

MVP Southgate Project

Docket No. CP19-XX-000

Resource Report 3 – Fish, Wildlife, and Vegetation

Appendix 3-A

Agency-Approved Rare Species Survey Plans

November 2018

Pesi 1219

STUDY PLAN: HABITAT ASSESSMENTS AND SURVEYS FOR RARE PLANTS ALONG THE MOUNTAIN VALLEY PIPELINE SOUTHGATE PROJECT IN NORTH CAROLINA

17 July 2018

Submitted To:

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Prepared by:



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1.0 Introduction

1.1 **Project Description**

Mountain Valley Pipeline, LLC ("Mountain Valley") is seeking a Certificate of Public Convenience and Necessity ("Certificate") from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act to construct and operate the MVP Southgate Project ("Project"). The Project is in Pittsylvania County, Virginia and Rockingham and Alamance counties, North Carolina (Appendix A; Figure 1). Mountain Valley proposes to construct approximately 72 miles of 24-inchdiameter natural gas pipeline, known as the H-650 pipeline, to provide timely, costeffective access to new natural gas supplies to meet the growing needs of natural gas users in the southeastern U.S. Subject to receipt of the required permits and regulatory approvals, Mountain Valley anticipates construction of the Project to commence in spring of 2020.

The proposed Project will interconnect with and receive gas from the existing Mountain Valley Pipeline near Chatham, Virginia, and the East Tennessee Natural Gas, LLC., mainline near Eden, North Carolina, and will deliver gas to connections with customers' existing facilities in Eden and Graham, North Carolina. The Project is a stand-alone project from the Mountain Valley Pipeline and has an expected in-service date of late 2020. In addition to the H-650 pipeline, Mountain Valley proposes to construct and operate two new compressor stations at milepost (MP) 0 in Pittsylvania County, Virginia, and near MP 26 in Rockingham County, North Carolina, and four interconnects near MPs 0, 28, 30, and 72. Meter stations and other ancillary facilities required for the safe and reliable operation of the pipeline are also included.

To the extent practicable, Mountain Valley routed the new pipeline parallel to existing corridors. As currently proposed, the pipeline is parallel to existing utility corridors, trails, and roads for approximately 47 percent (34 miles) of the proposed alignment. The Project limits-of-disturbance (LOD) include a 100-foot-wide right-of-way (ROW), consisting of 50-foot temporary and 50-foot permanent easements. Where feasible, the ROW will be reduced in width to 75 feet (22.9 m) at resource crossings.

Access roads are 25 feet wide for permanent or temporary use. To facilitate the construction and maintenance of the pipeline, 196 access roads are currently proposed for construction or improvement. Of the 196 access roads, 68 will be in Virginia (±23.2 mi) and 128 will be in North Carolina (±28.3 mi). Additional temporary workspaces, laydown and contractor yards are also anticipated.

1.2 **Agency Coordination**

The Federal Endangered Species Act of 1973 (ESA) [16 U.S.C. 1531 et seq.] provides for the listing, conservation, and recovery of endangered and threatened Pesi 1219 1 Mountain Valley Pipeline Southgate



species of plants and wildlife. Under the ESA, the U.S. Fish and Wildlife Service (USFWS) is mandated to monitor and protect listed species. Many states enacted similar laws.

The USFWS (Raleigh Field Office) indicated two federally protected plant species may occur within the proposed Project area and requested completion of field surveys to determine presence or probable absence of each species. These species include small whorled pogonia (*Isotria medeoloides*), and smooth coneflower (*Echinacea laevigata*).

On behalf of Mountain Valley, Environmental Solutions & Innovations, Inc. (ESI) proposes to complete surveys to determine whether the above mentioned plant species or their preferred habitats occur within the Project area. Through submittal of this document, ESI and Mountain Valley request concurrence with the Study Plan's methods and site-specific authorization from USFWS (Raleigh Field Office) to conduct the proposed survey activities.

This Study Plan presents all current potential aspects of the Project; however, changes to the alignment and number and location of facilities and access roads may occur. Any additions to the Project will be handled consistently with the level of effort described in this Study Plan. Should a final route be determined prior to the completion of surveys, no surveys will be completed on the eliminated alignment, facilities, and/or access roads.

2.0 Survey Methods

In general, field surveys for rare plants are conducted using a meander search technique within predetermined areas along the Project route (Goff et al. 1982). During this type of survey, more time and effort is spent in areas exhibiting the most suitable habitat thus increasing the likelihood of locating rare species. If target species are found, population boundaries are recorded using a GPS Unit with submeter accuracy. Representative photographs are taken. Surveys are completed during the optimum search windows for rare plant target species identified in Table 1. Due to the short timeline of the Project, ESI proposes commencing surveys for small-whorled pogonia immediately such that field work is completed within the survey window. Further, ESI proposes conducting surveys for the smooth coneflower during the summer of 2018.

Common Name	Listing Status ¹	Habitat	Survey Window	Total Survey Acreage ⁴
Small whorled pogonia	FE (NC)	Open, mixed hardwood forests on level to gently sloping terrain with north to east aspect	May 5 – July 25 ²	271.2
Pesi 1219 Mountain Valley Pipelin	e Southgate	2		ESI

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Common	Listing	Habitat	Survey	Total Survey
Name	Status ¹		Window	Acreage ⁴
Smooth coneflower	FE (NC)	Open woods, glades, cedar barrens, roadsides, clearcuts, dry limestone bluffs, and power line rights-of-way; associated with neutral to alkaline soils high in calcium and magnesium	June 15 – October 31	88.3

¹FE - federally endangered

² Federally listed small whorled pogonia species optimal survey period for counties south of Caroline County, as designated by the USFWS Virginia Ecological Field Services Office (USFWS 2012)

³ Federally listed smooth coneflower optimal survey period as designated by the USFWS Virginia Ecological Field Services Office (USFWS 2012).

⁴ Survey areas determined by detailed GIS analysis of forest cover based on aerial imagery; soils; slopes; and slope aspects.

Mr. Lawrence Brewer and Mr. Fred Huber will conduct plant surveys for ESI. Both Mr. Brewer and Mr. Huber are USFWS Certified Plant Surveyors for smooth coneflower, small whorled pogonia in many states. North Carolina does not maintain a list of certified plant surveys for these species. Mr. Brewer is an experienced and trained plant taxonomist and has completed a wide variety of plant and natural community surveys over the last 25 years. Mr. Huber has 26 years' experience working with the U.S. Forest Service (USFS) as Forest Botanist where he monitored a multitude of federally listed plant species including the two federally listed species of interest associated with the Project area. Resumes for each of the Certified Plant Surveyors are included as Appendix B. ESI respectfully requests authorization for Mr. Brewer and Mr. Huber to conduct surveys for this Project given their extensive experience as professional botanists.

2.1 Small Whorled Pogonia (Isotria medeoloides)

The small whorled pogonia is a member of the orchid family and is characterized by a single gray-green stem 10 to 14 inches (25.4 to 35.6 cm) tall and a whorl of five to six leaves at the top of the stem. The leaves are gray-green, oblong, and can reach 1 to 3.5 inches (2.5 to 8.9 cm) in length. A single or a pair of green-yellow flowers appears in May or June. The small whorled pogonia is found in mature, hardwood stands comprising beech (*Fagus* spp.), birch (*Betula* spp.), maple (*Acer* spp.), oak (*Quercus* spp.), and hickory (*Carya* spp.) species with an open understory. The small whorled pogonia prefers acid soils under a thick layer of dead leaves, often on slopes adjacent small streams. Although widely distributed across 17 eastern states, the small whorled as federally endangered in 1982, but was reclassified to threatened in 1994. No published critical habitat exists for the small whorled pogonia.

Coordination with the USFWS Raleigh Field Office indicates this species may be located along portions of the Project in Rockingham and Alamance counties, North Carolina. A detailed GIS desktop analysis was performed along the Project area using aerial imagery and soils information to identify potential habitat, which is defined as forested areas with north to east-facing slopes 0-30 percent and soil pH ranging 3.5 to



5.5. Approximately 271 acres of potentially suitable habitat were identified for small whorled pogonia during the GIS desktop analysis (Appendix A, Figure 2). Surveys in suitable habitat for small whorled pogonia are conducted between May 5 and July 25.

2.2 Smooth Coneflower (*Echinacea laevigata*)

Smooth coneflower is a perennial herb in the Aster family (Asteraceae) that grows up to 4.9 feet (1.5 m) tall from a vertical root stock. The large elliptical to broadly lanceolate basal leaves may reach 7.8 inches (19.8 cm) in length and 2.9 inches (7.4 cm) in width and taper into long petioles toward the base. They are smooth to slightly rough in texture. The stems are smooth, with few leaves. The mid-stem leaves are smaller than the basal leaves and have shorter petioles. Flower heads are usually solitary. The rays of the flowers (petal-like structures) are light pink to purplish in color, usually drooping, and 1.9 to 3.1 inches (4.8 to 7.9 cm) long. Flowering occurs from late May through mid-July and fruits develop from late June to September. The fruiting structures often persist through the fall.

The species is typically found in well drained areas of open woods, cedar barrens, roadsides, clear cuts, dry limestone bluffs, and power line ROWs containing neutral to alkaline soils rich in calcium and magnesium. Smooth coneflower was listed as federally endangered on 8 October 1992. Currently 24 populations of the species are known only from Virginia, North Carolina, South Carolina, and Georgia (USFWS 1995). This species is not currently known in the Project area.

The USFWS Raleigh Field Office requested completion of surveys for smooth coneflower along the route in North Carolina. Discussion with the Service and the North Carolina Wildlife Resources Commission (NCWRC) suggested limiting survey areas by soil types associated with known populations in the state of North Carolina.

Surveys for smooth coneflower are completed on soil types associated with known populations of this species. Soil type associations were determined from observations found in <u>www.inaturalist.org</u>, a joint initiative of the California Academy of Sciences and the National Geographic Society that records research grade species identification and location data from field biologists. Soil types identified that correspond with soils found within the project area of investigation (AOI) include Chewacla and Wehadkee (ChA), Iredell (IrB), Wehadkee silt Ioam (41A), Cecil sandy Ioam (CaB), Helena sandy Ioam (HeB), and Vance sandy Ioam (VaC). These soil types were overlain within the Project AOI to determine focused survey areas (Appendix A, Figure 3). Approximately 88.3 acres of suitable habitat were identified using soil associations and photo-aerial review. Surveys for smooth coneflower are conducted June 15 to October 31 when the species is either flowering or fruiting.



3.0 Timeline and Reporting

Field surveys for rare plants within the Project area are scheduled to begin July 20, 2018 and continue until the late summer/early fall months. A single report following completion of field surveys will be submitted to the USFWS and NCWRC. ESI will compile synthesized documentation of the field investigations, life history information, coordination efforts, and photographs and maps into a written survey report detailing the habitat assessment and field survey methods, findings, and recommendations. The report will contain all pertinent Project data including (as attachments) notes, field forms, plant list(s), photographs, and mapping. The deliverable will include pertinent correspondence, contact narratives, action plan, or resource inquiries with any regulatory agency.

4.0 Request for Agency Concurrence

4.1 Request to Proceed

We are requesting concurrence from the USFWS and NCWRC that the methods and proposed personnel described herein are consistent with each agency's standards.

4.2 Period for Which Survey Results are Valid

Consistent with the USFWS guidelines for plant surveys, we seek confirmation that results of the survey remains valid for a period of two years upon completion of the project.

5.0 Literature Cited

- Goff, F. G., A. Dawson, and J. Rochow. 1982. Site examination for threatened and endangered plant species Environmental Management 6:307-316.
- USFWS. 1995. Smooth Coneflower (*Echinacea laevigata*) recovery plan. U.S. Department of Interior, Fish and Wildlife Service, Southeast Region, Atlanta, Georgia. 37 pp.
- USFWS. 2012. Optimal survey timeframes for Virginia's federally listed and candidate plant species. U.S. Department of Interior, Fish and Wildlife Service.



APPENDIX A FIGURES





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APPENDIX B QUALIFIED SURVEYORS





Environmental Solutions & Innovations, Inc.

Real Science, Real Solutions EDUCATION

M.A., Biology, Western Michigan University, 1982

B.A., Biology, Hope College, 1975

PROFESSIONAL CERTIFICATIONS

U.S Army Corps of Engineers Wetland Training Course, Ann Arbor, MI, 1996

Gopher Tortoise Training Course, Hattiesburg, MS, 1997

Geographic Positioning System (GPS) Field Training, Cincinnati, OH, 1998

Pesticide Training, Florence, KY, 2004

Ohio Department of Transportation – Ecological Training, 2011

USFWS QUALIFIED PLANT SURVEYOR:

Northeast bulrush (PA) Small whorled pogonia (PA, VA, OH)

Smooth coneflower (VA)

Running buffalo clover, Eastern prairie fringed orchid (OH)

Virginia spiraea (VA)

PROFESSIONAL AFFILIATIONS

Ecological Society of America

Ohio Academy of Sciences

Torrey Botanical Club

Southern Appalachian Botanical Society

Society for Ecological Restoration

Lucy Braun Association

Natural Areas Association

The Nature Conservancy

QUALIFICATIONS AND EXPERIENCE

Larry Brewer is an experienced and trained Plant Taxonomist. He has conducted a wide variety of plant and natural community surveys over the last 35 years. His experience includes rare plant surveys on public and private lands throughout the Midwest and eastern United States to address National Environmental Policy Act and Endangered Species Act concerns in environmental reports and permit applications. Mr. Brewer routinely conducts field surveys for federal and state listed threatened and endangered plants; plant community assessments; vegetation mapping; and habitat characterization. He writes technical sections of documents, prepares taxonomic plant lists, and conducts impact analyses for multidisciplinary environmental documents for federal and state agencies including Federal Energy Regulatory Commission (FERC), Departments of Transportation (DOT), Federal Aviation Administration (FAA), U. S. Army Corps of Engineers (ACOE), U. S. Fish and Wildlife Service (USFWS), and Department of Defense (DoD).

Mr. Brewer is experienced with wetland determination, delineation, habitat restoration, and preparation of detailed mitigation plans. He was the plant ecologist and wetland scientist for a project involving restoration and creation of 400 acres of wetlands for Indianapolis Airport Authority in Indiana. Mr. Brewer worked nine field seasons for the Michigan Natural Features Inventory where he did ecological assessments in 30 different plant community types. For a 3-year study, he completed quantitative sampling of over 80 wetlands around the Great Lakes region. While at Western Michigan University, Mr. Brewer mapped the presettlement vegetation of 10 counties in southwestern Michigan.

Over the last six years, Mr. Brewer has been Senior Plant Ecologist for the Center of Applied Ecology at the Northern Kentucky University and permanent employee at ESI, Inc.

PROJECTS

AT&T Fiber Optic Line

North Carolina

Virginia

Project Botanist

Lawrence G. Brewer

Plant Taxonomist 4525 Este Avenue

Cincinnati, OH 45232 513-451-1777

Survey for federally threatened *Virginia spiraea* and other plants of concern along AT&T's proposed 30.4-mile fiber optic line in Buncombe and Madison counties.

American Electric Power, Bland Area Improvements

Project Botanist

Rare plant surveys along 138 kV Transmission Line Rebuild Project crossing Jefferson National Forest in Bland County. Surveys included federally endangered northeastern bulrush, smooth coneflower, and small whorled pogonia.

MVP, Mountain Valley Pipeline

Virginia and West Virginia

Rare plant surveys along 300-mile natural gas pipeline crossing seventeen counties. Surveys include federally endangered species: northeastern bulrush, running buffalo clover, shale barren rock cress, small whorled pogonia, smooth coneflower, and Virginia spiraea. Surveys also focused on state listed species and species of concern.

Dominion Transmission, Jetersville to Ponton 115 kV Transmission Line Virginia

Presence and absence surveys for smooth coneflower along 8-mile corridor and multiple access roads in Amelia County.

Appalachian Power Company, Wythe Area Improvements

Virginia

Presence and absence surveys for smooth coneflower and Virginia spiraea along 15-mile transmission line in Wythe County.

Appalachian Transmission Company, Inc., Cloverdale-Lexington 500 kV transmission Line Virginia Project Botanist

Habitat Assessments and surveys for smooth coneflower and shale barren rock cress in Botetourt and Rockbridge counties.

Appalachian Power Company, Richland's-Whitewood 138 kV Transmission Line

Virginia

Presence/absence surveys for federally listed Virginia spiraea along 10-mile line in Buchanan and Tazewell counties.

American Electric Power Fleming to Jenkins Rebuild to Ferrus

Virginia

Habitat assessments for small whorled pogonia and surveys for Virginia spiraea in Letcher County, Kentucky and Dickenson County, Virginia.

American Electric Power, Sunscape and Matt Funk Transmission Lines

Virginia

Smooth coneflower and piratebush surveys along two transmission line corridors and associated access roads in Roanoke County, Virginia.

Dominion Transmission, 138 kV Hybrid Energy/Clinch River Transmission Line Virginia

Surveys for federally threatened small whorled pogonia and one state-listed plant celadine poppy (Stylophorum diphyllum) along 9-mile transmission line corridor in Wise and Russell counties.

American Electric Power, Penhook-Westlake 138 kV Line

Virginia

Habitat survey for federally endangered smooth coneflower along 14-mile transmission line corridor in Franklin County.

American Electric Power, Penhook-Westlake 138 kV Line

Virginia

2

Habitat survey for federally endangered smooth coneflower along 14-mile transmission line corridor in Franklin County.

Project Botanist

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Project Botanist



Environmental Solutions & Innovations, Inc.

Real Science, Real Solutions



EDUCATION M.S., Botany, North Carolina State University, 1976

B.A., Biology, Gettysburg CERTIFICATIONS Wild Plant Management Permit, Pennsylvania Department of Conservation and Natural Resources

QUALIFICATIONS AND EXPERIENCE

Mr. Huber is an experienced botanist and completes field surveys and monitoring for rare plant species. Much of his work is completed in North Carolina, Pennsylvania, Tennessee, West Virginia, and Virginia. A recent retiree of the U.S. Forest Service (USFS), Mr. Huber's experience encompasses 26 years of experience as Forest Botanist on the 1.8-million acre George Washington and Jefferson National Forests in Virginia and West Virginia where he monitored multiple federally listed plant species including: Virginia roundleaf birch (Betula uber), shale barren rockcress (Boechera serotina), rock gnome lichen (Cetradonia linearis), smooth purple coneflower (Echinacea laevigata), Virginia sneezeweeed (Helenium virginicum), swamp pink (Helonias bullata), small whorled pogonia (Isotria medeloides), northeastern bulrush (Scirpus ancistrochaetus), and Virginia meadowsweet (Spiraea virginiana).

Mr. Huber's extensive history in botany includes preparation of Biological Evaluations (BE) evaluating effects of proposed projects on rare plant species in support of National Environmental Policy Act (NEPA) documentation. His experience also includes reviewing Environmental Impact Statements (EIS); providing input to the forest planning process; and developing plant management strategies, including treatment for non-native plant infestations.

PROJECTS

USDA Forest Service, National Forests in North Carolina

North Carolina

Botanist

Fred Huber Botanist

4525 Este Avenue

Cincinnati, OH 45232 513-451-1777

Duties included conducting field surveys for federally and state listed plant species, as well as Regional Forester's Sensitive Species, in areas of Forest Service activity such as timber sales, road construction, and recreation developments. Provided botanical input for the first Forest Plan for the National Forests in North Carolina. Organized the first symposium to address the management of grassy balds.

USDA Forest Service, George Washington and Jefferson National Forests

Virginia, West Virginia, and Kentucky

Forest Botanist

Duties included conducting field surveys for federally and state listed plant species, as well as Regional Forester's Sensitive Species, in areas of Forest Service activity such as timber sales, road construction, recreation developments, and prescribed burns. Field surveys and monitoring were also conducted in support of endangered and threatened species recovery. Surveys were often in conjunction with cooperators such as the West Virginia Division of Natural Resources, the Virginia Natural Heritage Program, the Massey Herbarium at Virginia Tech, and the U.S. Fish and Wildlife Service. Averaged approximately 60 days a year in the field.

Real Science, Real Solutions

Served as forest coordinator for non-native invasive plant species management. Completed field surveys for non-native plant infestations; implemented treatments for those infestations; advised district offices on treatments; and coordinated with state, federal, and non-governmental organizations.

In addition, prepared BEs for plants on the federal threatened and endangered list and on the Regional Forester's Sensitive Species list. Bes were prepared as part of the NEPA process for evaluating the effects of proposed projects on rare species.

University of North Carolina, Chapel Hill

North Carolina

Field research in Great Smoky Mountains National Park for Dr. Peter White. Established and inventoried the vegetation in long-term monitoring plots in old growth forest.

Western Carolina University

North Carolina

Summarized research completed in the Great Smoky Mountains National Park for Dr. John McCrone in support of the establishment of the Great Smoky Mountains Biosphere Reserve.

USDA Forest Service, National Forest in North Carolina

North Carolina

Field inventory and monitoring, including for mountain golden heather (*Hudsonia montana*), and swamp pink (*Helonias bullata*), and providing botanical input to the Forest Planning process. Organized first symposium on management of grass bald habitats in the southern Appalachia.

North Carolina Natural Heritage Program

North Carolina

First botanist on staff. Acquired data on endangered, threatened, and state rare plant species and significant plant communities for entry into the Natural Heritage database. This included visiting herbaria throughout the state, reviewing scientific field reports, and conducting field inventories. Also reviewed environmental impact statements, organized a team of plant ecologists to establish a plant community classification system for the new program, and helped identify significant natural areas for protection.

North Carolina State University

North Carolina

Master's degree in Botany included research with the federally listed bunched arrowhead (*Sagittaria fasciculata*).



Research Associate

Research Associate

Botanist

Botanist

STUDY PLAN: BAT SURVEYS FOR THE MVP SOUTHGATE PROJECT IN ALAMANCE AND ROCKINGHAM COUNTIES, NORTH CAROLINA AND PITTSYLVANIA COUNTY, VIRGINIA

RALEIGH USFWS CONSULTATION CODE: 04EN2000-2018-SLI-0586 GLOUCESTER USFWS CONSULTATION CODE: 05E2VA00-2018-SLI-2818

23 July 2018

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1.0 Introduction

Mountain Valley Pipeline, LLC ("Mountain Valley") is seeking a Certificate of Public Convenience and Necessity ("Certificate") from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act to construct and operate the MVP Southgate Project ("Project"). The Project will be located in Pittsylvania County, Virginia and Rockingham and Alamance counties, North Carolina (Appendix A; Figure 1). Mountain Valley proposes to construct approximately 72-miles of 24-inch-diameter natural gas pipeline, known as the H-650 pipeline, to provide timely, cost-effective access to new natural gas supplies to meet the growing needs of natural gas users in the southeastern United States. Subject to receipt of the required permits and regulatory approvals, Mountain Valley anticipates construction of the Project to commence in spring of 2020.

The proposed Project will interconnect with and receive gas from the existing Mountain Valley Pipeline near Chatham, Virginia, and the East Tennessee Natural Gas, LLC., mainline near Eden, North Carolina, and will deliver gas to connections with customers' existing facilities in Eden and Graham, North Carolina. The Project is a stand-alone project from the Mountain Valley Pipeline and has an expected in-service date of late 2020. In addition to the H-650 pipeline, Mountain Valley proposes to construct and operate two new compressor stations at milepost (MP) 0 in Pittsylvania County, VA, and near MP 26 in Rockingham County, NC, and four interconnects near MPs 0, 28, 30, and 72. Meter stations and other ancillary facilities required for the safe and reliable operation of the pipeline are also included.

To the extent practicable, Mountain Valley has routed the new pipeline parallel to existing corridors. As currently proposed, the pipeline is located parallel to existing utility corridors, trails, and roads for approximately 47 percent (34 miles [54.7 km]) of the proposed alignment. The Project limits-of-disturbance include a 100-foot-wide right-of-way (ROW), consisting of 50-feet (15.2 m) temporary and 50-feet (15.2 m) permanent easements. Where feasible, the ROW will be reduced in width to 75 feet (22.9 m) at resource crossings. The permanent ROW affects approximately 160.8 acres in Virginia and 283.7 acres in North Carolina. The temporary ROW affects approximately 266.6 acres in Virginia and 477.4 acres in North Carolina.

Access roads are 25-feet (7.6 m) wide for permanent or temporary use. To facilitate the construction and maintenance of the pipeline, 196 access roads are currently proposed to be constructed or improved. Of the 196 access roads, 68 will be in Virginia (±23.2 mi [37.3 km]) and 128 will be in North Carolina (±28.3 mi [45.5 km]). Additional temporary workspaces, laydown and contractor yards are also anticipated.



2.0 Basis for ESA Compliance

The Federal Endangered Species Act (ESA) of 1973 [16 U.S.C. 1531 et seq.] provides for listing, conservation, and recovery of endangered and threatened species of plants and wildlife. Under the ESA, the U.S. Fish and Wildlife Service (USFWS) is mandated to monitor and protect listed species. Many states enacted similar laws.

Section 9 of the ESA prohibits take of listed species. 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].

Based on coordination with the USFWS Raleigh and Gloucester Field Offices, North Carolina Wildlife Resources Commission (NCWRC), and Virginia Department of Game and Inland Fisheries (VDGIF), the Project is not within the *known* range of any federally-endangered bat species. The Project is within the range of the federally-threatened northern long-eared bat (*Myotis septentrionalis*); however, because there are no *known* summer maternity roosts or winter hibernacula in the Project vicinity, any potential impacts to the species would be exempted under the species' Final 4(d) rule (USFWS 2016). Based on these data, FERC's Requirements under Section 7(a)(2) of the ESA for the Mountain Valley Southgate Project are met.

Under Section 7(a)(1) of the ESA, FERC has a requirement to use its authority to further the conservation of listed species. To that end, and because bat occurrence data within the Project area is significantly limited, Mountain Valley proposes to conduct targeted field surveys for bats as a Voluntary Conservation Measure for the Project.

According to the NCWRC's *Protected Wildlife Species of North Carolina* (NCWRC 2017), nine species of bats are of concern in North Carolina (Table 1). Based on available data, none of these species are known to occur in Rockingham or Alamance counties.

Common Name	Species	Federal Status	North Carolina Status
Indiana bat	Myotis sodalis	E	E
Gray bat	Myotis grisescens	E	E
Virginia big-eared bat	Corynorhinus townsendii virginianus	E	E
Northern long-eared bat	Myotis septentrionalis	T-4(d)	Т
Rafinesque's big-eared bat	Corynorhinus rafinesquii rafinesquii	SC	Т

Table 1. Federally or State-listed Bats in North Carolina



Common Name	Species	Federal Status	North Carolina Status
Eastern big-eared bat	Corynorhinus rafinesquii macrotis	SC	SC
Eastern small-footed bat	Myotis leibii	SC	SC
Florida yellow bat	Lasiurus intermedius floridanus	-	SC
Southeastern bat	Myotis austroriparius	SC	SC

E – Endangered; T-4(d) – Threatened with 4(d) Rule; T – Threatened; SC – Species of Concern

According to the VDGIF's *Special Status Faunal Species in Virginia* (VDGIF 2018), 12 species of bats are of concern in Virginia (Table 2). Five of these species are listed in the Virginia Wildlife Action Plan (WAP).

Table 2. Federally or State-listed Bats in Virginia

Common Name	Species	Federal Status	Virginia Status
Indiana bat	Myotis sodalis	E	E
Gray bat	Myotis grisescens	E	E
Virginia big-eared bat	Corynorhinus townsendii virginianus	E	E
Northern long-eared bat	Myotis septentrionalis	T-4(d)	Т
Eastern big-eared bat	Corynorhinus rafinesquii macrotis	SC	E
Little brown bat	Myotis lucifugus	-	E
Tri-colored bat	Perimyotis subflavus	-	E
Eastern small-footed bat	Myotis leibii	SC	WAP Tier I
Hoary bat	Lasiurus cincereus	-	WAP Tier IV
Eastern red bat	Lasiurus borealis	-	WAP Tier IV*
Silver-haired bat	Lasionycteris noctivagans	-	WAP Tier IV*
Southeastern bat	Myotis austroriparius	SC	WAP Tier IV

E – Endangered; T-4(d) – Threatened with 4(d) Rule; T – Threatened; SC – Species of Concern; Virginia Wildlife Action Plan, Species of Greatest Conservation Need (WAP) Tier I – Critical Conservation Need; WAP Tier IV – Moderate Conservation Need; * - Proposed for Inclusion

Environmental Solutions & Innovations, Inc. (ESI), on behalf of Mountain Valley, proposes to conduct field surveys for bats. Studies will be carried out under ESI's USFWS Federal Fish and Wildlife (TE02373A-12, TE56749B-2, TE01311C-0, and TE02365A-4), VDGIF (Threatened and Endangered Species 63022 and Scientific Collection 63023) and NCWRC (Threatened and Endangered Species [18-ES00406] and Scientific Collection [18-SC00839]) Permits.

Through submittal of this Study Plan, ESI requests concurrence with the methods and levels of effort for the Project herein, and site-specific authorization from USFWS, NCWRC and VDGIF to conduct proposed survey activities.



3.0 Field Surveys

Survey techniques will generally follow the USFWS 2018 *Rangewide Indiana Bat Survey Guidelines* (USFWS 2018); however, a targeted survey approach will be taken with respect to site placement and level of effort.

3.1 Level of Effort

A desktop habitat assessment was completed for the Project using the 2011 National Land Cover Database (NLCD; amended 2014). In lieu of conducting netting at an incremental rate of one site per kilometer, surveys are proposed for larger "survey blocks" which were identified as areas potentially conducive to high bat activity. Within these survey blocks, sampling will still be conducted at a rate of 1 site per linear kilometer of tree removal, however sites will be placed in the best available locations within each block, and not forced into 1-kilometer intervals. Although a preliminary analysis has been completed to identify potential net sites within survey blocks, final site locations will be determined by biologists on the ground, based on the presence of suitable features on the landscape.

3.1.1 North Carolina

Forest habitat is proposed for removal along approximately 52 linear kilometers, among both the proposed pipeline route and access roads. A total of **63 survey sites** is proposed within these survey blocks (Table 3; Appendix A, Figure 2).

Survey Block	Number of Survey Sites	County
01	2	Rockingham
02	5	Rockingham
03	16	Rockingham
04	3	Rockingham
05	7	Rockingham
06	2	Rockingham
07	2	Rockingham
08	5	Rockingham
09	1	Alamance
10	1	Alamance
11	2	Alamance
12	3	Alamance
13	1	Alamance
14	8	Alamance
15	5	Alamance

4

Table 3.	Proposed	Survey	Areas i	n North	Carolina
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A combination of mist netting and acoustic monitoring is proposed; surveys will be conducted at 52 mist net sites (minimum of 6 net nights per site) and 11 acoustic survey sites (minimum of 2 detector nights per site). The final survey method for each site will be determined by permitted ESI bat biologists based on observed field conditions and habitat suitability.

State natural areas (Rocky Branch Conglomerate Exposure, Stony Creek Forest, and ROA/Dan River Aquatic Habitat) and State managed areas (NC Clean Water Management Trust Fund Easement, NC Division of Mitigation Services Easement, Piedmont Land Conservancy Easement, and Mountains-to-Sea Trail) were identified within, or adjacent to, the Project area. Survey sites are proposed within, or near, these conservation areas; however, completion of these surveys is contingent on appropriate land access permissions.

3.1.2 Virginia

Forest habitat is proposed for removal along approximately 27 linear kilometers, among both the proposed pipeline route and access roads. A total of **30 survey sites** is proposed within these survey blocks (Table 4; Appendix A, Figure 3).

Survey Block	Number of Survey Sites	County			
01	5	Pittsylvania			
02	7	Pittsylvania			
03	5	Pittsylvania			
04	4	Pittsylvania			
05	9	Pittsylvania			

Table 4. Proposed Survey Areas in Virginia

Mist netting is proposed for all 30 identified sites; however, the final survey method will be determined by permitted ESI bat biologists based on observed field conditions and habitat suitability. Acoustic surveys may be conducted in lieu of netting if appropriate.

3.2 Presence / Probable Absence Survey

3.2.1 Mist Netting

3.2.1.1 Qualified Surveyors

Mist net surveys will be completed by a team of one or more biologists, including an individual permitted to handle bats by the USFWS, NCWRC, and/or VDGIF.

3.2.1.2 Net Placement

Mist nets are set to maximize coverage of flight paths used by bats along suitable travel corridors, foraging areas, and/or drinking areas. Riparian corridors are often used for travel or foraging; however, upland corridors (e.g., trails or logging roads) also provide suitable sites. In upland areas, net sites near road ruts holding water have resulted in



the capture of Indiana and northern long-eared bats. Site selection is based upon the extent of canopy cover, presence of an open flyway, and forest conditions near the site. The actual location and orientation of each net set is determined in the field. Coordinates of each net set are recorded via a combination of available technology including GIS systems (ESRI ArcMap), handheld GPS units, tablet computers, and customized software to ensure a high quality, easily interpreted, and universal standard of mapping for field studies and reporting for all target species.

3.2.1.3 Bat Capture

Bats are live-caught in mist nets and released unharmed near the point of capture. Captured bats are identified to species, sex, age class, and reproductive condition. Weight and right forearm length of each individual are also recorded. Age is determined by examining the epiphyseal-diaphyseal fusion of long bones in the wing. Reproductive condition of female bats is recorded as pregnant (based on gentle abdominal palpation), lactating, post lactating, or non-reproductive. Time and location/net site of captured bats is recorded. Processing is typically completed within 30 minutes of the time each bat is removed from the net. Listed bat species captured and identified are photographed and recorded on standardized data sheets, provided in Appendix B. USFWS, VDGIF, and NCWRC will be contacted within 48 hours if any listed bat is captured.

3.2.1.4 Protocol for Addressing White-nose Syndrome

White-nose syndrome (WNS) is a disease killing millions of bats in the eastern U.S. The disease, first found in New York, is spreading across the range of the Indiana and northern long-eared bat. All current federal and state guidelines for WNS decontamination, containment, and avoidance will be implemented. Biologists are kept aware of all current and changing WNS guidelines. Bat handling follows current WNS protocols set by the USFWS. Captured bats are examined for damage associated with WNS to the wing and uropatagium (tail) membranes, including use of white and/or ultraviolet light. Wing damage is categorized using the Wing-Damage Index Used for Characterizing Wing Condition of Bats Affected by White-nose Syndrome (Reichard 2008).

3.2.2 Acoustic Surveys

3.2.2.1 Qualified Surveyors

Acoustic detectors will be deployed by ESI scientists trained and experienced in acoustic survey techniques.

3.2.2.2 Detector Placement

Preferred acoustic monitoring sites have limited acoustic clutter, which reduces the quality of the calls recorded (Britzke 2004, Broders et al. 2004), and regular bat traffic, including: 1) borders of riparian corridors running through open landscapes; 2) fencerows adjacent to open habitats; 3) utility corridors; 4) water sources including



ponds and open stretches of streams; and 5) other open linear corridors, including logging and other woodland roads/trails. Detectors are placed at locations that maximize the potential of detecting individual bats while allowing biologists to monitor the detectors for security and to ensure proper operation.

Typically, areas with high amounts of acoustic clutter created by wind, vegetation, insects, other bats, open water, sheer rock surfaces, wind turbines, or high tension lines are avoided. In the event such areas cannot be avoided, ESI will coordinate with USFWS and provide justification.

In general, detectors are positioned at least five feet (1.5 m) in any direction from vegetation or other obstructions, in areas without, or with minimal, vegetation within 33 feet (10 m) in front of the microphone, parallel to woodland edges, and at least 49 feet (15 m) from known or suitable roosts. Microphones are elevated greater than five feet (1.5 m) above ground level as well. Lastly, if possible, monitors are placed a minimum of 656 feet (200 m) apart.

Coordinates for each detector location are recorded and included in the final report.

3.2.2.3 Analysis of Recorded Echolocation Calls

Recorded files are processed through Kaleidoscope Pro (Version 4.2; Wildlife Acoustics). This software is designed to identify bats to species and provide a statistical estimate of probability that federally-listed bats are present. If the results of this analysis indicate potential presence of listed bat species, ESI completes a visual review of the calls (per the steps outlined in the USFWS 2018 *Rangewide Indiana Bat Survey Guidelines*). Visual reviews are conducted by a USFWS approved biologist.

3.2.2.4 Follow-up Mist Netting at Acoustic Survey Sites

If a federally-endangered *myotis* is detected during acoustic surveys, mist netting will be conducted following the USFWS 2018 *Rangewide Indiana Bat Survey Guidelines*. If the federally-listed species is not captured during the follow-up mist netting, the species will be considered absent from the survey site.

3.2.3 Habitat Characterization

Habitat is described for each survey site. The emphasis of this description is habitat form: size and relative abundance of large trees and snags that potentially serve as roost trees, canopy closure, understory clutter/openness, water availability, and flight corridors. Habitat form is emphasized because Indiana and northern long-eared bats roost in a variety of tree species.

ESI's habitat characterization does more than emphasize species of large trees near the net. It identifies components of the canopy and subcanopy layers. All trees that reach into the canopy are canopy trees, regardless of their diameter/size. Many smaller trees are often also found in the canopy, and in some situations, the canopy can be



entirely composed of smaller diameter trees. ESI's habitat characterization identifies dominant and subdominant elements of the canopy.

The subcanopy, or understory, vegetation layer is well defined in classical ecological literature. It is that portion of the forest structure between the ground vegetation (to approximately 2 feet [0.6 m]) and the canopy layers, usually beginning at about 25 feet (7.6 m). Vegetation in the understory may come from:

- Lower branches of overstory trees;
- Small trees that will grow into the overstory;
- Small trees and shrubs that are confined to the understory.

The amount of understory, or clutter, is also recorded because, unlike the Indiana bat, the northern long-eared bat forages more under the tree canopy and closer to the ground where it can glean insects from vegetation. Information is recorded on standardized Data Sheets, provided in Appendix B.

3.2.4 Weather and Temperature

Weather conditions are monitored each survey night to assure compliance with USFWS guidelines. For mist netting, conditions recorded include temperature, wind speed and direction, and percent cloud cover. Any of a variety of standard mercury or electric thermometers is used to record temperature, wind speed is determined by use of the Beaufort wind scale, and cloud cover is visually estimated. For acoustic surveys, the nearest National Oceanic and Atmospheric Administration (NOAA) National Weather Service station is monitored nightly to ensure weather requirements are met.

Weather data are provided in an appendix and summarized in the report. Information is recorded on standardized Data Sheets, provided in Appendix B.

3.3 Radio Telemetry

Mountain Valley is proposing a targeted approach to radio telemetry. If captured, all Indiana bats will be fitted with radio-transmitters. Adult reproductive females are given first priority followed by juveniles, non-reproductive females, and adult males. For northern long-eared bats, if captured, a minimum of two females or juveniles per survey block will be fitted with radio-transmitters. If other tree-dwelling federally- or state-listed species (southeastern, little brown and tri-colored bats) are captured, up to two (2) adult reproductive females of each species will be fitted with radio-transmitters.

3.3.1 Transmitter Attachment

A small interscapular area is trimmed of fur and the transmitter is attached to this area with non-toxic surgical adhesive. Transmitters are activated and tested before attachment. The adhesive degrades over time (typically lasting 7 to 10 days) and the transmitter falls off the bat. Biologists record the transmitter weight, weight of the bat before and after transmitter attachment, and holding time. Bats are released unharmed



near the points of capture. Standardized data forms are used to record transmitter attachment information (Appendix B).

Transmitters are typically obtained from ®Holohil Systems Ltd. or ® Blackburn, or ®Telenax Transmitters (frequency of 171 and 172). Bat transmitter weights range from 0.009 to 0.017 ounce (0.25 to 0.5 g). Whenever possible, ESI uses 0.009- to 0.012-ounce (0.25- to 0.35-g) transmitters, as they are the lightest commercially available, least stressful to the bats, are usually less than five percent of the pre-attachment weight of the bat, and are not more than 10 percent of a bat's total body weight. Batteries on these transmitters typically last 7 to 14 days.

3.3.2 Diurnal Roost Telemetry

To locate roosting bats, radio-telemetry signals are tracked using a ®Wildlife Materials TRX-2000S PLL Synthesized Tracking Receiver, an ®Advanced Telemetry Systems, Inc. Model R2000 Scanning Receiver, or a ®Communications Specialists R200 receiver with three-element folding Yagi directional antennas manufactured by either ®Wildlife Materials, Inc. or ®Titley Electronics, PTY LTD. Receivers are not water resistant and are not used during periods of heavy rain. If a day of effort is missed due to inclement weather, an additional day is added.

Beginning the day after bat capture and transmitter attachment, telemetry is used to locate each bat's diurnal roost. Roost trees are identified to species and diameter at breast height (dbh) is measured using a dbh tape or Biltmore stick. The approximate height at which the bat is roosting and general condition of the roost tree (dead, live, dying, % bark cover, etc.) is noted. A description of habitat near the roost tree is recorded. Standardized data forms are used to characterize roost trees and assess associated habitat. Occasionally, bats roost in man-made structures; the form also provides for assessment of man-made structures used as roosts (Appendix B). Depending on specific requests by landowners or the client, roosts can either be flagged, painted, receive a metal tag, or be staked for ease of future identification. Coordinates of each roost are recorded with a GPS unit. If a roost tree occurs in an area where biologists are not permitted access, then triangulation is used to estimate its location.

Bats are tracked for approximately 7 days, for a minimum of 4 hours per day per bat (or until the bat is found), after the date of capture or until the transmitter is shed or fails, whichever happens first. Emergence counts will be performed on each identified roost tree for a minimum of 2 days as suggested in the USFWS 2018 *Range-wide Indiana Bat Summer Survey Guidelines*.

3.4 Timeline and Reporting

Surveys will be conducted during the regulatory survey window (15 May – 15 August 2018). Data are summarized in a detailed report and submitted to the appropriate state



and federal agencies within a month of completing the survey. The detailed report includes the following:

- 1. Detailed description of the project, methods, results, and discussion/interpretation of results;
- 2. Explanation of any modifications from the original survey plan (e.g., altered survey locations or addition of survey locations due to changes in Project design);
- 3. Copies of datasheets that will describe in detail:
 - Survey locations (including a site diagram and coordinates) and set-ups;
 - Habitat (including roosting potential) adjacent to each survey location;
 - Date, name of biologist(s) conducting survey, duration of survey, and weather conditions at each location;
 - Species, time of capture, sex, weight, reproductive status, right forearm length, and Reichard's wing damage index score;
 - If applicable, results of radio-tracking and roost tree emergence counts;
- 4. Color photographs of listed bats captured, mist-net/acoustic detector set-ups, and bat roosts located during radio-tracking (if Indiana bat captured).

3.5 **Property Access (All Techniques)**

ESI's biologists may work only on properties where landowners or other competent authorities have granted access. If a bat that is targeted for radio telemetry is captured, ESI and the client will work to gain access to roost(s). Studies will be conducted only where landowners grant permission to do so. ESI uses radio-triangulation to estimate locations of bats roosting on inaccessible properties.

4.0 Request for Agency Concurrence

4.1 Request for Site-Specific Authorization to Proceed

Please consider this Study Plan a request for site-specific authorization to begin survey efforts.

4.2 Time of Clearing Restrictions

ESI seeks confirmation that trees within the Project Area may be cleared at any time of year without restriction, unless a federally listed bat roost is located in the Project vicinity by this or another project.



Mountain Valley intends to use the 4(d) rule published in the Federal Register on 14 January 2016 to facilitate ESA compliance relative to the northern long-eared bat. As such, ESI seeks concurrence that upon completion of the study, tree-clearing restrictions will only be applied to the Project as follows:

- Within 150 feet (46 m) of trees used by female or juvenile northern longeared bats during June and July;
- Within 0.25 mile (0.4 km) of a hibernacula known to previously contain northern long-eared bats;
- Within 5 miles (8 km) of a known or potentially suitable hibernacula (note that none are known) for the Indiana bat;
- Within 5 miles (8 km) of the point of capture for an Indiana bat for which roosting data are not available;
- Within 2.5 miles (4 km) of a known Indiana bat roost.

4.3 Period for Which Survey Results are Valid

We seek confirmation that results of the mist net survey remain valid for a period of two complete summer maternity seasons after the summer when the survey was completed.

5.0 Literature Cited

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- Broders, H. G., C. S. Findlay, and L. Zheng. 2004. Effects of clutter on echolocation call structure of *Myotis septentrionalis* and *M. lucifugus*. Journal of Mammalogy 85:273–281.
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- VDGIF. 2018. Special Status Faunal Species in Virginia. Virginia Department of Game and Inland Fisheries.



APPENDIX A FIGURES





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Map 1 of 16

- Proposed Centerline Proposed Access Road Survey Block National Hydrography Dataset (NHD) Stream ccaneechi iponi Sdtsa Meban 0.2 0.4 Kilometers 0.2 0 Base Map: ESRI "World Imagery (Clarity)"; accessed 7/10/2018 ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC. ESI





Map 3 of 16 Proposed Centerline Proposed Access Road Survey Block National Hydrography Dataset (NHD) Stream Eden oni Sdts Meban 0.2 0.4 Kilometers 0 02 Base Map: ESRI "World Imagery (Clarity)"; accessed 7/10/2018 ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC. ESI



Map 4 of 16

 Proposed Centerline Proposed Access Road Survey Block National Hydrography Dataset (NHD) Stream oni Sdts. Meban 0.2 0.4 Kilometers 0.2 0 Base Map: ESRI "World Imagery (Clarity)"; accessed 7/10/2018 ESI

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Map 5 of 16

 Proposed Centerline Proposed Access Road Survey Block National Hydrography Dataset (NHD) Stream oni Sdts Meban 0.4 — Kilometers 0 0.2 0.2 Base Map: ESRI "World Imagery (Clarity)"; accessed 7/10/2018 ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC. ESI



Map 6 of 16

- Proposed Centerline
- Proposed Access Road
- Survey Block
- National Hydrography Dataset (NHD) Stream





Map 7 of 16

- Proposed Centerline
- Proposed Access Road
- Survey Block
- National Hydrography Dataset (NHD) Stream





Map 8 of 16

- Proposed Centerline
- Proposed Access Road
- Survey Block
- National Hydrography Dataset (NHD) Stream





Map 9 of 16

- Proposed Centerline
- Proposed Access Road
- Survey Block
- National Hydrography Dataset (NHD) Stream





Map 10 of 16

 Proposed Centerline Proposed Access Road Survey Block National Hydrography Dataset (NHD) Stream 0.4 Kilometers 0 0.2 0.2 Base Map: ESRI "World Imagery (Clarity)"; accessed 7/10/2018

ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC.

ESI

Project No. 1219.02

ni Sdts

Meban



Map 11 of 16

 Proposed Centerline Proposed Access Road Survey Block National Hydrography Dataset (NHD) Stream ni Sdt Meban 0.4 — Kilometers 0 0.2 0.2 Base Map: ESRI "World Imagery (Clarity)"; accessed 7/10/2018 ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC. ESI



Map 12 of 16

 Proposed Centerline Proposed Access Road Survey Block National Hydrography Dataset (NHD) Stream Meban 0.2 0.4 Kilometers 0.2 0 Base Map: ESRI "World Imagery (Clarity)"; accessed 7/10/2018 ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC. ESI



Map 13 of 16

 Proposed Centerline Proposed Access Road Survey Block National Hydrography Dataset (NHD) Stream ni Sdts Meban 0.4 Kilometers 0 0.2 0.2 Base Map: ESRI "World Imagery (Clarity)"; accessed 7/10/2018 ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC. ESI



Map 14 of 16

Proposed Centerline Proposed Access Road Survey Block National Hydrography Dataset (NHD) Stream 0.2 0.4 Kilometers 0 0.2 Base Map: ESRI "World Imagery (Clarity)"; accessed 7/10/2018 ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC. ESI









Map 16 of 16

--- Proposed Centerline - Proposed Access Road Survey Block National Hydrography Dataset (NHD) Stream 0.4 — Kilometers 0.2 0 02 Base Map: ESRI "World Imagery (Clarity)"; accessed 7/10/2018 ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC. ESI

Meban









Map 1 of 10

- Proposed Centerline
- Proposed Access Road
- Survey Block
- National Hydrography Dataset (NHD) Stream







Map 3 of 10

- Proposed Centerline
- Proposed Access Road
- Survey Block
- National Hydrography Dataset (NHD) Stream





Map 4 of 10

- Proposed Centerline
- Proposed Access Road
- Survey Block
- National Hydrography Dataset (NHD) Stream





Map 5 of 10

- Proposed Centerline
- Proposed Access Road
- Survey Block
- National Hydrography Dataset (NHD) Stream





Map 6 of 10

- --- Proposed Centerline
- Proposed Access Road
- Survey Block
- National Hydrography Dataset (NHD) Stream





Map 7 of 10

- Proposed Centerline
- Proposed Access Road
- Survey Block
- National Hydrography Dataset (NHD) Stream







Map 9 of 10

- Proposed Centerline
- Proposed Access Road
- Survey Block
- National Hydrography Dataset (NHD) Stream







Proposed Centerline
Proposed Access Road

Map 10 of 10



APPENDIX B EXAMPLE DATA SHEETS



2018

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

ESI

HABITAT ASSESSMENT

Project #	#:	D	ate:			State:	C	county:	
Project I	Name:	S	ite Name	/#:		USGS Q	uad:		
Permitted	Biologist:	C	ther Field	Staff:		State Perm	nit #:		
	(full nar	ne)		(fu	ll name)	Federal Pe	rmit #:		
Net/Trap/	Net/Trap/		Latitude		Lor	ngitude	F	Picture #	Waypoint #
Detector	Detector #	0	,	"N	0	,	"W		
		0	3	"N	0	,	"W		
		0	3	"N	0	3	"W		
Distance	te elecent water e	°	,	"N	° 	,	"W		
Water sc	to closest water s	source (mete	ers):		туре	e of water so	ource:		
ESTIMA	IED WATER SOL	JRCE CHAF	RACTERI	STICS (IF U		S OR DETE	-CTOR):	
Bank Hei	ght:meter	s Channe	el Width: _	meter	rs Stream	Width:	meter	S	
Substratu	im:Bedrock	Boulder	Cobb	leGra	velSand	dSilt/C	lay		
Still Wate	er Present (Y/N):	Aver	age Wate	er Depth:	m or cm	Clarity (H,M	,L):	-	
VEGETA	TION:	/ 10 ///					<i>(</i> 1 0	(4.0)	
Dominan	t Canopy Species	(> 40 cm/16)	or abh)	Subdo	minant Canc	py Species	(< 40 c	cm/16° di	on)
<u> </u>									
Estimate	d dbh range: Lg:	Sm	:	Estima	ated dbh ran	ge: Lg:	Sr	n:	
Relative	abundance of dom	ninant vs. su	bdominar	nt (ratio):					
Estimate	d canopy closure:		C	losed	Modera	ate	Op	en	
Roost tre	e potential consis	ts of:	Н	ollow	Large [·]	Trees	Sna	ags	Neithe
M. sodal	s roost tree poten	tial is:	Н	igh	Modera	ate	Lov	V	
Roost po	tential comments:			0					
M. septe	<i>ntrionalis</i> roost tre	e potential is	s: H	iah	Modera	ate	Lov	N	
Roost po	tential comments:			.9					
Subcano	py clutter:		С	losed	Moder	ate	Op	en	
Subcano	py comprised larg	elv of:	0	ower Branc	Model		Op	olinae	Shruha
oubcarlo						py nees	0a	Jilliga	011003
Commor	Subcanopy Spec	les: _	· · · · · · · · · · ·						· · · · · · · · · · · · · · ·
Check all	that apply:	Recent		Forest	Cron/Pa	sture Land		Other	
Young	Upland Forest	Forest	Edge		Stream/	River			<u> </u>
Mature	Lowland Forest	Woodle	ot		Vernal F	Pool			
Young	Lowland Forest	Old Fie	eld		Deepwa	iter Lake/Po	nd		
Herbaced	ous Cover: Sp	oarse _	Modera	ite	Dense				

2018

HABITAT ASSESSMENT (continued)

Project #:	State/County:	Site Name/#:	Initials:
	SKETCH NETS and/or D	ETECTORS	
N			
Na			
AN			
¥			
LECEND			<u>e</u>
LLGLND			5
Net:			
Detector:			

ES

	-									-	WEALHE	R DAIA	-	
	7	BAT CAF	TURE	DATA				Time (xxxx h)	Ĕ	emp °C) (e	Wind Speed stimated – see ch	art) Cover	6 Cloud (estimated)	Comments
Proje	ct #:			Date:										
Proje	ct Name:			Site Name	:#/									
State				County:					_					
GPS	Unit #:			Camera #:			1							
Permit	tted Biologis	st:(full name	(e)	Other Field S	Staff:	(full name)								
State F	Permit #:			Federal Perr	nit #:									
Net	/Trap/ tector	Net/Trap/ Detector #		Latitude			ongitude		Length (m)	Height (m)	Time Up (xxxx h)	Time Down (xxxx h)	Picture #	Waypoint #
			0	r	N"	o	•	Μ.,				/ xxxxx/		
			o	ŕ	۲" N	o	5	M.,						
			o	•	N"	o	•	Μ.,						
			0	4	N"	o	•	Μ.,						
Net P	lacement	VSite Description:_												
Capt #	Net/ Trap	Sper	cies		Time A	ge Sex I/Jv) (M/F)	Repro.1	Wt (a)	RFA (mm)	Belly ² V (F/M/E)	Ving Index* (0-3)	Picture #	Comments # /Guano/Hair Sa	mple/Band #
1 Repro	oductive Con	idition: Female = NR/PG	//L/PL; Male	t = 1/4 (NR=h	Von-reproduct:	ive, PG=Pregna	nt, L=Lactatin	g, PL=Post-I	∫actating; ^=	Ascended test	tes, \downarrow Descende 1	estes)		30 P 0000
∠ r≡ru * Refei	ull, M=Moae r to table on i	srate, E=Empty אים האיל האים לאים לאים לאים לאים לאים לאים לאים ל												Page 1 of

Revised June 2017

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BAT CAPTURE DATA (continued)

Project #	#: 		Dat								
Project P	Name:		Site	Name/#:					Initia	s:	
Capt T	Vet/ rap	Species	Time	Age (Ad/Jv)	Sex (M/F)	Repro. ²	Wt (g)	RFA (mm)	Belly Wing I (F/M/E) (0-	ndex* 3)	Comments Picture # /Guano/Hair Sample/Band #
	-			-			2	-	-		-
Wind Speed	Decription	Visibla Condition							Score		Description
(hdm)									0	No damage.	-ewer than 5 small scar spots are present on the membranes.
0 7	Calm Licht Air	Smoke rises vertically Dimotion of wind shown by smolo but not by wind	00007							Light damage	 Less than 50% of flight membrane is depigmented (splotching), visible only with translumination
47	Light Breeze	Wind felt on face; leaves rustle; ordinary wind van-	e moved by wir	p					-	Moderate dar	nage. Greater than 50% of wing membrane covered with scar tissue
8-12	Gentle Breeze	Leaves and small twigs in constant motion; wind e	xtends light fla	D						(splotching). S	scarring is visible without translumination. Membrane exhibits some
13-18	Moderate Breeze	Raises dust and loose paper, small branches are in	moved						~	he flaking and	e and possibly few small holes (<0.5 cm diameter). Forearm skin may discolared along the maintity of the forearm
25-31	Strong Breeze	Large branches in motion: telephone wires whistle	; umbrellas use	er ed with difficulty					J	Heavy damag	je. Deteriorated wing membrane and necrotic tissue. Isolated holes
32-38	Moderate Gale	Whole trees in motion; inconvenience in walking a	gainst wind						۳ 	>0.5 cm are p	resent in membranes. Necrotic or receding plagiopatagium and/or
39-4D	Fresh Gale	Breaks twigs off trees; generally impedes progress	~		٦				>	ייאוקאייאליייו	are evident.

Revised June 2017

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2018



BAT TRANSMITTER DATA

Project #:	Date:		Site Name/#:		
Project Name:_			Camera #:		
State:	County:		Picture #:		
Bat Species:			Capture Time:		
Permitted Biologis	t:		Other Field Staff:		
	(full	name)		(fu	ll name)
State Permit #:	,,,,,,,		Federal Permit #:		
Age Ad or Jv	Sex M or F	Reproduct F=(NR/PG	ive Condition /L/PL; M=↑/↓	Wt (g)	RFA (mm)
Transmitter weight = Transmitter + bat to	= grams tal weight =	Frec	uency number:		
 FINAL CHECK: 1) Transmitter 2) Signal received 3) Band attach 4) Condition or 5) Description 	attachment (Y/N): ving (frequency): ment (Y/N): f animal: of release:				
RELEASE TIME	: тс	OTAL HOLD TIN	IE:minu	utes	
RELEASE LOCA	ATION:				
COMMENTS:					

|--|

MOBILE TELEMETRY DATA

Project #:			Date:_	· · · · · · · · · · · · · · · · · · ·	State	: C	County:
Project Name:		GPS U	GPS Unit #:				
Permitted Biolog	gist:(full name)	Other Fi	eld Staff:(full na	ame)	State Perm Federal Pe	it #: rmit #:
Frequency	Sex	Age	Repro. Condition	Capture Site	Сар	oture Date	Day of Search (1 st , 2 nd , 3 rd , etc.)
Start Time:			Ending Milea	ge:	1		
End Time:			Starting Milea	age:		_	
Total Effort (h	nours):		Total Mileage	e:		_	
Antennas:	Yagi		Directiona	alBoth	n		
NOTE: Rec	ord coo	rdinates	s as often as	possible (at int	tersec	tions and v	when you stop).
Location (road or river name, etc.)		er	Latitude	Longitud	е	Comments	e (Bat frequency – if detected)



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Page___of___

MOBILE TELEMETRY DATA (continued)

Project #:	Date:	State :	County:	Initials:
Location (road or i name, etc.)	river La	atitude	Longitude	Comments (Bat frequency – if detected)



ROOST TREE DATA

Page ____ of ____

Project #:	Project I	Name:		Date:_		State:	Co	unty:
GPS Unit #:	Waypoi	nt:		Came	ra #:	Pi	cture #:	
Permitted Biologist:			Other Field St	aff:		State Per	mit #:	
	(full name)			(ful	name)	Federal P	Permit #:_	
Latitude:°	,	"N	Longitude:	°	,	_"W		
Bat Species:				Sex(M/F):		Age(Ad/Jv):		Repro.:
Capture Date:				Capture S	ite:			
Frequency:				Roost Na	me/#:			_
ROOST TREE DATA	<u>A</u>				dbl	n: cm		
Estimated height from	m ground t	o roosi	t:	(meters)	Tre	ee height		_ (meters)
Exfoliating bark (%):		Dista	nce from cap	ture site:		m or km (cir	cle one))
Tree health:		Liv	'e	Dea	d		Partial	
Observed roost pote	ntial:	Ex	foliating Bark	Cra	cks/crev	asses	Hollow	Unknown
Bat vocalizations:		Ye	S	No				
Guano on ground/fol	iage:	Ye	S	No				
Is guano fresh (if pre	sent)?:	Ye	S	No				
Guano volume (if pre	esent):							
DESCRIPTION OF	SURROUN	DING	HABITAT					
Dominant Canopy S	pecies (> 4	↓0 cm/′	l6" dbh)	Subo	lominar	nt Canopy Spe	cies (< 4	40 cm/16" dbh)
Estimated dbh range	e (cm): Lg		Sm:	Estin	nated d	bh range (cm)	: Lg:	Sm:
Estimated canopy clo	osure at ro	ost:	%					
Slope:Ste	epI	Nodera	teSligh	t <u>Non</u>	e Slo	ope aspect:		
Subcanopy Clutter:		Close	dMoo	derate		_Open		
Distance to nearest	water sour	ce:	m or k	۲ (circle oi	ne)	Distance to ne corridor:	earest flig _meters	ght
Habitat Description:_								
Check all that apply: Mature Upland For Young Upland For Mature Lowland For Young Lowland For Comments:	rest rest orest prest	Recen Pine P Woodl Old Fie	tly Logged Fo lantation ot/ForestEdgo eld	orest(eF	Crop/Pa Stream/I Emergel Forested	sture Land _ River _ nt Wetland _ d Swamp _	Shrub Verna Deepv Other	/scrub Swamp I Pool vater Lake/Ponc


Figure 38

Stage 4 Loose bark

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ROOST	TREE	DATA ((continued)
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of Page

	ROOST TREE DATA (continued)) Page of	
State/County:	·····	Project Name/#:			Date:
Frequency:	equency: Roost Name/#:			Initials:	
N	S	ketch: Roos	st Tree Habita	it	
Comments: Stages of Decay:					Sketch: Roost Tree

Stage 8 Down material



Page ____ of ____ ROOST TREE EMERGENCE DATA

Project #:	Date: State:		County:		
Project Name:		GPS Unit #:_	Waypoint:		
Permitted Biologist:	_ Other Field Staff:	(full name)	State Permit #:		
(iui name)		(iuii name)	Federal Permit #:		
Latitude:°'N	Longitude:°_	"W			
Roost Name/#:			-		
Radio-tagged bat present in t	ree: Yes No				
Complete the following information on	ly if a radio-tagged bat is	s present in the ro	post		
Bat species:	Sex(M/F):	Age(Ad/Jv)	: Repro:		
the roost to observe all exiting bats, b roost and do not make unnecessary n Arrival time: Depar	but not close enough to ir oise and/or conversation	and minimize us Total bats:	ice (do not stand directly beneath the se of lights).		
Emergence Time	Number of E	Bats	Emergence Aspect		

Describe emergence: Did bats emerge simultaneously, fly off in the same direction, loiter, circle, disperse, etc. What time did the transmittered bat(s) emerge? What direction did the transmittered bat fly?

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Page ____ of ____

ROOST TREE EMERGENCE DATA (continued)

Project #: Frequency:	Project name: Roost #:				
Emergence Time	Number of Bats	Emergence Aspect			



ENVIRONMENTAL SOLUTIONS & INNOVATIONS, INC.

1341 Old Freedom Road, Suite 202 Cranberry Township, PA 16066 Phone: 513-451-1777 Fax: 513-451-3321

Via UPS

31 August 2018

Mr. John Ellis U.S. Fish and Wildlife Service Raleigh Field Office 551F Pylon Drive Raleigh, NC 27606 Mr. Vann Stancil North Carolina Wildlife Resources Commission 1701 Mail Service Center Raleigh, NC 27699

Dear Environmental Managers:

RE: Mountain Valley Pipeline, LLC, Southgate Project Freshwater Mussel Study Plan

This letter transmits one bound hard copy of the following Study Plan: Freshwater Mussel (Unionidae) Habitat Assessments and Surveys Along the Proposed Mountain Valley Pipeline Southgate Project in North Carolina.

Through submittal of this Study Plan, ESI requests concurrence with the methods and levels of effort for the Project herein, and site-specific authorization from USFWS and NCWRC to conduct proposed survey activities. Thank you.

Sincerely,

Sm O

Stephanie Frazier Project Manager <u>sfrazier@envsi.com</u> Office: 513-591-4335

Enclosures

cc: Megan Stahl, MVP Southgate Alex V. Miller, MVP Southgate

www.ENVSI.com

Pesi 1219.04

STUDY PLAN:

FRESHWATER MUSSEL (UNIONIDAE) HABITAT ASSESSMENTS AND SURVEYS ALONG THE PROPOSED SOUTHGATE PROJECT IN NORTH CAROLINA

31 August 2018

Submitted to:

Mr. John Ellis U.S. Fish & Wildlife Service Raleigh Field Office 551F Pylon Drive Raleigh, NC 27606 Mr. Vann Stancil North Carolina Wildlife Resource Commission 1701 Mail Service Center Raleigh, NC 27699

Prepared for:



Prepared by:



Environmental Solutions & Innovations, Inc.

4525 Este Avenue Cincinnati, Ohio 45232 Phone: (513) 451-1777 Fax: (513) 451-3321 Stow, OH • Indianapolis, IN • Orlando, FL • Springfield, MO • Pittsburgh, PA • Teays Valley, WV

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1.0 Introduction

1.1 **Project Description**

Mountain Valley Pipeline, LLC ("Mountain Valley") is seeking a Certificate of Public Convenience and Necessity ("Certificate") from the Federal Energy Regulatory Commission (FERC) pursuant to Section 7(c) of the Natural Gas Act to construct and operate the MVP Southgate Project ("Project"). The Project will be located in Pittsylvania County, Virginia and Rockingham and Alamance counties, North Carolina (Figure 1). Mountain Valley proposes to construct approximately 72-miles of 24-inch-diameter natural gas pipeline, known as the H-650 pipeline, to provide timely, cost-effective access to new natural gas supplies to meet the growing needs of natural gas users in the southeastern United States. Subject to receipt of the required permits and regulatory approvals, Mountain Valley anticipates construction of the Project to commence in spring of 2020.

The proposed Project will interconnect with and receive gas from the existing Mountain Valley Pipeline near Chatham, Virginia, and the East Tennessee Natural Gas, LLC., mainline near Eden, North Carolina, and will deliver gas to connections with customers' existing facilities in Eden and Graham, North Carolina. The Project is a stand-alone project from the Mountain Valley Pipeline and has an expected in-service date of late 2020. In addition to the H-650 pipeline, Mountain Valley proposes to construct and operate two new compressor stations at milepost (MP) 0 in Pittsylvania County, VA, and near MP 26 in Rockingham County, NC, and four interconnects near MPs 0, 28, 30 and 72. Meter stations and other ancillary facilities required for the safe and reliable operation of the pipeline are also included.

To the extent practicable, Mountain Valley has routed the new pipeline parallel to existing corridors. As currently proposed, the pipeline collocated with existing utility corridors, trails, and roads for approximately 47 percent (34 miles) of the proposed alignment. The Project limits-of-disturbance include a 100-foot-wide right-of-way, consisting of 50-foot temporary and 50-foot permanent easements; where feasible, the right-of-way will be necked down to 75 feet at resource crossings. Access roads are 25 feet wide for permanent and temporary use. Additional temporary workspaces, laydown and contractor yards are also anticipated.

As the lead agency, the FERC will conduct a full review of the Project under its regulations in compliance with the Natural Gas Act and the National Environmental Policy Act; information on the Project can be found by reviewing FERC Docket No. PF18-4-000 or via the Project website at http://www.mvpsouthgate.com/.





1.2 Regulatory Setting

The Federal Endangered Species Act of 1973 (ESA) [16 U.S.C. 1531 et seq.] provides for the listing, conservation, and recovery of endangered and threatened species of plants and wildlife. Under the ESA, the U.S. Fish and Wildlife Service (USFWS) is mandated to monitor and protect listed species. Many states enacted similar laws.

The North Carolina Wildlife Resource Commission (NCWRC) administers the North Carolina Endangered Species Act (ESA) (ST § 113 -331-350; 1987). NCWRC defines an endangered species as any native or once-native species of wild animal whose continued existence as a viable component of the state's fauna is determined by NCWRC to be in jeopardy or any species of wild animal determined to be an "endangered species" pursuant to the federal ESA. This statute empowers the NCWRC to list species and outlines criteria for species listing and protection.

The NCWRC protects approximately 40 freshwater mussel species under the State Endangered Species Act including seven that are federally endangered and regulated by the USFWS. Freshwater mussel surveys (with detailed habitat mapping) and relocations (if necessary) are completed in accordance with standard mussel sampling protocols similar to those implemented in other states (e.g., Virginia and West Virginia).

1.3 Mussel Species

The proposed Project traverses watersheds known to harbor state and federally listed species such as federally endangered James spinymussel (*Parvaspina collina*) found within streams of the Dan River system. Several other North Carolina listed freshwater mussel species may potentially occur in various watersheds along the Project such as: state endangered Atlantic pigtoe (*Fusconaia masoni*), state endangered yellow lampmussel (*Lampsilis cariosa*), state endangered green floater (*Lasmigona subviridis*), state endangered Carolina creekshell (*Villosa vaughaniana*), state endangered eastern creekshell (*Villosa delumbis*), state threatened eastern lampmussel (*Lampsilis radiata*), state threatened creeper (*Strophitus undulatus*), and state special concern notched rainbow (*Villosa constricta*).

1.4 Agency Correspondence

On July 3, 2018, Mountain Valley held a call with NCWRC and USFWS to address state and federally listed species concerns along the proposed Project in North Carolina. USFWS and NCWRC reviewed the proposed Project alignment and identified three streams (i.e., Dan River, Cascade Creek, and Wolf Island Creek) where instream impacts should be avoided (i.e., HDD, directional bore) because of the potential presence of federally endangered James spinymussel or Roanoke logperch (*Percina rex*). Additionally, instream impacts to tributaries within 0.5 mile of the three aforementioned streams should also be avoided.



On August 10, 2018, NCWRC provided comments on the Project alignment to identify locations for aquatic surveys (Appendix A). NCWRC recommended surveys in nine streams within the Dan River basin and an additional eight streams in the Haw River basin (Table 1). If the Project alignment traverses any stream (listed in Table 1) numerous times, then each crossing location should be surveyed; as well as any new stream crossings traversed along alignment alterations. NCWRC identified Deep Creek (Alamance County) and Cascade Creek as waterbodies known to support rare, threatened, and endangered (RTE) mussels; specifically records of eastern lampmussel in Deep Creek. Wolf Island Creek was also identified for its high quality aquatic community, and is known habitat for the federally endangered Roanoke logperch. NCWRC recommended the Project avoid instream impacts at these waterbodies.

The August 10, 2018 letter from NCWRC indicated that targeted fish surveys were not required for the Project, however, any state listed, federal listed, or species of greatest conservation need as listed in the 2015 NC Wildlife Action Plan encountered during surveys should be noted.

2.0 Methods

Mussel surveys (with detailed habitat mapping) follow guidance provided by NCWRC and USFWS – Raleigh Field Office (Appendix A). Mussel collections will be supervised by individuals who have attended the Freshwater Mussels of Eastern NC Identification Workshop (see Appendix B for resumes).

2.1 Desktop Review

A detailed GIS desktop analysis is completed to identify potential freshwater mussel occurrences along the currently proposed Project alignment. The desktop analysis is an ongoing process and is updated as new alignments or route variations occur. Waterbodies traversed by the Project (including access roads and alternatives) are identified and assessed for their potential to support Unionid mussels including watershed size (upstream drainage), stream order (Strahler), stream type (i.e., ephemeral, intermittent, or perennial) with topographic map confirmation, existing available mussel distribution data, and correspondence with USFWS and/or NCWRC.

2.1.1 Dan River Basin

In the Dan River basin, nine streams were identified by NCWRC (i.e., Strahler stream order 1:24,000 scale) where multiple stream crossings are proposed along samenamed streams. Based on the current alignment and NCWRC recommendations, 13 crossings of the Dan River warrant mussel surveys.



2.1.2 Haw River Basin

NCWRC recommended surveys along eight streams in the Haw River basin including four unnamed tributaries of the Haw River. Mussel surveys are anticipated in first order and greater perennial stream crossings within the Haw River basin.

In total, surveys are anticipated at 17 streams (several with multiple crossings) along the current proposed Project in the Dan and Haw river basins (Table 1). At present, freshwater mussel surveys are not anticipated in any other tributaries or watersheds (not previously identified).

2.2 Freshwater Mussel Surveys

Mussel occupancy surveys are completed at streams identified during desktop analysis. Preliminary, qualitative mussel survey efforts are conducted from bank to bank and extend 100 meters upstream and 300 meters downstream of the area of direct impact (ADI) at each crossing. The Project ADI is anticipated at 30 meters. The total stream length where surveys are anticipated to occur measures 430 meters in length. Qualitative surveys are conducted using timed search survey cells delineated at 20-meter intervals along the thalweg. Detailed habitat maps are georeferenced and delineated by stream morphology (i.e., pools, riffles, and runs) based on water depth, velocity, and substrate. Additionally, beaver (*Castor canadensis*) activities are noted and resultant impounded stream sections are delineated as encountered. Impounded stream sections are not surveyed.

Depending on water depth, snorkeling (<1 meter deep) or scuba/surface supply air (>1 meter deep) are used to survey for mussels. Surveyors use their hands and fingertips to fan the top level of substrate and rake loose sediments to search for embedded mussels. Surveyors overturn large flat rocks and search beneath them where mussels could reside. Location, species counts, survey method (i.e., snorkel, scuba, surface supply), and search efforts are recorded. Live mussels are identified to species (to maximum extent possible), morphometrically processed, and returned to the stream. Representative deadshell material is also identified (when possible) and may be retained for specimen vouchers.

Stream crossings that yield live mussels will require further agency coordination. A second mussel survey effort (i.e., removal effort) may be warranted prior to instream disturbance.

As requested by NCWRC, state listed, federal listed, or species of greatest conservation need as listed in the 2015 NC Wildlife Action Plan encountered during surveys will be noted.



Table 1. Desktop review	i of stream crossings p	potentially supporting	g freshwater mussel	I resources along the	MVP Southgate
Project in North Carolina	a.				

		Mile			Drainage		
River Basin	County Name	Post	Stream ID	Waterbody Name	Area (km ²)	Latitude	Longitude
Dan	Rockingham	27.5	S-A18-42	Cascade Creek	77.8	36.52716	-79.64612
Dan	Rockingham	27.7	S-A18-40	Cascade Creek	93.7	36.52542	-79.64788
Dan	Rockingham	30.2	S-A18-17	Dan River	110.9	36.49716	-79.67610
Dan	Rockingham	30.9	S-A18-52	Rock Creek	8	36.48979	-79.68426
Dan	Rockingham	31.1	S-A18-52/ AS-A18-52	Rock Creek	2.9	36.48697	-79.68537
Dan	Rockingham	31.4	S-B18-95	Rock Creek	2.7	36.48337	-79.68671
Dan	Rockingham	32.2	S-A18-147	Machine Creek	2.4	36.47513	-79.69789
Dan	Rockingham	32.7	S-A18-151_A	Town Creek	28	36.46950	-79.70279
Dan	Rockingham	33.1	S-A18-151_B	Town Creek	27	36.46526	-79.70324
Dan	Rockingham	38.8	S-A18-8	Wolf Island Creek	49	36.40391	-79.64681
Dan	Rockingham	41.2	S-B18-56	Lick Fork	3.3	36.37758	-79.62498
Dan	Rockingham	43.3	S-A18-176	Jones Creek	11.5	36.35157	-79.61164
Dan	Rockingham	47.0	S-C18-76/ AS-C18-76	Hogans Creek	16	36.30560	-79.58791
Haw	Rockingham	48.7	S-A18-60	Giles Creek	0.9	36.28842	-79.57146
Haw	Rockingham	50.9	AS-NHD-305	UNT Haw River	2.4	36.26430	-79.55023
Haw	Alamance	52.8	S-B18-94	UNT Haw River	0.7	36.24187	-79.53111
Haw	Alamance	53.7	S-A18-84	UNT Haw River	0.03	36.22968	-79.52740
Haw	Alamance	58.7	S-C18-11	UNT Haw River	3	36.17242	-79.48576
Haw	Alamance	63.6	S-B18-16*/ AS-B18-16	Stony Creek	137	36.14646	-79.41138
Haw	Alamance	64	AS-NHD-1547	Deep Creek	23	36.14637	-79.40435
Haw	Alamance	67.1	AS-NHD-1558	Boyds Creek	12	36.11678	-79.3726



3.0 Schedule

The Project is currently in the planning stages and the mussel survey schedule is dependent on the progress of the Project permitting and construction schedule. Mussel survey efforts in the Dan and Haw River drainages will be conducted in 2018 and upon written receipt of Study Plan concurrence (i.e., letter or email) from the USFWS Raleigh Field Office and NCWRC.

4.0 Reporting

ESI will prepare a comprehensive report at the end of the year including the results of all freshwater mussel surveys performed and observations of fishes along the Project for submission to NCWRC and USFWS. Reports follow a scientific format and include a description of the regulatory setting requiring the field studies, background information on the Project location, survey methods, habitat mapping, results, and discussion. The text of this report is augmented with GIS maps where appropriate, copies of field data sheets, and representative photographs.

5.0 Agency Coordination

Appropriate NCWRC and USFWS personnel will be contacted prior to commencing survey activities within specific river drainages. Prior to conducting surveys in the Dan River Basin, T.R. Russ, the NCWRC Foothills Region Aquatic Wildlife Diversity Coordinator will be contacted with dates of surveys. Any state-listed species encountered will be reported to NCWRC. Should the Project route change to include additional crossings, the Project will consult with USFWS and NCWRC to determine if additional surveys are recommended.

In the event a federally threatened or endangered species is encountered, USFWS-Raleigh and NCWRC will be notified within 24 hours via phone or email. A GPS coordinate will be recorded at the exact capture location. At the time of capture, the mussel will be photographed, and measured before being returned to the water at the exact capture location.



6.0 Requests for Agency Concurrence

Please consider this Study Plan a request for authorization to address mussel-related concerns along the length of the Project in North Carolina.

In summary, ESI seeks concurrence from the NCWRC and USFWS (Raleigh Field Office) for the following:

- Approval to commence mussel surveys at all streams identified in Table 1 along the Project route in 2018.
- Confirmation that results of survey data collected on a specific site will be considered valid for two years from the date the survey was conducted.



APPENDIX A CORRESPONDENCE





⊟ North Carolina Wildlife Resources Commission

Gordon Myers, Executive Director

MEMORANDUM

- TO: Megan Stahl, Permitting Coordinator MVP Southgate
- FROM: Vann Stancil Research Coordinator Habitat Conservation Division
- DATE: August 10, 2018
- SUBJECT: Comments on proposed route and species surveys for MVP Southgate Project, Rockingham and Alamance counties.

Biologists with the North Carolina Wildlife Resources Commission (NCWRC) have met with representatives of the MVP Southgate Project and have reviewed the proposed project description. Comments are provided in accordance with provisions of the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661-667e), North Carolina Environmental Policy Act (G.S. 113A-1 through 113A-10; 1 NCAC 25) and North Carolina General Statutes (G.S. 113-131 et seq.).

The MVP Southgate Project is an interstate natural gas pipeline project that will extend approximately 72 miles from Pittsylvania County, Virginia to delivery points in North Carolina. Approximately 46 miles of the pipeline will traverse the Dan and Haw river basins in Rockingham and Alamance counties. The project will terminate in Alamance County on the east side of the Haw River between Graham and Swepsonville. The applicant has provided detailed information on the current proposed pipeline route and has requested information to guide aquatic and terrestrial surveys for this project. Page 2

August 10, 2018 MVP Southgate

The NCWRC has reviewed the MVP Southgate route. In general, we have identified locations where impacts can be lessened by reducing the number of stream crossings, following existing rights-of-way (ROW), reducing fragmentation of forested blocks, and reducing impacts to riparian zones. Locations of stream crossings are based on GIS stream layers; on-the-ground surveys may reveal that actual stream locations differ from what is shown on maps. We have the following specific concerns and recommendations about the current pipeline route:

Rockingham County

- The route crosses Cascade Creek in NC beside an existing utility ROW that is cleared along the riparian zone. There are records for the Federal Endangered Roanoke Logperch and other rare aquatic species in the North Carolina portion of Cascade Creek. Given the high quality of the aquatic community in Cascade Creek, we recommend that horizontal directional drilling (HDD) or conventional bore be used to cross this waterbody.
- The route crosses Rock Creek three times near its confluence with the Dan River and the route does not follow the existing ROW. Following the existing ROW would result in one creek crossing and less forest fragmentation. We recommend that the route be modified to reduce forest fragmentation so that Rock Creek is only crossed once, preferably along the existing ROW.
- Town Creek is crossed twice, the southern crossing is not along the existing ROW. If the MVP Southgate route followed the existing ROW, it would still cross Town Creek twice, but forest fragmentation would be reduced. Another alternative is to move the route farther east and avoid crossing Town Creek altogether, but this option could result in more forest fragmentation.
- There is an intermittent stream in the Town Creek watershed located between SR 1978 and SR 1979. The MVP Southgate route crosses it five times, as does the existing ROW. Four of the five current crossings are shared with the existing ROW. The route could be modified slightly to reduce the number of crossings from five to three. At the southernmost crossing of this intermittent stream, the pipeline diverges from the existing ROW and crosses a forested area north of SR 1980 and west of SR 1979. The proposed route continues to cross a forested block between SR 1982 and SR 1941 before it eventually reconnects with the existing ROW prior to crossing Wolf Island Creek. The preferred route would be to continue co-location with the existing ROW in this area.
- The pipeline route crosses an unnamed tributary to Wolf Island Creek two times on the north side of the Wolf Island Creek crossing. The Piedmont Land Conservancy controls an easement for a parcel on the west side of the unnamed tributary near the pipeline

location. The route could be modified to reduce the number of crossings along this unnamed tributary. There are records for the Federal Endangered Roanoke Logperch and other rare aquatic species in Wolf Island Creek. Given the high quality of the aquatic community in Wolf Island Creek, we recommend that HDD or conventional bore be used to cross this waterbody.

- The proposed route deviates from the existing ROW and crosses a forested area spanning from U.S. Highway 158 south to Daisy Drive east of Reidsville. Forest fragmentation could be reduced if the route followed the existing ROW on the west side to SR 2579. This could also shorten the length of the route.
- Forest fragmentation could also be reduced by following the existing ROW near the SR 2588 crossing.
- East of Williamsburg between SR 2571 and NC Highway 150, the pipeline crosses a large forested area with intermittent agricultural lands, Hogans Creek, and its unnamed tributaries. We prefer the pipeline to be co-located with the existing ROW.

Alamance County

- The pipeline crosses a forested area located south-southwest of SR 1594 and northwest of SR 1595 near Burlington. Forested fragmentation could be reduced by continuing to collocate the line southward until the existing east-west ROW (36.16604 N, -79.48789 W) and co-locate the line with the existing ROW eastward to SR 1595. Alternatively, the pipeline could extend to the southernmost end of the agricultural field south of the pond (36.1745 N, -79.48869 W), then continue south-southeast to SR 1595.
- After crossing SR 1598, the proposed route deviates from the existing ROW. The proposed pipeline is also only 700 feet south of a NC Division of Mitigation Services easement. A new pipeline corridor south of the mitigation project may reduce the effectiveness of the mitigation project. Forest fragmentation could be reduced if the route followed the existing ROW across SR 1601. This could also shorten the length of the route.
- There are records for Eastern Lampmussel (*Lampsilis radiata*) in Deep Creek upstream from the proposed crossing location. Therefore, we recommend that HDD or conventional bore be considered for crossing this waterbody.

- The Stony Creek Natural Heritage Natural Area occurs near the pipeline centerline on the east side of Stony Creek Reservoir. We recommend stringent erosion and sedimentation controls if the pipeline route remains close this natural area.
- The proposed route bisects a large forested block where it crosses Boyds Creek. Alternative routes may reduce forest fragmentation.
- The proposed route is within 250' of the Haw River south of US 70 and also north of I-40. The route is within 150' of the Haw River south of I-40 and within 200' north of NC 54 near the end of the route. We recommend examining alternative routes farther east that will be located farther from the Haw River. If alternative routes are not practical, when the route parallels the Haw River, it should be located farther away from the river to maintain the riparian zone and reduce forest fragmentation.

NCWRC offers the following comments regarding aquatic surveys:

- NCWRC requests freshwater mussel surveys for the following streams in the Dan River basin: Cascade Creek, Dan River, Hogans Creek, Jones Creek, Lick Fork Creek, Machine Creek, Rock Creek, Town Creek, and Wolf Island Creek. Please notify T. R. Russ, Foothills Region Aquatic Wildlife Diversity Coordinator (<u>thomas.russ@ncwildlife.org</u>, 928-803-6035), of the dates when sampling will occur in Dan River basin waterbodies.
- In the Haw River basin, freshwater mussel surveys should be conducted in all perennial streams first order and higher. Using the current route shapefile, this would include Boyds Creek, Deep Creek, Giles Creek, Stony Creek, and 4 unnamed tributaries to the Haw River. Using the current shapefile, these 4 unnamed tributary crossings are located at 36.17242, -79.48576; 36.22968, -79.5274; 36.24187, -79.53111; and 36.2643, -79.55023.
- If the pipeline route crosses one of these streams more than once, surveys should be conducted at each crossing location. If the current proposed route changes to include new stream crossings, additional sites may require surveys.
- Preliminary mussel surveys are needed to determine appropriate pipeline crossing methods and crossing locations. If any live mussels are collected, a second mussel survey will be needed prior to pipeline installation to relocate mussels that may be impacted by pipeline construction activities.

- Preliminary mussel surveys should extend 100 meters upstream and 300 meters downstream of the proposed crossing location.
- Habitat data, depth, substrate, habitat type (riffle, run, pool) should be mapped for each survey reach. Survey reaches should be divided into 20-meter sections to better determine areas of high mussel densities for crossing locations.
- Surveys for the Greensboro Burrowing Crayfish, *Cambarus catagius*, should be conducted in work areas within 200 ft of any mapped stream, both intermittent and perennial in the Haw River basin. Effort should cover all areas which will be excavated (i.e., for pipeline burial) as well as 25 feet on either side to allow for equipment space. Work pads for HDD access and conventional boring should also be included, along with any other areas where ground disturbance may lead to crayfish mortality through burrow destruction and crushing. If there are signs of burrowing crayfish activity (holes), burrows should be investigated, and inhabitants relocated.
- The Greensboro Burrowing Crayfish has been found in all types of soils from sandy loams to hard clay and burrows are not usually directly associated with any drainage or stream flow (McGrath 1994). The species has never been found in any flowing water. The full extent of its distribution in this watershed is unknown due to lack of targeted surveys. Please notify Brena Jones, Central Aquatic Wildlife Diversity Coordinator (brena.jones@ncwildlife.org, 919-707-0369), if any Greensboro Burrowing Crayfish are located.
- For burrowing crayfish surveys, we recommend using a device called a Yabby Pump to remove the crayfish from its burrow. This devise is far less invasive and labor-intensive than excavating burrows. We can provide additional information on the device, including photos and demonstrations, as needed.
- We recommend conducting burrowing crayfish surveys during winter months when burrows are more likely to be visible and water tables are typically higher. Collected crayfish should be identified, photographed, and relocated to suitable habitat nearby that will not be impacted by pipeline construction activities.
- No targeted surveys for Greensboro Burrowing Crayfish are needed in the Dan River basin; this endemic species is only known from the upper Cape Fear and a portion of the Yadkin-Pee Dee basins. However, if any crayfish burrows or tunnels are observed in the Dan River basin tributaries, they should be surveyed using the techniques described for Haw River basin surveys.

- Stream crayfish surveys should be conducted in all first to third order streams in the Dan and Haw river basins. These surveys should include 20 kicks into a seine approximately 8 feet wide. The area upstream of the seine should be disturbed by flipping rocks or kicking under banks or root wads to dislodge crayfish. The primary purpose of these surveys is to determine abundance and distribution of the Carolina Ladle Crayfish, *Cambarus davidi*, but other crayfish species may also be encountered. Collected crayfish should be identified, photographed, and enumerated. Seining effort should be spaced to include the 400-meter mussel survey area that extends above and below the proposed crossing location.
- No targeted fish surveys are necessary, but any state listed, federal listed, or Species of Greatest Conservation Need (SGCN) as listed in the 2015 NC Wildlife Action Plan that are encountered during surveys for freshwater mussels or crayfish should be denoted.
- If temporary dams are used for stream crossings, any aquatic species (fish, crayfish, mussels, reptiles and amphibians) found within the temporary dam footprint and dewatered area should be removed and relocated to suitable habitat away from the construction area.

NCWRC offers the following comments regarding surveys for terrestrial species:

Bats

NCWRC received the revised study plan for bat surveys dated 23 July 2018. We concur with the presence/probable absence survey methodology as described within the bat survey plan. However, we recommend the following changes and/or additions to the proposed survey sites, if landowner access is feasible:

- NC-SB01 Map 1: Shift the survey block south approximately 0.3 km to include the creeks (Dry Creek and unnamed tributaries) that flow into the Dan River. In this area, Dry Creek and its unnamed tributaries flow through a large forested area.
- NC-SB04 Map 5: Include forested area above this block near TA-RO-105.
- NC-SB06 Map 7: Area north of this block seems less fragmented and potentially better habitat, especially on the west side of the pipeline ROW. Consider adding a survey block or extending the survey block to include this area.

- NC SB08 Map 8 & 9: There is more forested habitat and less agriculture north of TA-RO-140 to about TA-RO-133 than seen in the current survey block. Consider adding or substituting this area for NC SB08.
- NC SB15 Map 15 & 16: Some of the industrial/highway areas in this block could be omitted. Consider starting the survey block around Stone Street/NC HWY 1935 and extend it farther south towards the end of the line. This would provide more options for good net sites, especially along the Haw River and its tributaries.

In the study plan, ESI requests concurrence that the project area may be cleared at any time of the year without restriction unless a federally-listed bat roost is found in the project vicinity. NCWRC prefers the avoidance of mature tree clearing activities during the maternity roosting season (May 15 – August 15), if ESI finds state-listed bat species.

Reptiles and Amphibians

Jeff Hall, the Reptile and Amphibian Conservation Biologist for NCWRC, has requested a desktop review of the MVP Southgate pipeline corridor to identify potential suitable habitat for four-toed salamanders and mole salamanders. Jeff Hall will review the findings and identify a subset of potentially suitable habitats to be surveyed for these salamander species.

Birds

Co-locating of the proposed pipeline with other linear projects reduces the fragmentation of forests. Many forest birds that breed in North Carolina are sensitive to habitat patch size. As patch size decreases and more edges are created, nest parasitism and nest predation increase. Fragmentation also impacts important ecosystem function, such as decreased forest biomass and nutrient cycling, thereby reducing abundance, biodiversity, persistence, and movement of wildlife (Haddad et al. 2015). The effects of fragmentation increase over time and the smaller and more isolated fragments are impacted most (Haddad et al. 2015). To reduce impacts of forest fragmentation on birds, we recommend limiting the number of large forested patches bisected by the pipeline.

Migratory birds and their eggs are protected from "take" by the Migratory Bird Treaty Act of 1918. Therefore, we recommend avoiding any clearing activities during the migratory bird nesting season, roughly March to August, or conduct surveys for active nests prior to construction to avoid "taking" migratory birds, which includes wounding or killing. We recommend surveys for active colonial nesting birds (i.e., rookery) and bald eagle nests within 0.5 miles of the pipeline corridor. Aerial surveys for bald eagle nests and colonial nesting birds should be conducted during winter months when deciduous trees have shed their leaves. If

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active rookeries are located, construction activities should not occur within 0.5-mile of each rookery from February 15 - July 31. Therefore, any construction activities begun prior to February 15th should cease by February 15th, allowing the birds to return to their rookeries with no added disturbance. We recommend adhering to the U.S. Fish and Wildlife National Bald Eagle Management Guidelines for high disturbance activities if nests occur within 0.5 miles of project activities.

Thank you for the opportunity to review and comment on this project. If the NCWRC can be of further assistance, please contact Olivia Munzer at (919) 707-0364 and <u>olivia.munzer@ncwildlife.org</u> or me at (919) 284-5218 and vann.stancil@ncwildlife.org.

Literature Cited

- Haddad, N.M, L.A. Brudvig, J. Clobert, K.F. Davies, A. Gonzalez, R.D. Holt, T.E. Lovejoy, J.O. Sexton, M.P. Austin, C.D. Collins, W.M. Cook, E.I. Damschen, R.M. Ewers, B.L. Foster, C.N. Jenkins, A.J. King, W.F. Laurance, D.J. Levey, C.R. Margules, B.A. Melbourne, A.O. Nicholls, J.L. Orrock, D. Song, and J.R. Townshend. 2015. Habitat Fragmentation and its Lasting Impact on Earth's Ecosystems. Science Advances 1:e1500052.
- McGrath, C. 1994. Status survey for the Greensboro burrowing crayfish. Proceedings of the annual conference, Southeastern Association of Game and Fish Commissioners, 48: 343–349.
- North Carolina Wildlife Resources Commission. 2015. North Carolina Wildlife Action Plan. Raleigh, NC
- ec: Olivia Munzer, NCWRC Brena Jones, NCWRC T. R. Russ, NCWRC Jeff Hall, NCWRC Katherine Caldwell, NCWRC John Ellis, USFWS Sarah McRae, USFWS Kathy Matthews, USFWS Judy Ratcliffe, NCNHP

APPENDIX B RESUMES





Environmental Solutions & Innovations, Inc.

Real Science, Real Solutions



EDUCATION M.S., Biology/Watershed Resource Science, Marshall University, 2008.

B.S., Environmental Science, Marshall University, 2005

PROFESSIONAL CERTIFICATIONS

NC, PA, WV, OH, NJ, NY Qualified Freshwater Mussel Surveyor

VA Qualified Fish and Big Sandy Crayfish Surveyors Lists

Freshwater Mussels of Eastern NC Identification Workshop: NC Museum Natural Sciences, 2015

Ecological Training: ODOT, 2016

MD Biological Stream Survey Spring Sampling Training, 2013

Stream Habitat (QHEI) Certified Level 2 Qualified Data Collector: and Qualitative Habitat Evaluation Index (QHEI) / Biocriteria Training: Ohio EPA, 2008 and 2007

First Responder CPR and AED Certification and Primary and Secondary Care

Divers Alert Network (DAN) Oxygen Provider Certification

PADI: Dive Master, Dry Suit Specialist, Rescue Diver, and Equipment Specialist

PROFESSIONAL AFFILIATIONS

American Society of Mammalogists, Life Member

Southwestern Association of Naturalists, 1994

The Wildlife Society, 2000-Present

Freshwater Mollusk Conservation Society

QUALIFICATIONS AND EXPERIENCE

Mr. Swecker serves as ESI's senior aquatic scientist / malacologist and is responsible for managing and implementing all aspects of ESI's aquatic services. He has completed literally hundreds of projects including presence/absence, habitat assessment, relocation, and monitoring in both large and small rivers across the eastern U.S. His credentials include listing on multiple states' Qualified Surveyors Lists. He is permitted by the U.S. Fish and Wildlife Service (USFWS) to collect federally listed fish species and Unionid mussels. Mr. Swecker is a certified Dive Master. He conducts surveys using SCUBA, surface supplied air, and both dry and wet suit following U.S. Army Corps of Engineers (USACE), OSHA, Commercial and Scientific Diving safety standards.

Mr. Swecker's aquatic survey specialties also include fish, crayfish, and macroinvertebrates. He regularly uses a variety of ecological field techniques, including: habitat assessment, seining, electrofishing (boat, backpack, and electric benthic trawl), fish population sampling (ICI), trawling (Missouri modified), water quality sampling, benthic macroinvertebrate sampling (IBI & Chironomid slide mounting and identification), pebble counts (Wolman) and other substrate classification methods, Rapid Bioassessment Protocol, Rosgen Classifications, GPS, depth sounders, and underwater photography and video.

Mr. Swecker is primary author of "Key to the crayfishes of Maryland" published by the Maryland Department of Natural Resources. He remains an active member of the Freshwater Mollusk Conservation Society (FMCS) and regularly participates in their symposiums and workshops both as an attendee and presenter.

PROJECTS

Virginia

Dominion Transmission, Atlantic Cost Pipeline

Virginia, West Virginia, and North Carolina

Project Manager

Casey D. Swecker

Cincinnati, OH 45232 513-451-1777

Vice President 4525 Este Avenue

Managing, conducting, and coordinating field surveys for threatened and endangered freshwater mussels, Roanoke logperch (*Percina rex*), tiger, Mabee's, green, and Cheat Mountain salamanders, and Neuse River waterdogs, Carolina madtom, candy darter, migratory birds and nesting habitat, rattlesnakes, North Carolina spiny and Chowanoke crayfishes along proposed 600-mile natural gas transmission mainline and associated laterals in Virginia, West Virginia, and North Carolina.

Koppers, Maintenance Dredging

Project Manager

Completed surveys for federally endangered Roanoke logperch (*Percina rex*) at water intake structure on the Roanoke River in Salem. Survey was completed via use of 12 seine hulls within temporary silt retention barrier set up for maintenance dredging.

Real Science, Real Solutions

Mountain Valley Pipeline

West Virginia (12 counties) and Virginia (6 counties)

Multi-taxa surveys along 300-mile natural gas pipeline including freshwater mussels, crayfish, bog turtles, Roanoke logperch, and orange-fin madtom.

American Electric Power, Cloverdale Extra High Voltage Transmission Improvement Virginia Project Manager

Completed habitat assessments for Roanoke logperch in Botetourt County.

American Electric Power, Cloverdale-Lexington 500 kV Transmission Line Virginia

Completed surveys for federally listed Roanoke logperch, and James spinymussel (*Parvaspina collina*) or their preferred habitat in Botetourt and Rockbridge counties.

Williams, Transco Mid-South Upgrade

North Carolina and Alabama

Completed habitat assessments for endangered fish, mussels, and snails along four proposed pipeline loops in Davidson, Gaston, and Rowan counties in North Carolina; and Rockford and Randolph counties in Alabama. Responsibilities included species identification, processing, analysis, and reporting.

Virginia Department of Game and Inland Fisheries Virginia

Mark-recapture mussel monitoring at two stream reaches of Craig Creek in Botetourt County. Collected live federally endangered James spinymussels and a live Atlantic pigtoe, state species of concern.

Williams and Boardwalk, Bluegrass Pipeline Kentucky

Completed federal and state threatened and endangered freshwater mussel surveys at eight stream crossings in Kentucky. Streams surveyed included Beech Fork, Fork Lick, Kincaid Creek, Licking River, North Elkhorn Creek, two crossings on Nolin River, South Fork Licking River, and Salt River. Live fanshell (*Cyprogenia stegaria*), a federally endangered species, was collected at one stream crossing.

American Electric Power, South Lynchburg Area Improvements

New Jersey

Completed assessments to identify potential habitat for federally listed Roanoke logperch (*Percina rex*) at two crossings (Buffalo Creek and unnamed tributary to Flat Creek) along 9-mile power line right-of-way in Campbell County, Virginia.

Tennessee Gas Pipeline, 300 Line

New Jersey

2

Mussel habitat assessment at proposed pipeline crossing on the Wallkill River in the Wallkill River National Wildlife Refuge. Evaluated abiotic (stream morphology, substrate, condition) and biotic (vegetation, riparian zone, presence/absence of live or dead mussels) factors along 200-foot reach of stream to determine suitability for native unionid mussels potentially impacted by general construction activities. Collected, tagged, and relocated over 900 live individuals, including state threatened eastern lampmussel, triangle floater, and creeper (a NJ species of special concern). Developed and implemented monthly monitoring plan to assess relocated population through 2014.

ESI

Project Manager

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Project Manager

Project Manager



Environmental Solutions & Innovations, Inc.

Real Science, Real Solutions



EDUCATION M.S., Biological Sciences, University of Southern Mississippi, 2008

B.S., Biological Sciences, Northern Kentucky University, 2003

PROFESSIONAL CERTIFICATIONS

OH & WV Qualified Freshwater Mussel Surveyors List

Freshwater Mussels of Eastern NC Identification Workshop: NC Museum of Natural Sciences

USFWS Endangered Species Act Section 7 Training

Ecological Training: ODOT

Electrofishing Safety Training: Midwest Biodiversity Institute

First Responder CPR and AED Certification

MD Biological Stream Survey Spring Sampling Training

OSHA 10-Hour General Industry Safety and Health

40 Hour HAZWOPER Training

Transportation Workers Identification Credential

Divers Alert Network Oxygen Provider Certification

PADI & SSI SCUBA Certification

QUALIFICATIONS AND EXPERIENCE

Mr. Spaeth serves as ESI's aquatics manager and malacologist and is responsible for managing and implementing ESI's aquatic services. He has completed literally hundreds of projects including presence/absence, habitat assessment, relocation, and monitoring in both large and small rivers across the eastern U.S. His credentials include listing on multiple states' Qualified Surveyors Lists. He is permitted by the U.S. Fish and Wildlife Service (USFWS) to collect federally listed fish species and Unionid mussels. His expertise includes biological and water quality monitoring, study plan development, federal and state agency coordination, field survey and identification, protocol development and implementation, field team coordination, and morphometric data collection.

In addition to field collection and species identification work, Mr. Spaeth's experience includes data management and assessment. He provides statistical support in examining and developing biological indicators, analyzing and assessing mercury dynamics in aquatic systems, calculating bioaccumulation factors (BAFs), and assists with developing new ambient water quality criteria (AWQC). His experience also includes analyzing a multitude of chemical parameters in the aquatic environment such as metals (e.g. Se, Pb, Cu), nutrients, perfluorinated compounds (PFCs), hormones and sterols, pharmaceuticals and personal care products (PPCPs), phenolic compounds, polychlorinated biphenyls (PCBs), and pesticides. He is proficient with a variety of statistical software programs to perform uni- and multi-variate statistical analyses on limnological datasets and managing large databases.

PROJECTS

Mountain Valley Pipeline

West Virginia and Virginia

Aquatics Manager

Completed and/or managed freshwater mussel surveys at 38 locations and Roanoke logperch habitat assessments at 27 locations along 300mile natural gas pipeline traversing twelve counties in West Virginia and six counties in Virginia. Prepared study plans; performed surveys; coordinated land access; and Agency coordination with WVDNR, VDGIF, and USFWS.

Authored Biological Assessment for four aquatic species including Roanoke logperch (*Percina rex*), James spinymussel (*Parvaspina collina*), clubshell (*Pleurobema clava*), and snuffbox (*Epioblasma triquetra*). Authored fisheries sections for Resource Report 3 – Fisheries, Vegetation and Wildlife submitted to FERC. Authored aquatic species evaluations in Biological Evaluation prepared on behalf of the U.S. Forest Service.

John P. Spaeth Malacologist 4525 Este Avenue Cincinnati, OH 45232 513-451-1777

Technical Reviewer

Real Science, Real Solutions

Virginia Department of Transportation, I-81 Bridge (0081-060-126) Replacement Virginia

Freshwater mussel surveys and relocations on the New River in Montgomery, Pulaski, and Radford counties, Virginia. Surveys resulted in the collection, tagging, and relocation of 47 state threatened pistolgrips (Tritogonia verrucosa).

Virginia Department of Transportation, SR23 Bridge Crossing

Virginia

Freshwater mussel and snail salvage efforts and fish removals in association with bridge replacement on the North Fork Holston River in Scott County, Virginia.

Virginia Department of Game and Inland Fisheries

Virginia

Assisted VDGIF with mark-recapture mussel monitoring project in Craig Creek (Botetourt County), Johns Creek (Craig County), Dicks Creek (Craig County) and Mill Creek (Bath County) in Virginia. Personally collected dozens of live federally endangered James spinymussels and live Atlantic pigtoe (Fusconaia masoni), a state species of concern.

Dominion Transmission, Atlantic Coast Pipeline

Virginia, West Virginia, and North Carolina

Prepared study plans, authored technical reports, and completed field surveys for freshwater mussels in Virginia, West Virginia, and North Carolina along proposed 554-mile natural gas transmission mainline and associated laterals.

American Electric Power, Cloverdale-Lexington 500 kV Transmission Line

Virginia

Completed surveys for federally listed Roanoke logperch, and James spinymussel or their preferred habitat in Botetourt and Rockbridge counties, Virginia.

Koppers, Maintenance Dredging

Virginia

Completed surveys for federally endangered Roanoke logperch at water intake structure on the Roanoke River in Salem, Virginia. Survey was completed via the use of seining within a temporary silt retention barrier set up for maintenance dredging.

Confidential Client, Emergency Response

Ohio

Over 10.3 miles of underwater transect surveys for freshwater mussels in the Markland Navigational Pool of the Ohio River. Survey was warranted by an inadvertent discharge of diesel fuel into the River. Project involved over 1,500 hours dive time and yielded more than 19,000 live mussels including 49 live federally endangered sheepnose (Plethobasus cyphyus) mussels. Responsible for all aspects of project management, agency coordination, and field collections. This was the largest, contiguous, and standardized mussel survey known to occur in the Ohio River.

Ohio Department of Natural Resources and USFWS Ohio Field Office

Ohio and West Virginia

Requested by agencies to provide comment and guidance on West Virginia Mussel Survey Protocol (OMSP) for inclusion in 2015 revision.

els prior to construction.

Project Manager

Project Manager

Project Manager

Biologist

Biologist

Biologist

Biologist

