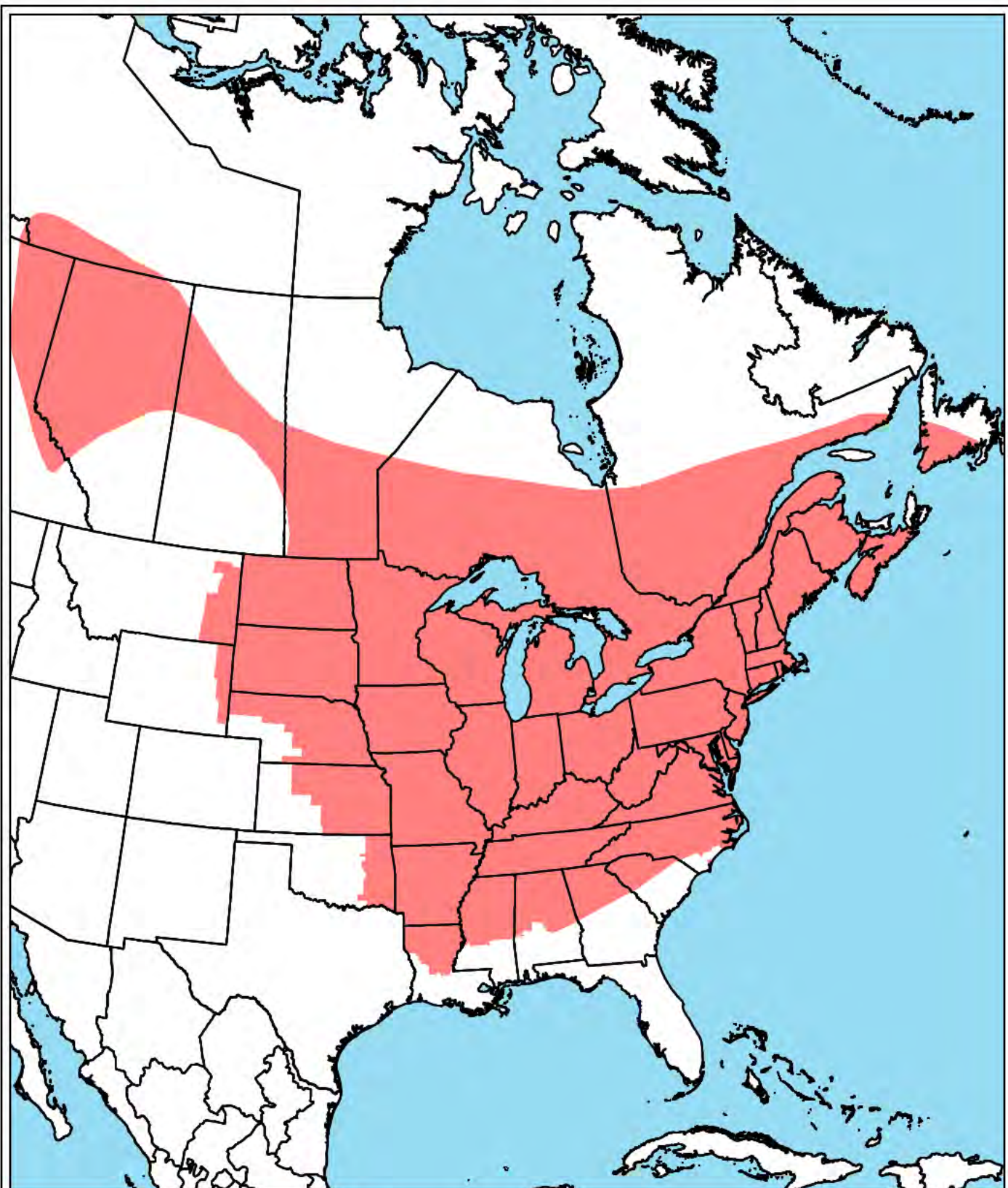


Figure 3. Seasonal chronology of northern long-eared bat activities



■ Northern Long-Eared Bat Range □ State or Province Boundary

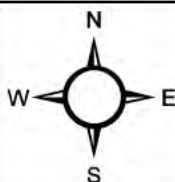


Figure 5. Range-wide distribution of the northern long-eared bat during summer.

0 400 800
Miles



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the tree. The species may also use several other structures as summer roost sites. These can be natural or man-made (e.g. bridges, barns/homes, rocky cracks or crevices). Northern long-eared bats make extensive use of bat-houses when these structures are available (Whitaker et al. 2006).

Some males and non-reproductive females remain near their winter hibernacula throughout summer while others migrate varying distances. This may be due to a preference for cooler environments in the absence of pups (Barbour and Davis 1969, Amelon and Burhans 2006).

Males can be caught at hibernacula on most nights during summer, although there may be a large turnover of individuals between nights.

Structurally, summer roosts used by males are similar to those used by maternity colonies. Trees used by males of the species are often smaller than those used by maternity colonies, perhaps because males are often solitary or form small groups and thus need less space or they may have different thermal requirements than females.

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APPENDIX C
AGENCY CORRESPONDENCE



October 13, 2014

Mr. Troy Andersen
United States Fish and Wildlife Service
Virginia Field Office
6669 Short Lane
Gloucester, VA 23061

Subject: Mountain Valley Pipeline Project

Dear Mr. Andersen,

Mountain Valley Pipeline, LLC, a joint venture of EQT Corporation and a subsidiary of NextEra Energy, Inc., is hereby providing background information on the proposed Mountain Valley Pipeline (MVP) Project (Project). MVP plans to construct an approximately 300-mile, 42-inch diameter natural gas pipeline to allow producers and end-users a direct route to transport new gas supplies to meet the growing need for natural gas in the southeastern United States.

The pipeline will extend from the existing Equitrans transmission system in Wetzel County, West Virginia to Transcontinental Gas Pipeline Company's (Transco) Zone 5 compressor station 165 in Pittsylvania County, Virginia. In addition to the pipeline, the Project will require approximately 225,000 horsepower of compression at approximately four compressor stations along the route along with measurement, regulation, and other ancillary facilities required for the safe operation of the pipeline. A Project map has been included as an attachment to this letter.

The Federal Energy Regulatory Commission (FERC) will serve as the lead agency for the Project. MVP plans to request to use the FERC's pre-filing process in late October 2014 and anticipates filing a formal application with the FERC in the third quarter of 2015. The FERC will then prepare an Environmental Assessment or an Environmental Impact Statement to satisfy the National Environmental Policy Act (NEPA) process for the Project.

MVP and their consultants, Tetra Tech, Inc. and Environmental Solutions & Innovation, Inc., will be consulting with the United States Fish and Wildlife Service Virginia Field Office as necessary during development of the Project. However, in order to assist MVP in preparing the FERC application and identifying possible issues to be addressed during the NEPA process, the purpose of this letter is to notify the United States Fish and Wildlife Service Virginia Field Office of MVP's intent to utilize the FERC's NEPA Pre-Filing Process, and to request information on resources under your agency's jurisdiction that could be potentially affected by the Project.

Mr. Troy Andersen

October 13, 2014

Page 2 of 2

The MVP team looks forward to working with your agency as we move forward with development of this Project. We appreciate your assistance and thank in you advance for any help you can provide. A representative of MVP will be in contact with you soon to discuss the Project in further detail.

If you have questions or would like additional information about the Project please contact me at 304-848-0061 (MLandfried@eqt.com), or Sean Sparks at 617-443-7565 (sean.sparks@tetrattech.com).

Sincerely,



Megan Landfried Neylon

Senior Environmental Coordinator

cc: John Centofanti, EQT Corporation
Blayne Gunderman, NextEra Energy Resources, LLC
Sean Sparks, Tetra Tech
Daniel Judy, Environmental Solutions & Innovations



October 13, 2014

Mr. Ernie Aschenbach
Virginia Department of Game and Inland Fisheries
P.O. Box 11104
Richmond, VA 23230

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Mr. Ernie Aschenbach

October 13, 2014

Page 2 of 2

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Sincerely,

A handwritten signature in blue ink that reads "Megan Landfried Neylon". The signature is written in a cursive, flowing style.

Megan Landfried Neylon

Senior Environmental Coordinator

cc: John Centofanti, EQT Corporation
Blayne Gunderman, NextEra Energy Resources, LLC
Sean Sparks, Tetra Tech
Danielle Judy, Environmental Solutions & Innovations



ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC.

2250 Lucien Way, Suite 302
Maitland, FL 32751
Phone: (321) 972-3958; Fax: (321) 972-3959

Pesi 593

3 November 2014

Mr. Troy Andersen
U.S. Fish and Wildlife Service
Virginia Field Office
6669 Short Lane
Gloucester, VA 23061

Dear Troy:

Please find one bound copy of the following study plan: **LISTED BAT STUDIES ALONG MVP'S PROPOSED MOUNTAIN VALLEY PIPELINE PROJECT IN BRAXTON, DODDRIDGE, FAYETTE, GREENBRIER, HARRISON, LEWIS, MONROE, NICHOLAS, SUMMERS, UPSHUR, WEBSTER, AND WETZEL COUNTIES, WEST VIRGINIA AND FRANKLIN, GILES, MONTGOMERY, PITTSYLVANIA, AND ROANOAKE COUNTIES, VIRGINIA**

We look forward to discussing the contents of this study plan with you during the 10 November 2014 meeting in Elkins.

Please feel free to contact me beforehand if you have any questions.

Sincerely,

A handwritten signature in dark ink, appearing to read "D. Judy", is shown within a rectangular box.

Daniel Judy
Southeast Regional Manager
(407) 269-7492
DJudy@envsi.com



ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC.

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Maitland, FL 32751
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Pesi 593

3 November 2014

Mr. Ernie Aschenbach
Virginia Department of Game and Inland Fisheries
4010 West Broad Street
Richmond, VA 23230

Dear Ernie:

Please find one bound copy of the following study plan: **LISTED BAT STUDIES ALONG MVP'S PROPOSED MOUNTAIN VALLEY PIPELINE PROJECT IN BRAXTON, DODDRIDGE, FAYETTE, GREENBRIER, HARRISON, LEWIS, MONROE, NICHOLAS, SUMMERS, UPSHUR, WEBSTER, AND WETZEL COUNTIES, WEST VIRGINIA AND FRANKLIN, GILES, MONTGOMERY, PITTSYLVANIA, AND ROANOAKE COUNTIES, VIRGINIA**

Representatives from MVP, ESI, and USFWS (WV and VA) will be meeting at the WV-USFWS Field Office in Elkins on 10 November 2014 at 10 AM to discuss the contents of the study plan. We cordially invite you to attend or join the conversation through telephone by calling:

Toll Free Number = [REDACTED]
Passcode = [REDACTED]

Please feel free to contact me beforehand if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Daniel Judy", is shown within a rectangular box.

Daniel Judy
Southeast Regional Manager
(407) 269-7492
DJudy@envsi.com



ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC.

2250 Lucien Way, Suite 302
Maitland, FL 32751
Phone: (321) 972-3958; Fax: (321) 972-3959

Pesi 593

6 March 2015

Mr. Troy Andersen
U.S. Fish and Wildlife Service
Virginia Field Office
6669 Short Lane
Gloucester, VA 23061

Dear Troy:

Please find one bound copy of the following revised study plan: **LISTED BAT STUDIES ALONG MVP'S PROPOSED MOUNTAIN VALLEY PIPELINE PROJECT IN BRAXTON, DODDRIDGE, FAYETTE, GREENBRIER, HARRISON, LEWIS, MONROE, NICHOLAS, SUMMERS, UPSHUR, WEBSTER, AND WETZEL COUNTIES, WEST VIRGINIA AND CRAIG, FRANKLIN, GILES, MONTGOMERY, PITTSYLVANIA, AND ROANOAKE COUNTIES, VIRGINIA**

This revised study plan includes new project routes, access roads, and above ground facilities. The proposed level of effort for the mist net survey has been updated accordingly.

Please feel free to contact me, Valerie Clarkston (vclarkston@envsi.com), or Taina Pankiewicz (tpankiewicz@envsi.com) if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "D. Judy", is shown within a rectangular box.

Daniel Judy
Southeast Regional Manager
(407) 269-7492
DJudy@envsi.com



ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC.

2250 Lucien Way, Suite 302
Maitland, FL 32751
Phone: (321) 972-3958; Fax: (321) 972-3959

Pesi 593

6 March 2015

Mr. Ernie Aschenbach
Virginia Department of Game and Inland Fisheries
4010 West Broad Street
Richmond, VA 23230

Dear Ernie:

Please find one bound copy of the following revised study plan: **LISTED BAT STUDIES ALONG MVP'S PROPOSED MOUNTAIN VALLEY PIPELINE PROJECT IN BRAXTON, DODDRIDGE, FAYETTE, GREENBRIER, HARRISON, LEWIS, MONROE, NICHOLAS, SUMMERS, UPSHUR, WEBSTER, AND WETZEL COUNTIES, WEST VIRGINIA AND CRAIG, FRANKLIN, GILES, MONTGOMERY, PITTSYLVANIA, AND ROANOAKE COUNTIES, VIRGINIA**

This revised study plan includes new project routes, access roads, and above ground facilities. The proposed level of effort for the mist net survey has been updated accordingly.

Please feel free to contact me, Valerie Clarkston (vclarkston@envsi.com), or Taina Pankiewicz (tpankiewicz@envsi.com) if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Daniel Judy", is shown within a rectangular border.

Daniel Judy
Southeast Regional Manager
(407) 269-7492
DJudy@envsi.com



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2250 Lucien Way, Suite 302
Maitland, FL 32751
Phone: (321) 972-3958; Fax: (321) 972-3959

Pesi 593

24 April 2015

Mr. Troy Andersen
U.S. Fish and Wildlife Service
Virginia Field Office
6669 Short Lane
Gloucester, VA 23061

Dear Troy:

Please find one bound copy of the following revised study plan: **REVISED STUDY PLAN: LISTED BAT STUDIES ALONG MVP'S PROPOSED MOUNTAIN VALLEY PIPELINE PROJECT IN CRAIG, FRANKLIN, GILES, MONTGOMERY, PITTSYLVANIA, AND ROANOAKE COUNTIES, VIRGINIA**

This revised study plan includes revisions based on comments received from the USFWS Gloucester Field Office on 3 April 2015 and from VDGIF on 27 March 2015 as well as the inclusion of a 5-mile protective buffer around Tawney's Cave. The proposed level of effort for the mist net survey has been updated accordingly.

Please feel free to contact me, Valerie Clarkston (vclarkston@envsi.com), or Taina Pankiewicz (tpankiewicz@envsi.com) if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Daniel Judy", is shown within a rectangular box.

Daniel Judy
Southeast Regional Manager
(407) 269-7492
DJudy@envsi.com



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2250 Lucien Way, Suite 302
Maitland, FL 32751
Phone: (321) 972-3958; Fax: (321) 972-3959

Pesi 593

24 April 2015

Mr. Rick Reynolds
Virginia Department of Game and Inland Fisheries
517 Lee Highway
Verona, VA 24482

Dear Rick:

Please find one bound copy of the following revised study plan: **REVISED STUDY PLAN: LISTED BAT STUDIES ALONG MVP'S PROPOSED MOUNTAIN VALLEY PIPELINE PROJECT IN CRAIG, FRANKLIN, GILES, MONTGOMERY, PITTSYLVANIA, AND ROANOAKE COUNTIES, VIRGINIA**

This revised study plan includes revisions based on comments received from the USFWS Gloucester Field Office on 3 April 2015 and from VDGIF on 27 March 2015 as well as the inclusion of a 5-mile protective buffer around Tawney's Cave. Unlike previous versions, this study plan and contents are specific to Virginia. The proposed level of effort for the mist net survey has been updated accordingly.

Please feel free to contact me, Valerie Clarkston (vclarkston@envsi.com), or Taina Pankiewicz (tpankiewicz@envsi.com) if you have any questions.

Sincerely,

A handwritten signature in black ink, appearing to read "Daniel Judy", is shown within a rectangular box.

Daniel Judy
Southeast Regional Manager
(407) 269-7492
DJudy@envsi.com

Valerie Clarkston

Subject: FW: Mountain Valley Pipeline - Revised Bat Study Plan

From: Sumalee Hoskin [mailto:sumalee_hoskin@fws.gov]
Sent: Friday, May 08, 2015 3:23 PM
To: Valerie Clarkston; Troy Andersen; Kimberly Smith
Cc: Daniel Judy; mneylon@eqt.com; Taina Pankiewicz
Subject: RE: Mountain Valley Pipeline - Revised Bat Study Plan

Valerie,

This message responds to your request for comments on the revised study plan: “Listed Bat Studies Along MVP’s Proposed Mountain Valley Pipeline Project in Craig, Franklin, Giles, Montgomery, Pittsylvania, and Roanoke Counties, Virginia” dated April 24, 2015. The following comments are provided under provisions of the Endangered Species Act of 1973 (16 U.S.C. 1531-1544, 87 Stat. 884), as amended.

Your proposed bat survey plan follows the U.S. Fish and Wildlife Service’s April 2015 Rangewide Indiana Bat Summer Survey Guidance and the June 25, 2012 White Nose Syndrome Decontamination Protocol. We concur with your proposed plan for the Virginia portion of the bat survey.

Sumalee

Sumalee Hoskin
US Fish & Wildlife Service
6669 Short Lane
Gloucester, VA 23061

Tel: 804-693-6694 ex. 2414
Fax: 804-693-9032
Cell: 804-654-1824
Visit us at <http://www.fws.gov/northeast/virginiafield/>

Valerie Clarkston

Subject: FW: ESSLog 35246: Mountain Valley Pipeline - revised Bat Study Plan

From: Aschenbach, Ernie (DGIF) [<mailto:Ernie.Aschenbach@dgif.virginia.gov>]
Sent: Monday, May 11, 2015 8:49 AM
To: Valerie Clarkston
Cc: ProjectReview (DGIF); Reynolds, Rick (DGIF)
Subject: FW: ESSLog 35246: Mountain Valley Pipeline - revised Bat Study Plan



Valerie Clarkston

Scientist

Environmental Solutions & Innovations, Inc.
4525 Este Avenue | Cincinnati, Ohio 45232 | USA
office: 513.451.1777 **direct:** 513.591.4315
fax: 513.451.3321 **cell:** 513.382.0925
vclarkston@envsi.com |

Rick Reynolds provided the following comment in response to your updated draft Bat Study Plan:

Page 5, sec. 4.1.3, last paragraph: *"Bat passes are monitored and tallied for at least one hour after 10:00 pm." Acoustic detectors should be run for 2 hours starting at dusk. If they start at 10:00 pm they'll miss the most active period for bats exiting, typically for at least an hour after dusk.*

Please update your draft as appropriate. Call Rick if you have further questions and CC: ProjectReview on relevant email correspondence...

Thanks.

p.s. DGIF is in the process of moving our Headquarters the next few weeks. Our phone and computer service may be intermittent during this time. Thank you for your patience.

Ernie Aschenbach
Environmental Services Biologist
Virginia Dept. of Game and Inland Fisheries
P.O. Box 11104
~~4010 West Broad Street~~
~~Richmond, VA 23230~~
~~FAX: (804) 367-2427~~
Phone: (804) 367-2733
Email: Ernie.Aschenbach@dgif.virginia.gov

We're moving! Our new address as of May 5, 2015

Physical
7870 Villa Park Dr, Suite 400
Henrico, VA 23233-6510

Mailing
P O Box 90778

From: Aschenbach, Ernie (DGIF)
Sent: Friday, May 08, 2015 2:07 PM
To: Reynolds, Rick (DGIF)
Cc: ProjectReview (DGIF)
Subject: FW: ESSLog 35246: Mountain Valley Pipeline - revised Bat Study Plan

Rick:

Got a window of internet access, probably brief. Did you see this? Have any additional comments/recommendations? Let me know.

Thanks.

Ernie Aschenbach
Environmental Services Biologist
Virginia Dept. of Game and Inland Fisheries
~~P.O. Box 11104~~
~~4010 West Broad Street~~
~~Richmond, VA 23230~~
~~FAX: (804) 367-2427~~
Phone: (804) 367-2733
Email: Ernie.Aschenbach@dgif.virginia.gov

We're moving! Our new address as of May 5, 2015

Physical
7870 Villa Park Dr, Suite 400
Henrico, VA 23233-6510

Mailing
P O Box 90778
Henrico, VA 23228-0778



United States Department of the Interior



FISH AND WILDLIFE SERVICE

Virginia Ecological Services Field Office

6669 SHORT LANE

GLOUCESTER, VA 23061

PHONE: (804)693-6694 FAX: (804)693-9032

URL: www.fws.gov/northeast/virginiafield/

Consultation Code: 05E2VA00-2016-SLI-0880

December 17, 2015

Event Code: 05E2VA00-2016-E-01079

Project Name: Mountain Valley Pipeline (REV 4.0)

Subject: List of threatened and endangered species that may occur in your proposed project location, and/or may be affected by your proposed project

To Whom It May Concern:

The enclosed species list identifies threatened, endangered, proposed and candidate species, as well as proposed and final designated critical habitat, that may occur within the boundary of your proposed project and/or may be affected by your proposed project. The species list fulfills the requirements of the U.S. Fish and Wildlife Service (Service) under section 7(c) of the Endangered Species Act (Act) of 1973, as amended (16 U.S.C. 1531 *et seq.*).

New information based on updated surveys, changes in the abundance and distribution of species, changed habitat conditions, or other factors could change this list. Please feel free to contact us if you need more current information or assistance regarding the potential impacts to federally proposed, listed, and candidate species and federally designated and proposed critical habitat. Please note that under 50 CFR 402.12(e) of the regulations implementing section 7 of the Act, the accuracy of this species list should be verified after 90 days. This verification can be completed formally or informally as desired. The Service recommends that verification be completed by visiting the ECOS-IPaC website at regular intervals during project planning and implementation for updates to species lists and information. An updated list may be requested through the ECOS-IPaC system by completing the same process used to receive the enclosed list.

The purpose of the Act is to provide a means whereby threatened and endangered species and the ecosystems upon which they depend may be conserved. Under sections 7(a)(1) and 7(a)(2) of the Act and its implementing regulations (50 CFR 402 *et seq.*), Federal agencies are required to utilize their authorities to carry out programs for the conservation of threatened and endangered species and to determine whether projects may affect threatened and endangered species and/or designated critical habitat.

A Biological Assessment is required for construction projects (or other undertakings having similar physical impacts) that are major Federal actions significantly affecting the quality of the human environment as defined in the National Environmental Policy Act (42 U.S.C. 4332(2)(c)). For projects other than major construction activities, the Service suggests that a biological evaluation similar to a Biological Assessment be prepared to determine whether the project may affect listed or proposed species and/or designated or proposed critical habitat. Recommended contents of a Biological Assessment are described at 50 CFR 402.12.

If a Federal agency determines, based on the Biological Assessment or biological evaluation, that listed species and/or designated critical habitat may be affected by the proposed project, the agency is required to consult with the Service pursuant to 50 CFR 402. In addition, the Service recommends that candidate species, proposed species and proposed critical habitat be addressed within the consultation. More information on the regulations and procedures for section 7 consultation, including the role of permit or license applicants, can be found in the "Endangered Species Consultation Handbook" at:

<http://www.fws.gov/endangered/esa-library/pdf/TOC-GLOS.PDF>

Please be aware that bald and golden eagles are protected under the Bald and Golden Eagle Protection Act (16 U.S.C. 668 *et seq.*), and projects affecting these species may require development of an eagle conservation plan (http://www.fws.gov/windenergy/eagle_guidance.html). Additionally, wind energy projects should follow the wind energy guidelines (<http://www.fws.gov/windenergy/>) for minimizing impacts to migratory birds and bats.

Guidance for minimizing impacts to migratory birds for projects including communications towers (e.g., cellular, digital television, radio, and emergency broadcast) can be found at: <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/towers.htm>; <http://www.towerkill.com>; and <http://www.fws.gov/migratorybirds/CurrentBirdIssues/Hazards/towers/comtow.html>.

We appreciate your concern for threatened and endangered species. The Service encourages Federal agencies to include conservation of threatened and endangered species into their project planning to further the purposes of the Act. Please include the Consultation Tracking Number in the header of this letter with any request for consultation or correspondence about your project that you submit to our office.

Attachment



United States Department of Interior
Fish and Wildlife Service

Project name: Mountain Valley Pipeline (REV 4.0)

Official Species List

Provided by:

Virginia Ecological Services Field Office

6669 SHORT LANE

GLOUCESTER, VA 23061

(804) 693-6694

<http://www.fws.gov/northeast/virginiafield/>

Consultation Code: 05E2VA00-2016-SLI-0880

Event Code: 05E2VA00-2016-E-01079

Project Type: OIL OR GAS

Project Name: Mountain Valley Pipeline (REV 4.0)

Project Description: A 301-mile natural gas pipeline crossing WV and VA. Construction beginning in Jan. 2017.

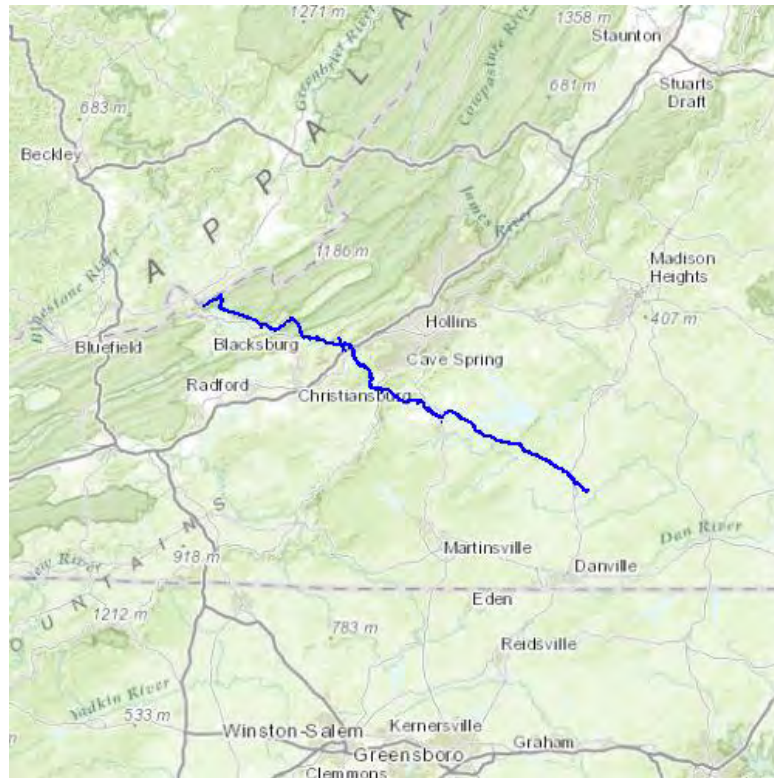
Please Note: The FWS office may have modified the Project Name and/or Project Description, so it may be different from what was submitted in your previous request. If the Consultation Code matches, the FWS considers this to be the same project. Contact the office in the 'Provided by' section of your previous Official Species list if you have any questions or concerns.



United States Department of Interior
Fish and Wildlife Service

Project name: Mountain Valley Pipeline (REV 4.0)

Project Location Map:



Project Coordinates: The coordinates are too numerous to display here.

Project Counties: Craig, VA | Franklin, VA | Giles, VA | Montgomery, VA | Pittsylvania, VA | Roanoke, VA



United States Department of Interior
Fish and Wildlife Service

Project name: Mountain Valley Pipeline (REV 4.0)

Endangered Species Act Species List

There are a total of 6 threatened or endangered species on your species list. Species on this list should be considered in an effects analysis for your project and could include species that exist in another geographic area. For example, certain fish may appear on the species list because a project could affect downstream species. Critical habitats listed under the **Has Critical Habitat** column may or may not lie within your project area. See the **Critical habitats within your project area** section further below for critical habitat that lies within your project. Please contact the designated FWS office if you have questions.

Clams	Status	Has Critical Habitat	Condition(s)
James spiny mussel (<i>Pleurobema collina</i>) Population: Entire	Endangered		
Fishes			
Roanoke logperch (<i>Percina rex</i>) Population: Entire	Endangered		
Flowering Plants			
Northeastern bulrush (<i>Scirpus ancistrochaetus</i>)	Endangered		
Smooth coneflower (<i>Echinacea laevigata</i>)	Endangered		
Mammals			
Indiana bat (<i>Myotis sodalis</i>) Population: Entire	Endangered		
Northern long-eared Bat (<i>Myotis septentrionalis</i>)	Threatened		



United States Department of Interior
Fish and Wildlife Service

Project name: Mountain Valley Pipeline (REV 4.0)

Critical habitats that lie within your project area

There are no critical habitats within your project area.

APPENDIX D
HABITAT PATCH AND POTENTIAL ROOST TREE DATA SHEETS



ENDANGERED BAT HABITAT ASSESSMENT

Property of: Environmental Solutions & Innovations, Inc.
4525 Este Ave. Cincinnati, OH 45232
(Phone: 513-451-1777)

STEP ONE: ☒ DETAILED Evaluation OR ☐ General Assessment of Indiana Bat Habitat

Project #: 593.08 Date: 11/19/2015 Biologists: Carne Ardito
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Giles

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Upland wooded hillside.

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00061 1a. Patch Acre: 0.54
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Upland wooded hillside, gentle slope. Overall low clutter. ATV trail goes through woodland
- Habitat Patch Type Deciduous Forest
- If Open, Developed No Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional No
- If Woodland, Type: Hardwood Woodland Age Less Mature Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 5 (%) 5-16" 80 (%) >16" 15 (%)
Species 1. Acer saccharum SubCanopy Species 1. Acer rubrum
2. Quercus rubra 2. Fagus grandifolia
3. Quercus montana 3. Quercus rubra
Canopy Closure 70
SubCanopy Clutter Low Suncanopy Dominated by Lower Branches of Canopy Trees

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Moderate
M.sodalis Moderate

Based on: Woodlands Yes Scrub/Shrub No Pasture/Hay No
Cultivated/Bare No Developed No Edge Yes Wetlands No
Stream Corridor No Man-made Corridor Yes

Roosting Potential: *M. septentrionalis* Moderate
M.sodalis Moderate

Based on Number of Roosts: Yes Spatial Association Yes
Quality of Roosts Size Yes Amount of Exfoliating Bark Yes
Solar Exposure: Opening Yes Edge Yes Density Yes

Adjacent Habitat Patch Description:

Upland woodland to N and W. Pasture to S and E

Explain your Foraging Potential Rating

MYSO/MYSE: Moderate due to low clutter in woodland and presence of ATV trail provides corridor for foraging. Forest edge located where pasture meets woodland. Upland location with no water present

Explain your Roosting Potential Rating

MYSO/MYSE: Overall moderate, many PRT's in patch but most are rated as low potential. Woods are open with little clutter and open pasture is nearby, providing open foraging area



ENDANGERED BAT HABITAT ASSESSMENT

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STEP ONE: ☒ DETAILED Evaluation OR ☐ General Assessment of Indiana Bat Habitat

Project #: 593.08 Date: 11/19/2015 Biologists: Carme Ardito
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Giles

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Cow pasture with scattered trees and scrub/shrub.

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00062 1a. Patch Acre: 3.79
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Upland cow pasture on SE facing hillside. Mostly scrub/shrub with some larger shade trees scattered throughout pasture. Stream located at bottom of hillside
- Habitat Patch Type Hay/Pasture
- If Open, Developed No Ag-Cultivated No Ag-Pasture Yes Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional Yes
- If Woodland, Type: _____ Woodland Age _____ Woodland Position _____ Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 0 (%) 5-16" 0 (%) >16" 0 (%)
Species 1. _____ SubCanopy Species 1. _____
2. _____ 2. _____
3. _____ 3. _____
Canopy Closure 0
SubCanopy Clutter _____ Subcanopy Dominated by _____

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Moderate

M.sodalis Moderate

Based on: Woodlands No Scrub/Shrub No Pasture/Hay Yes

Cultivated/Bare No Developed No Edge Yes Wetlands No

Stream Corridor Yes Man-made Corridor No

Roosting Potential: *M. septentrionalis* Low

M.sodalis Low

Based on Number of Roosts: Yes Spatial Association Yes

Quality of Roosts Size Yes Amount of Exfoliating Bark Yes

Solar Exposure: Opening Yes Edge Yes Density Yes

Adjacent Habitat Patch Description:

Upland woodland to E and W. Pasture to S and N

Explain your Foraging Potential Rating

MYSO/MYSE: Moderate due to upland location of pasture. Shade trees scattered throughout create some clutter. Water located at bottom of hill

Explain your Roosting Potential Rating

MYSO/MYSE: Low due to few PRTs in patch with low potential



ENDANGERED BAT HABITAT ASSESSMENT

Property of: Environmental Solutions & Innovations, Inc.
4525 Este Ave. Cincinnati, OH 45232
(Phone: 513-451-1777)

STEP ONE: ☒ DETAILED Evaluation OR ☐ General Assessment of Indiana Bat Habitat

Project #: 593.08 Date: 11/19/2015 Biologists: Carme Ardito
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Giles

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Cow pasture with scattered trees and some scrub/shrub. Creek runs through pasture

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00063 1a. Patch Acre: 10.54
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Cow pasture on SE facing hillside. Mostly open with some scattered trees scattered throughout pasture. Stream located at bottom of rolling hills
- Habitat Patch Type Hay/Pasture
- If Open, Developed No Ag-Cultivated No Ag-Pasture Yes Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional Yes
- If Woodland, Type: _____ Woodland Age _____ Woodland Position _____ Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 0 (%) 5-16" 0 (%) >16" 0 (%)
Species 1. _____ SubCanopy Species 1. _____
2. _____ 2. _____
3. _____ 3. _____
Canopy Closure 0
SubCanopy Clutter _____ Subcanopy Dominated by _____

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* High
M. sodalis High

Based on: Woodlands No Scrub/Shrub No Pasture/Hay Yes
Cultivated/Bare No Developed No Edge Yes Wetlands No
Stream Corridor Yes Man-made Corridor No

Roosting Potential: *M. septentrionalis* Low
M. sodalis Low

Based on Number of Roosts: Yes Spatial Association Yes
Quality of Roosts Size Yes Amount of Exfoliating Bark Yes
Solar Exposure: Opening Yes Edge Yes Density Yes

Adjacent Habitat Patch Description:

Upland woodland to E and W. Pasture to S and N

Explain your Foraging Potential Rating

MYSO/MYSE: High due to openness of pasture and forest edge where woodland meets pasture. Stream provides water source.

Explain your Roosting Potential Rating

MYSO/MYSE: Low. Only one PRT marked in patch but some other trees are present, which could become PRTs after a storm or if any damage occurs to trees.



ENDANGERED BAT HABITAT ASSESSMENT

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(Phone: 513-451-1777)

STEP ONE: ☒ DETAILED Evaluation OR ☐ General Assessment of Indiana Bat Habitat

Project #: 593.08 Date: 11/19/2015 Biologists: Carme Ardito
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Giles

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Upland woodland across rolling hills.

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00064 1a. Patch Acre: 5.98
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Upland woodland though upland rolling hillside. Overall clutter is very high and trees are very young. Most larger trees are dead or partially dead
- Habitat Patch Type Mixed Forest
- If Open, Developed No Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional No
- If Woodland, Type: Mixed Woodland Age Young Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 50 (%) 5-16" 45 (%) >16" 5 (%)
Species 1. Juniperus virginiana SubCanopy Species 1. Juniperus virginiana
2. Robinia pseudoacacia 2. Acer rubrum
3. Fraxinus americana 3. Carya ovata
Canopy Closure 75
SubCanopy Clutter High Suncanopy Dominated by Lower Branches of Canopy Trees, Saplings,

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Low
M.sodalis Low

Based on: Woodlands Yes Scrub/Shrub No Pasture/Hay No
Cultivated/Bare No Developed No Edge Yes Wetlands No
Stream Corridor No Man-made Corridor Yes

Roosting Potential: *M. septentrionalis* Moderate
M.sodalis Low

Based on Number of Roosts: Yes Spatial Association Yes
Quality of Roosts Size Yes Amount of Exfoliating Bark Yes
Solar Exposure: Opening Yes Edge Yes Density Yes

Adjacent Habitat Patch Description:

Pasture to NW. Upland woodland surrounding patch on all other sides.

Explain your Foraging Potential Rating

MYSO/MYSE: Overall very low foraging potential due to high clutter. Forest edge area where woodland meets pasture provides foraging location. ATV trail runs though portion of woodland near pasture

Explain your Roosting Potential Rating

MYSO: Low due to very high clutter in woodland even though a few PRTs are suitable for MYSO. MYSE: Overall moderate, due to many PRT's in patch suitable for MYSE



ENDANGERED BAT HABITAT ASSESSMENT

Property of: Environmental Solutions & Innovations, Inc.
4525 Este Ave. Cincinnati, OH 45232
(Phone: 513-451-1777)

STEP ONE: ☒ DETAILED Evaluation OR ☐ General Assessment of Indiana Bat Habitat

Project #: 593.08 Date: 11/19/2015 Biologists: Carme Ardito
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Giles

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Upland wooded hillside. SE facing

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00065 1a. Patch Acre: 2.31
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Upland woodland on SE facing hillside. Overall clutter is low to moderate high. Creek located at bottom of hill near Doe Creek Rd.
- Habitat Patch Type Deciduous Forest
- If Open, Developed No Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional No
- If Woodland, Type: Hardwood Woodland Age Less Mature Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 20 (%) 5-16" 70 (%) >16" 10 (%)
Species 1. Acer rubrum SubCanopy Species 1. Celtis occidentalis
2. Quercus alba 2. Acer rubrum
3. Acer saccharum 3. Carya ovata
Canopy Closure 70
SubCanopy Clutter Moderate Suncanopy Dominated by Lower Branches of Canopy Trees, Saplings

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Low
M. sodalis Low

Based on: Woodlands Yes Scrub/Shrub No Pasture/Hay No
Cultivated/Bare No Developed No Edge No Wetlands No
Stream Corridor Yes Man-made Corridor Yes

Roosting Potential: *M. septentrionalis* Moderate
M. sodalis Moderate

Based on Number of Roosts: Yes Spatial Association Yes
Quality of Roosts Size Yes Amount of Exfoliating Bark Yes
Solar Exposure: Opening Yes Edge Yes Density Yes

Adjacent Habitat Patch Description:

Pasture to S. Upland woodland surrounding patch on all other sides.

Explain your Foraging Potential Rating

MYSO/MYSE: Low foraging potential due to upland location and area being wooded. ATV trail runs through woodland and creek is located nearby. Pasture land is also nearby, providing better foraging options

Explain your Roosting Potential Rating

MYSO/MYSE: Moderate due to relative openness of woodland and presence of several moderate potential PRTs in patch. Water and good foraging area also located nearby patch



ENDANGERED BAT HABITAT ASSESSMENT

Property of: Environmental Solutions & Innovations, Inc.
4525 Este Ave. Cincinnati, OH 45232
(Phone: 513-451-1777)

STEP ONE: ☒ DETAILED Evaluation OR ☐ General Assessment of Indiana Bat Habitat

Project #: 593.08 Date: 11/20/2015 Biologists: Carme Ardito
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Giles

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: S/ SE facing upland wooded hillside

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00066 1a. Patch Acre: 1.77
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Young upland wooded hillside. S facing with moderate to high understory and subcanopy clutter. Very few large trees. Access road and ATV trail through woodland near bottom of hill. Stream located at bottom of hill
- Habitat Patch Type Mixed Forest
- If Open, Developed No Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional No
- If Woodland, Type: Mixed Woodland Age Young Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 35 (%) 5-16" 63 (%) >16" 2 (%)
Species 1. Carya ovata SubCanopy Species 1. Juniperus virginiana
2. Fraxinus americana 2. Robinia pseudoacacia
3. Juniperus virginiana 3. Celtis occidentalis
Canopy Closure 85
SubCanopy Clutter High Suncanopy Dominated by Lower Branches of Canopy Trees, Saplings,

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Low
M.sodalis Low

Based on: Woodlands Yes Scrub/Shrub No Pasture/Hay No
Cultivated/Bare No Developed No Edge No Wetlands No
Stream Corridor No Man-made Corridor Yes

Roosting Potential: *M. septentrionalis* Moderate
M.sodalis Moderate

Based on Number of Roosts: Yes Spatial Association Yes
Quality of Roosts Size Yes Amount of Exfoliating Bark Yes
Solar Exposure: Opening Yes Edge Yes Density Yes

Adjacent Habitat Patch Description:

Pasture to NW. Woodland surrounding patch on all other sides.

Explain your Foraging Potential Rating

MYSO/ MYSE: Very low foraging potential due to high clutter and low canopy. ATV trail through patch provides small corridor. Forest edge where woodland meets pasture provides foraging area in adjacent patch to NW.

Explain your Roosting Potential Rating

MYSO/MYSE: Overall moderate. Although patch has few PRTs and high clutter, several Carya ovata and Robinia pseudoacacia PRTs are located in a sunny S facing part of patch with less clutter and in close proximity to water



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Project #: 593.08 Date: 11/20/2015 Biologists: Carme Ardito
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Giles

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Open grassy pasture on hilltop. Power lines run through and few trees are scattered throughout area.

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00067 1a. Patch Acre: 3.18
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Upland grassy pasture on hilltop with few scattered trees. Power lines run along ridge top
- Habitat Patch Type Developed, Medium Intensity
- If Open, Developed No Ag-Cultivated No Ag-Pasture Yes Ag-Hayfield No
Other, explain Power line ROW
- If Scrub/Shrub-Oldfield-Early Successional No
- If Woodland, Type: _____ Woodland Age _____ Woodland Position _____ Evidence of Logging _____
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 0 (%) 5-16" 0 (%) >16" 0 (%)
Species 1. _____ SubCanopy Species 1. _____
2. _____ 2. _____
3. _____ 3. _____
Canopy Closure 0
SubCanopy Clutter _____ SubCanopy Dominated by _____

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Moderate

M. sodalis Moderate

Based on: Woodlands No Scrub/Shrub No Pasture/Hay Yes

Cultivated/Bare No Developed No Edge Yes Wetlands No

Stream Corridor No Man-made Corridor No

Roosting Potential: *M. septentrionalis* None

M. sodalis None

Based on Number of Roosts: No Spatial Association No

Quality of Roosts Size No Amount of Exfoliating Bark No

Solar Exposure: Opening No Edge No Density No

Adjacent Habitat Patch Description:

Very young woodland located in the middle of pasture. Wooded hillside surrounding patch on all sides

Explain your Foraging Potential Rating

MYSO/ MYSE: Moderate due to open pasture and forest edge but location is upland with no access to water

Explain your Roosting Potential Rating

No PRTs and very few trees in patch



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Project #: 593.08 Date: 11/20/2015 Biologists: Carme Ardito
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Giles

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: SW facing upland wooded hillside

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00068 1a. Patch Acre: 0.81
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Young upland woodland within pasture.
- Habitat Patch Type Mixed Forest
- If Open, Developed No Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional No
- If Woodland, Type: Mixed Woodland Age Young Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 55 (%) 5-16" 45 (%) >16" 0 (%)
Species 1. Fraxinus americana SubCanopy Species 1. Juniperus virginiana
2. Juniperus virginiana 2. Fraxinus americana
3. Prunus serotina 3. Celtis occidentalis
Canopy Closure 70
SubCanopy Clutter High Suncanopy Dominated by Lower Branches of Canopy Trees, Saplings,

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* None
M.sodalis None

Explain your Foraging Potential Rating

No foraging potential due to very high clutter

Based on: Woodlands No Scrub/Shrub No Pasture/Hay No
Cultivated/Bare No Developed No Edge No Wetlands No
Stream Corridor No Man-made Corridor No

Roosting Potential: *M. septentrionalis* None
M.sodalis None

Explain your Roosting Potential Rating

No roosting potential. All trees are very small and provide no places for bats to roost

Based on Number of Roosts: No Spatial Association No
Quality of Roosts Size No Amount of Exfoliating Bark No
Solar Exposure: Opening No Edge No Density No

Adjacent Habitat Patch Description:

Pasture to E and W. Woodland surrounding patch to N and S.



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Project #: 593.08 Date: 11/20/2015 Biologists: Carme Ardito
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Giles

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Lowland area with gravel access road, paved road, mowed lawn, and stream

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00069 1a. Patch Acre: 0.76
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Open lowland area with stream, roads, yard and bridge. Few scattered trees in yard and line of trees along stream.
- Habitat Patch Type Developed, Open Space
- If Open, Developed Yes Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain Paved road, developed area with yard, house and bridge over stream
- If Scrub/Shrub-Oldfield-Early Successional No
- If Woodland, Type: _____ Woodland Age _____ Woodland Position _____ Evidence of Logging _____
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 0 (%) 5-16" 0 (%) >16" 0 (%)
Species 1. _____ SubCanopy Species 1. _____
2. _____ 2. _____
3. _____ 3. _____
Canopy Closure 0
SubCanopy Clutter _____ SubCanopy Dominated by _____

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Moderate

M. sodalis Moderate

Based on: Woodlands No Scrub/Shrub No Pasture/Hay Yes

Cultivated/Bare No Developed Yes Edge Yes Wetlands No

Stream Corridor Yes Man-made Corridor Yes

Roosting Potential: *M. septentrionalis* None

M. sodalis None

Based on Number of Roosts: No Spatial Association No

Quality of Roosts Size No Amount of Exfoliating Bark No

Solar Exposure: Opening No Edge No Density No

Adjacent Habitat Patch Description:

Upland wooded hillsides surrounding patch

Explain your Foraging Potential Rating

MYSO/ MYSE: Moderate due to small open grassy yard in lowland location and stream provides water. Paved road is busy with a lot of noise and traffic.

Explain your Roosting Potential Rating

No PRTs and very few trees in patch



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Project #: 593.08 Date: 11/20/2015 Biologists: Carme Ardito
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Giles

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: N facing upland wooded hillside

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00070 1a. Patch Acre: 0.37
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Young upland woodland on N facing hillside. Overall, trees are small and young with some larger trees.
- Habitat Patch Type Mixed Forest
- If Open, Developed No Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional No
- If Woodland, Type: Mixed Woodland Age Less Mature Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 25 (%) 5-16" 70 (%) >16" 5 (%)
Species 1. Prunus serotina SubCanopy Species 1. Juniperus virginiana
2. Acer rubrum 2. Robinia pseudoacacia
3. Liriodendron tulipifera 3. Ailanthus altissima
Canopy Closure 70
SubCanopy Clutter Moderate Suncanopy Dominated by Lower Branches of Canopy Trees, Saplings,

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Low
M.sodalis Low

Based on: Woodlands Yes Scrub/Shrub No Pasture/Hay No
Cultivated/Bare No Developed No Edge No Wetlands No
Stream Corridor No Man-made Corridor No

Roosting Potential: *M. septentrionalis* Low
M.sodalis Low

Based on Number of Roosts: Yes Spatial Association Yes
Quality of Roosts Size Yes Amount of Exfoliating Bark Yes
Solar Exposure: Opening Yes Edge Yes Density Yes

Adjacent Habitat Patch Description:

Pasture to S. Paved road corridor and houses/yards to N. Wooded hillside to E and W.

Explain your Foraging Potential Rating

MYSO/ MYSE: Very low foraging potential due to high clutter. Forest edge where woodland meets pasture provides foraging area in adjacent patch to S

Explain your Roosting Potential Rating

MYSO/MYSE: Low due to patch having very few snags or other PRTs. Patch is beside busy road



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Project #: 593.08 Date: 11/20/2015 Biologists: Carme Ardito
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Giles

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Open grassy pasture on hilltop. Few trees are scattered throughout area.

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00071 1a. Patch Acre: 2.46
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Upland grassy pasture on hilltop with few scattered trees and trees along fence lines. Existing gravel access road runs through pasture
- Habitat Patch Type Hay/Pasture
- If Open, Developed No Ag-Cultivated No Ag-Pasture Yes Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional No
- If Woodland, Type: _____ Woodland Age _____ Woodland Position _____ Evidence of Logging _____
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 0 (%) 5-16" 0 (%) >16" 0 (%)
Species 1. _____ SubCanopy Species 1. _____
2. _____ 2. _____
3. _____ 3. _____
Canopy Closure 0
SubCanopy Clutter _____ Subcanopy Dominated by _____

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Moderate

M.sodalis Moderate

Based on: Woodlands No Scrub/Shrub No Pasture/Hay Yes

Cultivated/Bare No Developed No Edge Yes Wetlands No

Stream Corridor No Man-made Corridor No

Roosting Potential: *M. septentrionalis* None

M.sodalis None

Based on Number of Roosts: No Spatial Association No

Quality of Roosts Size No Amount of Exfoliating Bark No

Solar Exposure: Opening No Edge No Density No

Adjacent Habitat Patch Description:

Upland woodland and paved road with houses surrounds patch

Explain your Foraging Potential Rating

MYSO/ MYSE: Moderate due to open pasture and forest edge but location is upland with no access to water

Explain your Roosting Potential Rating

No PRTs and very few trees in patch



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STEP ONE: ☒ DETAILED Evaluation OR ☐ General Assessment of Indiana Bat Habitat

Project #: 593.08 Date: 11/20/2015 Biologists: Carme Ardito
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Giles

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Upland woodland on hilltop

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00072 1a. Patch Acre: 1.53
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Overall young upland woodland on hilltop with few large, more mature trees.
- Habitat Patch Type Mixed Forest
- If Open, Developed No Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional No
- If Woodland, Type: Mixed Woodland Age Less Mature Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 30 (%) 5-16" 65 (%) >16" 5 (%)
Species 1. Carya ovata SubCanopy Species 1. Juniperus virginiana
2. Quercus rubra 2. Acer rubrum
3. Quercus alba 3. Carya ovata
Canopy Closure 85
SubCanopy Clutter Moderate Suncanopy Dominated by Lower Branches of Canopy Trees, Saplings,

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Low
M.sodalis Low

Based on: Woodlands Yes Scrub/Shrub No Pasture/Hay No
Cultivated/Bare No Developed No Edge No Wetlands No
Stream Corridor No Man-made Corridor No

Roosting Potential: *M. septentrionalis* Low
M.sodalis Low

Based on Number of Roosts: Yes Spatial Association Yes
Quality of Roosts Size Yes Amount of Exfoliating Bark Yes
Solar Exposure: Opening Yes Edge Yes Density Yes

Adjacent Habitat Patch Description:

Developed area with house and paved road is adjacent to woodland to S. Pasture surrounds woodland on other sides.

Explain your Foraging Potential Rating

MYSO/ MYSE: Low foraging potential due to moderate clutter and no
ATV trails or other corridors through patch. Forest edge where
woodland meets pasture provides foraging area in adjacent patches

Explain your Roosting Potential Rating

MYSO/MYSE: Low due to few PRTs in patch and moderate to high
clutter.



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Project #: 593.08 Date: 11/20/2015 Biologists: Carme Ardito
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Giles

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Open grassy pasture on hilltop. Few small trees are scattered throughout area

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00073 1a. Patch Acre: 0.61
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Upland grassy pasture on hilltop with few scattered trees.
- Habitat Patch Type Hay/Pasture
- If Open, Developed No Ag-Cultivated No Ag-Pasture Yes Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional No
- If Woodland, Type: _____ Woodland Age _____ Woodland Position _____ Evidence of Logging _____
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 0 (%) 5-16" 0 (%) >16" 0 (%)
Species 1. _____ SubCanopy Species 1. _____
2. _____ 2. _____
3. _____ 3. _____
Canopy Closure 0
SubCanopy Clutter _____ Subcanopy Dominated by _____

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Moderate

M.sodalis Moderate

Based on: Woodlands No Scrub/Shrub No Pasture/Hay Yes

Cultivated/Bare No Developed No Edge Yes Wetlands No

Stream Corridor No Man-made Corridor No

Roosting Potential: *M. septentrionalis* None

M.sodalis None

Based on Number of Roosts: No Spatial Association No

Quality of Roosts Size No Amount of Exfoliating Bark No

Solar Exposure: Opening No Edge No Density No

Adjacent Habitat Patch Description:

Pasture to NE. Upland woodland on all other sides.

Explain your Foraging Potential Rating

MYSO/ MYSE: Moderate due to open pasture and forest edge but location is upland with no access to water

Explain your Roosting Potential Rating

No PRTs and very few trees in patch



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Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Giles

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Upland woodland on hilltop

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00074 1a. Patch Acre: 2.13
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Overall young upland woodland on hilltop with few large, more mature trees. ATV trails and small creek cut through woodland.
Overall patch has moderate clutter with some areas being high clutter and other areas of openness with low clutter
- Habitat Patch Type Mixed Forest
- If Open, Developed No Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional No
- If Woodland, Type: Mixed Woodland Age Less Mature Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 25 (%) 5-16" 70 (%) >16" 5 (%)
Species 1. Juglans nigra SubCanopy Species 1. Juniperus virginiana
2. Fagus grandifolia 2. Robinia pseudoacacia
3. Fraxinus americana 3. Carya ovata
Canopy Closure 65
SubCanopy Clutter Moderate Suncanopy Dominated by Lower Branches of Canopy Trees, Saplings,

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Low
M.sodalis Low

Based on: Woodlands Yes Scrub/Shrub No Pasture/Hay No
Cultivated/Bare No Developed No Edge No Wetlands No
Stream Corridor No Man-made Corridor Yes

Roosting Potential: *M. septentrionalis* Moderate
M.sodalis Low

Based on Number of Roosts: Yes Spatial Association Yes
Quality of Roosts Size Yes Amount of Exfoliating Bark Yes
Solar Exposure: Opening Yes Edge Yes Density Yes

Adjacent Habitat Patch Description:

Developed area with houses to N. Upland woodland surrounds patch on all other sides.

Explain your Foraging Potential Rating

MYSO/ MYSE: Low foraging potential due to moderate clutter. ATV trails provide small corridors through patch and small creek likely provides water seasonally.

Explain your Roosting Potential Rating

MYSO: Low due to few PRTs in patch suitable for MYSO and moderate to high clutter in places. MYSE: Moderate due to suitability of PRTs in patch for MYSE. Upland location and moderate clutter is ok for MYSE



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STEP ONE: ☒ DETAILED Evaluation OR ☐ General Assessment of Indiana Bat Habitat

Project #: 593.08 Date: 11/21/2015 Biologists: Carme Ardito
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Montgomery

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: SE facing upland wooded hillside with wide ATV trail corridor running through woodland. Survey buffer follows ATV trail for most of the way.

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00075 1a. Patch Acre: 10.47
- Does the patch look like it is supposed to look based on mapping? Yes
Describe SE facing upland wooded hillside. Clutter is low and woodland is very open. Many larger trees and many snags suitable for bats. Pines scattered throughout woodland but it is comprised mainly of oaks. Good sun exposure
- Habitat Patch Type Mixed Forest
- If Open, Developed No Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional No
- If Woodland, Type: Mixed Woodland Age Less Mature Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 10 (%) 5-16" 80 (%) >16" 10 (%)
Species 1. Quercus rubra SubCanopy Species 1. Acer rubrum
2. Quercus montana 2. Pinus virginiana
3. Quercus alba 3. Liriodendron tulipifera
Canopy Closure 60
SubCanopy Clutter Low Suncanopy Dominated by Lower Branches of Canopy Trees, Saplings

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Moderate

M. sodalis Low

Based on: Woodlands Yes Scrub/Shrub No Pasture/Hay No

Cultivated/Bare No Developed No Edge No Wetlands No

Stream Corridor No Man-made Corridor Yes

Roosting Potential: *M. septentrionalis* High

M. sodalis High

Based on Number of Roosts: Yes Spatial Association Yes

Quality of Roosts Size Yes Amount of Exfoliating Bark Yes

Solar Exposure: Opening Yes Edge Yes Density Yes

Adjacent Habitat Patch Description:

Wooded ridge top adjacent to patch to N. Upland wooded SE facing hillside surrounding patch to all other sides.

Explain your Foraging Potential Rating

MYSO: Low due to upland wooded location and lack of water. MYSE:

Moderate due to low clutter and wide ATV trail which provides a

corridor as a flyway and foraging area

Explain your Roosting Potential Rating

MYSO/MYSE: High due to availability of numerous PRTs with

moderate to high roosting potential. Location of patch also has great
solar exposure on a SE facing slope and woodland is very open and
has ATV trail flight corridor



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STEP ONE: ☒ DETAILED Evaluation OR ☐ General Assessment of Indiana Bat Habitat

Project #: 593.08 Date: 11/21/2015 Biologists: Carme Ardito
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Montgomery

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Wooded ridge top with access road/ATV trail going through portion of patch. ROW follows ridge top.

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00076 1a. Patch Acre: 9.65
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Wooded ridge top. Clutter is low and woodland is relatively open. ATV trail and road go through woodland
- Habitat Patch Type Deciduous Forest
- If Open, Developed No Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional No
- If Woodland, Type: Hardwood Woodland Age Less Mature Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 10 (%) 5-16" 80 (%) >16" 10 (%)
Species 1. Quercus rubra SubCanopy Species 1. Acer rubrum
2. Quercus montana 2. Quercus montana
3. Quercus alba 3. Carya glabra
Canopy Closure 75
SubCanopy Clutter Low Suncanopy Dominated by Lower Branches of Canopy Trees, Saplings

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Low
M.sodalis Low

Based on: Woodlands Yes Scrub/Shrub No Pasture/Hay No
Cultivated/Bare No Developed No Edge No Wetlands No
Stream Corridor No Man-made Corridor Yes

Roosting Potential: *M. septentrionalis* Moderate
M.sodalis Moderate

Based on Number of Roosts: Yes Spatial Association Yes
Quality of Roosts Size Yes Amount of Exfoliating Bark Yes
Solar Exposure: Opening Yes Edge Yes Density Yes

Adjacent Habitat Patch Description:

N: N facing upland wooded hillside, S: S facing upland wooded hillside, E and W: Wooded ridge top

Explain your Foraging Potential Rating

MYSO: Low due to upland wooded location and lack of water. MYSE: Moderate due to low clutter and ATV trail which provides a corridor as a flyway and foraging area

Explain your Roosting Potential Rating

MYSO/MYSE: Moderate due to availability of many PRTs, some with moderate to high roosting potential. Location of patch also has good solar exposure on ridgetop and woodland has low clutter. But ridgetop PRTs have little shelter from wind and elements



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State: Virginia County: Montgomery

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Wooded N facing hillside.

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: CRA-HA-00077 1a. Patch Acre: 0.00
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Upland wooded hillside. Mixed hardwood and evergreen woodland consisting mainly of various pine species with a few scatter white oaks and red maples. Very high clutter
- Habitat Patch Type Deciduous Forest
- If Open, Developed No Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional No
- If Woodland, Type: Hardwood Woodland Age Less Mature Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 20 (%) 5-16" 80 (%) >16" 0 (%)
Species 1. Pinus virginiana SubCanopy Species 1. Acer rubrum
2. Pinus strobus 2. Pinus rigida
3. Quercus alba 3. Juniperus virginiana
Canopy Closure 75
SubCanopy Clutter High Suncanopy Dominated by Lower Branches of Canopy Trees, Saplings,

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Low
M.sodalis Low

Explain your Foraging Potential Rating

MYSO/MYSE: Very low foraging potential due to very high clutter

Based on: Woodlands Yes Scrub/Shrub No Pasture/Hay No
Cultivated/Bare No Developed No Edge No Wetlands No
Stream Corridor No Man-made Corridor No

Roosting Potential: *M. septentrionalis* Low
M.sodalis Low

Explain your Roosting Potential Rating

MYSO/MYSE: Very low roosting potential due to high clutter and low availability of PRTs in patch.

Based on Number of Roosts: Yes Spatial Association Yes
Quality of Roosts Size Yes Amount of Exfoliating Bark Yes
Solar Exposure: Opening Yes Edge Yes Density Yes

Adjacent Habitat Patch Description:

Upland wooded hillside surrounds patch on all sides



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Project #: 593.08 Date: 11/19/2015 Biologists: Jeremy Van Deventer
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Giles

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Pasture

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: JLV-HA-00051 1a. Patch Acre: 0.95
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Open pasture with barn and house. Enclosed by fence. Hill face sloping to south. Creek to south of patch
- Habitat Patch Type Developed, Open Space
- If Open, Developed Yes Ag-Cultivated No Ag-Pasture Yes Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional _____
- If Woodland, Type: _____ Woodland Age _____ Woodland Position _____ Evidence of Logging _____
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 0 (%) 5-16" 0 (%) >16" 0 (%)
Species 1. _____ SubCanopy Species 1. _____
2. _____ 2. _____
3. _____ 3. _____
Canopy Closure 0
SubCanopy Clutter _____ Subcanopy Dominated by _____

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Moderate

M.sodalis Moderate

Based on: Woodlands No Scrub/Shrub No Pasture/Hay Yes

Cultivated/Bare No Developed Yes Edge Yes Wetlands No

Stream Corridor Yes Man-made Corridor No

Roosting Potential: *M. septentrionalis* None

M.sodalis None

Based on Number of Roosts: No Spatial Association No

Quality of Roosts Size No Amount of Exfoliating Bark No

Solar Exposure: Opening No Edge No Density No

Adjacent Habitat Patch Description:

Mixed hardwood and evergreen forest to north. Pasture continues to east and west and south

Explain your Foraging Potential Rating

MYSO AND MYSE- moderate foraging potential due to open pasture with close proximity to forest edge and stream corridor.

Explain your Roosting Potential Rating

No trees in patch



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STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Mixed forest

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: JLV-HA-00052 1a. Patch Acre: 6.82
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Young upland mixed forest with old trail running through patch. Areas of open grass patches. Mostly small red cedar trees and shagbark hickory. Stream runs through patch
- Habitat Patch Type Mixed Forest
- If Open, Developed Ag-Cultivated Ag-Pasture Ag-Hayfield
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional _____
- If Woodland, Type: Mixed Woodland Age Young Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 55 (%) 5-16" 40 (%) >16" 5 (%)
Species 1. Quercus alba SubCanopy Species 1. Carya ovata
2. Fraxinus americana 2. Juniperus virginiana
3. Carya ovata 3. Acer rubrum
Canopy Closure 40
SubCanopy Clutter Low Subcanopy Dominated by Saplings

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* High
M.sodalis High

Based on: Woodlands Yes Scrub/Shrub No Pasture/Hay No
Cultivated/Bare No Developed No Edge Yes Wetlands No
Stream Corridor Yes Man-made Corridor Yes

Roosting Potential: *M. septentrionalis* Moderate
M.sodalis Moderate

Based on Number of Roosts: Yes Spatial Association No
Quality of Roosts Size No Amount of Exfoliating Bark Yes
Solar Exposure: Opening Yes Edge Yes Density Yes

Adjacent Habitat Patch Description:

Deciduous forest to north and west, similiar forest to east, pasture to south.

Explain your Foraging Potential Rating

Trail and open forest provide excellent flyways. Stream close by as well as good forest edg

Explain your Roosting Potential Rating

MYSO/MYSE-moderate potential due to number of moderate roosts in patch as well as open forest and flyways and water source nearby



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STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Young deciduous forest

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: JLV-HA-00053 1a. Patch Acre: 4.16
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Young upland hardwood forest with a few small streams/springs. Powerline ROW runs through portion of southern end of patch.
- Habitat Patch Type Deciduous Forest
- If Open, Developed Ag-Cultivated Ag-Pasture Ag-Hayfield
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional _____
- If Woodland, Type: Hardwood Woodland Age Young Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 50 (%) 5-16" 40 (%) >16" 10 (%)
Species 1. Carya ovata SubCanopy Species 1. Robinia pseudoacacia
2. Fraxinus americana 2. Liriodendron tulipifera
3. Juglans nigra 3. Acer rubrum
Canopy Closure 60
SubCanopy Clutter Moderate Subcanopy Dominated by Saplings

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Low
M. sodalis Low

Based on: Woodlands Yes Scrub/Shrub No Pasture/Hay No
Cultivated/Bare No Developed No Edge No Wetlands No
Stream Corridor Yes Man-made Corridor No

Roosting Potential: *M. septentrionalis* Moderate
M. sodalis Low

Based on Number of Roosts: Yes Spatial Association No
Quality of Roosts Size Yes Amount of Exfoliating Bark Yes
Solar Exposure: Opening Yes Edge Yes Density Yes

Adjacent Habitat Patch Description:

Similiar forest to north, west. Mixed young forest to south and east

Explain your Foraging Potential Rating

Young forest with many saplings. Streams are cluttered as is rest of forest

Explain your Roosting Potential Rating

MYSO-low due to overall quality of trees as well as age/cluttered forest. MYSE-moderste due to overall number of PRT's, mostly black locust



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STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Electric ROW

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: JLV-HA-00053a 1a. Patch Acre: 0.74
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Electric ROW
- Habitat Patch Type Developed, Medium Intensity
- If Open, Developed No Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain Electric ROW
- If Scrub/Shrub-Oldfield-Early Successional _____
- If Woodland, Type: _____ Woodland Age _____ Woodland Position _____ Evidence of Logging _____
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 0 (%) 5-16" 0 (%) >16" 0 (%)
Species 1. _____ SubCanopy Species 1. _____
2. _____ 2. _____
3. _____ 3. _____
Canopy Closure 0
SubCanopy Clutter _____ Subcanopy Dominated by _____

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* High
M.sodalis Moderate

Explain your Foraging Potential Rating

Based on: Woodlands _____ Scrub/Shrub _____ Pasture/Hay _____
Cultivated/Bare _____ Developed _____ Edge Yes Wetlands _____
Stream Corridor _____ Man-made Corridor Yes

Roosting Potential: *M. septentrionalis* None
M.sodalis None

Explain your Roosting Potential Rating

No Suitable trees within patches

Based on Number of Roosts: Yes Spatial Association _____
Quality of Roosts Size _____ Amount of Exfoliating Bark _____
Solar Exposure: Opening _____ Edge _____ Density _____

Adjacent Habitat Patch Description:

Forested to the North and South with some patches of pasture; ROW runs from NW to SE



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STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Less mature mixed forest

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: JLV-HA-00054 1a. Patch Acre: 3.22
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Less mature upland forest, slightly cluttered subcanopy. Ridgetop to SE facing slope. Stream runs through patch
- Habitat Patch Type Mixed Forest
- If Open, Developed Ag-Cultivated Ag-Pasture Ag-Hayfield
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional _____
- If Woodland, Type: Mixed Woodland Age Less Mature Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 30 (%) 5-16" 60 (%) >16" 10 (%)
Species 1. Pinus strobus SubCanopy Species 1. Carya ovata
2. Quercus montana 2. Liriodendron tulipifera
3. Liriodendron tulipifera 3. Acer rubrum
Canopy Closure 85
SubCanopy Clutter Moderate Subcanopy Dominated by Saplings

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Moderate

M.sodalis Moderate

Based on: Woodlands Yes Scrub/Shrub No Pasture/Hay No

Cultivated/Bare No Developed No Edge No Wetlands No

Stream Corridor Yes Man-made Corridor No

Roosting Potential: *M. septentrionalis* Moderate

M.sodalis Low

Based on Number of Roosts: Yes Spatial Association No

Quality of Roosts Size Yes Amount of Exfoliating Bark Yes

Solar Exposure: Opening No Edge No Density Yes

Adjacent Habitat Patch Description:

Red cedar forest to north and west and east, similiar forest to east

Explain your Foraging Potential Rating

Slightly cluttered forest but close proximity to pasture and forest edge and there is an stream that is not cluttered through patch

Explain your Roosting Potential Rating

MYSO-low due to overall quality of trees and numbers of trees.

MYSE-moderate due to quality of overall trees with a couple of high potential roost trees.



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STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Gravel road

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: JLV-HA-00055 1a. Patch Acre: 3.25
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Open gravel road for access road
- Habitat Patch Type Developed, Open Space
- If Open, Developed No Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain Open gravel road leading to houses
- If Scrub/Shrub-Oldfield-Early Successional _____
- If Woodland, Type: _____ Woodland Age _____ Woodland Position _____ Evidence of Logging _____
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 0 (%) 5-16" 0 (%) >16" 0 (%)
Species 1. _____ SubCanopy Species 1. _____
2. _____ 2. _____
3. _____ 3. _____
Canopy Closure 0
SubCanopy Clutter _____ Subcanopy Dominated by _____

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* High
M. sodalis High

Explain your Foraging Potential Rating

Based on: Woodlands No Scrub/Shrub No Pasture/Hay Yes
Cultivated/Bare No Developed No Edge Yes Wetlands No
Stream Corridor Yes Man-made Corridor Yes

MYSE/MYSO-good wide flyway with some forest edge and stream running parallel with road.

Roosting Potential: *M. septentrionalis* None
M. sodalis None

Explain your Roosting Potential Rating

MYSE/MYSO-no suitable trees

Based on Number of Roosts: No Spatial Association No
Quality of Roosts Size No Amount of Exfoliating Bark No
Solar Exposure: Opening No Edge No Density No

Adjacent Habitat Patch Description:

Forest to north and west, stream and hayfield to south. Pasture to east



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STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Pasture with few areas of small trees and shrubs

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: JLV-HA-00056 1a. Patch Acre: 11.92
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Open cow pasture with house and barn on property. Patch has a few areas of small clumps of trees, mostly eastern red cedar and a couple of small areas of shrubs.
- Habitat Patch Type Developed, Open Space
- If Open, Developed Yes Ag-Cultivated No Ag-Pasture Yes Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional Yes
- If Woodland, Type: _____ Woodland Age _____ Woodland Position _____ Evidence of Logging _____
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 0 (%) 5-16" 0 (%) >16" 0 (%)
Species 1. _____ SubCanopy Species 1. _____
2. _____ 2. _____
3. _____ 3. _____
Canopy Closure 0
SubCanopy Clutter _____ Subcanopy Dominated by _____

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Moderate

M. sodalis Moderate

Explain your Foraging Potential Rating

MYSE/MYSO-open pasture for foraging with some forest edge

Based on: Woodlands No Scrub/Shrub No Pasture/Hay Yes

Cultivated/Bare No Developed No Edge Yes Wetlands No

Stream Corridor No Man-made Corridor No

Roosting Potential: *M. septentrionalis* None

M. sodalis None

Explain your Roosting Potential Rating

MYSE/MYSO-no suitable roost trees

Based on Number of Roosts: Yes Spatial Association No

Quality of Roosts Size No Amount of Exfoliating Bark No

Solar Exposure: Opening Yes Edge No Density No

Adjacent Habitat Patch Description:

Entire patch is surrounded by more pasture followed by hardwood forest



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STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Scrub shrub/early successional

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: JLV-HA-00057 1a. Patch Acre: 0.95
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Scrub shrub with some small trees, mostly black locust and red cedar. Dominant in multiflora rose and rubus sp. and autumn olive.
farm access road runs through patch to connect pastures
- Habitat Patch Type Shrub/Scrub
- If Open, Developed Ag-Cultivated Ag-Pasture Ag-Hayfield
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional Yes
- If Woodland, Type: _____ Woodland Age _____ Woodland Position _____ Evidence of Logging _____
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 0 (%) 5-16" 0 (%) >16" 0 (%)
Species 1. _____ SubCanopy Species 1. _____
2. _____ 2. _____
3. _____ 3. _____
Canopy Closure 0
SubCanopy Clutter _____ SubCanopy Dominated by _____

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Low

M. sodalis Low

Based on: Woodlands No Scrub/Shrub Yes Pasture/Hay Yes

Cultivated/Bare No Developed No Edge Yes Wetlands No

Stream Corridor No Man-made Corridor Yes

Roosting Potential: *M. septentrionalis* Low

M. sodalis Low

Based on Number of Roosts: Yes Spatial Association No

Quality of Roosts Size No Amount of Exfoliating Bark No

Solar Exposure: Opening Yes Edge No Density No

Adjacent Habitat Patch Description:

Pasture to NW and SE, forest to NE and SW

Explain your Foraging Potential Rating

MYSE/MYSO-cluttered scrub shrub area with a few trees spread throughout. One flyway that connects two pastures

Explain your Roosting Potential Rating

MYSE/MYSO-low due to low amount of poor quality suitable roost trees.



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STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Pasture

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: JLV-HA-00058 1a. Patch Acre: 1.91
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Open cow pasture
- Habitat Patch Type Hay/Pasture
- If Open, Developed No Ag-Cultivated No Ag-Pasture Yes Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional No
- If Woodland, Type: _____ Woodland Age _____ Woodland Position _____ Evidence of Logging _____
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 0 (%) 5-16" 0 (%) >16" 0 (%)
Species 1. _____ SubCanopy Species 1. _____
2. _____ 2. _____
3. _____ 3. _____
Canopy Closure 0
SubCanopy Clutter _____ Suncanopy Dominated by _____

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Moderate

M. sodalis Moderate

Explain your Foraging Potential Rating

MYSE/MYSO-open pasture for foraging with some forest edge

Based on: Woodlands No Scrub/Shrub No Pasture/Hay Yes

Cultivated/Bare No Developed No Edge Yes Wetlands No

Stream Corridor No Man-made Corridor No

Roosting Potential: *M. septentrionalis* None

M. sodalis None

Explain your Roosting Potential Rating

MYSE/MYSO-no suitable trees

Based on Number of Roosts: No Spatial Association No

Quality of Roosts Size No Amount of Exfoliating Bark No

Solar Exposure: Opening No Edge No Density No

Adjacent Habitat Patch Description:

Forest to west, north and south, scrub shrub and small forest to east



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STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Cluttered hardwood forest

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: JLV-HA-00059 1a. Patch Acre: 1.18
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Highly cluttered mixed forest consisting mostly of hardwoods with cedar trees mixed in. Subcanopy largely composed of shrubs including multiflora rose and rubus sp.
- Habitat Patch Type Mixed Forest
- If Open, Developed Ag-Cultivated Ag-Pasture Ag-Hayfield
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional _____
- If Woodland, Type: Mixed Woodland Age Young Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 40 (%) 5-16" 55 (%) >16" 5 (%)
Species 1. Liriodendron tulipifera SubCanopy Species 1. Prunus serotina
2. Acer rubrum 2. Quercus rubra
3. Prunus serotina 3. Acer rubrum
Canopy Closure 70
SubCanopy Clutter High Subcanopy Dominated by Saplings & Shrubs

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Low
M.sodalis Low

Explain your Foraging Potential Rating

Based on: Woodlands Yes Scrub/Shrub No Pasture/Hay No
Cultivated/Bare No Developed No Edge Yes Wetlands No
Stream Corridor No Man-made Corridor No

MYSE/MYSO-low due to highly cluttered forest. Does have forest edge along pasture

Roosting Potential: *M. septentrionalis* Low
M.sodalis Low

Explain your Roosting Potential Rating

MYSE/MYSO-low due to low number of quality trees in patch along with cluttered forest

Based on Number of Roosts: Yes Spatial Association No
Quality of Roosts Size Yes Amount of Exfoliating Bark Yes
Solar Exposure: Opening No Edge No Density No

Adjacent Habitat Patch Description:

Surrounded by forest to west, north, and south, pasture to east



ENDANGERED BAT HABITAT ASSESSMENT

Property of: Environmental Solutions & Innovations, Inc.
4525 Este Ave. Cincinnati, OH 45232
(Phone: 513-451-1777)

STEP ONE: ☒ DETAILED Evaluation OR ☐ General Assessment of Indiana Bat Habitat

Project #: 593.08 Date: 11/20/2015 Biologists: Jeremy Van Deventer
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Giles

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Mixed forest

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: JLV-HA-00060 1a. Patch Acre: 2.82
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Mixed forest consisting mostly of oak species with cedar trees mixed in. Subcanopy has a mix of open areas and cluttered areas
- Habitat Patch Type Mixed Forest
- If Open, Developed Ag-Cultivated Ag-Pasture Ag-Hayfield
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional _____
- If Woodland, Type: Mixed Woodland Age Less Mature Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 25 (%) 5-16" 65 (%) >16" 10 (%)
Species 1. Quercus alba SubCanopy Species 1. Carya ovata
2. Quercus velutina 2. Quercus alba
3. Carya ovata 3. Juniperus virginiana
Canopy Closure 80
SubCanopy Clutter Moderate Subcanopy Dominated by Saplings & Shrubs

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Low
M.sodalis Low

Explain your Foraging Potential Rating

Based on: Woodlands Yes Scrub/Shrub No Pasture/Hay No
Cultivated/Bare No Developed No Edge No Wetlands No
Stream Corridor No Man-made Corridor No

MYSE/MYSO-low due to moderately cluttered forest and no existing flyways in forest

Roosting Potential: *M. septentrionalis* Moderate
M.sodalis Moderate

Explain your Roosting Potential Rating

Based on Number of Roosts: Yes Spatial Association Yes
Quality of Roosts Size Yes Amount of Exfoliating Bark Yes
Solar Exposure: Opening No Edge No Density Yes

MYSE/MYSO-moderate potential due to number of moderate quality roosts. Forest is a little cluttered

Adjacent Habitat Patch Description:

Surrounded by forest to north and south, pasture to east and west



ENDANGERED BAT HABITAT ASSESSMENT

Property of: Environmental Solutions & Innovations, Inc.
4525 Este Ave. Cincinnati, OH 45232
(Phone: 513-451-1777)

STEP ONE: ☒ DETAILED Evaluation OR ☐ General Assessment of Indiana Bat Habitat

Project #: 593.08 Date: 11/21/2015 Biologists: Jeremy Van Deventer
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Montgomery

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Maintained gravel rd. Reese Mountain Rd

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: JLV-HA-00062 1a. Patch Acre: 7.47
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Well maintained gravel rd (Reese Mountain Rd) starts in the valley and goes up to ridgetop. Should not be any improvements made.
Trees off of side of road are far enough out that they will not be affected
- Habitat Patch Type Developed, Medium Intensity
- If Open, Developed No Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain Well maintained gravel road
- If Scrub/Shrub-Oldfield-Early Successional _____
- If Woodland, Type: _____ Woodland Age _____ Woodland Position _____ Evidence of Logging _____
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 0 (%) 5-16" 0 (%) >16" 0 (%)
Species 1. _____ SubCanopy Species 1. _____
2. _____ 2. _____
3. _____ 3. _____
Canopy Closure 0
SubCanopy Clutter _____ Subcanopy Dominated by _____

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Moderate

M.sodalis Moderate

Based on: Woodlands No Scrub/Shrub No Pasture/Hay No

Cultivated/Bare No Developed No Edge Yes Wetlands No

Stream Corridor No Man-made Corridor Yes

Roosting Potential: *M. septentrionalis* None

M.sodalis None

Based on Number of Roosts: No Spatial Association No

Quality of Roosts Size No Amount of Exfoliating Bark No

Solar Exposure: Opening No Edge No Density No

Adjacent Habitat Patch Description:

Surrounded by forest in all directions

Explain your Foraging Potential Rating

MYSE/MYSO-road provides good flyway to lowland and upland areas.

Water source at bottom of valley, end of road

Explain your Roosting Potential Rating

MYSE/MYSO-no suitable trees in patch



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Property of: Environmental Solutions & Innovations, Inc.
4525 Este Ave. Cincinnati, OH 45232
(Phone: 513-451-1777)

STEP ONE: ☒ DETAILED Evaluation OR ☐ General Assessment of Indiana Bat Habitat

Project #: 593.08 Date: 11/21/2015 Biologists: Jeremy Van Deventer
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Montgomery

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Gravel/dirt road

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: JLV-HA-00063 1a. Patch Acre: 9.49
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Gravel/dirt road. Wide enough in most places that it wont affect surrounding trees if improved on. Areas where the road narrows and trees fall in buffer were not suitable roost trees. Steep road down mostly north facing side of mountain.
- Habitat Patch Type Mixed Forest
- If Open, Developed No Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional _____
- If Woodland, Type: Mixed Woodland Age Less Mature Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 40 (%) 5-16" 55 (%) >16" 5 (%)
Species 1. Quercus alba SubCanopy Species 1. Pinus virginiana
2. Quercus montana 2. Quercus rubra
3. _____ 3. Pinus strobus
Canopy Closure 70
SubCanopy Clutter Low Subcanopy Dominated by Sapplings

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Moderate

M.sodalis Moderate

Based on: Woodlands No Scrub/Shrub No Pasture/Hay No

Cultivated/Bare No Developed No Edge Yes Wetlands No

Stream Corridor Yes Man-made Corridor Yes

Roosting Potential: *M. septentrionalis* None

M.sodalis None

Based on Number of Roosts: No Spatial Association No

Quality of Roosts Size No Amount of Exfoliating Bark No

Solar Exposure: Opening No Edge No Density No

Adjacent Habitat Patch Description:

Surrounded by forest in all directions

Explain your Foraging Potential Rating

MYSE/MYSO-road provides good flyway to lowland and upland areas.
Creek runs through patch

Explain your Roosting Potential Rating

MYSE/MYSO-no suitable trees in patch



ENDANGERED BAT HABITAT ASSESSMENT

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STEP ONE: ☒ DETAILED Evaluation OR ☐ General Assessment of Indiana Bat Habitat

Project #: 593.08 Date: 11/21/2015 Biologists: Jeremy Van Deventer
Project Name: Mountain Valley Pipeline Project Site Name: Mountain Valley Pipeline
State: Virginia County: Montgomery

STEP TWO: Comparison of Project to Surrounding Landscape

HOW DOES PROJECT HABITAT COMPARE TO SURROUNDING LANDSCAPE?

Describe: Forest on ridgetop

STEP THREE: For EACH PATCH OF HABITAT of the search area delineated, complete the following:

- Patch ID: JLV-HA-00065 1a. Patch Acre: 11.67
- Does the patch look like it is supposed to look based on mapping? Yes
Describe Young mixed forest on ridgetop. SE-NW facing slopes. Poor soil quality, lots of shale. Dominated by small shrubby sized trees. Trees may grow shorter and slower due to mountaintop and poor soil. Reese Mountain rd cuts through patch and parallels ROW
- Habitat Patch Type Mixed Forest
- If Open, Developed No Ag-Cultivated No Ag-Pasture No Ag-Hayfield No
Other, explain _____
- If Scrub/Shrub-Oldfield-Early Successional _____
- If Woodland, Type: Mixed Woodland Age Young Woodland Position Upland Evidence of Logging No
Average DBH in cm _____ Percent of Trees DBH (Must Total 100%) <5" 60 (%) 5-16" 35 (%) >16" 5 (%)
Species 1. Quercus montana SubCanopy Species 1. Pinus virginiana
2. _____ 2. Quercus rubra
3. _____ 3. Carya glabra
Canopy Closure 60
SubCanopy Clutter High Suncanopy Dominated by Lower Branches of Canopy Trees, Saplings

STEP FOUR: Determination of Habitat Quality

Foraging Potential: *M. septentrionalis* Low
M.sodalis Low

Based on: Woodlands Yes Scrub/Shrub No Pasture/Hay No
Cultivated/Bare No Developed No Edge No Wetlands No
Stream Corridor No Man-made Corridor Yes

Roosting Potential: *M. septentrionalis* Moderate
M.sodalis Low

Based on Number of Roosts: Yes Spatial Association Yes
Quality of Roosts Size Yes Amount of Exfoliating Bark Yes
Solar Exposure: Opening No Edge No Density Yes

Adjacent Habitat Patch Description:

Surrounded by forest in all directions

Explain your Foraging Potential Rating

MYSE/MYSO-highly cluttered forest with small trees on ridgetop

Explain your Roosting Potential Rating

MYSE-moderate due to overall number of trees, many with crevices. Many are low quality but there are some moderate and high roosts and most are on SE-SW facing slopes. MYSO-low due to overall quality, very few with decent exfoliating bark



Potential Roosts

Project Number 593.08 Project Name Mountain Valley Pipeline Project Site Name Mountain Valley Pipeline

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Primary Biologist Carme Ardito Secondary Biologist Justin Bower State Virginia

Date	Roost Tree ID	Roost Tree species	County	Tree DBH	Tree Status	Observed Roosting Potential Factors	Roosting Potential Indiana	Roosting Potential Northern	Latitude (DMS)	Longitude (DMS)
11/19/2015	CRA-PRT-00674	<i>Robinia pseudoacacia</i>	Giles	20	Dead	Exfoliating Bark	Low	Low	37° 20' 13.428" N	80° 36' 16.085" W
11/19/2015	CRA-PRT-00675	<i>Acer rubrum</i>	Giles	20	Dead	Exfoliating Bark	Low	Low	37° 20' 13.586" N	80° 36' 12.092" W
11/19/2015	CRA-PRT-00676	<i>Quercus montana</i>	Giles	25	Dead	Exfoliating Bark	Low	Low	37° 20' 12.576" N	80° 36' 11.565" W
11/19/2015	CRA-PRT-00677	<i>Quercus montana</i>	Giles	19	Dead	Exfoliating Bark	Low	Low	37° 20' 12.004" N	80° 36' 11.114" W
11/19/2015	CRA-PRT-00678	<i>Fagus grandifolia</i>	Giles	15	Dead	Hollow	Low	Low	37° 20' 11.962" N	80° 36' 11.255" W
11/19/2015	CRA-PRT-00679	<i>Robinia pseudoacacia</i>	Giles	20	Dead	Cracks & Exfoliating Bark	Low	Moderate	37° 20' 11.669" N	80° 36' 10.284" W
11/19/2015	CRA-PRT-00680	<i>Carya ovata</i>	Giles	30	Dead	Exfoliating Bark	Moderate	Moderate	37° 20' 11.940" N	80° 36' 9.975" W
11/19/2015	CRA-PRT-00681	<i>Quercus alba</i>	Giles	35	Dead	Exfoliating Bark	Low	Low	37° 20' 11.033" N	80° 36' 9.758" W
11/19/2015	CRA-PRT-00682	<i>Quercus alba</i>	Giles	17	Dead	Exfoliating Bark	Low	Low	37° 20' 10.877" N	80° 36' 8.957" W
11/19/2015	CRA-PRT-00683	<i>Quercus alba</i>	Giles	15	Dead	Exfoliating Bark	Low	Low	37° 20' 10.986" N	80° 36' 8.641" W
11/19/2015	CRA-PRT-00684	<i>Acer rubrum</i>	Giles	19	Dead	Exfoliating Bark	Low	Low	37° 20' 11.280" N	80° 36' 7.408" W
11/19/2015	CRA-PRT-00685	<i>Quercus rubra</i>	Giles	40	Dead	Exfoliating Bark	Low	Low	37° 20' 11.204" N	80° 36' 6.817" W
11/19/2015	CRA-PRT-00686	<i>Acer saccharum</i>	Giles	45	Dead	Exfoliating Bark	Moderate	Moderate	37° 20' 10.818" N	80° 36' 4.369" W
11/19/2015	CRA-PRT-00687	<i>Liriodendron tulipifera</i>	Giles	50	Partial	Hollow	Low	Moderate	37° 20' 11.040" N	80° 36' 4.312" W
11/19/2015	CRA-PRT-00688	<i>Acer rubrum</i>	Giles	38	Dead	Exfoliating Bark	Moderate	Moderate	37° 20' 10.529" N	80° 36' 2.660" W
11/19/2015	CRA-PRT-00689	<i>Quercus rubra</i>	Giles	50	Live	Exfoliating Bark	Moderate	Moderate	37° 20' 9.655" N	80° 36' 3.472" W
11/19/2015	CRA-PRT-00690	<i>Liriodendron tulipifera</i>	Giles	17	Dead	Exfoliating Bark	Low	Low	37° 20' 9.866" N	80° 36' 2.283" W
11/19/2015	CRA-PRT-00691	<i>Acer saccharum</i>	Giles	90	Live	Exfoliating Bark	Low	Moderate	37° 20' 9.453" N	80° 36' 0.849" W
11/19/2015	CRA-PRT-00692	<i>Acer saccharum</i>	Giles	120	Live	Exfoliating Bark & Hollow	Moderate	Moderate	37° 20' 9.544" N	80° 36' 0.052" W
11/19/2015	CRA-PRT-00693	<i>Robinia pseudoacacia</i>	Giles	80	Dead	Cracks, Exfoliating Bark, & Hollow	Moderate	Moderate	37° 20' 9.552" N	80° 35' 59.695" W
11/19/2015	CRA-PRT-00694	<i>Acer rubrum</i>	Giles	65	Partial	Exfoliating Bark & Hollow	Moderate	Moderate	37° 20' 9.946" N	80° 35' 59.741" W
11/19/2015	CRA-PRT-00695	<i>Robinia pseudoacacia</i>	Giles	40	Partial	Hollow	Low	Moderate	37° 20' 9.154" N	80° 35' 55.799" W
11/19/2015	CRA-PRT-00696	<i>Robinia pseudoacacia</i>	Giles	50	Partial	Hollow	Low	Moderate	37° 20' 8.137" N	80° 35' 54.430" W



Potential Roosts

Project Number 593.08 Project Name Mountain Valley Pipeline Project Site Name Mountain Valley Pipeline

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Primary Biologist Carme Ardito Secondary Biologist Justin Bower State Virginia

Date	Roost Tree ID	Roost Tree species	County	Tree DBH	Tree Status	Observed Roosting Potential Factors	Roosting Potential Indiana	Roosting Potential Northern	Latitude (DMS)	Longitude (DMS)
11/19/2015	CRA-PRT-00697	<i>Robinia pseudoacacia</i>	Giles	45	Partial	Exfoliating Bark & Hollow	Moderate	Moderate	37° 20' 8.088" N	80° 35' 54.277" W
11/19/2015	CRA-PRT-00698	<i>Robinia pseudoacacia</i>	Giles	115	Partial	Cracks, Exfoliating Bark, & Hollow	Moderate	Moderate	37° 19' 42.385" N	80° 34' 28.150" W
11/19/2015	CRA-PRT-00699	<i>Quercus montana</i>	Giles	37	Dead	Cracks, Exfoliating Bark, & Hollow	Low	Moderate	37° 19' 39.104" N	80° 34' 13.719" W
11/19/2015	CRA-PRT-00700	<i>Carya ovata</i>	Giles	38	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 38.537" N	80° 34' 13.345" W
11/19/2015	CRA-PRT-00701	<i>Acer saccharum</i>	Giles	35	Dead	Exfoliating Bark & Hollow	Low	Moderate	37° 19' 37.084" N	80° 34' 7.791" W
11/19/2015	CRA-PRT-00702	<i>Robinia pseudoacacia</i>	Giles	45	Dead	Exfoliating Bark & Hollow	Moderate	Moderate	37° 19' 37.222" N	80° 34' 7.665" W
11/19/2015	CRA-PRT-00703	<i>Robinia pseudoacacia</i>	Giles	48	Dead	Exfoliating Bark & Hollow	Low	Moderate	37° 19' 36.821" N	80° 34' 5.936" W
11/19/2015	CRA-PRT-00704	<i>Robinia pseudoacacia</i>	Giles	45	Dead	Exfoliating Bark & Hollow	Low	Moderate	37° 19' 36.745" N	80° 34' 5.557" W
11/19/2015	CRA-PRT-00705	<i>Robinia pseudoacacia</i>	Giles	50	Dead	Exfoliating Bark	Low	Moderate	37° 19' 36.552" N	80° 34' 5.184" W
11/19/2015	CRA-PRT-00706	<i>Robinia pseudoacacia</i>	Giles	35	Dead	Exfoliating Bark	Low	Moderate	37° 19' 36.439" N	80° 34' 5.079" W
11/19/2015	CRA-PRT-00707	<i>Liriodendron tulipifera</i>	Giles	30	Dead	Exfoliating Bark	Low	Moderate	37° 19' 36.311" N	80° 34' 4.612" W
11/19/2015	CRA-PRT-00708	<i>Robinia pseudoacacia</i>	Giles	45	Partial	Exfoliating Bark & Hollow	Low	Moderate	37° 19' 35.106" N	80° 34' 1.344" W
11/19/2015	CRA-PRT-00709	<i>Quercus alba</i>	Giles	42	Partial	Exfoliating Bark & Hollow	Low	Moderate	37° 19' 33.265" N	80° 33' 58.188" W
11/19/2015	CRA-PRT-00710	<i>Ulmus americana</i>	Giles	25	Dead	Cracks & Exfoliating Bark	Moderate	Moderate	37° 19' 33.284" N	80° 33' 59.918" W
11/19/2015	CRA-PRT-00711	<i>Robinia pseudoacacia</i>	Giles	50	Dead	Cracks & Exfoliating Bark	Moderate	Moderate	37° 19' 33.327" N	80° 34' 1.731" W
11/19/2015	CRA-PRT-00712	<i>Carya ovata</i>	Giles	35	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 35.127" N	80° 34' 4.381" W
11/19/2015	CRA-PRT-00713	<i>Robinia pseudoacacia</i>	Giles	44	Partial	Exfoliating Bark & Hollow	Moderate	Moderate	37° 19' 35.600" N	80° 34' 4.546" W
11/19/2015	CRA-PRT-00714	<i>Robinia pseudoacacia</i>	Giles	40	Partial	Exfoliating Bark & Hollow	Moderate	Moderate	37° 19' 35.548" N	80° 34' 3.822" W
11/19/2015	CRA-PRT-00715	<i>Quercus velutina</i>	Giles	45	Partial	Exfoliating Bark & Hollow	Low	Moderate	37° 19' 35.406" N	80° 34' 6.766" W
11/19/2015	CRA-PRT-00716	<i>Robinia pseudoacacia</i>	Giles	30	Dead	Hollow	Low	Moderate	37° 19' 36.421" N	80° 34' 9.205" W
11/19/2015	CRA-PRT-00717	<i>Carya ovata</i>	Giles	38	Partial	Exfoliating Bark	Moderate	High	37° 19' 36.652" N	80° 34' 10.129" W
11/19/2015	CRA-PRT-00718	<i>Carya ovata</i>	Giles	36	Partial	Exfoliating Bark	Moderate	High	37° 19' 36.657" N	80° 34' 10.246" W
11/19/2015	CRA-PRT-00719	<i>Carya ovata</i>	Giles	26	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 36.625" N	80° 34' 10.237" W

DBH measurement units are within centimeters



Potential Roosts

Project Number 593.08 Project Name Mountain Valley Pipeline Project Site Name Mountain Valley Pipeline

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Primary Biologist Carme Ardito Secondary Biologist Justin Bower State Virginia

Date	Roost Tree ID	Roost Tree species	County	Tree DBH	Tree Status	Observed Roosting Potential Factors	Roosting Potential Indiana	Roosting Potential Northern	Latitude (DMS)	Longitude (DMS)
11/19/2015	CRA-PRT-00720	<i>Carya ovata</i>	Giles	28	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 36.674" N	80° 34' 10.287" W
11/19/2015	CRA-PRT-00721	<i>Carya ovata</i>	Giles	34	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 36.750" N	80° 34' 10.387" W
11/19/2015	CRA-PRT-00722	<i>Quercus velutina</i>	Giles	42	Partial	Exfoliating Bark & Hollow	Low	Moderate	37° 19' 36.930" N	80° 34' 10.484" W
11/19/2015	CRA-PRT-00723	<i>Carya ovata</i>	Giles	35	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 36.576" N	80° 34' 10.812" W
11/19/2015	CRA-PRT-00724	<i>Carya ovata</i>	Giles	38	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 36.675" N	80° 34' 11.975" W
11/19/2015	CRA-PRT-00725	<i>Carya ovata</i>	Giles	38	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 36.617" N	80° 34' 12.277" W
11/19/2015	CRA-PRT-00726	<i>Carya ovata</i>	Giles	16	Live	Exfoliating Bark	Low	Low	37° 19' 37.116" N	80° 34' 13.459" W
11/19/2015	CRA-PRT-00727	<i>Carya ovata</i>	Giles	21	Dead	Exfoliating Bark	Moderate	Moderate	37° 19' 37.308" N	80° 34' 13.552" W
11/19/2015	CRA-PRT-00728	<i>Robinia pseudoacacia</i>	Giles	32	Partial	Cracks & Exfoliating Bark	Low	Low	37° 19' 53.796" N	80° 34' 57.451" W
11/19/2015	CRA-PRT-00729	<i>Robinia pseudoacacia</i>	Giles	40	Partial	Cracks & Exfoliating Bark	Low	Low	37° 19' 54.503" N	80° 34' 57.998" W
11/19/2015	CRA-PRT-00730	<i>Carya ovata</i>	Giles	18	Live	Exfoliating Bark	Low	Low	37° 19' 54.890" N	80° 34' 58.844" W
11/19/2015	CRA-PRT-00731	<i>Carya ovata</i>	Giles	25	Live	Exfoliating Bark	Low	Low	37° 19' 56.074" N	80° 35' 0.436" W
11/19/2015	CRA-PRT-00732	<i>Robinia pseudoacacia</i>	Giles	29	Dead	Cracks & Exfoliating Bark	Low	Moderate	37° 19' 56.958" N	80° 35' 1.568" W
11/19/2015	CRA-PRT-00733	<i>Robinia pseudoacacia</i>	Giles	29	Dead	Exfoliating Bark & Hollow	Low	Moderate	37° 19' 56.777" N	80° 35' 1.400" W
11/19/2015	CRA-PRT-00734	<i>Carya ovata</i>	Giles	40	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 57.826" N	80° 35' 1.765" W
11/19/2015	CRA-PRT-00735	<i>Quercus alba</i>	Giles	36	Dead	Exfoliating Bark	High	High	37° 19' 57.852" N	80° 35' 2.108" W
11/19/2015	CRA-PRT-00736	<i>Robinia pseudoacacia</i>	Giles	35	Dead	Cracks & Exfoliating Bark	Low	Moderate	37° 19' 58.144" N	80° 35' 2.798" W
11/19/2015	CRA-PRT-00737	<i>Acer rubrum</i>	Giles	37	Partial	Exfoliating Bark	Moderate	Moderate	37° 19' 58.552" N	80° 35' 2.887" W
11/19/2015	CRA-PRT-00738	<i>Acer saccharum</i>	Giles	60	Live	Exfoliating Bark	Low	Low	37° 19' 57.712" N	80° 35' 3.448" W
11/19/2015	CRA-PRT-00739	<i>Carya ovata</i>	Giles	36	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 55.716" N	80° 35' 2.480" W
11/19/2015	CRA-PRT-00740	<i>Robinia pseudoacacia</i>	Giles	48	Dead	Cracks & Exfoliating Bark	Low	Moderate	37° 19' 55.524" N	80° 35' 2.081" W
11/19/2015	CRA-PRT-00741	<i>Robinia pseudoacacia</i>	Giles	48	Partial	Exfoliating Bark	Moderate	Moderate	37° 19' 55.326" N	80° 35' 2.037" W
11/19/2015	CRA-PRT-00742	<i>Carya ovata</i>	Giles	28	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 55.435" N	80° 35' 2.573" W
11/20/2015	CRA-PRT-00743	<i>Carya ovata</i>	Giles	55	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 41.750" N	80° 31' 0.317" W

DBH measurement units are within centimeters



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Date	Roost Tree ID	Roost Tree species	County	Tree DBH	Tree Status	Observed Roosting Potential Factors	Roosting Potential Indiana	Roosting Potential Northern	Latitude (DMS)	Longitude (DMS)
11/20/2015	CRA-PRT-00744	<i>Carya ovata</i>	Giles	22	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 41.525" N	80° 31' 0.724" W
11/20/2015	CRA-PRT-00745	<i>Carya ovata</i>	Giles	28	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 41.533" N	80° 31' 0.835" W
11/20/2015	CRA-PRT-00746	<i>Carya ovata</i>	Giles	24	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 41.457" N	80° 31' 0.956" W
11/20/2015	CRA-PRT-00747	<i>Carya ovata</i>	Giles	22	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 41.354" N	80° 31' 1.211" W
11/20/2015	CRA-PRT-00748	<i>Carya ovata</i>	Giles	27	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 41.817" N	80° 31' 1.098" W
11/20/2015	CRA-PRT-00749	<i>Carya ovata</i>	Giles	28	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 41.872" N	80° 31' 1.045" W
11/20/2015	CRA-PRT-00750	<i>Robinia pseudoacacia</i>	Giles	35	Dead	Exfoliating Bark	Moderate	Moderate	37° 18' 42.029" N	80° 31' 1.801" W
11/20/2015	CRA-PRT-00751	<i>Carya ovata</i>	Giles	16	Live	Exfoliating Bark	Low	Low	37° 18' 42.332" N	80° 31' 2.493" W
11/20/2015	CRA-PRT-00752	<i>Robinia pseudoacacia</i>	Giles	32	Dead	Exfoliating Bark	Moderate	Moderate	37° 18' 42.075" N	80° 31' 2.450" W
11/20/2015	CRA-PRT-00753	<i>Robinia pseudoacacia</i>	Giles	25	Dead	Exfoliating Bark	Low	Low	37° 18' 40.788" N	80° 31' 3.092" W
11/20/2015	CRA-PRT-00754	<i>Carya ovata</i>	Giles	19	Live	Exfoliating Bark	Low	Low	37° 18' 41.128" N	80° 31' 3.079" W
11/20/2015	CRA-PRT-00755	<i>Acer rubrum</i>	Giles	26	Dead	Exfoliating Bark & Hollow	Low	Low	37° 18' 39.071" N	80° 30' 56.554" W
11/20/2015	CRA-PRT-00756	<i>Carya ovata</i>	Giles	16	Live	Exfoliating Bark	Low	Low	37° 18' 29.595" N	80° 30' 48.767" W
11/20/2015	CRA-PRT-00757	<i>Carya ovata</i>	Giles	20	Live	Exfoliating Bark	Low	Low	37° 18' 29.979" N	80° 30' 47.555" W
11/20/2015	CRA-PRT-00758	<i>Carya ovata</i>	Giles	18	Live	Exfoliating Bark	Low	Low	37° 18' 30.223" N	80° 30' 48.251" W
11/20/2015	CRA-PRT-00759	<i>Carya ovata</i>	Giles	26	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 30.528" N	80° 30' 48.741" W
11/20/2015	CRA-PRT-00760	<i>Carya ovata</i>	Giles	30	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 30.798" N	80° 30' 48.408" W
11/20/2015	CRA-PRT-00761	<i>Prunus serotina</i>	Giles	40	Live	Cracks	Low	Moderate	37° 18' 39.174" N	80° 30' 56.287" W
11/20/2015	CRA-PRT-00762	<i>Prunus serotina</i>	Giles	40	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 39.663" N	80° 30' 57.601" W
11/20/2015	CRA-PRT-00763	<i>Liriodendron tulipifera</i>	Giles	38	Live	Cracks & Exfoliating Bark	Low	Low	37° 19' 7.501" N	80° 26' 26.701" W
11/20/2015	CRA-PRT-00764	<i>Carya ovata</i>	Giles	19	Live	Exfoliating Bark	Low	Low	37° 19' 7.925" N	80° 26' 25.085" W
11/20/2015	CRA-PRT-00765	<i>Robinia pseudoacacia</i>	Giles	25	Live	Exfoliating Bark	Low	Low	37° 19' 8.153" N	80° 26' 23.654" W
11/20/2015	CRA-PRT-00766	<i>Carya glabra</i>	Giles	16	Dead	Exfoliating Bark	Moderate	Moderate	37° 19' 8.237" N	80° 26' 23.126" W
11/20/2015	CRA-PRT-00767	<i>Pinus virginiana</i>	Giles	45	Dead	Exfoliating Bark	Low	Moderate	37° 19' 8.698" N	80° 26' 23.041" W

DBH measurement units are within centimeters



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Date	Roost Tree ID	Roost Tree species	County	Tree DBH	Tree Status	Observed Roosting Potential Factors	Roosting Potential Indiana	Roosting Potential Northern	Latitude (DMS)	Longitude (DMS)
11/20/2015	CRA-PRT-00768	<i>Fagus grandifolia</i>	Giles	47	Live	Exfoliating Bark & Hollow	None	Moderate	37° 19' 9.464" N	80° 26' 22.374" W
11/20/2015	CRA-PRT-00769	<i>Ulmus rubra</i>	Giles	20	Dead	Exfoliating Bark	High	High	37° 19' 10.291" N	80° 26' 22.053" W
11/20/2015	CRA-PRT-00770	<i>Robinia pseudoacacia</i>	Giles	30	Dead	Cracks & Hollow	Low	Moderate	37° 19' 10.072" N	80° 26' 20.289" W
11/20/2015	CRA-PRT-00771	<i>Ulmus rubra</i>	Giles	18	Dead	Exfoliating Bark	Moderate	High	37° 19' 9.897" N	80° 26' 21.861" W
11/21/2015	CRA-PRT-00772	<i>Quercus rubra</i>	Montgomery	42	Live	Exfoliating Bark	Moderate	Moderate	37° 15' 27.138" N	80° 13' 38.607" W
11/21/2015	CRA-PRT-00773	<i>Robinia pseudoacacia</i>	Montgomery	25	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 25.381" N	80° 13' 36.613" W
11/21/2015	CRA-PRT-00774	<i>Quercus montana</i>	Montgomery	36	Live	Exfoliating Bark & Hollow	Low	Moderate	37° 15' 24.319" N	80° 13' 36.816" W
11/21/2015	CRA-PRT-00775	<i>Quercus alba</i>	Montgomery	35	Live	Hollow	Low	Moderate	37° 15' 24.302" N	80° 13' 36.432" W
11/21/2015	CRA-PRT-00776	<i>Quercus alba</i>	Montgomery	45	Dead	Cracks, Exfoliating Bark, & Hollow	High	High	37° 15' 23.949" N	80° 13' 36.537" W
11/21/2015	CRA-PRT-00777	<i>Quercus rubra</i>	Montgomery	35	Dead	Exfoliating Bark	High	High	37° 15' 23.143" N	80° 13' 35.638" W
11/21/2015	CRA-PRT-00778	<i>Quercus rubra</i>	Montgomery	30	Dead	Cracks, Exfoliating Bark, & Hollow	Moderate	High	37° 15' 22.335" N	80° 13' 34.287" W
11/21/2015	CRA-PRT-00779	<i>Quercus montana</i>	Montgomery	32	Dead	Exfoliating Bark	High	High	37° 15' 21.620" N	80° 13' 34.916" W
11/21/2015	CRA-PRT-00780	<i>Quercus rubra</i>	Montgomery	30	Dead	Exfoliating Bark	High	High	37° 15' 21.713" N	80° 13' 33.592" W
11/21/2015	CRA-PRT-00781	<i>Quercus montana</i>	Montgomery	28	Dead	Exfoliating Bark	High	High	37° 15' 20.925" N	80° 13' 34.043" W
11/21/2015	CRA-PRT-00782	<i>Quercus rubra</i>	Montgomery	27	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 21.022" N	80° 13' 33.465" W
11/21/2015	CRA-PRT-00783	<i>Quercus montana</i>	Montgomery	38	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 20.577" N	80° 13' 33.681" W
11/21/2015	CRA-PRT-00784	<i>Quercus montana</i>	Montgomery	28	Dead	Exfoliating Bark & Hollow	Low	Moderate	37° 15' 20.402" N	80° 13' 32.855" W
11/21/2015	CRA-PRT-00785	<i>Pinus virginiana</i>	Montgomery	34	Dead	Cracks, Exfoliating Bark, & Hollow	Low	Moderate	37° 15' 17.042" N	80° 13' 29.202" W
11/21/2015	CRA-PRT-00786	<i>Pinus virginiana</i>	Montgomery	33	Dead	Exfoliating Bark	High	High	37° 15' 16.461" N	80° 13' 28.307" W
11/21/2015	CRA-PRT-00787	<i>Quercus rubra</i>	Montgomery	37	Partial	Cracks & Exfoliating Bark	High	High	37° 15' 17.447" N	80° 13' 26.841" W
11/21/2015	CRA-PRT-00788	<i>Quercus rubra</i>	Montgomery	30	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 15.938" N	80° 13' 26.820" W
11/21/2015	CRA-PRT-00789	<i>Quercus rubra</i>	Montgomery	26	Dead	Exfoliating Bark	Low	Moderate	37° 15' 15.985" N	80° 13' 27.273" W



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11/21/2015	CRA-PRT-00790	<i>Quercus rubra</i>	Montgomery	30	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 15.173" N	80° 13' 26.676" W
11/21/2015	CRA-PRT-00791	<i>Quercus rubra</i>	Montgomery	33	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 15.133" N	80° 13' 25.632" W
11/21/2015	CRA-PRT-00792	<i>Quercus rubra</i>	Montgomery	30	Dead	Exfoliating Bark	High	High	37° 15' 15.643" N	80° 13' 24.636" W
11/21/2015	CRA-PRT-00793	<i>Quercus rubra</i>	Montgomery	30	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 15.351" N	80° 13' 24.731" W
11/21/2015	CRA-PRT-00794	<i>Quercus rubra</i>	Montgomery	30	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 14.837" N	80° 13' 23.312" W
11/21/2015	CRA-PRT-00795	<i>Quercus rubra</i>	Montgomery	30	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 13.833" N	80° 13' 23.487" W
11/21/2015	CRA-PRT-00796	<i>Quercus rubra</i>	Montgomery	32	Dead	Exfoliating Bark	High	High	37° 15' 14.019" N	80° 13' 23.052" W
11/21/2015	CRA-PRT-00797	<i>Quercus rubra</i>	Montgomery	33	Dead	Exfoliating Bark	High	High	37° 15' 13.820" N	80° 13' 23.270" W
11/21/2015	CRA-PRT-00798	<i>Quercus rubra</i>	Montgomery	28	Dead	Exfoliating Bark	High	High	37° 15' 13.722" N	80° 13' 23.494" W
11/21/2015	CRA-PRT-00799	<i>Quercus rubra</i>	Montgomery	26	Dead	Exfoliating Bark & Hollow	Moderate	Moderate	37° 15' 13.773" N	80° 13' 23.407" W
11/21/2015	CRA-PRT-00800	<i>Quercus rubra</i>	Montgomery	28	Dead	Exfoliating Bark	High	High	37° 15' 13.480" N	80° 13' 23.259" W
11/21/2015	CRA-PRT-00801	<i>Quercus rubra</i>	Montgomery	28	Dead	Exfoliating Bark	High	High	37° 15' 13.792" N	80° 13' 22.671" W
11/21/2015	CRA-PRT-00802	<i>Quercus rubra</i>	Montgomery	34	Dead	Exfoliating Bark	High	High	37° 15' 13.931" N	80° 13' 21.957" W
11/21/2015	CRA-PRT-00803	<i>Quercus rubra</i>	Montgomery	41	Dead	Cracks & Exfoliating Bark	Moderate	High	37° 15' 14.679" N	80° 13' 20.540" W
11/21/2015	CRA-PRT-00804	<i>Quercus rubra</i>	Montgomery	38	Dead	Exfoliating Bark	Low	Low	37° 15' 13.722" N	80° 13' 19.478" W
11/21/2015	CRA-PRT-00805	<i>Quercus rubra</i>	Montgomery	30	Dead	Cracks & Exfoliating Bark	Low	Low	37° 15' 13.752" N	80° 13' 19.178" W
11/21/2015	CRA-PRT-00806	<i>Quercus rubra</i>	Montgomery	30	Dead	Exfoliating Bark	High	High	37° 15' 14.926" N	80° 13' 17.891" W
11/21/2015	CRA-PRT-00807	<i>Quercus rubra</i>	Montgomery	34	Dead	Exfoliating Bark	High	High	37° 15' 13.218" N	80° 13' 16.285" W
11/21/2015	CRA-PRT-00808	<i>Quercus rubra</i>	Montgomery	30	Dead	Exfoliating Bark	High	High	37° 15' 13.375" N	80° 13' 15.748" W
11/21/2015	CRA-PRT-00809	<i>Quercus rubra</i>	Montgomery	28	Dead	Cracks & Exfoliating Bark	Low	Moderate	37° 15' 13.529" N	80° 13' 15.124" W
11/21/2015	CRA-PRT-00810	<i>Quercus rubra</i>	Montgomery	30	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 13.521" N	80° 13' 14.308" W
11/21/2015	CRA-PRT-00811	<i>Quercus rubra</i>	Montgomery	38	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 11.992" N	80° 13' 11.387" W
11/21/2015	CRA-PRT-00812	<i>Pinus virginiana</i>	Montgomery	32	Dead	Exfoliating Bark	Low	Low	37° 15' 11.494" N	80° 13' 10.506" W
11/21/2015	CRA-PRT-00813	<i>Pinus virginiana</i>	Montgomery	30	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 11.345" N	80° 13' 10.473" W

DBH measurement units are within centimeters



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11/21/2015	CRA-PRT-00814	<i>Quercus rubra</i>	Montgomery	32	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 11.911" N	80° 13' 10.001" W
11/21/2015	CRA-PRT-00815	<i>Quercus rubra</i>	Montgomery	24	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 12.339" N	80° 13' 9.658" W
11/21/2015	CRA-PRT-00816	<i>Quercus rubra</i>	Montgomery	20	Dead	Exfoliating Bark	High	High	37° 15' 11.658" N	80° 13' 9.096" W
11/21/2015	CRA-PRT-00817	<i>Quercus rubra</i>	Montgomery	24	Dead	Exfoliating Bark	High	High	37° 15' 11.468" N	80° 13' 8.308" W
11/21/2015	CRA-PRT-00818	<i>Quercus rubra</i>	Montgomery	35	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 11.222" N	80° 13' 8.391" W
11/21/2015	CRA-PRT-00819	<i>Quercus montana</i>	Montgomery	34	Dead	Exfoliating Bark & Hollow	Low	Low	37° 15' 10.912" N	80° 13' 5.470" W
11/21/2015	CRA-PRT-00820	<i>Quercus montana</i>	Montgomery	32	Dead	Cracks & Hollow	None	Low	37° 15' 10.669" N	80° 13' 5.298" W
11/21/2015	CRA-PRT-00821	<i>Quercus rubra</i>	Montgomery	34	Dead	Exfoliating Bark	High	High	37° 15' 10.165" N	80° 13' 5.741" W
11/21/2015	CRA-PRT-00822	<i>Quercus montana</i>	Montgomery	30	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 10.023" N	80° 13' 4.481" W
11/21/2015	CRA-PRT-00823	<i>Quercus rubra</i>	Montgomery	34	Dead	Exfoliating Bark	High	High	37° 15' 9.941" N	80° 13' 4.322" W
11/21/2015	CRA-PRT-00824	<i>Quercus rubra</i>	Montgomery	36	Dead	Exfoliating Bark	High	High	37° 15' 9.820" N	80° 13' 3.814" W
11/21/2015	CRA-PRT-00825	<i>Quercus rubra</i>	Montgomery	38	Dead	Exfoliating Bark	High	High	37° 15' 9.811" N	80° 13' 3.708" W
11/21/2015	CRA-PRT-00826	<i>Quercus rubra</i>	Montgomery	34	Dead	Exfoliating Bark	High	High	37° 15' 9.645" N	80° 13' 2.938" W
11/21/2015	CRA-PRT-00827	<i>Quercus rubra</i>	Montgomery	28	Dead	Exfoliating Bark	High	High	37° 15' 9.978" N	80° 13' 2.443" W
11/21/2015	CRA-PRT-00828	<i>Quercus rubra</i>	Montgomery	30	Dead	Exfoliating Bark	High	High	37° 15' 9.634" N	80° 13' 2.146" W
11/21/2015	CRA-PRT-00829	<i>Quercus rubra</i>	Montgomery	32	Dead	Exfoliating Bark	High	High	37° 15' 9.146" N	80° 13' 2.261" W
11/21/2015	CRA-PRT-00830	<i>Quercus rubra</i>	Montgomery	33	Dead	Exfoliating Bark	High	High	37° 15' 9.461" N	80° 13' 1.880" W
11/21/2015	CRA-PRT-00831	<i>Quercus rubra</i>	Montgomery	34	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 9.721" N	80° 13' 1.124" W
11/21/2015	CRA-PRT-00832	<i>Quercus rubra</i>	Montgomery	42	Live	Exfoliating Bark	Low	Low	37° 15' 26.370" N	80° 13' 40.257" W
11/21/2015	CRA-PRT-00833	<i>Quercus alba</i>	Montgomery	40	Live	Hollow	Low	Moderate	37° 15' 25.281" N	80° 13' 41.208" W
11/21/2015	CRA-PRT-00834	<i>Quercus montana</i>	Montgomery	19	Live	Hollow	None	Low	37° 15' 24.017" N	80° 13' 47.180" W
11/21/2015	CRA-PRT-00835	<i>Quercus montana</i>	Montgomery	24	Dead	Exfoliating Bark & Hollow	Low	Low	37° 15' 23.570" N	80° 13' 49.914" W
11/21/2015	CRA-PRT-00836	<i>Quercus montana</i>	Montgomery	38	Dead	Cracks, Exfoliating Bark, & Hollow	Moderate	Moderate	37° 15' 22.335" N	80° 13' 51.017" W
11/21/2015	CRA-PRT-00837	<i>Quercus rubra</i>	Montgomery	30	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 22.104" N	80° 13' 50.987" W

DBH measurement units are within centimeters



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11/21/2015	CRA-PRT-00838	<i>Quercus montana</i>	Montgomery	44	Live	Exfoliating Bark	Low	Low	37° 15' 21.850" N	80° 13' 50.995" W
11/21/2015	CRA-PRT-00839	<i>Quercus montana</i>	Montgomery	38	Live	Exfoliating Bark	Low	Low	37° 15' 21.777" N	80° 13' 51.119" W
11/21/2015	CRA-PRT-00840	<i>Quercus montana</i>	Montgomery	30	Dead	Exfoliating Bark	Low	Low	37° 15' 20.676" N	80° 13' 54.168" W
11/21/2015	CRA-PRT-00841	<i>Quercus velutina</i>	Montgomery	32	Dead	Exfoliating Bark	High	High	37° 15' 19.854" N	80° 13' 54.780" W
11/21/2015	CRA-PRT-00842	<i>Pinus virginiana</i>	Montgomery	26	Dead	Exfoliating Bark	Low	Low	37° 15' 20.501" N	80° 13' 58.027" W
11/21/2015	CRA-PRT-00843	<i>Quercus montana</i>	Montgomery	32	Dead	Exfoliating Bark & Hollow	Low	Moderate	37° 15' 19.384" N	80° 14' 0.542" W
11/21/2015	CRA-PRT-00844	<i>Pinus strobus</i>	Montgomery	30	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 20.224" N	80° 14' 1.147" W
11/21/2015	CRA-PRT-00845	<i>Quercus montana</i>	Montgomery	42	Partial	Cracks & Exfoliating Bark	Moderate	Moderate	37° 15' 18.866" N	80° 14' 1.505" W
11/21/2015	CRA-PRT-00846	<i>Quercus montana</i>	Montgomery	32	Partial	Cracks	None	Low	37° 15' 19.023" N	80° 14' 2.052" W
11/21/2015	CRA-PRT-00847	<i>Quercus montana</i>	Montgomery	40	Partial	Cracks & Exfoliating Bark	Low	Low	37° 15' 18.486" N	80° 14' 3.013" W
11/21/2015	CRA-PRT-00848	<i>Quercus rubra</i>	Montgomery	18	Dead	Exfoliating Bark	Low	Low	37° 15' 18.950" N	80° 14' 3.486" W
11/21/2015	CRA-PRT-00849	<i>Quercus velutina</i>	Montgomery	40	Dead	Exfoliating Bark	High	High	37° 15' 18.671" N	80° 14' 5.557" W
11/21/2015	CRA-PRT-00850	<i>Quercus montana</i>	Montgomery	28	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 18.497" N	80° 14' 6.863" W
11/21/2015	CRA-PRT-00851	<i>Quercus montana</i>	Montgomery	40	Dead	Exfoliating Bark	High	High	37° 15' 19.020" N	80° 14' 8.241" W
11/21/2015	CRA-PRT-00852	<i>Quercus montana</i>	Montgomery	35	Partial	Exfoliating Bark	Moderate	Moderate	37° 15' 19.476" N	80° 14' 8.118" W
11/21/2015	CRA-PRT-00853	<i>Acer rubrum</i>	Montgomery	32	Live	Hollow	None	Moderate	37° 15' 18.599" N	80° 14' 11.541" W
11/21/2015	CRA-PRT-00854	<i>Quercus rubra</i>	Montgomery	38	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 16.519" N	80° 14' 15.319" W
11/21/2015	CRA-PRT-00855	<i>Quercus montana</i>	Montgomery	18	Dead	Exfoliating Bark	Low	Low	37° 15' 16.846" N	80° 14' 15.707" W
11/21/2015	CRA-PRT-00856	<i>Quercus montana</i>	Montgomery	38	Dead	Exfoliating Bark	High	High	37° 15' 16.759" N	80° 14' 16.244" W
11/21/2015	CRA-PRT-00857	<i>Pinus virginiana</i>	Montgomery	30	Dead	Exfoliating Bark	Low	Low	37° 15' 9.740" N	80° 15' 22.743" W
11/19/2015	JLV-PRT-00391	<i>Robinia pseudoacacia</i>	Giles	20	Dead	Cracks & Hollow	Low	Moderate	37° 19' 6.624" N	80° 33' 12.637" W
11/19/2015	JLV-PRT-00392	<i>Ulmus rubra</i>	Giles	30	Dead	Cracks & Exfoliating Bark	High	High	37° 19' 11.887" N	80° 33' 11.158" W
11/19/2015	JLV-PRT-00393	<i>Acer rubrum</i>	Giles	60	Live	Hollow	Moderate	High	37° 19' 15.986" N	80° 33' 10.168" W
11/19/2015	JLV-PRT-00394	<i>Carya ovata</i>	Giles	35	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 19.632" N	80° 33' 10.905" W

DBH measurement units are within centimeters



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Date	Roost Tree ID	Roost Tree species	County	Tree DBH	Tree Status	Observed Roosting Potential Factors	Roosting Potential Indiana	Roosting Potential Northern	Latitude (DMS)	Longitude (DMS)
11/19/2015	JLV-PRT-00395	<i>Fraxinus americana</i>	Giles	45	Partial	Exfoliating Bark	Moderate	Moderate	37° 19' 23.009" N	80° 33' 11.888" W
11/19/2015	JLV-PRT-00396	<i>Carya ovata</i>	Giles	30	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 24.010" N	80° 33' 14.185" W
11/19/2015	JLV-PRT-00397	<i>Robinia pseudoacacia</i>	Giles	25	Dead	Cracks, Exfoliating Bark, & Hollow	Moderate	Moderate	37° 19' 24.593" N	80° 33' 14.432" W
11/19/2015	JLV-PRT-00398	<i>Robinia pseudoacacia</i>	Giles	20	Dead	Cracks, Exfoliating Bark, & Hollow	Low	Moderate	37° 19' 24.901" N	80° 33' 14.288" W
11/19/2015	JLV-PRT-00399	<i>Robinia pseudoacacia</i>	Giles	50	Dead	Cracks, Exfoliating Bark, & Hollow	Moderate	High	37° 19' 23.853" N	80° 33' 16.569" W
11/19/2015	JLV-PRT-00400	<i>Robinia pseudoacacia</i>	Giles	25	Dead	Cracks & Exfoliating Bark	Low	Moderate	37° 19' 23.954" N	80° 33' 17.313" W
11/19/2015	JLV-PRT-00401	<i>Ulmus americana</i>	Giles	30	Dead	Cracks & Exfoliating Bark	Moderate	Moderate	37° 19' 24.363" N	80° 33' 18.166" W
11/19/2015	JLV-PRT-00402	<i>Robinia pseudoacacia</i>	Giles	30	Dead	Exfoliating Bark	Low	Moderate	37° 19' 24.631" N	80° 33' 18.438" W
11/19/2015	JLV-PRT-00403	<i>Carya ovata</i>	Giles	35	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 25.282" N	80° 33' 19.303" W
11/19/2015	JLV-PRT-00404	<i>Carya ovata</i>	Giles	25	Live	Exfoliating Bark	Low	Low	37° 19' 25.418" N	80° 33' 19.656" W
11/19/2015	JLV-PRT-00405	<i>Carya ovata</i>	Giles	30	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 25.839" N	80° 33' 19.955" W
11/19/2015	JLV-PRT-00406	<i>Robinia pseudoacacia</i>	Giles	20	Dead	Cracks, Exfoliating Bark, & Hollow	Low	Moderate	37° 19' 25.061" N	80° 33' 21.564" W
11/19/2015	JLV-PRT-00407	<i>Robinia pseudoacacia</i>	Giles	45	Dead	Cracks, Exfoliating Bark, & Hollow	Low	Moderate	37° 19' 24.729" N	80° 33' 22.289" W
11/19/2015	JLV-PRT-00408	<i>Robinia pseudoacacia</i>	Giles	22	Dead	Cracks, Exfoliating Bark, & Hollow	Low	Moderate	37° 19' 25.008" N	80° 33' 22.499" W
11/19/2015	JLV-PRT-00409	<i>Robinia pseudoacacia</i>	Giles	30	Dead	Cracks, Exfoliating Bark, & Hollow	Low	Moderate	37° 19' 25.606" N	80° 33' 22.660" W
11/19/2015	JLV-PRT-00410	<i>Robinia pseudoacacia</i>	Giles	20	Dead	Cracks, Exfoliating Bark, & Hollow	Moderate	Moderate	37° 19' 26.777" N	80° 33' 27.386" W
11/19/2015	JLV-PRT-00411	<i>Robinia pseudoacacia</i>	Giles	22	Dead	Cracks, Exfoliating Bark, & Hollow	Low	Moderate	37° 19' 27.842" N	80° 33' 27.783" W
11/19/2015	JLV-PRT-00412	<i>Robinia pseudoacacia</i>	Giles	18	Dead	Cracks, Exfoliating Bark, & Hollow	Low	Moderate	37° 19' 27.612" N	80° 33' 29.027" W
11/19/2015	JLV-PRT-00413	<i>Robinia pseudoacacia</i>	Giles	23	Dead	Exfoliating Bark	Low	Low	37° 19' 28.357" N	80° 33' 29.073" W

DBH measurement units are within centimeters



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Date	Roost Tree ID	Roost Tree species	County	Tree DBH	Tree Status	Observed Roosting Potential Factors	Roosting Potential Indiana	Roosting Potential Northern	Latitude (DMS)	Longitude (DMS)
11/19/2015	JLV-PRT-00414	<i>Robinia pseudoacacia</i>	Giles	20	Dead	Exfoliating Bark & Hollow	Low	Moderate	37° 19' 28.396" N	80° 33' 29.415" W
11/19/2015	JLV-PRT-00415	<i>Carya ovata</i>	Giles	30	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 26.685" N	80° 33' 20.434" W
11/19/2015	JLV-PRT-00416	<i>Carya ovata</i>	Giles	40	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 26.617" N	80° 33' 20.102" W
11/19/2015	JLV-PRT-00417	<i>Carya ovata</i>	Giles	40	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 21.278" N	80° 33' 9.754" W
11/19/2015	JLV-PRT-00418	<i>Carya ovata</i>	Giles	40	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 21.469" N	80° 33' 9.519" W
11/19/2015	JLV-PRT-00419	<i>Carya ovata</i>	Giles	30	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 22.045" N	80° 33' 9.356" W
11/19/2015	JLV-PRT-00420	<i>Carya ovata</i>	Giles	22	Live	Exfoliating Bark	Low	Low	37° 19' 21.952" N	80° 33' 9.114" W
11/19/2015	JLV-PRT-00421	<i>Carya ovata</i>	Giles	30	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 22.081" N	80° 33' 8.910" W
11/19/2015	JLV-PRT-00422	<i>Quercus alba</i>	Giles	150	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 21.765" N	80° 33' 8.286" W
11/19/2015	JLV-PRT-00423	<i>Quercus macrocarpa</i>	Giles	35	Partial	Cracks, Exfoliating Bark, & Hollow	Moderate	Moderate	37° 19' 16.569" N	80° 33' 2.027" W
11/19/2015	JLV-PRT-00424	<i>Carya ovata</i>	Giles	35	Live	Cracks, Exfoliating Bark, & Hollow	Moderate	Moderate	37° 19' 16.281" N	80° 33' 2.301" W
11/19/2015	JLV-PRT-00425	<i>Carya ovata</i>	Giles	40	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 15.485" N	80° 33' 1.732" W
11/19/2015	JLV-PRT-00426	<i>Carya ovata</i>	Giles	22	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 15.261" N	80° 33' 1.539" W
11/19/2015	JLV-PRT-00427	<i>Carya ovata</i>	Giles	22	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 15.171" N	80° 33' 1.560" W
11/19/2015	JLV-PRT-00428	<i>Carya ovata</i>	Giles	40	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 14.818" N	80° 33' 0.821" W
11/19/2015	JLV-PRT-00429	<i>Carya ovata</i>	Giles	22	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 14.615" N	80° 33' 1.533" W
11/19/2015	JLV-PRT-00430	<i>Carya ovata</i>	Giles	18	Live	Exfoliating Bark	Low	Moderate	37° 19' 13.938" N	80° 33' 1.767" W
11/19/2015	JLV-PRT-00431	<i>Carya ovata</i>	Giles	20	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 13.791" N	80° 33' 1.501" W
11/19/2015	JLV-PRT-00432	<i>Carya ovata</i>	Giles	20	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 13.645" N	80° 33' 1.252" W
11/19/2015	JLV-PRT-00433	<i>Carya ovata</i>	Giles	45	Partial	Cracks, Exfoliating Bark, & Hollow	High	High	37° 19' 13.080" N	80° 33' 1.850" W
11/19/2015	JLV-PRT-00434	<i>Carya ovata</i>	Giles	20	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 13.030" N	80° 33' 1.906" W
11/19/2015	JLV-PRT-00435	<i>Carya ovata</i>	Giles	22	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 11.929" N	80° 33' 2.201" W



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11/19/2015	JLV-PRT-00436	<i>Carya ovata</i>	Giles	22	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 11.766" N	80° 33' 2.204" W
11/19/2015	JLV-PRT-00437	<i>Carya ovata</i>	Giles	22	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 11.376" N	80° 33' 2.182" W
11/19/2015	JLV-PRT-00438	<i>Carya ovata</i>	Giles	22	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 11.401" N	80° 33' 2.186" W
11/19/2015	JLV-PRT-00439	<i>Carya ovata</i>	Giles	24	Live	Exfoliating Bark	Moderate	Moderate	37° 19' 10.967" N	80° 33' 1.671" W
11/19/2015	JLV-PRT-00440	<i>Robinia pseudoacacia</i>	Giles	18	Dead	Cracks, Exfoliating Bark, & Hollow	Low	Moderate	37° 19' 10.876" N	80° 33' 1.210" W
11/19/2015	JLV-PRT-00441	<i>Quercus montana</i>	Giles	18	Dead	Exfoliating Bark	Low	Low	37° 19' 10.034" N	80° 33' 0.917" W
11/19/2015	JLV-PRT-00442	<i>Quercus velutina</i>	Giles	35	Partial	Exfoliating Bark	Low	Low	37° 19' 9.387" N	80° 33' 1.039" W
11/19/2015	JLV-PRT-00443	<i>Pinus strobus</i>	Giles	35	Live	Hollow	Moderate	High	37° 19' 9.650" N	80° 32' 59.801" W
11/19/2015	JLV-PRT-00444	<i>Pinus strobus</i>	Giles	30	Dead	Hollow	Moderate	High	37° 19' 9.129" N	80° 32' 59.656" W
11/19/2015	JLV-PRT-00445	<i>Quercus montana</i>	Giles	18	Dead	Exfoliating Bark	Low	Low	37° 19' 8.793" N	80° 33' 1.124" W
11/19/2015	JLV-PRT-00446	<i>Quercus montana</i>	Giles	18	Dead	Exfoliating Bark & Hollow	Low	Low	37° 19' 8.545" N	80° 33' 1.720" W
11/19/2015	JLV-PRT-00447	<i>Quercus montana</i>	Giles	18	Live	Hollow	Low	Moderate	37° 19' 7.904" N	80° 33' 1.683" W
11/19/2015	JLV-PRT-00448	<i>Acer rubrum</i>	Giles	60	Live	Exfoliating Bark & Hollow	Moderate	High	37° 19' 5.388" N	80° 32' 53.857" W
11/20/2015	JLV-PRT-00449	<i>Robinia pseudoacacia</i>	Giles	40	Partial	Hollow	Low	Moderate	37° 18' 45.496" N	80° 32' 13.393" W
11/20/2015	JLV-PRT-00450	<i>Carya ovata</i>	Giles	32	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 48.556" N	80° 32' 24.025" W
11/20/2015	JLV-PRT-00451	<i>Cornus florida</i>	Giles	20	Partial	Cracks & Hollow	Low	Moderate	37° 18' 48.447" N	80° 32' 24.215" W
11/20/2015	JLV-PRT-00452	<i>Robinia pseudoacacia</i>	Giles	18	Dead	Exfoliating Bark	Low	Low	37° 18' 48.509" N	80° 32' 28.313" W
11/20/2015	JLV-PRT-00453	<i>Robinia pseudoacacia</i>	Giles	18	Dead	Exfoliating Bark	Low	Low	37° 18' 48.647" N	80° 32' 28.590" W
11/20/2015	JLV-PRT-00454	<i>Cornus florida</i>	Giles	15	Dead	Cracks & Hollow	Low	Moderate	37° 18' 50.433" N	80° 32' 28.320" W
11/20/2015	JLV-PRT-00455	<i>Robinia pseudoacacia</i>	Giles	18	Dead	Exfoliating Bark	Low	Low	37° 18' 50.438" N	80° 32' 27.683" W
11/20/2015	JLV-PRT-00456	<i>Ulmus rubra</i>	Giles	30	Dead	Exfoliating Bark	Low	Low	37° 18' 50.505" N	80° 32' 26.440" W
11/20/2015	JLV-PRT-00457	<i>Ulmus rubra</i>	Giles	13	Dead	Exfoliating Bark	Moderate	Moderate	37° 18' 50.397" N	80° 32' 26.256" W
11/20/2015	JLV-PRT-00458	<i>Robinia pseudoacacia</i>	Giles	20	Dead	Cracks & Hollow	Low	Moderate	37° 18' 45.323" N	80° 32' 15.310" W
11/20/2015	JLV-PRT-00459	<i>Robinia pseudoacacia</i>	Giles	40	Dead	Exfoliating Bark & Hollow	Moderate	Moderate	37° 18' 43.916" N	80° 31' 32.829" W

DBH measurement units are within centimeters



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11/20/2015	JLV-PRT-00460	<i>Carya ovata</i>	Giles	17	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 44.231" N	80° 31' 32.104" W
11/20/2015	JLV-PRT-00461	<i>Carya ovata</i>	Giles	17	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 44.318" N	80° 31' 32.128" W
11/20/2015	JLV-PRT-00462	<i>Quercus velutina</i>	Giles	30	Dead	Exfoliating Bark	Moderate	Moderate	37° 18' 44.245" N	80° 31' 31.900" W
11/20/2015	JLV-PRT-00463	<i>Carya ovata</i>	Giles	18	Live	Exfoliating Bark	Low	Moderate	37° 18' 43.770" N	80° 31' 30.615" W
11/20/2015	JLV-PRT-00464	<i>Carya ovata</i>	Giles	16	Live	Exfoliating Bark	Low	Low	37° 18' 43.911" N	80° 31' 30.746" W
11/20/2015	JLV-PRT-00465	<i>Carya ovata</i>	Giles	16	Live	Exfoliating Bark	Low	Low	37° 18' 43.537" N	80° 31' 30.759" W
11/20/2015	JLV-PRT-00466	<i>Carya ovata</i>	Giles	16	Live	Exfoliating Bark	Low	Low	37° 18' 43.455" N	80° 31' 30.796" W
11/20/2015	JLV-PRT-00467	<i>Carya ovata</i>	Giles	20	Live	Exfoliating Bark	Low	Moderate	37° 18' 44.337" N	80° 31' 30.533" W
11/20/2015	JLV-PRT-00468	<i>Populus grandidentata</i>	Giles	28	Dead	Exfoliating Bark	Moderate	Moderate	37° 18' 44.814" N	80° 31' 30.232" W
11/20/2015	JLV-PRT-00469	<i>Populus grandidentata</i>	Giles	30	Dead	Exfoliating Bark	Moderate	Moderate	37° 18' 45.027" N	80° 31' 30.228" W
11/20/2015	JLV-PRT-00470	<i>Carya ovata</i>	Giles	23	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 45.224" N	80° 31' 29.936" W
11/20/2015	JLV-PRT-00471	<i>Quercus velutina</i>	Giles	32	Live	Hollow	Moderate	High	37° 18' 45.391" N	80° 31' 29.951" W
11/20/2015	JLV-PRT-00472	<i>Carya ovata</i>	Giles	25	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 45.279" N	80° 31' 29.106" W
11/20/2015	JLV-PRT-00473	<i>Ailanthus altissima</i>	Giles	25	Live	Hollow	Low	Moderate	37° 18' 45.365" N	80° 31' 29.061" W
11/20/2015	JLV-PRT-00474	<i>Carya ovata</i>	Giles	35	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 45.017" N	80° 31' 28.203" W
11/20/2015	JLV-PRT-00475	<i>Carya ovata</i>	Giles	30	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 45.172" N	80° 31' 28.104" W
11/20/2015	JLV-PRT-00476	<i>Robinia pseudoacacia</i>	Giles	25	Dead	Exfoliating Bark & Hollow	Low	Moderate	37° 18' 45.378" N	80° 31' 27.741" W
11/20/2015	JLV-PRT-00477	<i>Quercus velutina</i>	Giles	60	Live	Cracks & Hollow	High	High	37° 18' 45.446" N	80° 31' 27.966" W
11/20/2015	JLV-PRT-00478	<i>Carya ovata</i>	Giles	28	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 46.851" N	80° 31' 27.755" W
11/20/2015	JLV-PRT-00479	<i>Quercus velutina</i>	Giles	40	Partial	Exfoliating Bark	Low	Low	37° 18' 46.299" N	80° 31' 28.469" W
11/20/2015	JLV-PRT-00480	<i>Robinia pseudoacacia</i>	Giles	25	Dead	Cracks & Hollow	Low	Moderate	37° 18' 46.469" N	80° 31' 28.716" W
11/20/2015	JLV-PRT-00481	<i>Juglans nigra</i>	Giles	22	Dead	Exfoliating Bark	Low	Low	37° 18' 45.080" N	80° 31' 32.239" W
11/20/2015	JLV-PRT-00482	<i>Quercus alba</i>	Giles	22	Live	Exfoliating Bark	Moderate	Moderate	37° 18' 45.074" N	80° 31' 33.238" W
11/21/2015	JLV-PRT-00483	<i>Quercus montana</i>	Montgomery	23	Dead	Cracks & Hollow	Low	Moderate	37° 15' 4.907" N	80° 14' 46.482" W

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11/21/2015	JLV-PRT-00484	<i>Quercus montana</i>	Montgomery	30	Dead	Cracks & Hollow	Low	Moderate	37° 15' 4.767" N	80° 14' 46.798" W
11/21/2015	JLV-PRT-00485	<i>Pinus virginiana</i>	Montgomery	26	Dead	Exfoliating Bark	Low	Low	37° 15' 4.887" N	80° 14' 47.931" W
11/21/2015	JLV-PRT-00486	<i>Pinus virginiana</i>	Montgomery	15	Dead	Exfoliating Bark	Low	Low	37° 15' 4.817" N	80° 14' 48.156" W
11/21/2015	JLV-PRT-00487	<i>Pinus virginiana</i>	Montgomery	20	Dead	Exfoliating Bark	Low	Low	37° 15' 4.744" N	80° 14' 48.276" W
11/21/2015	JLV-PRT-00488	<i>Pinus virginiana</i>	Montgomery	22	Dead	Exfoliating Bark	Low	Low	37° 15' 5.283" N	80° 14' 49.020" W
11/21/2015	JLV-PRT-00489	<i>Pinus virginiana</i>	Montgomery	22	Dead	Hollow	Low	High	37° 15' 5.287" N	80° 14' 50.167" W
11/21/2015	JLV-PRT-00490	<i>Pinus virginiana</i>	Montgomery	22	Dead	Exfoliating Bark	Low	Low	37° 15' 5.690" N	80° 14' 50.334" W
11/21/2015	JLV-PRT-00491	<i>Quercus montana</i>	Montgomery	20	Dead	Cracks & Hollow	Low	Moderate	37° 15' 5.952" N	80° 14' 51.304" W
11/21/2015	JLV-PRT-00492	<i>Pinus virginiana</i>	Montgomery	25	Dead	Hollow	Low	Moderate	37° 15' 5.803" N	80° 14' 53.500" W
11/21/2015	JLV-PRT-00493	<i>Quercus rubra</i>	Montgomery	22	Live	Hollow	Low	Moderate	37° 15' 5.939" N	80° 14' 54.154" W
11/21/2015	JLV-PRT-00494	<i>Quercus montana</i>	Montgomery	25	Partial	Cracks & Hollow	Low	High	37° 15' 6.350" N	80° 14' 54.851" W
11/21/2015	JLV-PRT-00495	<i>Pinus virginiana</i>	Montgomery	18	Dead	Exfoliating Bark	Low	Low	37° 15' 6.424" N	80° 14' 55.121" W
11/21/2015	JLV-PRT-00496	<i>Pinus virginiana</i>	Montgomery	18	Dead	Cracks & Hollow	Low	Low	37° 15' 6.339" N	80° 14' 57.340" W
11/21/2015	JLV-PRT-00497	<i>Quercus montana</i>	Montgomery	40	Partial	Cracks & Hollow	Low	Moderate	37° 15' 8.112" N	80° 14' 59.763" W
11/21/2015	JLV-PRT-00498	<i>Quercus montana</i>	Montgomery	22	Partial	Hollow	Low	Moderate	37° 15' 8.136" N	80° 15' 0.113" W
11/21/2015	JLV-PRT-00499	<i>Quercus montana</i>	Montgomery	45	Partial	Cracks & Hollow	Moderate	High	37° 15' 8.619" N	80° 15' 0.589" W
11/21/2015	JLV-PRT-00500	<i>Quercus montana</i>	Montgomery	18	Partial	Hollow	Low	Low	37° 15' 9.370" N	80° 15' 0.463" W
11/21/2015	JLV-PRT-00501	<i>Pinus virginiana</i>	Montgomery	20	Dead	Exfoliating Bark	Low	Low	37° 15' 6.302" N	80° 14' 48.883" W
11/21/2015	JLV-PRT-00502	<i>Quercus montana</i>	Montgomery	35	Dead	Cracks & Hollow	Low	Moderate	37° 15' 6.563" N	80° 14' 42.082" W
11/21/2015	JLV-PRT-00503	<i>Pinus virginiana</i>	Montgomery	20	Dead	Exfoliating Bark	Low	Low	37° 15' 7.785" N	80° 14' 41.454" W
11/21/2015	JLV-PRT-00504	<i>Pinus virginiana</i>	Montgomery	20	Dead	Exfoliating Bark	Low	Low	37° 15' 8.019" N	80° 14' 41.692" W
11/21/2015	JLV-PRT-00505	<i>Carya glabra</i>	Montgomery	20	Live	Hollow	Low	Moderate	37° 15' 8.045" N	80° 14' 36.943" W
11/21/2015	JLV-PRT-00506	<i>Quercus rubra</i>	Montgomery	20	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 8.133" N	80° 14' 35.575" W
11/21/2015	JLV-PRT-00507	<i>Quercus montana</i>	Montgomery	23	Dead	Hollow	Low	Moderate	37° 15' 8.985" N	80° 14' 34.507" W



Potential Roosts

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Primary Biologist Jeremy Van Deventer Secondary Biologist Luke Corbin State Virginia

Date	Roost Tree ID	Roost Tree species	County	Tree DBH	Tree Status	Observed Roosting Potential Factors	Roosting Potential Indiana	Roosting Potential Northern	Latitude (DMS)	Longitude (DMS)
11/21/2015	JLV-PRT-00508	<i>Quercus rubra</i>	Montgomery	45	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 8.058" N	80° 14' 33.669" W
11/21/2015	JLV-PRT-00509	<i>Quercus rubra</i>	Montgomery	20	Partial	Hollow	Low	Moderate	37° 15' 8.758" N	80° 14' 33.170" W
11/21/2015	JLV-PRT-00510	<i>Quercus montana</i>	Montgomery	18	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 8.756" N	80° 14' 31.673" W
11/21/2015	JLV-PRT-00511	<i>Quercus rubra</i>	Montgomery	18	Dead	Exfoliating Bark & Hollow	Moderate	Moderate	37° 15' 10.376" N	80° 14' 29.782" W
11/21/2015	JLV-PRT-00512	<i>Quercus rubra</i>	Montgomery	18	Dead	Exfoliating Bark & Hollow	Low	Moderate	37° 15' 10.573" N	80° 14' 29.164" W
11/21/2015	JLV-PRT-00513	<i>Pinus virginiana</i>	Montgomery	25	Dead	Exfoliating Bark & Hollow	Low	Low	37° 15' 11.697" N	80° 14' 28.882" W
11/21/2015	JLV-PRT-00514	<i>Quercus montana</i>	Montgomery	40	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 10.274" N	80° 14' 27.492" W
11/21/2015	JLV-PRT-00515	<i>Quercus rubra</i>	Montgomery	20	Live	Hollow	Low	Low	37° 15' 11.560" N	80° 14' 27.143" W
11/21/2015	JLV-PRT-00516	<i>Quercus rubra</i>	Montgomery	23	Partial	Hollow	Low	Low	37° 15' 12.681" N	80° 14' 24.556" W
11/21/2015	JLV-PRT-00517	<i>Quercus montana</i>	Montgomery	38	Live	Hollow	Moderate	High	37° 15' 13.837" N	80° 14' 23.161" W
11/21/2015	JLV-PRT-00518	<i>Quercus montana</i>	Montgomery	38	Live	Hollow	Low	Moderate	37° 15' 13.550" N	80° 14' 22.329" W
11/21/2015	JLV-PRT-00519	<i>Quercus montana</i>	Montgomery	30	Partial	Cracks	Low	Low	37° 15' 13.377" N	80° 14' 22.218" W
11/21/2015	JLV-PRT-00520	<i>Quercus montana</i>	Montgomery	30	Partial	Cracks & Hollow	Low	Moderate	37° 15' 14.021" N	80° 14' 21.613" W
11/21/2015	JLV-PRT-00521	<i>Quercus montana</i>	Montgomery	24	Dead	Exfoliating Bark & Hollow	Moderate	Moderate	37° 15' 14.439" N	80° 14' 20.201" W
11/21/2015	JLV-PRT-00522	<i>Quercus montana</i>	Montgomery	20	Dead	Exfoliating Bark & Hollow	Low	Low	37° 15' 14.720" N	80° 14' 20.262" W
11/21/2015	JLV-PRT-00523	<i>Quercus montana</i>	Montgomery	20	Dead	Exfoliating Bark	Moderate	Moderate	37° 15' 14.316" N	80° 14' 19.807" W
11/21/2015	JLV-PRT-00524	<i>Quercus montana</i>	Montgomery	30	Partial	Exfoliating Bark	Low	Low	37° 15' 14.661" N	80° 14' 19.931" W
11/21/2015	JLV-PRT-00525	<i>Quercus montana</i>	Montgomery	30	Partial	Exfoliating Bark	High	High	37° 15' 14.955" N	80° 14' 19.538" W
11/21/2015	JLV-PRT-00526	<i>Quercus montana</i>	Montgomery	27	Partial	Exfoliating Bark & Hollow	Moderate	Moderate	37° 15' 15.271" N	80° 14' 19.581" W
11/21/2015	JLV-PRT-00527	<i>Quercus rubra</i>	Montgomery	27	Dead	Hollow	Low	Moderate	37° 15' 16.207" N	80° 14' 18.583" W
11/21/2015	JLV-PRT-00528	<i>Quercus alba</i>	Montgomery	30	Dead	Exfoliating Bark	Low	Low	37° 15' 16.005" N	80° 14' 16.712" W

APPENDIX E
REPRESENTATIVE PHOTOGRAPHS

Habitat Patch Photographs



Representative Patch



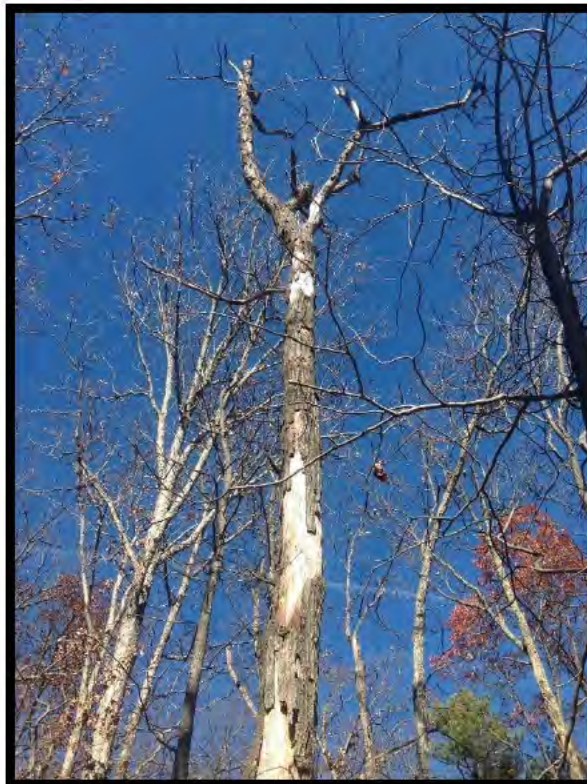
Representative Patch

Potential Roost Tree Photographs



CRA-PRT-00779, *Quercus rubra*

Indiana bat = High Potential; Northern long-eared bat = High Potential



CRA-PRT-00820, *Quercus rubra*

Indiana bat = High Potential; Northern long-eared bat = High Potential

Potential Roost Tree Photographs



CRA-PRT-00768, *Ulmus rubra*

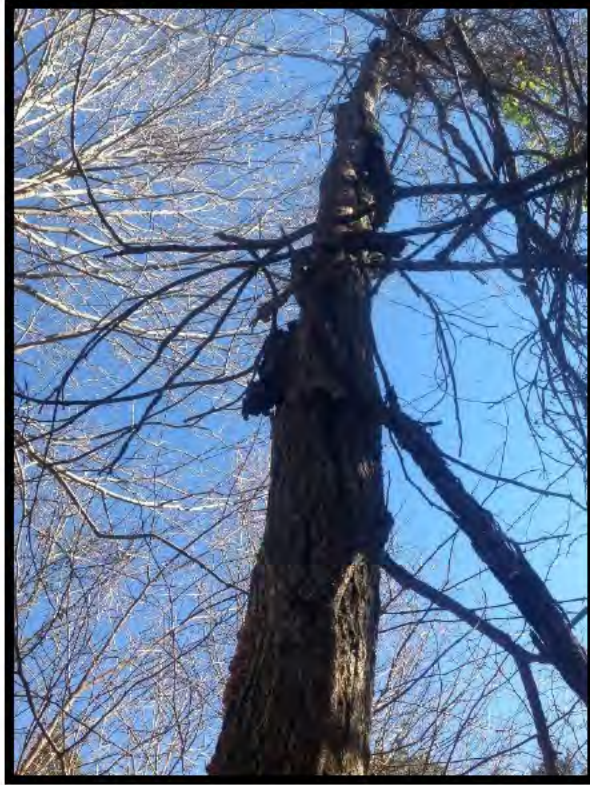
Indiana bat = High Potential; Northern long-eared bat = High Potential



CRA-PRT-00851, *Quercus montana*

Indiana bat = Moderate Potential; Northern long-eared bat = Moderate Potential

Potential Roost Tree Photographs



CRA-PRT-00709, *Ulmus americana*

Indiana bat = Moderate Potential; Northern long-eared bat = Moderate Potential



CRA-PRT-00699, *Carya ovata*

Indiana bat = Moderate Potential; Northern long-eared bat = Moderate Potential

Potential Roost Tree Photographs



CRA-PRT-00722, *Carya ovata*

Indiana bat = Moderate Potential; Northern long-eared bat = Moderate Potential



CRA-PRT-00784, *Pinus virginiana*

Indiana bat = Low Potential; Northern long-eared bat = Moderate Potential

Potential Roost Tree Photographs



CRA-PRT-00714, *Quercus velutina*

Indiana bat = Low Potential; Northern long-eared bat = Moderate Potential



CRA-PRT-00700, *Acer saccharum*

Indiana bat = Low Potential; Northern long-eared bat = Moderate Potential

Potential Roost Tree Photographs



CRA-PRT-00783, *Quercus montana*

Indiana bat = Low Potential; Northern long-eared bat = Moderate Potential



JLV-PRT-00491, *Acer rubrum*

Indiana bat = Low Potential; Northern long-eared bat = Low Potential